Addis Ababa University College of Development Studies

Center for Food Security Studies

Determinants of Food Security Status of Acquired Immunodeficiency Syndrome Patients: Evidence from Menelik II Hospital, Ethiopia

By

Fekede Melaku

September, 2023

Addis Ababa, Ethiopia

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Addis Ababa University College of Development Studies Center for Food Security Studies

Affirmation:

This paper is the result of my claim work and all sources or materials utilized in this paper have been appropriately recognized. I pronounce with full certainty that this work has not been submitted to any other institution for the grant of an scholastic MA/MSc degree.

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As members of the Examining Board of this thesis open defense, we certify that we have read and evaluated the thesis prepared by Fekede Melaku, entitled **"Determinants of Food Security Status of Acquired Immunodeficiency Syndrome Patients: Evidence from Menelik II Hospital, Ethiopia."** and recommend that it is acceptable as a thesis required for the degree of Master of Science in Food Security and Development.

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Table of Contents

Contents **Page**

List of Tables

List of Figures

Lists of Appendices

Abbreviations

AAU: Addis Ababa University

AIDS: Acquired Immune Deficiency syndrome

ART: Antiretroviral therapy

ASV: Access Scale Value

BSc: Bachelor of Science

FAO: Food and Agricultural Organization

FFQs: Food Frequency Questionnaires

FI: Food Insecurity

HAART: Highly Active Antiretroviral Therapy

HFIAS: Household Food Insecurity Access Scale

HDDS: Household Dietary Diversity Score

HID: Health Information Dissemination

HH: Household

HIV: Human Immunodeficiency Virus

OSSA: Organization for Social Service Association

PLWHA: People Living with HIV AIDS

PSNP: Productive Safety Net Program

SSA: Sub-Saharan Africa

USAID: Unites States Agency for International Development

WHO: World Health Organization

Abstract

The fact that food insecurity is a critical problem among individuals living with human immunodeficiency virus initiated us to conduct an investigation on this issue. The objective of the study was to examine food security status and its determinants in individuals living with human immunodeficiency virus and actively attending antiretroviral therapy at Menelik II Hospital, Ethiopia. A hospital-based cross-sectional study was conducted on 262 adult patients. These respondents were selected from the study population using a systematic random sampling technique. Food security status and its determinants were assessed using two types of food insecurity measures such as Household Food Insecurity Access Scale and using Dietary Diversity Score. The socio-demographic data were collected using a pre-tested structured questionnaire during individual interviews. An ordered logistic regression model was employed to determine the effects of various independent factors over the dependent variable or food security status of respondents. The prevalence of food insecurity was found to be high in the study population. The result revealed that, out of 262 respondents, about 56.8% of them were severely food insecure whereas 13 %, 12.6% and 17.6 were categorized under rarely food insecure, mild food insecure and moderately food insecure respectively. Besides this, the severity of food insecurity was 60.3% in male and 53.6% among female respondents. Regarding to the dietary diversity score, the result revealed that, majority of the respondents (approximately 46%) were scored low levels of dietary diversity in the last 24 hours at the time of the study. The regression analysis result indicated that, all of the independent variables such as sex, age, marital status, family size, education and income level significantly influenced the food security status of the study population at P-value<0.05. The study also highlights the importance of food security and nutrition programming as an integral part of health and socio-economic well-being. Food insecurity is an emerging problem among people living with human immunodeficiency syndrome. This population group should be focused on measures to improve food security intervention program at all level. Moreover, efforts should be made to address the burden of food insecurity taking into account the identified determinants of food security status in the target population.

Keywords: *Food Insecurity, Dietary Diversity, Human Immunodeficiency Virus, Determinants, Ethiopia*

CHAPTER ONE: INTRODUCTION

1.1.Background of the Study

It is estimated that over 2 billion people worldwide are affected by food insecurity. The problem of food security is more serious in sub-Saharan Africa, including Ethiopia. The Food and Agriculture Organization of the United Nations (FAO) report shows that about 26.4% of the world's population suffered from a combination of moderate and severe food insecurity and hunger (FAO, 2019).

The global prevalence of malnutrition was 10.8% worldwide, 19.9% in Africa, 11.3% in Asia, 6.5% in Latin America and the Caribbean, 6.2% in Oceania and <2.5% in North America and Europe are largely inconsistent. Approximately 89% of people experiencing food insecurity live in Asia and Africa. Food insecurity refers to the unavailability of an adequate and sustainable food supply, the inability to access adequate and balanced nutrition, and the inability to consume safe and quality foods that are nutritionally adequate and socially acceptable for all household members (G. Bhalla et al., 2016). The four-level dimensions of food security are food availability, food access, food utilization and food stability.

Poverty in general and food poverty in particular increase the risk of people from poor households being exposed to HIV-AIDS. Around 28.5 million HIV-infected people live in sub-Saharan Africa. About 70% of these were food insecurity and malnutrition (WB, 2019). Food insecurity is considered a key factor in reduced adherence to antiretroviral therapy, increased behavioral risk of HIV transmission, limited access to HIV treatment, adverse antiretroviral pharmacokinetics, and worse clinical outcomes in HIV-infected individuals (A. C. Tsai et al., 2011).

In Ethiopia, chronic and transient food insecurity is widespread and severe in both rural and urban areas (FAO, 2014). On the other hand, there are strong bidirectional links between HIV/AIDS and food insecurity in resource-poor areas. HIV-AIDS leads to impoverishment when working-age adults in poor households become ill and require treatment and care. When workers are no longer able to work and expenses increase due to the cost of medical care. Poor households often spend their savings and lose their assets to pay for medical care for sick members.

Assets may need to be sold when many households have the same need, and such distress sales are often ill-timed and incur a loss. Food insecurity increases sexual risk-taking, particularly among women who may engage in transactional sex to obtain food for themselves and their children. Several ethnographic studies suggest that material poverty has increased the frequency of transactional sex (Byron et al., 2006).

HIV-AIDS exacerbates food insecurity; affects the nutritional status of people with HIV and leads to weight loss and emaciation. Food insecurity can lead to increased risk behaviors, such as labor migration or transactional sex, which increase the likelihood of infection.

The United Nations Food and Agriculture Organization estimated that 923 million individuals were undernourished globally in 2007, representing an increase of 75 million from 2005. Although 89% of food-insecure individuals live in Asia and Africa (FAO, 2008), the prevalence of food insecurity also appears to be high in resource-rich settings.

HIV-AIDS has a direct impact on economic growth in the most affected developing (particularly SSA) and developed countries (Stevens, 2002). It is likely that the epidemic will contribute to aggravation of widespread food insecurity and, conversely, food insecurity will increase the population's vulnerability to HIV infection (UNAIDS, 2001).

In a chronic disease such as HIV-AIDS, the patient's quality of life is also important (Bhownmik et al., 2012). The World Health Organization (WHO) defines quality of life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, standards, expectations and concerns (WHO, 1998). Health-related quality of life includes the components of quality of life that are directly related to health status and to food security and nutritional status. Poor households are most affected by food insecurity and are particularly vulnerable to shocks. In many cases, the unemployed, single parents, elderly people living alone, and destitute and homeless people in urban Ethiopia are food insecure (Drimie, et al, 2006). Nutrition is the key interface between food security and health security. The risk of HIV infection is high in low-income countries (Drimie et al., 2006). A good diet can boost the immune system and energy levels. It can help maintain body weight and support the effective effects of drug treatments.

Those who are well nourished are stronger and can fight infections better. This is particularly important for people living with HIV. Likewise, good nutrition improves the quality of life and extends the life of people living with HIV (FAO, 2005).

The Ethiopian population-based HIV impact assessment report showed that HIV prevalence in urban areas is 3.0% (EPHI, 2018). In Addis Ababa, the susceptibility to HIV infection is higher in percentage terms. This infection is most likely to worsen the prevalence of food insecurity among vulnerable individuals/households. Unfortunately, Ethiopia is severely affected by food insecurity; In addition, a large percentage of people living with HIV/AIDS still face scarcity of access to safe, sufficient and nutritious food for themselves and their families. However, there is no concrete scientific evidence to the desired extent. Given this background, this study was conducted to analyze the prevalence of food and nutrition insecurity and its associated factors. The focus was on adult people living with human immunodeficiency virus who received antiretroviral chemotherapy at Menelik II Hospital in Addis Ababa, Ethiopia.

1.2. Statement of the Problem

The problem related with food security is a critical issue in developing countries including Ethiopia. Food insecurity and hunger are undesirable in every sense and considered as problem of nutrition, health and development (M. Asefa et al. 2018). Chronic and temporal food insecurity is far reaching and serious in both rural and urban regions of Ethiopia (FAO, 2014). The status of food insecurity shifts depending on area, financial status and living circumstances. The predominance of food insecurity among individuals living with HIV/AIDS was high in sub-Saharan Africa, especially Ethiopia. The figures are Ethiopia 63%, Uganda 75% and Tanzania 52% (C. A. Fahey et al., 2019).

Studies showed that, in Ethiopia, nearly 1.5% of the age category from 15 to 49 years are infected with HIV and at the same time this group are struggling with food insecurity. It was assessed that nearly one in ten Ethiopians experienced trouble getting to secure, adequate and nutritious nourishment for their families (K. Lewis, 2017).

Rising food costs worsen food precariousness (FAO, 2019) and the majority of city inhabitants rely on purchased food commodities from the local market (Pulverize & Frayne, 2010). City dwellers are devastated; majority of them are socially disadvantaged and underserved.

Unfortunately, HIV-AIDS can be considered as one of the major factors adversely affecting the food security situation of individuals, families and communities. This infection leads to impeded quality of life for families and individuals as a consequence of work misfortune, decreased efficiency, and expanded caregiver burden. Moreover, HIV infection has numerous negative impacts on health, food and nutrition as well as on well-being of the vulnerable individuals. HIV can affect family financial matters in two ways; direct costs (due to treatment, illness-related issues, and funerals); indirect costs (due to decreased efficiency, loss of asset and time by the caregivers and patients, lack of productivity due to untimely death, etc.). Ethiopia is considered as one of the poorest nations in the world. Moreover, the vulnerability of city dwellers to various urban challenges like poverty, unemployment, street dwelling, prostitute work, diseases such as HIV-AIDS can aggravate food insecurity status of individuals. Food insecurity and HIV/AIDS are intertwined in a vicious cycle that worsens the severity of, each condition (WHO, 2003). However, the issue of food security status among the HIV vulnerable families has not been properly addressed.

In spite of the huge number of HIV patients living in Addis Ababa, little or no investigation has been conducted to illustrate the severity and status of their food insecurity. In fact, numerous analysts have been conducted a study on individuals with HIV (UNAIDS, 2008; WHO, 2008); however, most of them were focused on the medical issues rather than looking at patients' food security status. Therefore, the status of food security and its determinants among individuals affected with HIV pathogen needs to be further investigated. Based on this fact, there was a need to investigate food security status and its determinants among PLWHA and who actively using ART medication at Menelik II Hospital in Ethiopia. The study site was chosen due to the fact that relatively there are many HIV patients attended at Menelik II hospital than in other hospitals.

1.3. Objective of the Study

1.3.1. General Objective

The general objective of this study was to examine the food security status and its determinants among PLHIV in Menelik II Hospital, Addis Ababa, Ethiopia.

1.3.2. Specific Objectives

Specifically, this study attempted to:

– Analyze the prevalence of food insecurity status among people living with HIV in the study area

– Examine the determinants of food security status of the study population.

1.4. Research Questions

– What are the major socioeconomic factors affecting the food security status of individuals living with HIV/AIDS in the study area?

– What are the main determinants of the food security status PLHIV in the study area?

– What is the level of food insecurity among the surveyed patients at Menelik II Hospital?

1.5. Significance of the Study

The predominance of food insecurity among individuals with HIV infection in Ethiopia in general and in Addis Ababa in particular has not been adequately examined. Hence, this study was conducted to analyze the prevalence of food insecurity and its related factors among individuals living with HIV/AIDS at Menelik II Hospital in Addis Ababa, Ethiopia. As a result, this study made it possible to determine the extent of food insecurity and its influencing factors among people living with HIV infection in the study area. Since food security and HIV are a critical issues in Addis Ababa, it is accepted that conducting inquire about this issue is significant for the concerned administrative and non-governmental organizations as well as arrangement creators to develop interventions that might improve the food security situation of the target group. Finally, the results and conclusions presented for this study can serve as basis for further research on food security status in the vulnerable community. Most importantly, the study assumed to encourage the suggestion of nourishment and sustenance mediations as portion of food policy and dietary back for individuals living with HIV/AIDS in the study population as well as in the target population.

1.6. Scope and Limitations of the Study

1.6.1. Scope of the Study

Thematically, the study was targeted on investigating the determinants of food security status and at the same time analyzing the prevalence of food insecurity in individuals/families at risk of HIV. Spatially, the study was conducted in Addis City Administration at Menelik II Comprehensive Specialized Hospital.

The fact that relatively many a number HIV patients have been attending ART at this hospital allowed us to select the study area. In terms of time scope, the study was conducted in March, April and May 2023 for a period of three months.

1.6.2. Limitations and Delimitation of the Study

The study conducted on this theme has been exceptionally restricted. Especially, the issue of individuals' health secrecy regarding HIV cases may be one of the major challenges that drive us to require extraordinary care on the information collection. On top of this, in most cases, great effort was made to aware the patients/respondents and confirms their readiness to reply to the interview. As long as the study was under taken in Addis Ababa City at Menelik II Hospital, a large percentage of the respondents were city dwellers whereas a few of them (only 3.4%) were living around the rural areas; However, various factors and rural livelihoods that can determine food security status of the respondents (for the rural residents) were not considered in the courses of study, which can be considered as the limitation of the study.

The study conducted on determinants of food security status of PLWHA at the city level may not show the real facts for patients who are living in the rural areas. For this concern, further investigation has to be undertaken by other researchers in the future.

Finally, to avoid ambiguity as well as to enhance reliability and relevance, an efficient search of the available data using secondary and/or primary sources, limiting the boundary of study population/population frame/ by using hospital based cross-sectional study design, collecting information from the target respondents using various psychological treatment techniques was carried out to overcome the stated limitations and ultimately the aim of the study was achieved properly.

1.7. Ethical Considerations and the Review Board

The study proposal was reviewed and approved by the Ethical Review Board of AAU and the research team at Addis Ababa Health Bureau. In addition, the aim of the study was clarified to the concerned clinic staff and endorsement was permitted. The data collection process in the study site was considered as the rule of awareness and willingness of the respondents to give data to the researcher freely and confidentially.

Besides this, the method of data collection and investigation was carried out in such a way that to secure the respondents secrecy of their identities and their insider facts. Furthermore, respondents were not identified by name or not pictured during the research process; instead, the code was employed. In general, there was shared and quiet communication between the analyst and respondents. On the other hand, both the primary and secondary data collected in the study zone ought to be more or less practical, fitting, time-based, clear and simple to get it.

The investigator cited and affirmed all data from literatures and information created by other individuals or organizations.

1.8. Organization of the Thesis

This paper was organized into five fundamental chapters. Chapter one presents the background of the study, the problem statement, the aim of the study, research questions, scope and limitations, significance of the study and ethical considerations. Chapter two addresses the theoretical, empirical and conceptual literature review related to individuals' food security and the conceptual framework for the study. The third chapter dealt with the description of the study area, research design, sampling method, procedure and method of data analysis. Chapter four presents the results or the relevant findings of the study and discussions. The last chapter deals with conclusions and recommendations.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1. Theoretical Framework

2.1.1. Concepts of Food Security

The topic of food security was embraced after the first World food Conference in Rome in 1974, which gave a comprehensive definition of family food security. Referring to FAO (1996), food security may be a circumstance in which all individuals have physical and financial get to at all time to adequate, secure and nutritious nourishment that meets their dietary needs for active and health life. This definition comprises of four parameters of food security. These are: availability of food, accessibility, utilization and stability of food.

Food insecurity: according to FAO (2015), food insecurity happens when households don't have sufficient assets to buy nourishment commodities accessible within the market in adequate amounts to meet dietary needs. In other words, food insecurity happens when food is accessible and available but the family does not access it since the household's capacity to meet standard calorie admissions is limited. Agreeing to Kakwani & Child (2016), food insecurity is characterized when members of a family don't earn the least taken cost of nourishment that would meet the normal wholesome needs of the family and its composition. The concept of family food security is characterized in numerous measurements in different literary works. In any case, the foremost well-known condition is chronic and temporal and depends on the transient measurement of food insecurity.

Chronic food insecurity: happens when individuals are incapable to meet their least food prerequisites for a long period of time or when the family is incapable to supply itself with adequate nourishment (FAO, 2005). It occurs when households are unable to meet food needs in normal times because they lack sufficient income, land or productive assets, or suffer from high dependency rates, chronic diseases or social barriers (Meseret, 2013). Temporary food insecurity refers to a sudden decline in the ability to purchase or grow enough food to meet the physiological requirements for good health and activity (Barrett, 2002). It implies being incapable to meet nourishment needs when certain shocks affect income or capacity to access food without sacrificing productive resources or undermining human capital (WFP, 2006).

Measuring Food Insecurity: There are only a few studies on measuring food insecurity, i.e. a forward-looking analysis of food security. Since most studies on household food insecurity focuses on poverty rather than food insecurity. The issue of poverty and food insecurity is closely related, but not the same. Majority of poor families encountering poverty are not continuously undernourished or are more likely to consume less than the prescribed calorie admissions in the future. There are two main approaches to measuring food insecurity. The outcome approaches measure food insecurity depending on the definition of expected poverty using mental calculation and the quadratic poverty gap (Ravallion, 1988; and Chaundhuri & Suryahadi, 2002).

The income generation and opportunity for dependable employment of the family and the family members can impact the availability and accessibility of food at the house hold level. The level of food insecurity is the degree of a household's capacity to smooth consumption over time in reaction to various shocks, the likelihood of falling underneath a certain consumption threshold, or the likelihood that the share of nourishment in add up to use is over a basic level to degree welfare. However, other components of the definition of food security, such as food stability and food utilization, are not captured. According to Ersado (2008), it has been claimed that the measurement of food insecurity does not only focus on current income and consumption, but should also be included in the assessment of assets and changes in assets over time.

Family units with a low current standard of living might suffer more from a downturn in the future than families with a better current standard of living. There was a dynamic pointer technique that required capturing the different dimensions of nourishment uncertainty at national, family and individual levels.

National level: In the 1970s, food security was caught as the ampleness of food supplies at worldwide and national levels. This view centered as it were on the factors of nourishment generation and ignored the numerous actions that affected nourishment get to in numerous ways. Definitions of food security centered on total food supplies at national and worldwide levels, and investigators pushed production self-sufficiency as a technique for countries to realize food security.

Food security at the country level can to some extent be measured by supply. According to Hoddinot (1999), food supplies can come from current production and stocks as well as past production, while needs can be determined based on the biological or nutritional needs of a given society for a given period, usually one or more years or a day. However, national-level measures are inherently only suitable to address shortages in food availability at the national level, not domestic concerns about access and use.

Household Level: In the 1980s, the concept of food security addressed both supply and demand side variables. The problem of food security thus shifted from the global and national levels to the household and individual levels.

Due to the macro level, food self-sufficiency did not ensure the achievement of food security at the household level. Therefore, food security at the household level is best measured through a direct survey of food intake (compared to appropriate adequacy standards). However, they measure the current situation and not the possible downside risks. The level and changes in socio-economic and demographic variables such as real wages, employment, price ratio and migration, when properly analyzed, can serve as proxies for the status and change in food security.

According to Rafael and Ana Maria (2008), there are five common measures of food insecurity. For example, the FAO method for estimating calories per capita at the country level using food balance and energy intake, household income and expenditure, dietary intake, anthropometrics and an experience-based food insecurity scale. On the other hand, food consumption value, coping strategy, and household food insecurity and food access are a current proxy measure of food insecurity (FAO, 2015). There is no universal proxy measure and evaluation household food insecurity that capture all pillars of food security concept.

2.1.2. HIV/AIDS and Food Security

Human immune virus/acquired immunodeficiency syndrome (HIV/AIDS) and food insecurity are interrelated. Food insecurity increases the risk of HIV infection and leads to poor nutritional status. HIV infection causes food insecurity by reducing agricultural production, reducing income, and increasing medical costs, resulting in a reduced ability to respond to the crisis (S. D. Weiser, et al. 2011).

At the global level, cross-national evidence suggests strong and significant associations between HIV prevalence and aspects of socioeconomic performance. There are strong bidirectional links between HIV/AIDS and poverty in resource-poor areas.

HIV/AIDS is both an expression of existing poverty conditions that take hold where livelihoods are unsustainable and the result of the epidemic's unbridled impact on social and economic conditions. HIV/AIDS is both a cause and a consequence of poverty, and poverty is both a cause and a consequence of HIV/AIDS.

In general, the higher the HIV incidence, the lower the economic output, whether measured by the lost growth rate of GDP or the growth rate of GDP per capita, income inequality, or the poverty rate lives under 1 and 2 US dollars per day). However, there are exceptions to the link between HIV/AIDS and poverty, particularly in Africa, where some countries with very high HIV prevalence rates are also among the richest. One explanation put forward is that the paradox is due to weaknesses in strategy, policy and program implementation, as well as poor institutional response (ILO, 2015).

Due to the loss of labor, the epidemic is an important factor in the slowdown of economic growth at the national level. This, in turn, undermines poverty reduction efforts and results in some population groups – particularly in poor and least developed countries – living in poverty and being more exposed to HIV/AIDS (ILO, 2015).

2.2. Empirical Literature Review

2.2.1. Socioeconomic Impact of AIDS on Affected Families

HIV/AIDS and food insecurity are two major causes of illness and mortality, expanding helplessness and compounding each other's seriousness. The prevalence of food insecurity among people living with HIV was high in sub-Saharan Africa, particularly Ethiopia. The numbers are: Ethiopia 63%, Uganda 75% and Tanzania 52% (C. A. Fahey et al., 2019).

In Ethiopia, roughly 1.5% of grown-ups matured 15 to 49 years are affected with HIV, which has been seriously influenced by food insecurity. It was evaluated that nearly one in ten Ethiopians experienced trouble getting to secure, adequate and nutritious food for their families (K. Lewis, 2017).

Nourishment frailty and destitute dietary status lead to lower CD4 cell tallies, destitute adherence to ART, leads to high viral load in the blood, and enhanced morbidity and mortality. It can too quicken the incidence of infections and lead to the multiplication of AIDS-related infections in individuals with HIV-AIDS (.F. Weldegebreal, et al, 2018).Since it was recognized in the late 1980s that AIDS epidemics became a danger to food security (Gillespie 1989), numerous investigations in sub-Saharan Africa have since appeared that subsistence farming communities are vulnerable to the impacts of AIDS because the infection depletes accessible assets and diminishes family's productivity capacity.

The under efficiency of labor is due to illness, management of caregiving for patients, additional cost incurred for treatments and related medical follow up, and due to death. The degree and nature of the vulnerability depends on the characteristics of families, jobs and social and economic conditions. AIDS has also impacted commercial agriculture, although companies are now able to shift the costs of their employees' health problems onto the employees themselves in various ways (Rosen and Simon 2002). Agricultural extension services are also being hit hard by illness and death of extension workers who are particularly at risk due to their mobility.

As rural communities with high HIV prevalence face increasing labor shortages, widespread cuts in household incomes and increasing cash constraints may also dampen labor demand and lead to wage declines that affect poor households not directly affected by AIDS (Dorward and Mwale 2006). The situation of the chronically ill or deceased person proved to be a crucial factor in the resilience of the cluster, with the death of primary producers having the most serious consequences. However, prime-age mortality tended to be more concentrated among secondary producers, i.e. adults who are expected to become primary producers in the future. This suggests that the full impact of AIDS on agriculture should be considered over a relatively long, even intergenerational, period.

2.2.2. Factors Driving HIV Risk

A major analytical challenge is to define causal pathways ranging from distal socioeconomic factors to proximal individual behaviors to physiological factors. Different socioeconomic factors may impact health at different points in the life course, operating at different levels (e.g., individual, household, and neighborhood) and through different causal pathways (Gillespie et al. 2007).

There are several important mediating factors: First, gender is front and center in every discussion about HIV and poverty. HIV infection rates among young women tend to be the highest of all subgroups in the most affected countries (UNAIDS 2007).

Gender inequality shapes power relations, sexual relationships and therefore risks. Women are biologically at higher risk of HIV infection than men. Sociocultural, the relative powerlessness of women increases the risk. Women are less likely to negotiate condom use, whether within or outside of marriage, and are more at risk for sexual practices such as dry sex.

Economic asymmetries within a couple are reinforced by various contextual factors, such as: E.g., familial and peer pressure, social and economic institutions, and widespread and deep-rooted gender inequalities. For example, a recent study in Kenya found that economic gender inequality between young women and adult men was significantly correlated with individuals' HIV-positive status, depending on a range of individual and community characteristics (Beegle and Ozler 2007). Other evidence suggests significant positive associations between larger age differences between partners, the value of economic transactions, and unsafe sexual behavior (e.g., Luke 2005).

In Botswana and Swaziland, food insufficiency among women has been found to be significantly associated with inconsistent condom use with a non-primary partner, sex exchange, intergenerational sexual relations, and lack of control in sexual relationships. Sex workers in Kenya are more likely to engage in unprotected sex when dealing with unexpected income shocks (Robinson and Yeh 2008).

Second, the link between mobility and the spread of HIV is determined by the structure of the migration process and the conditions under which it takes place. These include poverty, exploitation, separation of families and partners, and separation from the socio-cultural norms that apply within communities. Mobility may increase vulnerability to risky sexual behavior because migrants' multilocal social networks create opportunities for sexual networking. In eastern and southern Africa, plantations and related agricultural industries are often associated with situations of significant risk. More mobile people are also harder to reach for preventive care or treatment services (Bärnighausen et al. 2007).

Third, social cohesion and social capital are other important conditioning factors (Barnett and Whiteside 2006). In a study in Limpopo, South Africa (Pronyk et al. 2008, in press). Higher HIV prevalence was also observed in communities that had easier access to a local mine and bars, had a higher number of sex workers per village, and had a lower proportion of expatriates.

Fourth, nutrition is the critical interface between food security and health security. An individual's susceptibility to disease depends on the strength of the immune system, which is influenced by, among other things, diet, stress and the presence of other infections and parasites. Infectious and parasitic diseases as well as malnutrition thus create an environment with increased risk (Stillwaggon 2006). Malnutrition, particularly vitamin A deficiency, which in turn has been shown to increase the risk of HIV transmission (Galvin and Cohen 2004).

2.2.3. Food Security in Ethiopia

According to Arega (2012), an empirical study found that food insecurity is widespread in Ethiopia and sporadic cases of acute food insecurity result in malnutrition and deaths. Food insecurity is still the main factor hindering the country's human development.

The combination of these factors has led to serious consequences affecting up to 45% of the country's population. The problem is getting worse, despite huge investments in humanitarian aid and food security programs every year.

Although major efforts to ensure food sufficiency at the national level have been successful, these efforts have failed to ensure food availability for households and individuals. In Ethiopia, very few studies have been conducted on the determinants of food insecurity in urban areas at least three years ago. As Girma (2012); Ejigayehu and Abdi (2013) in their study titled “Empirical Analysis of Determinants of Food Insecurity in Addis Ababa” using logistic and Tobit models concluded that family size, age of households, education level, asset ownership, access to Credit services and occupation have statistically significant effects on household food insecurity. Mesfin (2014) analyzed the determinants of household food insecurity in Ethiopia.

The study used descriptive statistics and a logit model to examine household characteristics that impact food security status. The studies concluded that households with large families, lower consumer spending, as well as senior households, unemployed people and male heads of households in urban areas are more affected by food insecurity.

Tesfaye et al. (2014) in their study entitled on empirical analysis of urban food insecurity in Addis Ababa using scale indicators of access to household food insecurity. The study's multiple logistic models showed that household income, wealth, home ownership, educational attainment, and household size had a statistically significant impact on household food insecurity.

Abebe (2015), in his study on household food insecurity and coping strategies in Gimbichu town, Hadiya zone, using descriptive research methods, pointed out that household income level, occupational engagement, age, marital status, remittance dependence and dependency ratio of great importance were the impact on household food insecurity. According to Gutu (2015), the reasons for food insecurity in Nekemete city were tenure security, lower diversity of household livelihoods, and poor access to entrepreneurial skills, household dependency ratio and lower access to financial services.

In several previous studies on food security in Ethiopia, factors such as age of household head, lack of off-farm income, large family size, lack of livestock, borrowing from informal rural moneylenders, rain showers/frequent droughts, illiteracy have taken into account the extent of household food insecurity Level of household food insecurity, low income level, no fertilizer use, small land size, high dependency ratio and low access to credit, whereas farm income, access to credit, ownership of farmland and participation in farms determine the level of food insecurity of households - Agricultural activities, high levels of education of household heads and livestock farming had a negative impact on the level of household food insecurity.

Olaniyi (2014) analyzed the assessment of household food access and food security in urban Negeria using the Household Food Insecurity Access Scale (HFIAS) and the Household Dietary Diversity Scale (HDDS).

Tshediso (2017) conducted a study assessment of the relationship between food security and household demographics in South Africa using a household food insecurity access scale. The logistic regression model of the study results showed that household income, marital status; Household age and size have statistically significant effects on household food insecurity. Tumaini (2017), in his study on household food insecurity and coping strategies of associations in cities from Tanzania, using ordinal logistic regression, pointed out that household education level, share of income spent on food, and dependence on remittances and gifts are statistically

related influence have a significant impact on household food insecurity. S.S. Akadir et.al (2018) in their study titled “Empirical analysis of the determinants and causes of lower food security in female-headed households: Findings from Nigeria and Ethiopia”. The probit and tobit model of the study results revealed that education level, income, proximity to market and wealth have a significant impact on household food security status.

The Ethiopian government's five-year growth and transformation plans aim to move the country to middle-income status by 2025 by sustaining rapid growth and accelerating structural change. The World Food Program (WFP) supports this goal through a range of life-saving and resilience activities targeting vulnerable populations experiencing acute and chronic food insecurity (including refugees and internally displaced persons) and people at risk of malnutrition.

WFP also supports the government of Ethiopia's Productive Safety Net Program (PSNP), which provides predictable, multi-year assistance to millions of chronically food-insecure rural and urban households to help them transition from dependence on emergency food aid. To complement the Ethiopian government's work to address urgent food security needs, WFP is providing unconditional food and cash transfers to the most vulnerable families across Ethiopia.

2.3. Conceptual Framework

The framework indicated that, food insecurity at individual’s level can be resulted in three shortfalls: Nutritional, Mental & behavioral. These shortfalls can aggravate food insecurity status at individual’s level. The burden was higher in PLWHA. On the other hand, HIV/AIDS affects food security status of individuals, households and communities due to morbidity and mortality (limits productive labor, reduces food access & availability).

Food insecurity and HIV/AIDS are intertwined in a vicious cycle that heightens the vulnerability to, and worsens the severity of, each condition (WHO, 2003).

In addition, the framework illustrated that, HIV can adversely impact food utilization at the individual level, food access at the household level, and food availability at the community or macro level, with potential impact on the gross domestic product (GDP). HIV erodes expenditures, limits household access to credit, and leads to a reduction in productive and nonproductive assets.

HIV-AIDS also affected commercial agriculture; labor loss as a result of sickness and premature adult death which leads to decline in productive force then adversely impacts food availability. HIV -ADIS reducing food consumption; impairing nutrient absorption then impacts utilization. Pay for treatment & opportunistic infection increase medical cost which decline the purchasing capacity of patients – then declines accessibility of food at the individuals or at the families level. Migration, social instability, incident of illness & death due to HIV adversely affects stability of food in patients

The dependent variable is food insecurity whereas the independent variables are the drivers such as social factors (education, gender, and marital status), economic factors (income, food sources), individual's health, age, sex, marital status & educational level

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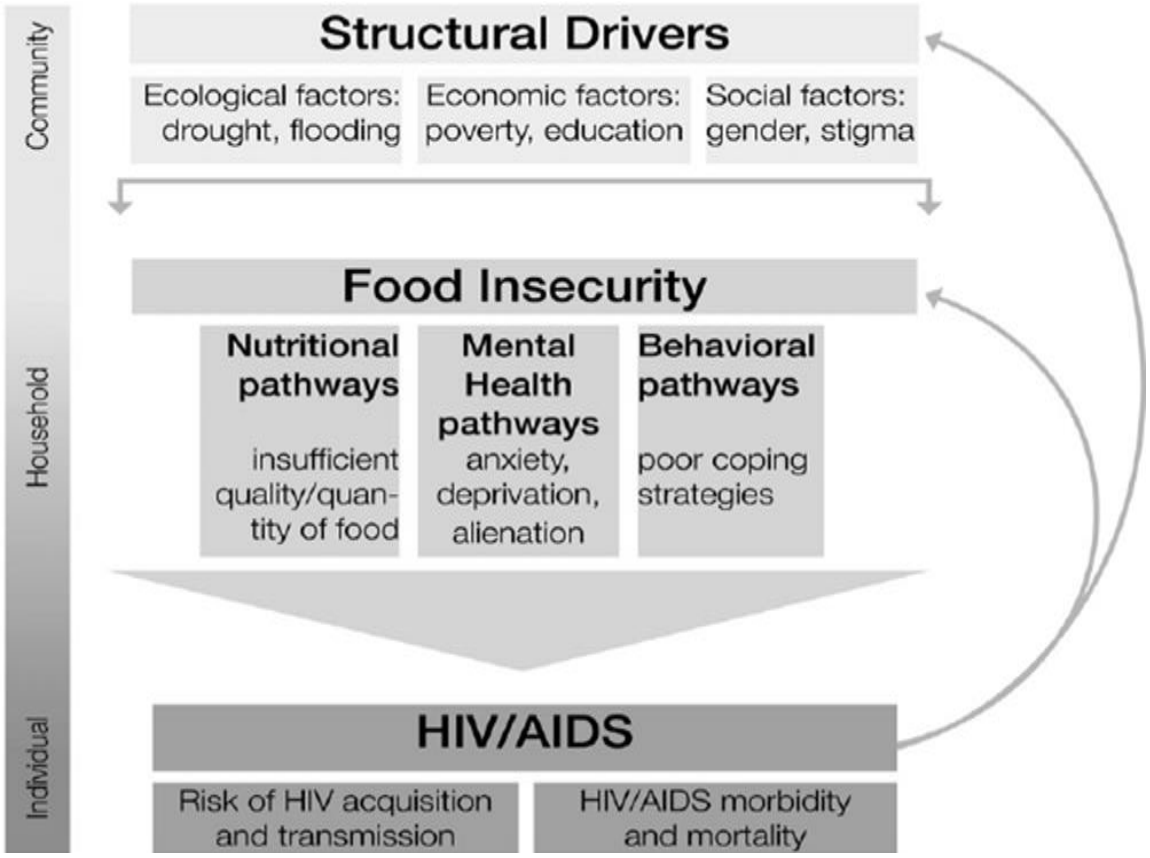


Source: Sheri D Weiser et al., 2011

Figure 1. Food Insecurity at Household & Community Level and HIV Vulnerability

CHAPTER THREE: RESEARCH METHODS

3.1. Description of the Study Area

3.1.1. Geo-environment of Addis Ababa City as a Study Site

The investigation was undertaken at Menelik II Comprehensive Specialized Hospital which is found in Addis Ababa city administration, Yeka sub-city- woreda 04. Addis Ababa, which is the biggest and the central city of Ethiopia, is divided in into eleven sub-cities and consists more than 120 woredas. The Addis Ababa city is considered as a center of economy, center of politics, center of culture and religious as well as center of industry and technology for our country. Furthermore, it is a station for African Union (AU) and other international organizations. The total land area of Addis Ababa is nearly about 540 square kilometer. Regarding to its climatic condition, it is categorized under highland ecology with temperature range of average maximum 23 to average minimum 11degre Celsius. Its average annual rain fall condition or its annual precipitation is around 1200mm which falls about 80% during main rainy season (NMA, 2017). It is categorized under high altitude zones having altitude ranges from 2400 to 3200 meters above sea level at the Entoto hill mountain.

3.1.2. Demographics

Addis Ababa city is one of the primate cities in Ethiopia. Primate city means or primacy is the condition whereby the population of the number one largest city in the country is more than two times larger than the population of the second largest city/town in the same country. The population size of Addis Ababa city is estimated to be 3.27 million (CSA, 2015), which covers 3.6% of the total national population, about 18% of the total urban population of Ethiopia with annual growth rate of 2.1%. The population size of Addis Ababa increases at a fast rate for the fact that there is high rate of rural- urban migration from different rural regions of Ethiopia to this central city. This situation imposed multidimensional socio-economic burden over the city population.

3.1.3. Socioeconomic Situation

Approximately 24 % of the Addis Ababa city dwellers are living below poverty line (CSA, 2015). The city populations are facing various socioeconomic challenges.

Among these are: poverty, lack of shelter or homelessness, street dwelling, unemployment, lack of income generation, food insecurity, diseases like HIV, and etc are few of them. With regard to the issue of food security, about 26.1% of the urban inhabitants experienced food poverty (AABoFED). Especially, studies showed that, the level of food insecurity is more severe among females than males. In addition, 48.7% of Addis Ababa inhabitants are poor or at risk of poverty (OPHI, 2015). Inequality is additionally another feature of the social circumstance in the city. Agreeing to IDPR (2015), wage disparity, measured by the Ginny coefficient of per capita consumption, is assessed at 0.32 in 2015.This is often quite low compared to many other cities in the world. It is additionally worth noticing that the trend of the Ginny coefficient has continuously diminished over the past 10 years.

On the other hand, the infestation of HIV AIDS is relatively high in Addis Ababa than other regions of the country. The sum of all these challenges can complicate the food security issues of the study population.

The city comprises of numerous public and private hospitals. Of these, Mienelik II Comprehensive Specialized Hospital is one of the oldest and biggest hospitals, established before hundred years ago. This hospital offers compressive and specialized healthcare services to the patients, including the care of HIV patients.

3.1.4. Site Map of the Study Area

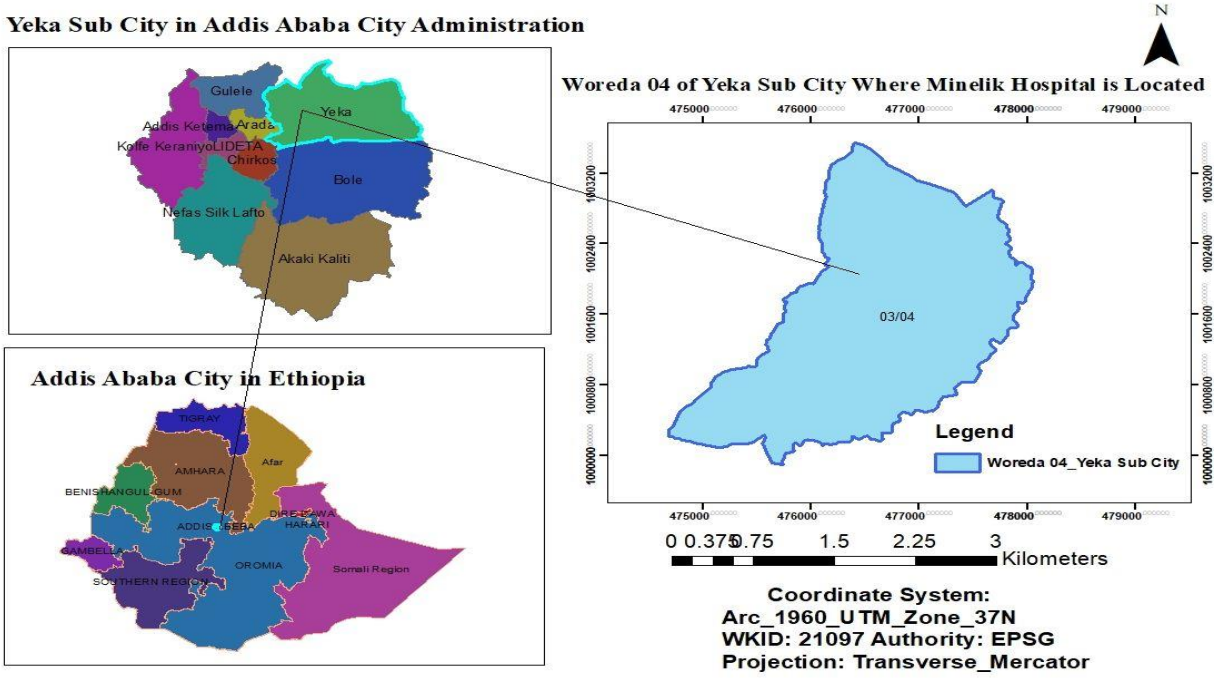


Figure 2. Map of the study site

Source: Clipped from Arch-GIS

3.2. Research methods

3.2.1. Research Design

A hospital based cross-sectional study design was used to investigate the food security status and its associated factors. We choose this design for the fact that, cross-sectional design generally uses survey techniques to gather data concerning one point in time, relatively inexpensive and takes little time to conduct. In addition, the research applied both qualitative and quantitative approach that is used as inputs for analysis and discussion. According to Venkatesh, et al., (2013), the use of both methods in the same research inquiry help to develop a rich insight into various phenomena that cannot be fully understood using only one method. Quantitative research involved the collection and analysis of numerical data, while qualitative research considered narrative data (Hayes et al., 2014). By integrating the two approaches, we understood the research problem from different perspectives and contributed in improving the research results.

3.2.2. Data Source and Setting of the Study Population

Both quantitative and qualitative data from primary and secondary sources were collected and analyzed. The study populations were all people living with human immunodeficiency virus/PLHIV/ and actively receiving antiretroviral therapy/ART/ at Menelik II Hospital. All PLHIV over 18 years of age who received ART in the last five years (2010 to 2015 EC) were included. Patients who were not actively on follow-up were excluded from the study. The progress report data up to the third quarter of 2023 from the study area showed that there were a total of 722 HIV patients who were actively taking ART medicines during the specified time limit. Therefore, based on this cross-sectional design, our population framework was targeted to those patients who have been attending ART in the last five years (2010 to 2015 EC). The reason was to reduce bias, increase precision, and make the population frame easy to manage. These 722 ART users were considered as our study population from which our representative sample was drawn to examine determinants of food security status in the population under study.

3.2.3. Sampling Techniques and Determination of Sample Size

The sample size of the study was calculated using the formula developed by Yaman (1967:886) for determining sample sizes, taking into account 95% of the confidence interval and 5% of the marginal error. This technique was selected for its simplicity and suitability to draw samples for the study population having less than one thousand individuals.

Accordingly, n=N/(1+ N*E*E) Where; n=sample size; N = study population size = 722

E is the maximum percentage error required = 5% = 0.05;

Therefore, the sample size = n=722/(1+722*0.05*0.05) = 257

The respondents of the study were included through systematic random sampling technique.

The total sample size was systematically included by calculating the constant k value of all people living with HIV at follow-up and on active antiretroviral therapy, which is 722/257 ≈3. The initial code was randomly selected from the interval one to four. Based on proportional allocation, respondents were included in all three intervals.

Considering a non-response rate of 5%, the total number of participants or respondents recruited for the study was 270. Therefore, in practical, our data were collected from 262 hospitalized HIV patients/respondents using systematic random sampling; this corresponds to approximately 97% of the response achievement.

3.3. Data Collection Tools and Procedures.

A structured questionnaire was used to collect data during personal/ individual interviews. The data collection questionnaire consists of different parts: The first part was the socio-demographic questionnaires developed by the researchers; the second part was the questionnaire used in measuring food insecurity using HFIAS and DDS.

The HFIAS was used to measure food insecurity using 18 questions/items. The 18 questions/items consist of two components: The first 9 items are occurrence questions that are answered with "Yes = 1" or "No = 0" and have a minimum value of 0 to a maximum value of 9. HFIAS is used to assess food uncertainty of individuals during the last 30 days with reference to the study time. The second parts are frequency questions that have an option of rarely = 1 (if the uncertainty has occurred once or twice in the last four weeks); sometimes = 2 (if the uncertainty has occurred three to ten times in the last four weeks); and frequently = 3 (if the uncertainty occurred more than ten times in the last four weeks); This has a value range of 9 to 27 (FANTA, 2004).

The third part consisted of questionnaires measuring food insecurity using the Dietary Diversity Score (DDS): defined as the number of food groups consumed by household members in the last 24 hours (Kennedy G, et al., 2013).

In Ethiopia, majority of the households (ranging from 65.7% to 83.3%) could access low dietary diversity. In addition, majority of food items consumed by most households were grains (rice, sorghum, barley, wheat). This can be leads to the reduction in nutrients as no single food group contains all of the nutrients required for the body's healthy function and performance (MekuriaG, et al, 2017). Therefore, DDS considers 12 food items consumed by the respondents in the last 24 hours.

The twelve food groups/items had two possible values: 1 = Yes (if the individual consumed that particular food group within the last 24 hours) otherwise 0 = No (if they did not consume that particular food item in the last 24 hours) so that DDS had a minimum value of 0 to a maximum value of 12. Each respondent was asked personal, structured and closed-ended questions by the investigator. In both cases, the questionnaires were initially prepared in English and then translated into the national language according to the language skills of the respondents.

The tools used were questionnaires, computers, calculators and other stationeries. Important variables or determinants of food security status such as marital status, education level, gender and family size, age, and food sources of the respondents were included. Construct validity was ensured through an accurate operational definition of the variables.

3.4. Data Collection Methods

The study utilized both primary and secondary data sources. Primary data were collected using individual based interview from 262 respondents who were randomly selected from the study population. Questionnaires, checklists and interview guide were used as tools in data collection. In addition, observations as well as face-to-face interview with the target respondents were among the techniques used to collect relevant data. The questionnaire contained both socioeconomic parts and questionnaires related to food insecurity measures such as HFAIS and DDS.

Dietary diversity score reflects the likelihood that the diet contains sufficient micronutrients. Household Dietary Diversity: Defined as the number of food groups consumed by household members or individuals over a 24-hour period (Kennedy G et al., 2013)

According to the Food and Agriculture Organization, there are sixteen food groups. These food groups are grains, vitamin A-rich vegetables and tubers, white tubers and roots, dark green leafy vegetables, other vegetables, vitamin A-rich fruits, other fruits, offal (liver, heart, kidney, etc.), donkey meat, eggs, fish and seafood, legumes (beans, peas, lentils, etc.), dairy products (milk and milk products), oils and fats, sweets and spices, condiments and beverages (KennedyG,etal.,2013).

Dietary diversity score was calculated by listing all of the 12 foods that study participants consumed outside or inside the home in the last 24 hours. Study participants received 1 point if they have eaten food at least once in the previous 24 hours otherwise valued 0. Thus, the individual dietary diversity score (IDDS) in this study had a value range from 1 to 12.

Those who consumed more than 7 food groups in the last 24 hours were considered to have adequate dietary diversity (high dietary diversity); moderate dietary diversity for those who consumed (4 - 6) food groups; Inadequate dietary diversity occurs among respondents who consumed <=3 (Kennedy G, et al., 2013). For HFIAS data collection, subjects studied were asked to answer nine questions, taking into account the amount and preferences of foods they accessed in the last four weeks. The first 9 items were occurrence questions that were answered with "Yes = 1" or "No = 0", which corresponds to a minimum value of 0 to a maximum value of 9. The second 9 items were frequency questions derived from occurrence questions with the answer option "yes".

Secondary Data Sources: The sources of our secondary data were intensive desk research of published and unpublished literature such as books, journals, articles, e-resources or libraries, documents from various institutions as well as reports and patient files in the hospital.

3.5. Data Analysis

3.5.1. Types of Data Analysis

Among the different types of data analysis (diagnostic, predictive, perspective and statistical analysis), our study used statistical analysis. This type of analysis allowed us to answer the research questions through data collection, analysis, modeling, interpretation and presentation. As part of this statistical analysis, we used both descriptive and inferential analysis. Descriptive analysis was used to illustrate means and variances in continuous data and to illustrate percentages and frequencies in categorical data. In the same way, the inference method was implemented to draw different conclusions from the same comprehensive data set by simply selecting different samples.

3.5.2. Data Analysis Methods/Techniques

Both qualitative and quantitative data analysis methods were employed in the study:

- **Qualitative Data Analysis**:

The qualitative data analysis method derived data about words and observations. The most commonly used qualitative methods include:

Content analysis to analyze behavioral and verbal data;

Narrative analysis for working with data from interviews, diaries, and surveys;

Qualitative data collected through key informant interviews and field observations. Explanations and discussion sessions were presented and transcribed to reinforce the quantitative information. Narrative analysis and concept analysis were used to analyze qualitative data.

- **Quantitative Data Analysis:**

The quantitative data collected was analyzed using descriptive statistics and using ordered logistic regression. The measure of central tendencies (mean) and the measure of dispersion (standard deviation) were important descriptive techniques used to summarize and compare the numerical data for the continuous variables. In addition, the categorical variables were statistically described in the form of percentages, proportions and frequencies. The software analysis was carried out using SPSS version 25 software.

3.6. The Analytical Model

Food security as a dependent variable was analyzed based four ordinal levels (rarely, mild, moderately and severely food insecure by assigning code 0, 1, 2, and 3 respectively). Majority of independent variables were categorical and ordinal. Therefore, the ordinal regression model was preferred for the analysis. Unlike linear probability, the ordered logit model guarantees that the estimated probabilities increase but never leave the 0 - 1 interval, and that the relationship between probability (Pi) and explanatory variable (Xi) is nonlinear (Gujarati, 1995).

To test the hypothesis, a probabilistic model was specified in which food security as a function of a set of individual characteristics serves as explanatory variables. Therefore, the main purpose of a qualitative selection model is to determine the probability that a person with a given set of attributes will fall into a selection rather than the alternative.

Pindyek and Rubinfeld (1981) also showed that the logistic and probit formulations are quite comparable. The main difference is that the former has slightly flatter ends, i.e. H. the normal curve approaches the axis faster than the logistic curve. Therefore, the choice between the two is a matter of convenience and availability of the computer program.

Therefore, ordered logistic model was specified to identify the determinants of food insecurity and assess their relative importance in determining the likelihood of food insecurity at the household/individual level. The model analysis showed that changing an independent variable changed the likelihood of individual experiencing food insecurity.

3.7. Hypothesis and Description of Dependent and Independent Variables

The analysis procedures were clearly described and the potential explanatory variables that would influence individual/patient food insecurity were identified. In addition, literature reviews as well as previous research and author knowledge were used to identify the potential determinants of individuals' food insecurity (Bogale and Shimelis, 2009).Therefore, food insecurity status is assigned as the dependent variable; in parallel, the following independent variables were selected to analyze whether or not they affect the food security status of the individual.

3.7.1. Dependent Variable

The dependent variable was individuals' food security status. Even though the food security status has a dichotomous nature, in this study it was treated as ordinal variables. It has four ordinal variables such as rarely food insecure with a value assigned 0, mild food insecure with a value assigned 1, moderately food insecure with a value assigned 2 and severely food insecure with a value assigned 3.

Food insecurity status of individuals can be measured in different ways depending on the purpose of the study. The Household Food Insecurity Access Scale (HFIAS) and Dietary Diversity Score (DDS) were used in this study.

- **Household Food Insecurity Access Scale/HFIAS/**

The Household Food Insecurity Access Scale (HFIAS) is based on the idea that there are a number of predictable responses to the experience of food insecurity that can be summarized and quantified. HFIAS uses a set of nine questions used in surveys to distinguish between safe and unsafe food at the individuals level. The HFIAS questions thus represent universal aspects of the experience of food insecurity and capture information about food scarcity, food quantity and diet quality to examine respondents' food access status. Individuals can be classified according to the severity of their food security status along a spectrum using data on the severity and frequency of their experiences in the last 30 days (Coates et al, 2007).

Accordingly, the food security of the respondents was assessed and the result was presented based on the Household Food Insecurity Access Scale (HFIAS) developed by the Food and Nutrition Technical Assistance (FANTA) Project of USAID.

The scale represents a continuous measure of individuals food insecurity that can be divided into four levels of access to individuals food insecurity. Subjects studied were asked to respond to nine questions listed in (Appendix A), taking into account the quantity and preferences of foods they had accessed in the previous four weeks. The frequency of occurrence value for each of the nine questions was summed and divided by nine, ultimately giving the maximum access scale value (ASV) in four categories (ASV0; ASV1-3; ASV 3-10; ASV 10-30).

- **Dietary Diversity Scale (DDS)**

The study measured the DDS of respondents using 12 food items. This was used to measure respondents' food insecurity based on the variety of nutrients consumed in the previous 24 hours at the time of the study. Two possible values were used in this measurement: 1 or Yes (if the respondent has consumed that particular food group, otherwise 0 or No (if he /she did not consume these foods in the last 24 hours).

Accordingly, the DDS values range between 0 and 12. In this study, the DDS result was divided into three categories: Low DDS (for those who could consume 1 to 3 foods), medium DDS (for those who consumed 4 to 6 foods), and adequate DDS (for those who consumed 7+ food items).

3.7.2. Description of Independent Variables

Gender of the Respondent: Gender of the respondent is considered as one of the categorical variables coded 1 for male and 2 for female. As an independent variable, it was assumed that sex of the respondents can significantly affects the food security status of the individuals. In reference with Mitiku et al. (2013) it was hypothesized that male sex and food security would be positively related. According to the literature reviewed, females are more likely to experience food insecurity (Tsegaye, 2009).

Age of the Respondents: Age of the individual is one of the continuous independent variables described in years. It was assumed that, the age can influence food security status of individuals (the older age group are more vulnerable to food insecurity than the younger or the productive age groups). The older the age of individual, the lower the productivity, the more the susceptibility to food insecurity. It is hypothesized that the age of individual and food security are positively correlated (Beyene and Mequanent, 2010).

Marital Status the Respondents: It is a categorical variable described as single/unmarried, married and divorced and coded by 1, 2 and 3 respectively. Most empirical literature argues differently about the impact of the marital status of the individuals/respondents on food insecurity. It was hypothesized that married patients would be more vulnerable to food insecurity and have a positive relationship with food insecurity.

On the other hand, divorce may cause family instability and eventual leads to poverty, displacement, disease like HIV and food insecurity.

Family Size: In developing countries where there is less efficiency of labor productivity, high poverty and unemployment, increased in family member might leads to various socio-economic challenges including food insecurity. An increase in household size means more mouths to feed from the limited resources. Bogale and Shimelis (2009) point out that a positive relationship is expected between household size and food insecurity status.

Education Level: Education was described as ordered or ranked variables based on the level of education in grade. It was assumed that, education has significant impact on the food security status of the family as well as the individual. For instance, increase in education level may increase the possibilities for job opportunity, increase income, and facilitates achievement of food security.

3.8. List of Independent Variables

Independent variables affecting food security status of study population are:
Sex of respondents __Categorical/dichotomous/

Age of respondents in years __Quantitative/ continuous

Marital status __Categorical

Family size in number_ Quantitative/ continuous

Education level in grade__ Ordered or ranked based on grade

Monthly income in birr __Quantitative/ continuous

Sources of food commodities – Nominal

3.9. Data Processing and Model Specification

Ordered logistic regression was used in the analysis of this study. We preferred this model for the fact that the food security status which represents the dependent variable has ordinal nature (food-secure, mild food insecure, moderately food insecure and severely food insecure). Therefore, the best fitting statistical model to run ordered outcome is an ordered-logistic regression model. In addition, the ordinal regression is easier and efficient algorithms to set in case one or more of the independent variables are continuous, categorical or ordinal. It was used as an analytical model to determine factors expected to affect the food security status of the study population.

According to Long and Freese (2003), symbols rather than actual variable names are used. Then, Y is an ordinal dependent variable with c categories, and Pr ($Y \leq j$) denotes the probability that the response on Y falls in category j or below (i.e., in category 1, 2…or j). This is called a cumulative probability. It equals the sum of the probabilities in category j as shown below:

$Pr(Y \leq j) = Pr(Y = 1) + (Pr(Y = 2) + Pr(Y = j)$ ……...……... (1)

A -c-category Y-dependent variable has c cumulative probabilities: $Pr(Y \leq 1)$, $Pr(Y \leq 2)$ $Pr(Y \leq c)$.

The final cumulative probability uses the entire scale as a consequence, $Pr(Y \leq c) = 1$

The order of forming the final cumulative probabilities reflects the ordering of dependent variable scale, and those probabilities themselves satisfy

$Pr(Y \leq 1) \leq Pr(Y \leq 2) \leq$----------(1)

$\leq Pr(Y \leq c) =$ ----------(2)

In ordered logit model, an underlying probability score for an observation of being in the ith response category is estimated as a linear function of the independent variables and a set of cut points.

Goodness of Fit of the Model

The goodness of fit measures how well the model describes the data. Assessing goodness of fit investigates how much the predicted value is close to (fit with) the observed values.

Goodness of fit was checked for all variables through the analysis. Likelihood-based models, is one of the most commonly recommended tests for overall fit check of a model (Hosmer &Lemeshow1980).

Model Diagnostics

It can measure based on diagnosing residuals and measure of influence. The most model diagnosis used is:

Leverage Values: It is a measure of how far an observation is from the others in terms of the levels of the independent variables. Observations with leverage values larger than one are potentially highly influential (Belsley et al., 1980).

In addition, post-estimation test was done after ordered logistic regression. The explanatory variable was checked using Variance Inflation Factor (VIF) between the dependent variable to identify the determinate factor that affects individuals/respondents food security status. If the VIF of a variable exceeds 10, that variable is said to be highly collinear and it can be concluded that multi- collinearity is a problem (Gujarati, 1995).

Beta weights: Beta is the average amount by which the dependent variable increases when the independent variable increases one standard deviation and other independent variables are held constant.

Finally, a model was used to include all variables suitable for ordinal regression and thereby the analysis with AOR, CI at 95% and the significance level was set; data were cleaned, edited, coded, entered and exported to SPSS Windows version 25 for analysis. The continuous variables were statistically described in the form of mean, median, range and standard deviation, while the categorical variables were presented in the form of percentage, proportion and frequency table.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1. Socio-demographic Characteristics of the Respondents

From two hundred seventy survey schedules, two hundred sixty-two respondents were participated in the study, representing a response rate of 97%. The majority of respondents 152 (58%)) were women, while 110 (42%) of them were men. Regarding marital status, the highest proportion of respondents 171 (65.3%) were married, 49 (18.7%) were divorced and the remaining 16% were single or unmarried.

About 164 (62.6%) study participants were between 30 and 48 years old. Regarding educational status, 117 (44.7%) of the respondents were classified from 0th to 8th grade and only 36 (13.7%) had education level above 12th grade. Regarding monthly income, majority of the respondents 100 (37.6%) had a monthly income of 3,000 to 5,000 birr, while about a third of the respondents 87 (33.2%) had a low monthly income of less than 3,000 Birr per month (Appendix C). The study showed that since the majority of the respondents were urban residents, about 211 (80.5%) obtained their food by purchasing from the local market, while only 9 (3.4%) of them got their food from their own farm cultivation. The study also showed that majority of the respondents 189 (72.1%)) own a family size 3 to 5.

On the other hand, the results of measuring food insecurity by HFIAS showed that out of 262 respondents, about 149 (56.9%) experienced severe food insecurity; 46 (17.6%) were moderately food insecure, while the remaining 67 (25%) were classified as food secure to mild food insecure. From this finding, we concluded that the problem of food security among people living with HIV/AIDS was a relatively critical issue (Table 1).

Table 1. Descriptive Analysis of Qualitative Variables

Variables	Category	Frequency	Percent
Sex	Male	110	42.0
	Female	152	58.0
Marital Status	Single	42	16.0
	Married	171	65.3
	Divorce	49	18.7
Food security status	Food secure	34	13.0
	Mild FI	33	12.6
	Moderate FI	46	17.6
	Severe FI	149	56.8
Source of food commodities	1= on-farm	9	3.4
	2= purchase	211	80.5
	3= aid	26	9.9
	4= others	16	6.1

Source: From own survey, 2023

The descriptive analysis of continuous variables indicated that, the minimum and maximum age of respondent is 22 and 65 years respectively. Regarding to the household family size they had minimum 1 and maximum 7 family members with a standard deviation of 1.4. In case of monthly income of respondents there was larger range between lower income and higher income individuals and thereby resulted in relatively larger deviation from the mean which was 1771.9(Table 2).

Table 2. Descriptive Analysis of Continuous Variables

Variables	Average
Age of respondents in years	43.73 (St.d. 9.4)
Family size(in number of families)	3.38 (St.d 1.4)
Education level in grade	8.95 (St.d 3.4)
Monthly income of respondents in birr	4050.02 (St.d 1771.9)

Source: Statistical analysis from own surveyed data, 2023

4.2. Prevalence of Food Insecurity Status of Respondents as Measured by HFIAS

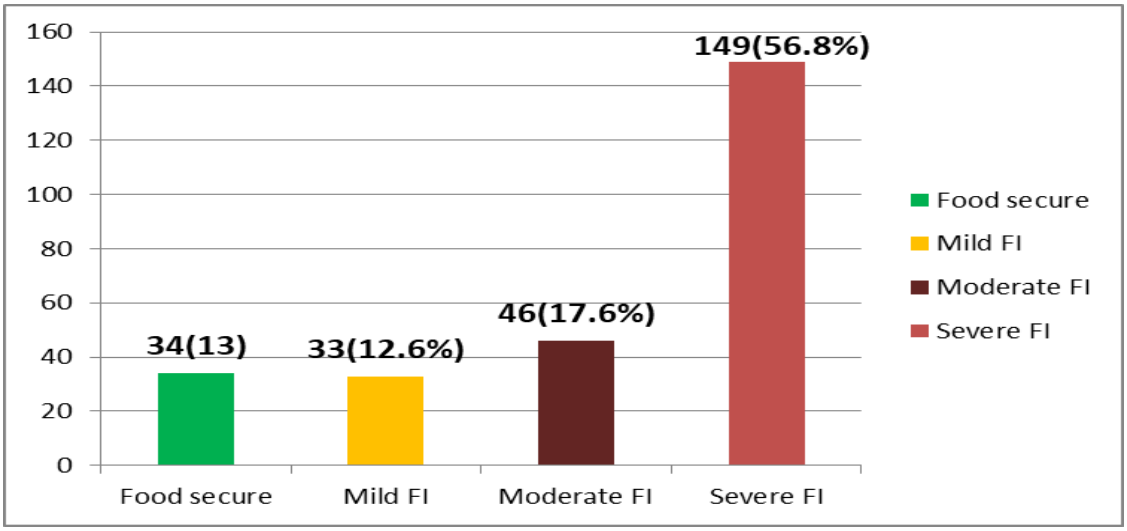
Based on HFIAS measurement, the result indicated that, about 34(13%) of the respondents were food secure individuals who had experience none of food insecurity condition with access scale value zero(ASV0) over the last 30 days. In the same manner, about 33(12.6%) were mild or marginally food insecure individuals who have worried about not having enough food sometimes and/or ate a monotonous diet or less-preferred foods, but only rarely over the last 30 days.

About 46(17.6%) of respondents were categorized as moderate food insecure individuals who scarified quality more frequently, and experienced eating less-preferred foods sometimes or often, and used to reduce size or number of meals, rarely or sometimes over the last 30 days.

Majority of the respondents 149(56.8%) were categorized as severe food insecure who experienced one or more of severe conditions such as going a whole day without eating more frequently(Figure 3).

Regarding to the coping strategies almost all of those respondents categorized under severe food insecure experienced minimization of the amount of food to be eaten, focusing on easily accessible and cheap food, jumping the daily eating round, and etc. were among the coping mechanisms adopted by the study population.

Figure 3. Food Security Status of Respondents as Measured by HFIAS

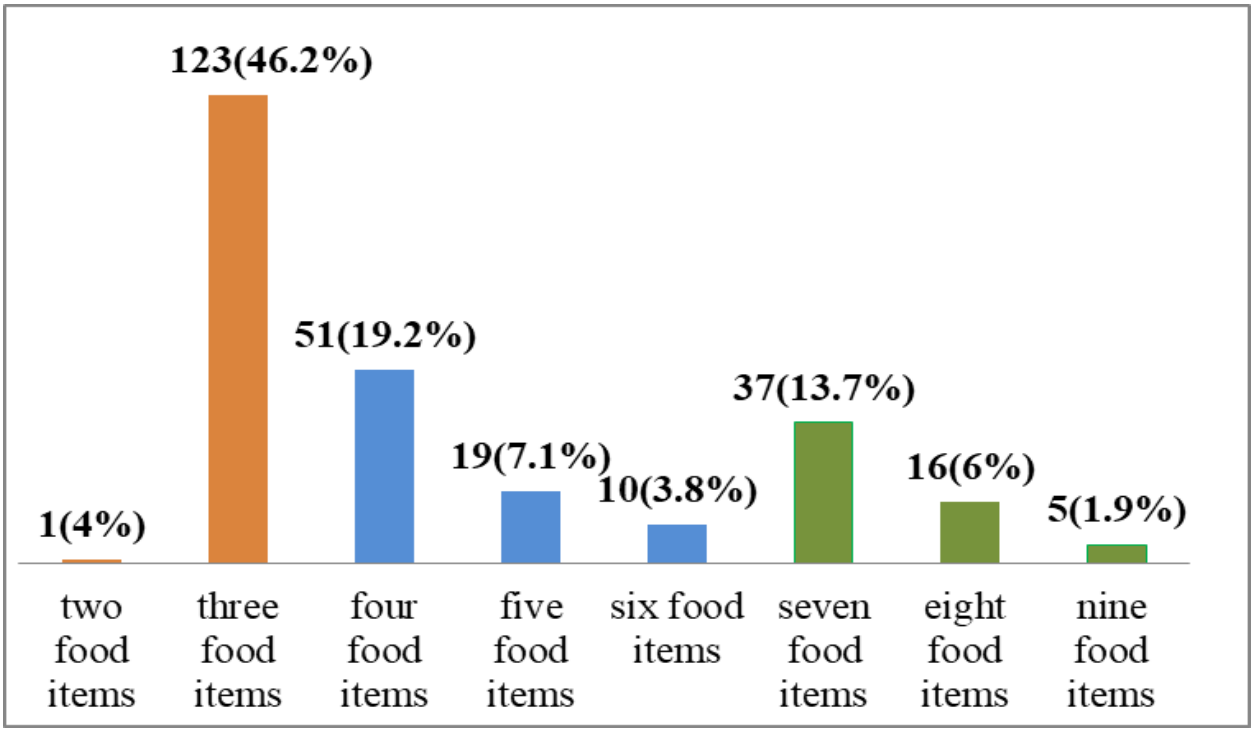


Source: From Own Survey Result, 2023

4.3. Prevalence of Food Insecurity Status of Respondent as Measured by DDS

According to this finding, majority of the respondents 123(46.9%) could consume only three food items; about 51 (19.5%) could consume four varieties of food items whereas only 5(1.9%) of the respondents could use nine varieties of food items in the last 24 hours (Figure 4). None of the respondents could eat 9+ food items. All of the respondents accessed for cereals but none of them could use fish & poultry meat in the last 24 hours.

Figure 4. Dietary Diversity Score (DDS) of the Respondents



Source: From Own Survey Result, 2023

4. 4. Results of Regression Analysis to Show the Effects of Independent Variables on the Dependent Variable

4.4.1. Food Security Status of Respondents in Relation to Gender

The study showed that the severity of food insecurity among PLHIV receiving ART therapy in Menelik II Hospital was 60.3% in male whereas 53.6% in female respondents. Similarly, about 16.5% of men and 10.7% of women were food secure or rarely food insecure. According to this result, the prevalence of food insecurity was relatively higher among men than women.

As far as the study populations were urban dwellers, the demand for human recruitment especially on various service sectors like waiters, kitchen workers, messengers, cleaners, garden workers, child care givers and related jobs were more accessible for females than males. This fact might improve the food accessibility for females than males. About 25% of females respondents are mild to moderate food insecure or non-hunger food insecure **(**Table 3**)**.

4.4. 2. Food Security Status of Respondents with Respect to Age

With regard to the age, the prevalence of severity of food insecurity was relatively low (7.9%) in the young age group(18-30years) of respondents whereas out of 164 respondents categorized from 30 to 48 years of age about half of them or 49.7% were severely food insecure. In the same manner, severity of food insecurity was by far higher (80.1%) in the older age group of the study population **(**Appendix B).

4.4.3. Food Security Status of Respondents with Respect to their Marital Status

Based on marital status, the severity of food insecurity was 30.7% in single (unmarried), 54% in married, and 85.3% in divorce. This showed that, the marital status can be considered as one of the most determinant factors affecting the food security status of individuals. In addition, divorce dis-stabilizes the socio-economic status of the household and speeds up the prevalence of food insecurity. On the other hand, about 15% of single respondents were food secure whereas only 8.8% out divorce respondents were food secure (Table 3).

4.4.4. Food Security Status of Respondents with Regard to their Family Size

Concerned with the family size, the level of severity of food insecurity of respondents having family size 1-2 was 39.6%; whereas, the level of severity of food insecurity having family size 5 and above was 45%.

With this regard, the finding showed that, the more the number of family size of respondents, the more the vulnerability for food insecurity. In the other words, respondents having less number of family sizes were less severe for food insecurity than those having many numbers of family sizes. One third or about 33% of respondents having family size 1-2 were moderately food insecure or non-hunger food insecure. On the other hand, as indicated in sex variable, this result also showed that, relatively the more the number of male family size, the more the severity for food insecurity than female family size (Table 3).

Table 3. Regression Analysis between a Dependent Variable and Independent Variables

Variables	Category/indications	Food Insecurity Level(in percentage distribution)				P-value
		Food secure	Mild Food Insecure	Moderate Food Insecure	Severe Food Insecure	
Food security Status		34(13%)	33(12.6%)	44(17.6%)	149(56.9%)	0.000
Independent		In %	In %	In %	In %	
Sex	Male	16.5	9.4	13.8	60.3	.000
	Female	10.7	15.3	20.5	53.6	
Marital Status	Single/unmarried	14.8	19.3	35.2	30.7	.007
	Married	14.2	14.2	17.6	54.0	
	Divorce	8.8	2.9	2.9	85.3	
Age in years	Average of continuous	15.4	13.6	21.4	49.6	.000
Education level	Average of continuous	13.9	11.3	12.3	62.6	0.05
Income level	Average of continuous	5.6	38.9	16.7	38.9	.000
Family size	Family 1	12.2	18.9	38.9	30.0	0.07
	Family 2	10.0	10.0	22.0	58.0	
	Family 3	13.2	7.9	14.9	64.0	
	Family 4	13.4	14.5	13.4	58.7	
	Family 5	16.7	10.8	8.8	63.7	
	Family 6	18.8	18.8	18.8	43.8	
Sources of food commodities	Source from on-farm	31.8	13.6	40.9	13.6	.253
	Source from purchase	12.9	12.9	17.6	56.6	
	From aid	1.8	1.8	1.8	94.6	
	From others	25.0	30.6	30.6	13.9	
Dietary diversity score level	Low DDS	0.4	0.4	1.2	98.0	.000
	Medium DDS	0.6	10.2	54.8	34.3	
	Adequate DDS	56.6	41.8	0.8	0.8	

Source: Analysis from own survey, 2023

4.4.5. Food Security Status of Respondents with Regard to their Educational Level

Educational level is considered as one of the most determinants of food security status of the study population at p-value < 0.05. The analysis of the study showed that, the prevalence of food insecurity was more severe in respondents having lower educational levels. For instance, the percentage of food insecurity in respondents having educational level grade 9 to grade 12 was 62.6 %; for those having education level above grade 12 was only 39%. In the same manner, only about 11% from respondents having educational level 0 to grade 8 were food secure whereas about 15 % of those having education level above grade 12 were food secure (appendix B). From this result, we can conclude that, the higher the educational level of respondents, the higher the opportunity to join at various income earning activities, the less the susceptibility for food insecurity.

4.4.6. Food Security Status of Respondents versus Monthly Income of Respondents

The monthly income was directly proportional with the food security status of the respondents. The prevalence of food insecurity was more severe in respondents having lower income. For instance, the percentage of food insecurity in respondents having average monthly income around 4000 birr was only 38.9% and only about 5.6 % of them were food secure. In the same manner, about 98% of low income respondents (<3000br per month) were severe food insecure contrary to this only 2% of high income respondents (>5000br per month) were severely food insecure (Appendix B). The higher the level of income, the higher the capacity to access food commodities, the lesser the vulnerability to food insecurity and vice versa.

Regarding to the Sources of food commodities of respondents, the result of study showed that, majority of study populations were urban dwellers. About 211(80.5%) of them had access their food commodities from purchase. Out of this 56.6% were severely food insecure; 12.9 % of them were food secure and the rest were mild to moderate food insecure. Only 9(3.4%) of respondents were owed their food commodities from cultivation. Of these, majority of them (32%) were food secure whereas only 13.6 % of them were severe food insecure (Table 3).

Contrary to this, the finding showed that, those respondents who accessed their food from various aid like UPSNP, support from USAID and etc. were to the large extent exposed to food insecurity at a severe level which was 94. 6% (Table 3). This may be due to the fact that external aid lacks consistency, non- continuity and at the same time it develops of sense of dependency

4.4.7. Analysis of Food Security Status of Respondents with Regard to DDS

Regarding to the dietary diversity score of respondents, the result of study showed that, those respondents who could consume a fewer diversity of food item, for example, two items per the last 24 hours, were to a large extent (about 50% of them) exposed to severe food insecure.

Meaning, the higher the food insecurity the lower the economic capacity to access diversified food items in the specific periods of time. On the contrary, very few numbers of the respondents could consume the adequate amount of diversified food items which was 9 items per the last 24 hours. Majority of these respondents (78.6%) who could access 9 food items per 24 hours were categorized under food secured groups.

As long as many a number of respondents were food insecure, they could access low dietary diversity score which was three and less food items in the last 24 hours (Figure 4).

On the other hand, the study indicated that, 122(46.6%) of the respondents were categorized under individuals who could access low dietary diversity (Figure 4). Because these respondents could consume only 3 and less food items per the last 24 hours. Contrast to this, 59(22.5 %) of the respondents were categorized under individuals who could access adequate dietary diversity. Of these majorities of them (56.6%) were food secured.

4.4.8. The Correlation between Food Security Status and DDS of the Study Population

The study showed that, there was positive correlation between food security status and dietary diversity score which was significant at the .000 level. The higher the food security status, the higher the access to obtain adequate diversity of food items during the specific period of time (Table 4).

Table 4. The correlation Analysis between HFIAS and DDS

Correlations			
Control Variables		food security status measured by HFIAS	Dietary Diversity Score
food security status measured by HFIAS	Correlation	1.000	-.929
	Significance (2-tailed)	.	.000
Dietary Diversity Score	Correlation	-.929	1.000
	Significance (2-tailed)	.000	.

Source: Analysis Result from Own Survey, 2023

The study was conducted to examine the level of food security and its determinants among adult individuals living with HIV/AIDS and actively undergoing ART in Menelik II Hospital. It was conducted on randomly selected 262 respondents from the study population. According to this finding, approximately 56% of respondents suffered from severe food insecurity. This result was significantly higher than the national food insecurity (35%) reported by the Ethiopian Health and Nutrition Research Institute (EHNRI, 2009). About 12.6% and 17.6% of respondents experienced mild and moderate food insecurity, respectively. While about 13% of respondents were completely food secure and not worried about the issue of food insecurity.

Our findings related to examining the extent of food insecurity. The result was relatively lower than the study result reported in Dire Dawa where (89.8%) and Indonesia (84%) of PLHIV were food insecure (FMOE, 2012). However, the study among PLHIV conducted in Tanzania showed that (52.2%) were food insecure, which was slightly lower than our current finding (Cherie A, et al., 2012). This discrepancy could be due to the different socioeconomic status of the study population.

The key determinants of food security analyzed in this study include gender, age, monthly income, education level, food sources and marital status. The results of the model analysis using ordinal regression showed that the majority of the independent factors significantly determined the food security status of the respondents at a P-value <0.05.

However, the p-value for respondents' food sources indicated a p-value > 0.05, so the null hypothesis for this variable was not rejected. That is, it has no significant impact on the dependent variable. This may be due to the fact that the majority of respondents were consumers (buyers of food commodities from the local market), so the income level of respondents can be determined and replaced a role as a source of food.

The monthly income of the respondents was one of the most important factors that determined the food security status of the respondents. The result showed that respondents with high income had a minor problem with food insecurity, while the majority of respondents with lower monthly income were classified as having severe food insecurity (Table 3).

This finding is consistent with the study conducted in Dire Dawa, Tanzania, Indonesia and Malaysia (Cherie A. et al., 2012). This showed that low-income households have a high problem of food insecurity. The association between food insecurity and low income found in the study population may be due to the socioeconomic impact of HIV/AIDS.

Regarding the assessment of dietary diversity, approximately (46.6%) of the respondents achieved low dietary diversity and only 59 (22.5%) had access to adequate dietary diversity (Appendix D). Most studies conducted in Africa show a higher trend of low dietary diversity in approximately 59% of people living with HIV (Gina K et al., 2010).

One of the reasons for low dietary diversity could be related to low income and low purchasing capacity for the variety of foods. This could also be because most of the study participants belonged to a lower economic class and therefore could not afford micronutrient-rich foods. The dietary habits of people in developing countries are based on monotonous, energy-rich and micronutrient-poor starchy staple foods (ECA, 2010).

The assessment of food diversity was similar to the result of another study conducted in Kenya (Keino S. et al.). Grains were the most commonly consumed food group by the study population, while fruits, vegetables and animal products were consumed at low levels. Reducing meal size and focusing on lower quality foods have been frequently described as strategies to address food insecurity which was consistent with findings from Bangladesh (Sulaiman M, et al.).

The correlation analysis between food security status and dietary diversity score of respondents showed that, there was strong positive correlation between them. Meaning, the higher the level of food security status of the individuals, the higher the opportunity to access adequate dietary diversity.

Age is a continuous explanatory variable inherent to the respondents/individuals. The result of the regression output showed that the age of the respondents has a positive correlation (at $P < 0.05$) with the food security of the individual (Table 3). According to the result of the analysis, the younger and productive age group was less vulnerable to the problem of food insecurity than the older age group (Appendix B). This finding is consistent with the findings of Beyene and Muche (2010).

Regarding family size, households with large families are more likely to experience food insecurity due to the high burden of active employment. This is due to the fact that HIV-AIDS can reduce work productivity due to illness, caregivers, mortality, morbidity and other socioeconomic burdens. The severity of food insecurity was about 33% for respondents with a small family size, while it was about 45% for respondents with a large family (more than 5 members) (Appendix B). This result is consistent with the findings of Ayalew (2003), Tesfaye (2005) and Guled (2006).

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study was conducted on people living with HIV/AIDS and receiving antiretroviral chemotherapy at Menelik II Hospital. The aim of the study was to investigate the food security status of PLHIV and to analyze the determinants of food security status in the study population. The food security status of this study population was measured by HFIAS and DDS. In addition, the most important factors influencing food security were examined. The main determinants examined were gender, age, marital status, education level, family size, monthly income and food sources of the respondents. The analysis for each determinant was properly performed using descriptive statistics and using ordered logistic regression models. The analysis confirmed that almost all determinant factors or independent variables significantly influenced the food security status of respondents at P value < 0.05, except food sources.

The result showed that, majority of the individuals/patients (approximately 56.9%) were severely food insecure, while the remaining 13%, and 12.6% and 17.6% were classified as food secure, mild food insecure and moderately food insecure respectively. This suggested that, the problem of food security was more severe among people living with HIV.

According to these findings, the main causes and drivers of food insecurity in this study population were low income, additional health care costs among PLWHIV, lack of employment opportunities due to low educational levels, and low food accessibility due to under efficiency and low productivity of patients. The effects of age, marital status, education level and family size, could impact the availability, accessibility, stability and utilization of respondents' food security status. Furthermore, the result showed that male respondents were relatively more affected by food insecurity than female respondents; 60.3% of men and 53.6% of women were severely food insecurity. Respondents with higher levels of education were less vulnerable to food insecurity than respondents with lower levels of education.

Regarding to the measurement of dietary diversity, 46.6% of respondents were able to score low dietary diversity, 30.9% of respondents were categorized under medium dietary diversity, and only 22.5% were able to consume adequate dietary diversity in the last 24 hours at the study time.

From this fact, we could conclude that, the prevalence of food insecurity in HIV patients resulted in low access to consume diversified food items that might leads to lack of balanced diet and under nutrition. This is to show that, the issue of food security status in this target population is not only about food but also most likely connected with nutrition and health condition of individuals. On the other hand, access to safe, sufficient and nutritious food has to be recommended for this target population than any other group of community. Therefore, in general, the issue of food security status of PLHIV was considered as one of the most critical issue that needs to be addressed properly by all concerned bodies.

5.2. Recommendations

It was investigated that, majority of the study population are living under the situations of severe food insecurity. Food insecurity can be considered as the major part socioeconomic constraints for this target population. The study revealed that, the socio-economic burden due to food insecurity is by far higher in PLWHA than the other groups of community.

Based on the analysis made, results obtained, and conclusions drawn, the following recommendations are forwarded to the policy makers, concerned government and non-governmental actors as well as to all other stakeholders.

- The analysis result revealed that, education is one of the major determinant factors that affect food security status of the study population. For instance, lower grade or non-educated respondents were relatively more food insecure than those who were educated. Therefore, the government and nongovernmental agencies who work on education sector should improve the education status of the target population so as to improve their food security as well as socioeconomic status.
- In case of marital status, the result showed that, the severity of food insecurity was higher in divorce (about 85% of the divorce respondents whereas 54 % of non-divorce/ married/ patients were severe food insecure). Especially female divorce patients were severely food insecurity than male divorce. This indicates, divorce destabilize families and adversely affects socioeconomic condition as well as food security status of individuals in general and HIV patient families in particular.

Therefore, the concerned government and non-governmental agencies should work on gender and marital status of the families as one of development intervention program including food security strategies.

- Similarly, the study finding indicates that monthly income of the respondents adversely affects the food security status of the respondents. About 98% of low income respondents (<3000br per month) were severe food insecure; contrary to this only 2% of high income respondents (>5000br per month) were severely food insecure. So, to overcome this issue, the concerned town administrators as well as the micro finance institutions should work together in facilitating credit service. So that this target population can create job opportunities and enhance their income which serves to improve accessibility for food.
- According to this finding, majority of the respondents (56.9%) were severely food insecure. Therefore, there is a need to give priority for this target population in the implementation of PSNP so as to improve their food security status.
- Furthermore, the international and local agencies who have been working on charity mission had better support and address the nutrition and food security problem of PLWHA.
- Finally, this study has conducted on cross sectional data collected from 262 adult HIV patients who have been attending antiretroviral therapy at Menelik II Comprehensive Specialized Hospital, Addis Ababa. As far as the study populations were city dwellers, the research outcomes may not be able to make generalization for other target population. This is to mean that, the socioeconomic as well as food security situation of HIV patients who are living in Addis Ababa city may be different from the food security situation of HIV patients who are living in the local and rural areas. Therefore, the researcher had better conduct further studies to explore other factors affecting the food security status of this target population.

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Appendices

Appendix A: Questionnaires used as a tool for data collection

Expectations/ Indicators	No	Questionnaire	Category		Code	
Socio-economic background of the respondent	2	Sex of the respondent	Male		1	
			Female		2	
	3	Age in years			[ ]	
	4	Marital status	Single		1	
			Married		2	
			Divorce		3	
	5	Family Size			[ ]	
	6	Religious	Christian		1	
			Muslim		2	
			Catholic		3	
			Others		4	
	7	Education level of the respondent	In grade		[ ]	
Situations of Food Security or Food insecurity status in the study area	8	**Food insecurity check by HFIAS Questions:**	Yes=1 Occurrence	Freq1,2,3	No= 0	Freq * occu.
		a. In the past four weeks, how often did you worry that your household would not have enough food?				
		b. In the past four weeks, how often were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?				
		c. In the past four weeks, how often did you or any household member have to eat a limited variety of foods due to a lack of resources?				
		d. In the past four weeks, how often did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?				
		e. In the past four weeks, how often did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?				
		f. In the past four weeks, how often did you or any household member have to eat fewer meals in a day because there was not enough food?				

Situations of Food Security status of respondents in the study area		g. In the past four weeks, how often was there ever no food to eat of any kind in your household because of lack of resources to get food?				
		h. In the past four weeks, how often did you or any household member go to sleep at night hungry because there was not enough food?				
		i. In the past four weeks, how often did you or any household member go a whole day and night without eating anything because there was not enough food?				
		j. In the past four weeks, how often did you worry that your household would not have enough food?				
		k. In the past four weeks, how often were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?				
		Total HFIAS Value				
		Food insecurity check by DDS check	1= yes	0= No		
		a) Cereals				
		b) Fish and seafood				
		c) Root and tubers				
		d) Pulses/legumes/nuts				
		e) Vegetables				
		f) Milk and milk products				
		g) Fruits				
		h) Oil/fats				
		i) Meat, poultry, offal				
		j) Sugar/honey				
		k) Eggs				
		l) Miscellaneous				
		DDS Value				
	9	In case you are living under condition of food insecurity; what are mechanisms you use as a coping strategies ?	_____ _____			
	10	What is the impact of food insecurity on your daily life?	_____ _____			

Appendix B: Sample Outputs of Regression Analysis

Variables	Food security status by HFIAS	Count	Percent	Likelihood Ratio	Pearson Chi-Square	Df	Sig
Sex –male	0=food secure	18.500	16.5	.000	.000	3	.000
	1 =mild FI	10.500	9.4				
	2 =moderate FI	15.500	13.8				
	3=severe FI	67.500	60.3				
Sex-female	0	16.500	10.7				
	1	23.500	15.3				
	2	31.500	20.5				
	3	82.500	53.6				
Marital-single	0	6.500	14.8	.000	.000	4	.000
	1	8.500	19.3				
	2	15.500	35.2				
	3	13.500	30.7				
Marital-married	0	24.500	14.2				
	1	24.500	14.2				
	2	30.500	17.6				
	3	93.500	54.0				
Marital-divorce	0=food secure	4.500	8.8				
	1 =mild FI	1.500	2.9				
	2 =moderate FI	1.500	2.9				
	3=severe FI	43.500	85.3				
Age 18- 30 years	0	2.500	13.2	.000	.000	6	.000
	1	3.500	18.4				
	2	11.500	60.5				
	3	1.500	7.9				
Age 30 – 48 years	0	25.500	15.4				
	1	22.500	13.6				
	2	35.500	21.4				
	3	82.500	49.7				
Age above 48 years	0	7.500	9.0				
	1	8.500	10.2				
	2	.500	0.6				
	3	66.500	80.1				
Education level Grade 0-8	0	7.500	11.2	.000	.000	6	.000
	1	10.500	15.7				
	2	22.500	33.6				
	3	26.500	39.6				

Education level Grade 9-12	0	26.500	13.9				
	1	21.500	11.3				
	2	23.500	12.3				
	3	119.50	62.6				
Education level Above Grade 12	0	1.500	15.0				
	1	2.500	25.0				
	2	1.500	15.0				
	3	4.500	45.0				
Monthly income <3000 birr	0	.500	0.6	.000	.000	6	.000
	1	.500	0.6				
	2	.500	0.6				
	3	87.500	98.3				
Monthly income 3000 to 5000 birr	0	8.500	8.3				
	1	8.500	8.3				
	2	23.500	23.0				
	3	61.500	60.3				
Monthly income >5000 birr	0	26.500	34.4				
	1	25.500	33.1				
	2	23.500	30.5				
	3	1.500	1.9				
Family size 1-2 members	0=food secure	7.500	11.2	.000	.000	6	.000
	1 =mild FI	10.500	15.7				
	2 =moderate FI	22.500	33.6				
	3=severe FI	26.500	39.6				
Family size 3-5 members	0	26.500	13.9				
	1	21.500	11.3				
	2	23.500	12.3				
	3	119.50	62.6				
Family size Above 5 members	0	1.500	15.0				
	1	2.500	25.0				
	2	1.500	15.0				
	3	4.500	45.0				

Source: SPSS analysis output using own survey

Appendix C: Analysis of Continuous Variables in Percentage & Frequency

Variables	Category	Frequency	Percent
Age of Respondent in years category	18-30	17	6.5
	30-48	164	62.6
	Above 48 years	81	30.9
Family size (in number of families)	1 family member	43	16.3
	2	23	8.7
	3	55	20.9
	4	84	31.9
	5	49	18.6
	6	6	2.3
	7	2	.8
Education level	Grade 2	4	1.5
	3	10	3.8
	4	22	8.4
	5	10	3.8
	6	19	7.3
	7	25	9.5
	8	27	10.3
	9	33	12.6
	10	16	6.1
	11	30	11.5
	12	30	11.5
	13	9	3.4
	14	13	5.0
	15	6	2.3
	16	8	3.1
Educational level in grade category	0-8 grade	117	44.7
	9- 12	109	41.6
	Above 12	36	13.7
Monthly income in birr	< 3000 birr	87	33.2
	3000-5000	100	38.2
	Above 5000	75	28.6

Source: Analysis From own survey, 2023

Appendix D: Analysis of DDS in terms of food items & Score Level

Variables	Category	Frequency	Percent
`Dietary Diversity Score/ number of food items consumed per 24 hours	2	1	.4
	3	123	46.9
	4	51	19.5
	5	19	7.3
	6	10	3.8
	7	37	14.1
	8	16	6.1
	9	5	1.9
Level of DDS	Low = 1	122	46.6
	Medium = 2	81	30.9
	Adequate =3	59	22.5

Variables	Category/indication	Food Insecurity Level(in percentage distribution)			
		Food secure In (%)	Mild Food Insecure In (%)	Moderate Food Insecure In (%)	Severe Food Insecure In (%)
Dietary diversity score level	Low DDS	0.4	0.4	1.2	98.0
	Medium DDS	0.6	10.2	54.8	34.3
	Adequate DDS	56.6	41.8	0.8	0.8
DDS in terms of food items consumed per 24 hours	2 food items consumed /24hrs	16.7	16.7	16.7	50.0
	3 food items consumed /24hrs	0.4	1.2	2.0	96.4
	4food items consumed /24hrs	0.9	6.6	40.6	51.9
	5 food items consumed /24hrs	2.4	2.4	88.1	7.1
	6food items consumed /24hrs	4.2	45.8	45.8	4.2
	7 food items	42.3	55.1	1.3	1.3
	8 food items consumed /24hrs	75.0	19.4	2.8	2.8
	9 food items consumed /24hrs	78.6	7.1	7.1	7.1

Source: Analysis from own survey, 2023