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INSTITUTE OF TECHNOLOGY

SCHOOL OF RESEARCH AND POSTGRADUATE STUDIES

APPLIED HUMAN NUTRITION

UNDERNUTRITION AND ASSOCIATED FACTORS AMONG ADULTS LIVING WITH HIV/AIDS ATTENDING IN SELECTED PUBLIC HOSPITALS IN ADDIS ABABA, ETHIOPIA

By

LUBABA DEBEBE MARYE

October, 2019

Bahir Dar, Ethiopia

UNDERNUTRITION AND ASSOCIATED FACTORS AMONG ADULTS LIVING WITH HIV/AIDS ATTENDING IN SELECTED PUBLIC HOSPITALS IN ADDIS ABABA, ETHIOPIA: A Cross-Sectional Study

BY

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A thesis submitted to the school of Research and Graduate Studies of Bahir Dar Institute of Technology, BDU in partial fulfillment of the requirements for the degree of MASTERS in the applied human nutrition

Advisor Name: Kedir Teji (PhD, Assistant Professor)

October, 2019

Bahir Dar, Ethiopia

DECLARATION

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have acknowledged and refereed all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation/ fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the University and can also evoke penal action from the sources which have not been properly cited or acknowledged.

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Date of submission: _____

Place: Bahir Dar

This thesis has been submitted for examination with my approval as a university advisor.

Advisor Name: _____

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ABSTRACT

Background: Both Human Immunodeficiency Virus (HIV) and malnutrition can independently cause progressive damage to the immune system. The former increases susceptibility to infection, morbidity and mortality through opportunistic infections. Malnutrition hastens progression to AIDS related illnesses; undermines adherence and response to antiretroviral therapy (ART) in resource-poor settings.

Objectives: To asses under nutrition and associated factors among adults living with HIV/AIDS in Addis Ababa.

Methods: An Institution based cross- sectional study was conducted on March 2019 and simple random sampling technique was used to select study subjects with a total of clients 504 were included in the study. Weight and height of the patient was measured to estimate the magnitude of under nutrition in addition of face to face interview. The study subject was interviewed based on the questionnaire. The degree of association was assessed using odds ratio with 95% confidence interval and P value. Level of statistical significance was declared at p value less than 0.05.

Result: The prevalence of under nutrition in this study was 23.8 %(95% CI 12.8-24.8). In the multivariable logistic regression analysis under nutrition (BMI<18.5) was significantly associated with those who are divorced (AOR=4.82, 95%CI (1.09-21.55)), being Anemic (AOR= 3.02, 95%CI (1.42-6.43)),WHO clinical stage I&II (AOR=.03,95%CI(.01-.09)and AOR=.19,95%CI(.07-.51)respectively) and clients with poor food consumption score(AOR=10.07,95%CI(3.12-32.5)).

Conclusion: There is a burden of under nutrition in people living with HIV/AIDS. Being divorced, presence of anemia, current ART regimen, late WHO T- clinical stage and poor food consumption score were associated with under nutrition in this study.

Key Words: Nutritional status, BMI, Adult, HIV/AIDS

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ABBREVIATION AND ACRONYMS

AA	Addis Ababa
AIDS	Acquired Immune Deficiency Syndrome
AOR	Adjusted Odds Ration
ART	Anti-Retroviral Treatment
ARV	Anti-Retroviral
BMI	Body Mass Index
BWL	Body Weight Loss
CI	Confidence Interval
COR	Crude Odds Ratio
CDC	Communicable Disease Control
CD4cell	T-lymphocyte Bearing CD4 Receptor
EDHS	Ethiopia Demographic Health Survey
FAO	Food and Agriculture Organization
FCS	Food consumption score
HAART	Highly Active Anti-Retroviral Treatment
HIV	Human Immune Virus
HSDP	Health Sector Development Program
IDDS	Individual dietary diversity
KG	Kilo Gram

MCH maternal and child health

OI Opportunistic Infections

OPD outpatient department

PLWHIV People Living with HIV

SPSS Statistical Package for Social Science

SSA Sub Saharan Africa

TB Tuberculosis

UNAIDS United Nations Programme on HIV/AIDS

UNDP United Nations' Development Program

UNECA United Nations' Economic Commission of Africa

UOG University of Gondar

USA United States of America

USAID United States Agency For International Development

WFP World Food Program

WHO World Health Organization

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CHAPTER1. INTRODUCTION

1.1 Backgrounds

Under nutrition is defined as the condition in which nutrient intake is continuously below a minimum requirement for maintaining healthy life. According to the global conceptual framework, the causes of under nutrition are multiple and interrelated requiring intricate series of approaches, multifaceted, and multispectral interventions to address it (Sirotin et al., 2012; USAID,2014).

Under nutrition is considered as one of the world's most serious but least addressed health problems. Malnutrition defines a state when the body does not have enough of the required nutrients (under-nutrition) orhas excess of required nutrients (over-nutrition). Body mass index (BMI) may be the "best predictor" of mortality in PLWHA. According to World Health Organization (WHO) general cutoff points, BMI could be used to classify individuals into four major categories; underweight (<18.5 kg/m ^{2}), normal (18.5-24.9 kg/m ^{2}), overweight (25-29.9 kg/m ^{2}), and obese (≥30 kg/m ^{2}) (WHO,2006).

Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) has become one of the daunting challenges to socio-economic development in the world. The first cases were reported in 1981 and at the moment, nearly 36.9 million people are living with HIV and many had died of AIDS and associated morbidity since the start of the pandemic. Although, new cases are being reported in all regions of the world, almost 70% are in sub-Saharan Africa AIDS (Chipeta et al. 2009).

Ethiopia is one of the sub-Saharan countries most severely affected by the HIV/AIDS pandemic (CPRH, 2014). According to the 2011 demographic health survey (DHS) of Ethiopia, the overall prevalence of HIV is 1.1nationally (EDHS, 2016). In 2016, there have been 710,000 people living with HIV and approximately 20,000 AIDS-related deaths in Ethiopia (CPRH, 2018).

Both Human Immunodeficiency Virus (HIV) and malnutrition can independently cause progressive damage to the immune system. The former increases susceptibility to infection, morbidity and mortality through opportunistic infections, fever, diarrhea, loss of appetite, nutrient malabsorption, and weight loss. Malnutrition together with infectious diseases aggravated the HIV/AIDS pandemic and contributed for both mortality and morbidity of patients

(Nnyepi, 2009). The effects of malnutrition by itself can decrease cluster of differentiation-four (CD4+) T cells and contribute to abnormal B-cell responses which adversely affect the overall clinical outcome and exacerbate HIV-related immune depression (Katona,2008).

HIV/AIDS and malnutrition are interrelated and exacerbate one another in a vicious cycle. HIV could affect nutritional status through several pathways including increasing energy requirements, reducing food intake, and adversely affecting nutrient absorption and metabolism. Asymptomatic and symptomatic adults have energy requirements by 10 and 30%, respectively to maintain body weight and physical activity (PEPFAR, 2006).

HIV, food insecurity and malnutrition are intricately linked and exacerbate the harmful impacts of each other. Millions of HIV infected people live in countries with high levels of poverty and food insecurity. Food insecurity has a negative impact on the overall nutritional and health status of those infected and affected by HIV and AIDS, and PLHIV often express that food is the greatest need for themselves and their families (USAIDS, 2014).

Food availability and good nutrition are thus essential to keep people with HIV healthy and enable them resist opportunistic infections such as tuberculosis for longer. Sub-Saharan Africa in particular has the highest prevalence estimates of undernourishment in the world, with 23.2% of its population affected. Likewise, the region has the highest burden ofhuman immune deficiency virus(HIV)infection, constituting 69% of the estimated 36.7 million people living with HIV globally in 2015 (UNAIDS,2016).

Acquired Immune Deficiency Syndrome (AIDS) related morbidity and mortality remains unacceptablyhigh in developing countries (Ivers et al, 2009). Even there is significant variation in the risk of death after initiation of ART. Accordingly, the odds of death was higher among HIV positive adults with sever acute malnutrition comparedto the well-nourished adults (Zachariah et al, 2006).

1.2 Statement of the problem

Under nutrition has been negatively affecting the economic development in Ethiopia. Many lives had lost due to under nutrition. Also shortened lives filled with illness and reduced physical capabilities and compromised mental performance. It is reflected through deterioration of welfare of a population and reduction in human productivity and creativity, which are vital for economic development of a country (FMOH, 2008).

The impact of HIV/AIDS goes beyond public health concerns. It primarily affects adult population in the productive and reproductive age groups, as such, in its endemic stage, undermines the social and economic structure of the world in general and of developing countries in particular (PHAH,2016).

According to global HIV/AIDS report 2013, globally 0.8% of adults from 15 to 49 years worldwide are living with HIV. Sub-Saharan Africa was the most severely affected region in the world and accounts about 71% of the peoples living with HIV worldwide]. In Ethiopia, 1.1% of adult people aged 15–49 are infected with HIV (EDHS, 2016).In Ethiopia since its detection; HIV/AIDS has badly costs the lives of millions. Unless the dispute of under nutrition is answered, this higher mortality rate could not be overwhelmed even in the era of ART (Mitiku et al, 2016)

HIV/AIDS and malnutrition are highly prevalent in many parts of the world, especially in sub-Saharan Africa. There is convincing evidence on the relationship between the HIV epidemic and malnutrition, PLWHIV are more likely to become malnourished due to reduced food intake, side effects of medication, depression, poor absorption of nutrients and HIV-caused intestinal cell damage, increased energy needs as a result of virus replication and opportunistic infections, changes in the way the body uses the nutrients it receives or has stored. Malnutrition on the other hand, contributes to immune system impairment, making the body vulnerable to frequent illness, there by accelerating disease progression (Dereje et al, 2015).

The prevalence of under nutrition among HIV positive people was high in different part of the world including Ethiopia. For example In Nepal (19.93%) (Thapa et al, 2015) and in China (37.2%)(Wen et al,2011)).Recent studies done in Ethiopia revealed that malnutrition is highly prevalent among people living with HIV enrolled on ART. For instance study in FelegeHiwot

Referral Hospital, Bahir Dar (25.5%) (Molla et al,2013), in Butajira Hospital (25.2%) (Dereje et al, 2015), Hossana reported a total prevalence of (31.2%)(Mekuria et al, 2015), in Dilla University referral Hospital (12.3%)(Solomon et al ,2013), in Humera Hospital (42.3%)(Tsegazeab et.al,2013), in Gondar University referral Hospital (27.8%) (Belaynew et al,2014),and in St. Peter Hospital, Addis Ababa (25%) (Habtamu et al, 2009).

1.3 Objective of the study

General objective

- To assess the magnitude of under nutrition and associated factors among adults living with HIV/AIDS in selected public hospitals in Addis Ababa, March , 2019

Specific objectives

- To determine the magnitude of under nutrition
- To identify factors associated with under nutrition

1.4 Scope of the study

The study seeks to examine the magnitude of under nutrition and associated factors among adults living with HIV/ AIDS attending ART clinic in public hospital in Addis Ababa. Using crossectional study design the data was collected from three hospitals in Addis Ababa within one month study period. The data collection time was also at the time of fasting month in orthodox so this may affect food consumption and dietary diversity pattern. Only weight and height was measured to estimate BMI as dependent variable and tried to investigate socio economic, nutrition related and medical related factors as associated risk factors.

1.5Significant of the study

Evidence has shown that good nutrition may contribute to slowing the progression of the disease. Nutrition interventions can also help to optimize the benefits of antiretroviral drugs and may increase compliance with treatment regimens.

Nutritional assessment and counseling should be an integral part of all HIV treatment programs. Improved attention to diet and nutrition may augment ART acceptability and effectiveness, helps prevent metabolic complications, and improves adherence and response to antiretroviral therapy.

Despite enormous problem of HIV patients on HAART and malnutrition in the country, there was limited study conducted in the country context in general. This research will intend to provide such vital information that can be used as inputs in the efforts to improve nutritional status of HIV patients on HAART.

The study could help to inform policy maker in the study area on ways of improving or maintaining adherence to and scale up the treatment level to reduce morbidity, mortality and improving nutritional status of the PLWAH. Furthermore, effort will be made to publish the result in scientific journals.12/4/20195

Taking this complex nature of the problem in to account this study was carried out to assess the prevalence of malnutrition and associated factors in PLWHA. It is my strong belief that the results of this study provide valuable information to strengthen HIV/AIDS continuum of care.

The finding of this research will be used as input to ART programs at local and national levels.

CHAPTER2.LITERATURE REVIEW

2.1 Magnitude of under nutrition on PLWHIV

The subsequent weight loss and severe malnutrition that ensue are significant predictors of Acquired Immune Deficiency Syndrome (AIDS) related morbidity and mortality (Thapa et al,2015).

Despite the high global burden of HIV/AIDS, between 2010 and 2015 there has been more than a two-fold increase in the number of HIV-positive people receiving antiretroviral therapy (ART), which reached 10.33 million in eastern and southern Africa, the world's most affected regions.

The scale up of ART has resulted in AIDS-related deaths in the region decreasing by 36% since 2010. While this is good news, there are certain factors associated with poor outcomes. For example, in sub-Saharan Africa, malnutrition in the form of low body mass index (BMI) is common at ART initiation ranging from 10% to 33% and this is associated with poor treatment outcomes and increased mortality(Benzekri et al 2015, Weiser et al 2009, Benzekri et al 2015).

The latest FAO estimates, shows world hunger has reduced but still about 805 million are considered to be chronically undernourished globally. About 925 million hungry people live in Asia and the Pacific, the world's most populated region. Also, sub-Saharan Africa (SSA) is home to 26% of the world's under-nourished population. In Ethiopia, just as in SSA, approximately 26% of the general population is without adequate nutrition (FAO, 2014; Federal Ministry of Health, 2008).

HIV causes significant immune suppression in the infected individual. Weight loss of more than 5% with concomitant HIV infection is associated with accelerated disease progression, impaired functional status, and increased mortality. Malnutrition in HIV individuals is not only a problem in low income countries but also in developed countries. Several analyses have shown accelerated mortality less than six months with initiation of antiretroviral therapy (ART) if the patient's body mass index (BMI) was less than 18(Mashinya et al,2016).

A cross sectional study conducted in hospitalized patients in china showed that the prevalence of malnutrition was 37.2%. The estimated gross prevalence of undernourishment among HIV/AIDS individuals in this study (7.3%) (Wen et al,2011).

In Ethiopia, institutional based cross sectional study was conducted at the UOG referral hospital results shows that the prevalence of the overall malnutrition is 60.9% with mild malnutrition (BWL between 5-10%) 22%, moderate (10-20% BWL) 28.8%, and severe malnutrition (>20%BWL) 10.1%. There was no malnutrition (body weight loss < 5%) for 128(39.1%) of the patients. (Belaynew et al, 2014) Using the BMI, the prevalence of malnutrition was 27.8%.

2.2Factors associated with nutritional status of PLWHA

2.2.1 Socio demographic and Economic factor

The empirical evidences among HIV positive clients showed that, sex, residence, economic status, and educational status were significantly associated with under nutrition (Mollaet al,2013; Dereje et al, 2015).

A quantitative cross sectional study conducted in Nepal indicated that during bivariate analysis. Those who are unmarried were 2.7 times more likely to be undernourished than those who were married and in multivariable analysis illiterate people were 2.3 times as likely to be undernourished as people who could read and write (Thapa et al, 2015).

In studies conducted among PLWHA receiving ART at Butajira Hospital The mean BMI for male and female was 20.77 (SD ± 3.15) and 21.04 (SD ± 3.56), respectively. The prevalence of malnutrition among male patients was 25.9% (95% CI: 18.3%–34.3%) but 24.9% (95% CI: 18.8%–31.2%) among females. The prevalence of malnutrition was also different by the age of the study subjects (Dereje et al, 2015).

A study on the assessment of nutritional status and associated factors among adult HIV/AIDS clients in FelgeHiwot Referral Hospital, Bahir Dar showed from the total malnourished, females were more than males (56.7% vs.43. 3%).Even from pre ART clients more than 2/3rd (71%) were females, but the proportion of malnutrition among on ART care clients was relatively comparable between Females (48%) and males (52%) (mollaet al,2013).

Another research done in wollega showed that clients malnourished were 26.47% and 73.53% was well nourished. Females accounted 65.5% of them 29.2% were malnourished. Males accounted34.5%, of them 24.1% were malnourished. The study shows that (26.6%) of the respondents that got < 675ETB monthly income were malnourished and (26.3%) of the respondents that are malnourished were got ≥ 675ETB monthly income (Alemayehu et al, 2015).

In another study done in Dilla indicated, with reference to employment status, the proportion of malnutrition was higher (23.7%) in unemployed group compared to those employed (8.1%) this difference was statistically significant as well for unemployed as compared to their counterparts. In the same way, moderately poor economic status was found to be protective factor of malnutrition (Solomon et al, 2013).

Additional study in Wolita, Ethiopia showed that consequently, under nutrition was higher among clients whose age ranged between 18 to 29 years compared to those aged 45 years and above. The likelihood of under nutrition was higher among widowed study participants compared to married counter parts. Descriptively, from the total participants, females accounted for 312 (62.6%), and from which 77 (24.7%) were under nutrition. Males accounted for 188 (37.6%); 56 (29.8%), of them were under nourished. Males are 1.8 times more odds of getting under weight than the counterpart (Lula et al,2017).

2.2.2 Nutritional related factors

Globally more than800 million people remain chronically undernourished, and the HIV epidemic largely overlaps with population already experiencing low diet quality and quantity HIV infection results in functionally defective metabolic ability at the individual level to absorb, store and utilize nutrients thus resulting in nutrient deficiencies, compromised immunity and increased risk of acquiring infectious diseases (Katona et al 2008).

Across sectional study conducted in Hossana showed that there was a statically significant positive association between malnutrition and food insecurity. Respondents who were food insecure were more than two times likely malnourished than food secure. There was a statistically significant positive association between malnutrition and dietary diversity. Clients who were taking adequate diversified food were 56% less likely to be malnourished than who have adequate diversified food. There was astatically significant positive association between malnutrition and meal frequency.

Respondents with high meal frequency score were 71% less likely to be malnourished than who have low meal frequency. Individual who were not receiving nutritional support and care55%less likely to be malnourished than those who were receiving nutritional support and care (Mekuria et al, 2015).

According to the World Health Organization (WHO), nutritional support is an integral part of a comprehensive response to HIV/AIDS and receiving appropriate nutrition can help improve the health and quality of life of HIV infected individual (Heikens et al, 2009).

2.2.3. Medical factors

The stark reality is opportunistic infections place PLWHA at a high risk of developing malnutrition. HIV related debilitating infections, such as tuberculosis and diarrhea, have severe nutritional consequences that commonly precipitate appetite loss, weight loss and finally they lead to a wasting syndrome (WHO, 2003).

A cross sectional study in Nepal on nutritional status and its association with quality of life among people living with HIV showed that CD4 count was a significant factor associated with under-nutrition. PLHIVs with CD4 counts of 350cells/mm^3 or more were 74% less likely to be undernourished than their counter parts. PLHIVs in stage III and IV were more than twice as likely to be under-nourished than WHO stage I and II. Previous OIs with tuberculosis was also found to be the prominent risk factor for under nutrition. (Thapa et al, 2015).

Moreover, the presence of gastrointestinal symptoms, opportunistic infections,CD4 count, eating difficulty , ART status, current clinical condition, World Health Organization (WHO) clinical AIDS stage and duration of ART (Molla et al,2013,Dereje et al 20015,Mekuri et al 2015,Solomon et al 2013)were reported as the determinants for under nutrition.

Another study in Ethiopia, Dembia, and shows obviously late clinical stage of HIV increases the odds of developing under nutrition, mainly through higher nutritional requirement coupled with poor food intake, and malabsorption of nutrients (Anbesaw et al, 2016).

In study done in Gonder on nutritional status of adults living with HIV/AIDS, Clients treated for less than one month were 14 times more likely to be malnourished as compared to those treated for more than six months. The duration of treatment (ART) reduces the risk of getting malnutrition as shown by the statistically significant association between duration of more than one month and reduction of the risk of developing malnutrition also in this study there was a statistically significant association between malnutrition and the presence of eating problems, those clients with eating problem were 2.35 times significantly associated with malnutrition than their counterparts (Belaynewetal, 2010). A study on Prevalence of malnutrition and Its associated

factors among adult people living with HIV/AIDS receiving anti-retroviral therapy at Butajira Hospital revealed Eating difficulty was also positively associated with malnutrition ($P = 0.002$). Participants who had one or more eating difficulty were 2.69 times more likely to be malnourished as compared to those who were free of eating difficulty (AOR = 2.69; 95% CI: 1.41, 5.11). Anemia was also positively associated with malnutrition ($P = 0.03$). Nutritional status and associated factors among adultHIV/AIDS clients in FelgeHiwot Referral Hospital, those who were on ARV drugs less than 12 months were 1.7 times more malnourished than those who took the drug more than a year

(Molla et al, 2013**).**

A study done in Dilla showed that one diagnosis of previous OI had a higher risk for developing malnutrition (AOR = 3.10, 95% CI 2.06–5.46) and having two or more diagnoses of OIs further increased the likelihood (AOR = 4.50, 95% CI 3.38–10.57) of malnutrition as compared to those with no previous diagnosis of OIs in the past 6 month. Likewise, independent of all other variables gastrointestinal symptoms (GIS) had significant association with malnutrition. Those patients with one or more GIS had 5.3 times a higher risk of developing malnutrition as compared to those with no GIS. (Solomon et al, 2013)

A cross sectional study conducted in Nekemte revealed that those who reported to had tuberculosis had 0.30 times significantly lowers likelihood of malnutrition than other opportunistic infections (Alemayehu et al, 2015). Another study conducted in Hosanna, clinical staging three (AOR = 3.91, 95% CI: 1.57, 9.73) and presence of opportunistic infections (AOR = 2.62, 95% CI: 1.49 - 4.59) were significantly associated with under nutrition. (Alemayehuet al, 2015).

Participants who were anemic were 1.94 more likely to be malnourished than those with normal hemoglobin level (AOR = 1.94; 95% CI: 1.05, 3.57)(Dereje et al,2015).

2.2.4 Life style factors

The result of a study done in south Africa on the weight status and associated factors among HIV infected people on ART therapy shows The prevalence of underweight among tobacco users was double the prevalence among non-tobacco users (15.6% vs. 7.1%), (Mashinya et al,2016).

CONCEPTUAL FRAMEWORK

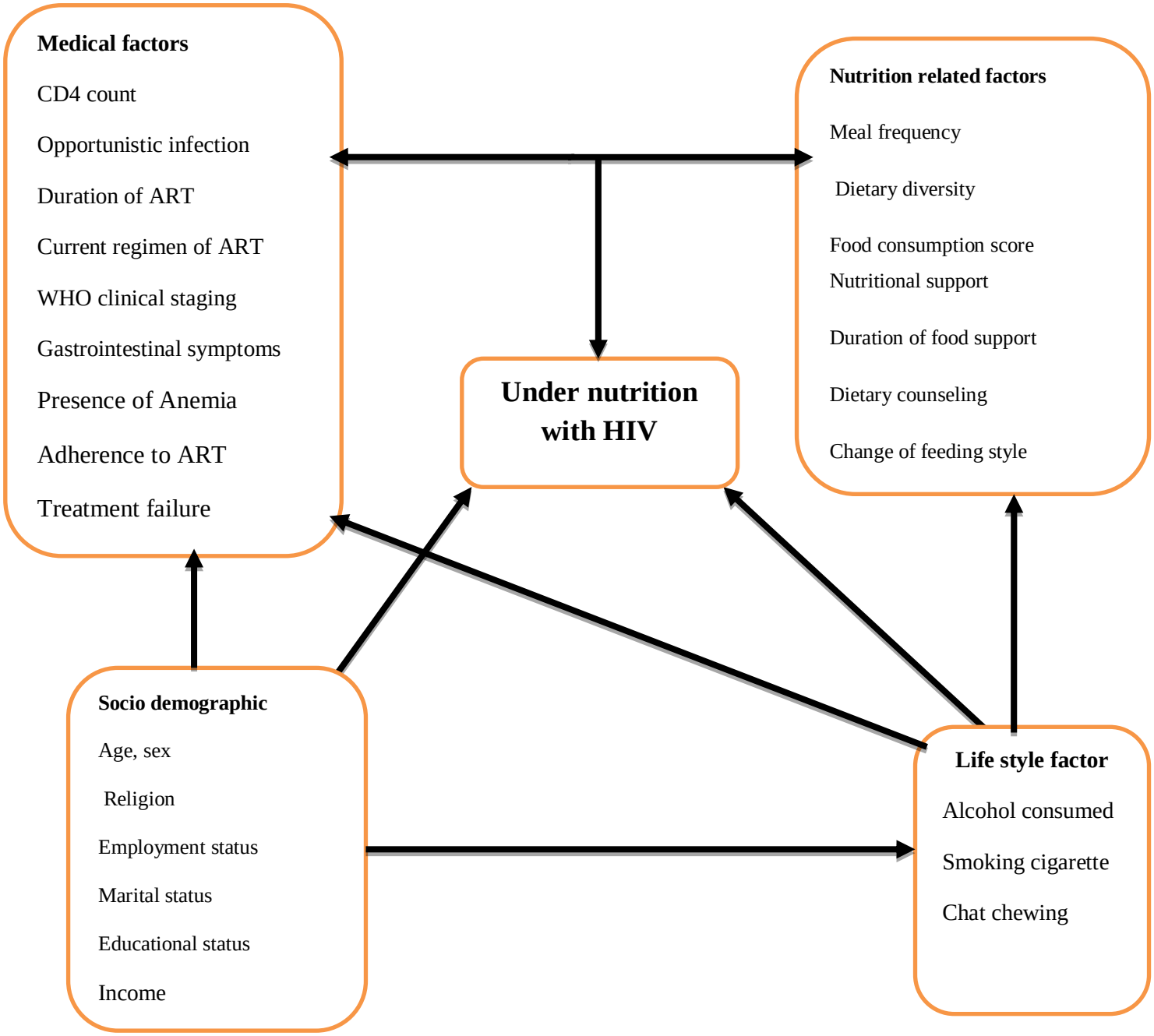

Figure 1 Conceptual framework assessments of under nutrition and associated factors among adults with HIV/AIDS on ART in Addis Ababa, Adapted from study from Wolita(Lula et al,2017)

CHAPTER3. METHOD AND MATERIALS

3.1. Study area and study period

Addis Ababa which is the capital city of Ethiopia and the largest as well as the dominant political, economic, cultural and historical city, were established in 1887 by Emperor Minilik II. The city lies $9^0 1' 48''$ N latitude and 38^0 44'24" longitudes and located at the heart of the country, at an altitude ranging from 2,100 meters at Akaki in the south to 3,000(9800 ft.) meters at Entoto Hill in the North. Its time zone is categorized in East Africa Time (UTC+3), the city occupies a total area of 527 Sq. Km^2. The total population of Addis Ababa was estimated to be 3, 384,569 according to 2007 census (WPR, 2019).Among public hospitals located in the city five are under federal ministry of health and six are under Addis Ababa city administration health bureau. The study was conducted in some selected hospitals under Addis Ababa health bureau on March2019. These hospitals are government hospitals that provide ART service with different catchment area. Those are minilik hospital, yekatit 12 hospital and Zewditu memorial hospital. Zewditu Memorial Hospital was located in a center of Addis Ababa, It is located a place where called fullwuha at kirkos sub city .There are different health departments like; OPD, MCH, Emergency room, Inpatient room, Major and Minor surgery room, ART clinic, TB clinic and delivery ward, Dental clinic. Additionally, the health service there is regional laboratory and dialysis center inside it. Menilik hospital health provider center that offers high quality comprehensive health service to patients from all over the region at affordable cost and located in the up market area of kilimani Nairobi, 200 meters along menilik road off Ngong road at Yeka sub city. Services are ophthalmology, surgery, psychiatry, dental, plastic surgery, art service and other departments.

Yakatit 12hospital providing modern, up to date and affordable health care service within a frame work of national health policy. The hospital is found in front of sidist kilo square in yeka sub city. It is serving more than 5 million people in the catchment area the main referral hospital for treatment of burn patients.

The study wasconducted from March 1 to March 30, 2019.

3.2 Study Design

An institutional based cross sectional study was conducted to assess under nutrition and associated factor among adults living with HIV/AIDS in selected public hospitals in Addis Ababa.

3.3 Source and Study population

The source population was all adults attending ART clinic inpublic hospitals under Addis Ababa health bureau. The study populations were those adults from the age greater than or equal to15years who wereattending ART clinic in selected hospitals.

3.4 Sample size determination

The sample size of the study was calculated using the formula for the estimation of single proportion as

$$n = \frac{Z^2 P(1-P)}{d^2}$$

n = sample size

p = proportion of malnutrition among PLWHAs on ART is (25%) (Addis Ababa)

W = maximum allowable error (margin of error) = 0.05

Z = value of standard normal distribution (Z-Statistic) at 95% confidence level (z=1.96).

With 10% non-respondent rate=288

For the first objective, by taking p=25% the study was done on degree of accuracy/precision and p is the estimated proportion of undernutrition among adult individuals on HAART in St peter hospital Addis Ababa(Habtamu et al, 2009). The computed sample size will be 288 and by taking 10% non-response rate, the sample size is 317.

To determine the required sample size for the second objective of the study, various factors significantly associated with the outcome variables were considered with the following assumption: confidence level 95%,power of 80% and odds ratio for each factor and 10% for non-response using EPI info version7.2.1 (Table1).

After calculating the required sample size for those selected variables, the maximum sample size was considered in this study by computing the sample for both objectives.Accordingly,the maximum sample size used for this study was 504 from the second objective.

Table 1sample size calculation of the associated factors

Variables	Assumption	10% Non-respondent rate	Sample size
Educational status	AOR=2.08(1.48-4.17) Power=80% Ratio 4:1 P=23.6%	458	504
CD4 count	AOR=2.01(1.31-3.42) Power=80% Ratio 1:2 P=18.5%	443	487
Food Aid	AOR=2.47(1.77-4.30) Power=80% Ratio=1:3 P=24.5%	228	251

3.5 Sampling technique

Random sampling by using lottery method was used to select three hospitals out of six hospitals under Addis Ababa health bureau. The study participants were selected by simple random sampling technique. Those appoint for the monthly ART refill obtain from the data clerk and those appoint at the time of data collection within 1month were used as a sampling frame. After excluding patients that did not fulfill the inclusion criteria all given a code to avoid repetition and data was collected until the desired sample obtain.

The total number of adult living with HIV/ AIDIS currently on ART attending ART clinic in each hospital were taken and proportional sample size was calculated for each selected hospital so as to give the total sample size by using the following formula

$$n=\frac{nx.\ Nx}{N}$$

Where: nx= Total number of adults currently on ART the x^{th} hospital.

Nx= Sample size of the study.

n = number of respondents to be selected from each institution.

N = Total number of adults living with HIV/AIDS currently on ART in selected hospitals

Menilik hospital $\frac{2700*504}{12,000} = 113$

Yekatit 12 hospital $\frac{2300*504}{12,000} = 97$

Zewiditu hospital $\frac{7000*504}{12,000} = 294$

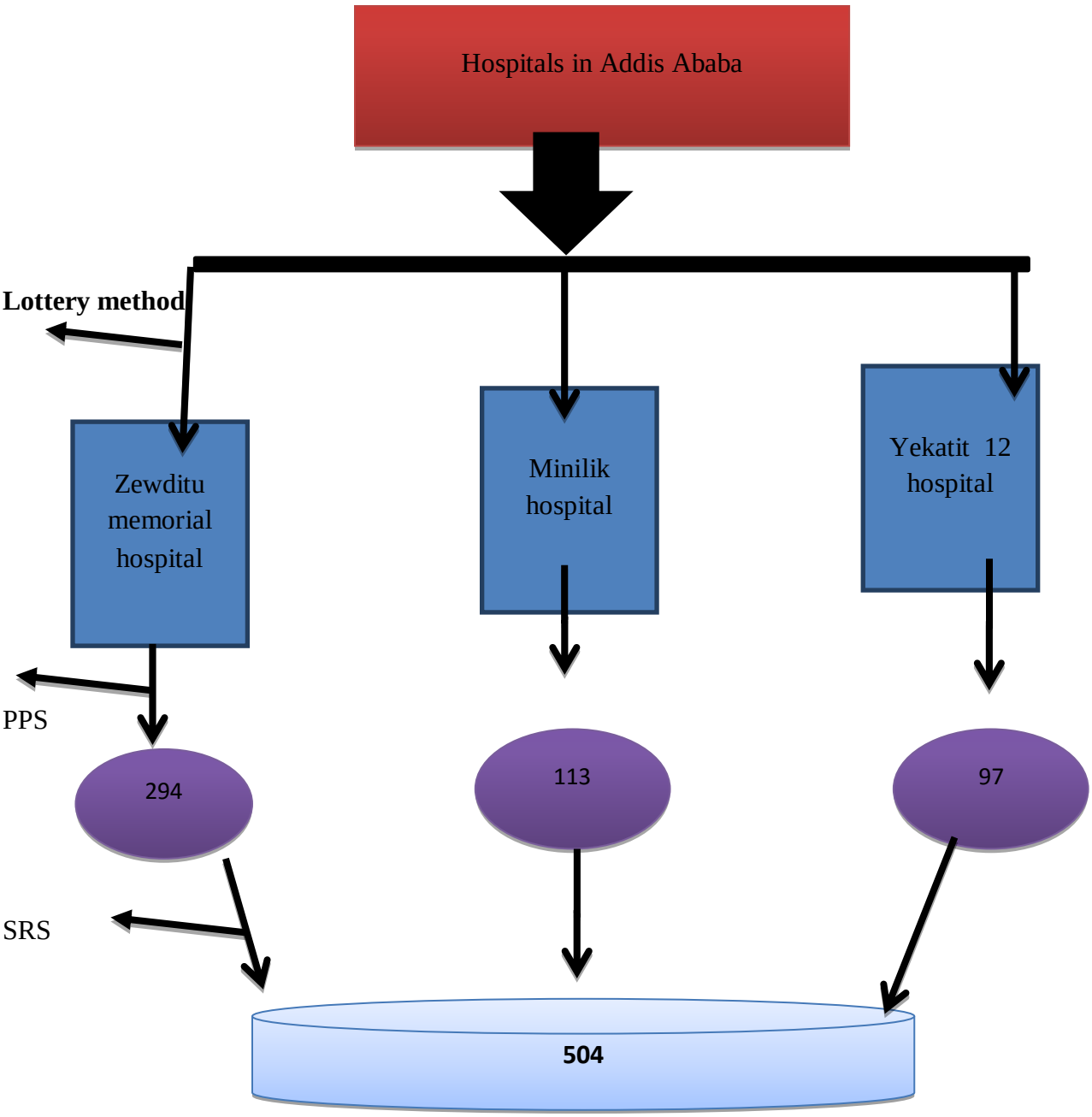

Figure 2Schematic diagrams for sampling procedure adult on ART in some selected public hospitals in Addis Ababa

Key**:** PPS=Proportion Probability to Size SRS=Simple Random Sampling

3.6 Inclusion and exclusion criteria

Inclusion criteria

All HIV-positive adults greater than or equal to 15years old who were on ART for at least 6 month were included in the study.

Exclusion criteria:

Patients with difficulty to stand, pregnant mothers and severely ill patients were excluded from the study.

3.7Variables

Dependent variables

- Under nutrition

Independent Variable

- Sociodemographic (age, sex, educational status, marital status, occupation, Income)
- Nutritional related factors (meal frequency, individual dietary diversity, nutritional support, duration of food support, dietary counseling, food consumption score)
- Medical factors (CD4count, opportunistic infection, duration of ART, current regimen of ART, WHO T- clinical staging, gastrointestinal symptoms, presence of anemia, adherence to ART, history of treatment failure, side effect of ART, eating difficulty)
- Life style-drink alcohol, smoking cigarette and chat chewing.

3.8 Operational definitions

Under nutrition was defined as the body mass index less than 18.5kg/m^2 (WHO, 2011).

Body Mass Index (BMI): The ratio of weight to height in meters squared(WHO,2006).

Individual Dietary diversity is a qualitative measure of foodconsumption that reflects individual access to a variety of foodsand is also a proxy for nutrient adequacy of the diet of individuals.

Dietary diversity score: Total count of food groups that an individual has consumed over the past 24 hours (FAO,2011).

* Low dietary diversity score= ≤3 food groups

*Medium dietary diversity= 4 and 5 food groups

*High dietary diversity= ≥ 6 food groups

Meal frequency: The frequency of food consumed by individual per day (WHO,2011).

Food consumption score: data on the diversity and frequency of food groups consumed over the previous seven days and calculated from the consumption frequencies are summed and multiplied by the standardized food group weight WFP (2008)

Poor: food consumption score <28

Borderline: food consumption score 28-42

Acceptable: food consumption score >42

Anemia: Hemoglobin <13gm/dl in males and Hemoglobin <12gm/dl infemale (WHO, 2011)

ART adherence status: It isdefined as taking one's medicine as prescribed and agreed between the patient and provider and estimated by percent of missed dose enclosed in the last 2 month follow-up time from patient ART follow-up form(Jerome CS et al,2017).

*Good adherence->95%, missed ≤2does of 30 doses or ≤ 3doses of 60 doses

*Fair adherence- 85- 94%, missed 3-5 doses of 30 doses or 6-9 doses of 60 doses

*Poor adherence-<85%, missed ≥6 doses of 30 doses or > 9 doses of 60 dose

3.9 Data Collection Procedure

Data collection was made by three nurseswho were assisting in the ART clinic in the selected hospitals and one health officer was a supervisor.

Data was collected in three ways.

First the anthropometric data of the subject was taken by data collectors. The anthropometric data was used to obtain weight and height in order to calculate BMI.Weight measurement wasconducted using a standard beam balance that is used in the medical setup and weight wasrecorded to the nearest 0.1kg. The body weight was taken with subject light clothes and shoes taken off. Besides, over worn cloths such as scarf in case of women was also ask to remove during body weight measurementsand the scale was checked at zero before and after each measurement(WHO,2006).

Height a measurement was carriedout while the subject removed his/her shoes, stand erect, looking straight in a horizontal plane with feet together and knees straight. During this measurement the heels, buttocks, shoulder blades and the back of the head was adjusted to touch against the wall and the measurements and height will record to the nearest 0.1cm. Body Mass Index calculation BMI was calculated using the formula: BMI = Weight in kg/ (Height in meters) ^{2}then the WHO BMI cutoff points were used to classify nutritional status of the study population (WHO,2006).

The questionnaire was used to obtain information about the sociodemographic & economic factors, nutritional factors, individual dietary diversity,Household food consumption score&life style factors.

Dietary diversity was calculated using questionnaire adopted from FAO (2011) guidelines. A record of the 24-hour recall of all food groups eaten by the respondents was taken and classified into the 18 food groups. . Food-consumption score thresholds and weights were borrowed directly from WFP(2008), making the results comparable to other scores across the country. Food consumption information was collected using a list of nine items. Respondents were asked the number of days each item/group was consumed inside the house during the past 7days.

Patients' medical chart was reviewed for extraction of hemoglobin level to assessed presence of Anemia, adherence to HAART, history of treatment failure,WHO AIDS' clinical stage, History of previous opportunistic infections (OIs) in the last 6 months and current CD4 cell count. This was registered during their monthly spell of follow up.

4.10 Data quality control measures

To assure the data quality high emphasis was given in preparing data collection Instrument especially on Anthropometry measuring instruments, on the preparation of questioner and also spot checking besides principal investigator did close supervision when data collection wastaking place.One day of Training was given to all data collectors and supervisor on the questionnaire and ways of collecting data by the principal investigator. The investigator was involved inall the process of the thesis completion.The questionnaire was initially prepared in English and then translated into Amharic. The Amharic version was again retranslated back toEnglish. The translated Amharic version questionnaire was pre-testedprior to the actual data collection on 5% of the sample size on patients who were not included in the study. The pre-test took place in RasDestahospital. Following analysis of the pre-test of the questionnaire was assessed for its consistency, clarity, understandability, completeness, reliability and how much of it was answered the objectives and the sensitivity of the subject matter.

Data collection process was strictly followed day to day by the supervisor and principal investigator. Then the data collectors assist in explaining the questionnaire that was given to the clients.The collected data was review and checked for completeness, coded andentered to SPSS window version 20 for further analysis.

3.11 Data processing and analysis

Data was checkedfor its completeness, coded manually before data entry. The data were entered to SPSS (Statistical Package for Social science) version 20 for analysis. Data entry was made by the principal investigator. In descriptive statistics tables, frequency and percentage were used to present the information. Bivariate and multivariable binarylogistic regression analyses were used to assess the effect of the various factors on under nutrition and to control possible confounders. The absence of multi-co-linearity was checked using variance inflation factor. P value ≤ 0.05 at 95% CI was considered statistically significant

3.12 Ethical consideration

Ethical approval was obtained from Bahirdar University and an official letter of permission was written to the respective hospitals from Addis Ababa health bureau ethical review committee prior to data collection. Permission was obtained from medical director of each referral Hospitals. Participants were informed about the nature of the study, its objectives, expected outcomes, and the benefits and the risks associated with it. Informed verbal consent was obtained from each study participant before data collection. Voluntary written consent was sought from those aged ≥18 years old whilst those aged 15–17 years were interviewed after obtaining parental assent. Confidentiality was also ensured by using questionnaire identification numbers instead of using any personalidentifiers. Written informed consent was obtained from each study participants.

CHAPTER4. RESULTS AND DISCUSSION

4.1. Results

4.1.1 Socio-demographic and economic characteristics of respondents

A total of 504 HIV/AIDS clients on ART were approached and 475 responded to the questionnaire making response rate 94.3%. Females accounted 267(56. 2%).The mean age of the study participants is 36.79± 9.1 years. Thelargest numbers of the clients were found in the age range of 35-44 years (44. 9%).Regarding to educational status of the participants. Onehundred fifteen (24.2%) have attended primary school. Nearly 158 respondents were married (33.3%). Concerning the occupational status of the respondents, most of them were government employee 101(21.3%) and majority of the clients monthly income was less than 2000 birr was 224(47.2%).

Table 2 Sociodemographic characteristics of the respondents in some selected hospitals in Addis Ababa, Ethiopia,2019

Variables(n=475)		Frequency	Percent
SEX	Female	267	56.2
	Male	208	43.8
AGE	15-24	83	17.5
	25-34	146	30.7
	35-44	195	41.1
	>45 years	51	10.7
Religion	Orthodox	273	57.5
	Protestant	126	26.5
	Muslim	70	14.7
	Others	6	1.3
	Primary school	115	24.2
	Secondary school	166	34.9
	Preparatory school	53	11.2
	College/University	106	22.3
	No formal education	34	7.2
Marital status	Single	172	36.2
	Married	158	33.3
	Divorced	78	16.4
	Widowed	67	14.1
Occupation	Government employee	101	21.3
	Student	86	18.1
	Daily laborer	61	12.8
	Self-employee	74	15.6
	Housewife	42	8.8
	Private employee	72	15.2
	No job	39	8.2
Income	< 2000 birr	224	47.2
	2000-5000 birr	122	25.7
	>5000 birr	129	27.2

4.1.2 Nutrition and Behavioral related characteristics of the participants

About 194(40.8%) clients wereChanged their feeding style after knowing HIV status from those majority 106 (22.3%) of the clients change their quality of feeding style. More than half of the participants consumed three and above meals per day 259 (54.5%). 50(10.5%) of the clients received food support. From those who received food support, 21(4.4%) received for one up to three months. More than half of the clients 311(65.5%) received dietary counseling.

The number of respondents who have consumed food from various categories is depicted. Majority of the clients have medium individual dietary diversity which is 215(45.3%).Large number of respondents were in the borderline food consumption score 247 (52%).

Twenty-two (4.6%) of the respondent's smoked cigarette and 6.9% drunk alcohol. Seventeen 3.6% respondents had habit of chewing chat.

Table 3 Nutritional and Behavioralrelated characteristics of the respondents in some selected hospitals in Addis Ababa, Ethiopia, 2019

Variables		Frequency	Percent
Chang In feeding style	No	281	59.2
	Yes	194	40.8
Changed feeding style	Quality	106	22.3
	Frequency	62	13
	Quantity	26	5.5
Meal frequency	Three and above meals	260	54.7
	Less than three meals	166	34.9
	I do not remember	49	10.3
Food support	No	425	89.5
	Yes	50	10.5
Duration of food support	Less than one month	10	2.1
	1-3 months	21	4.4
	More than three months	19	4.0
Dietary counseling	Yes	311	65.5
	No	164	34.5
Individual Dietary Diversity Score	Low dietary diversity(< 3 foods)	163	34.3
	Medium dietary diversity(4-5 foods)	250	52
	High dietary diversity(>6 foods)	65	13.7
Food consumption score	Poor (threshold<28)	52	10.9
	Borderline (threshold 28-42)	247	52.0
	Acceptable (threshold >42)	176	37.1
Cigarette smoking	No	453	95.4
	Yes	22	4.6
Frequency of smoking	once per day	1	.2
	2-3 times per day	20	4.2
	more than 3 times per day	1	.2
Alcohol drinking	No	442	93.1
	Yes	33	6.9
Frequency of drinking	Once per week	26	5.5
	2-3 days per week	7	1.5
Chat chewing	No	458	96.4
	Yes	17	3.6
Frequency of chewing	Once per week	7	1.5
	2-3 days per week	8	1.7
	3-6 days per week	2	.4

4.1.3 Medical and related characteristics of the participants

Nearly half 231(48.6%) of the respondents were fall under WHO clinical T stage one. And most of the respondents 155(32.6%) had CD4 count above 500cells/mm^3.One hundred eighty-one (38.1%) took ART for greater than 10 years. The commonest Regimen prescribed was 1e used in 208(43. 8%).Majority of the respondents had good adherence which was 326(68.6%).seventy three (15.5%) respondents had history of treatment failure. Side effect of ART drug seen 159(33.5%), the most common being neuropathy 49(10. 3%).Anemia was seen in 154 of the participants and gastrointestinal symptoms experienced by 135 of the clients. One hundred fifty-one clients (31.8%) had complain of eating problem most of which being loss of appetite 84(17.7%).

Table 4 Medical and related characteristics of the respondents

Variables		Frequency	Percent
Duration of ART	>10 years	181	38.1
	5-10 years	146	30.7
	1-5 years	97	20.4
	<1 year	51	10.7
CD4 count	>500 cells/mm3	155	32.6
	350-499 cells/mm3	94	19.8
	200-349 cells/mm3	137	28.8
	<200 cell/mm3	89	18.7
WHO staging	Stage1	231	48.6
	Stage 2	156	32.8
	Stage 3and 4	88	18.5
Regimen	1e	208	43.8
	1f	112	23.6
	1c	67	14.1
	1d	55	11.6
	Second line	33	6.9
Anemia	No	321	67.6
	Yes	154	32.4
Adherence	Good	326	68.6
	Fair	112	23.6
	Poor	37	7.8
Treatment failure	No	402	84.6
	yes	73	15.4
side effects of ART	None	317	66.5
	Neuropathy	49	10.3
	Hepato toxicity	37	7.8
	Food & drug interaction	22	4.6
	Rash	37	7.8
	Vomiting	6	1.3
	Others	8	1.7
Opportunistic infection	None	313	65.9
	Mouth sore & ulcer	48	10.1
	Pneumonia	36	7.6
	Acute/Chronic Diarrhea	28	5.9
	Tuberculosis	25	5.3
	Herpes zoster	6	1.3
	Others	19	4.0
GI symptoms	No	340	71.6
	Yes	135	28.4
Eating problems	No	324	68.2
	Yes	151	31.8

4.1.4 Nutritional status of people living with HIV/AIDS

The prevalence of under nutrition was 23.8%in this study. The mean BMI was 20.89 with ± 3.31.About 299(62.9%) were in the normal ranges, while 51 (10.7%) were in the overweight ranges and further 12(2.5%) were in the obese category.

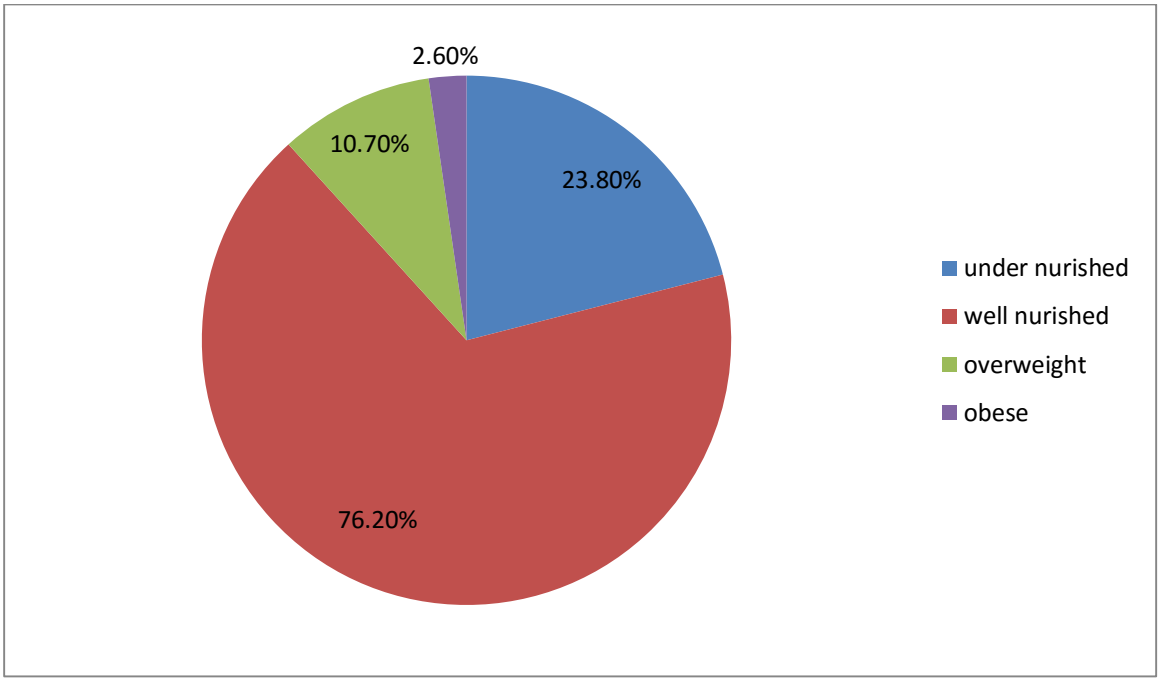

Figure 3Nutritional status of PLWHIV on ART follow up in some selected hospitals under Addis Ababa beauro, 2019

4.1.5 Factors associated with malnutrition in PLHIV

Both bivariable and multivariable binary logistic analysis were used to know the association between predictor variables and nutritional status of HIV/AIDS patients. Each variable entered to bivariable analysis and analyzed with the outcome variable and those variables p< 0.25 like age, marital status, current occupation, Income,Change of feeding style knowing after HIV status, food support, CD4 count, WHO staging, individual dietary diversity, food consumption score, presence of opportunistic infections, regimen of ART, presence of gastrointestinal symptoms, presence of anemia and eating problemshowed significant association with undernutrition.

In Multivariable logistic regression analysis indicated that Undernutrition (BMI<18.5) was significantly associated with marital status, food consumption score, presence of anemia, WHO staging and current ART regimeafter controlling for confounding factors.

The odds of being divorced were 4.8 times more likely to be undernourished compared to married individuals. Those participants with anemia were 3 times more likely to be malnourished than those without anemia.Concerning WHO T- staging, participants in stage one were 97% and stage two were 81% less likely to develop undernutrition than respondents in stage3and 4 which was used as a reference category. Participants who had poor food consumption score (threshold<28) were 10 times more likely to develop undernutrition than those who had acceptance food consumption score.Those participant who took ART regimen 1e(TDF+3TC+EFV) were8.3 timesmore likely to be under nourished than those who took second line ART regimen.

Table 5 Associated risk factors for under nutrition in HIV/AIDS clients on ART care in some selected hospitals under Addis Ababa health bureau, Addis Ababa, Ethiopia, 2019

Nutritional status		**95% CI**		
Under nourished	Normal	COR	AOR	
Age				
15-24	41	42	4.00(1.8-9.03)*	4.11(.77-25.09)
25-34	35	111	1.29(.58-2.88)	2.56(.70-9.32)
35-44	27	168	.66(.29-1.46)	.83(.25-2.58)
>44	10	41	1	1
Marital status				
Married	26	132	1.12(.51-2.48)	1.62(.41-6.4)
Single	62	110	3.21(1.53-6.73)*	1.12(.24-5.19)
Divorced	15	63	1.35(.56-3.26)	4.8(1.09-21.55)*
Widowed	10	57	1	1
Income				
<2000	80	144	4.56(2.45-8.47)*	1.43(.45-4.53)
2000-5000	19	103	1.51(.72-3.17)	.94(.34-2.58)
>5000	14	115	1	1
Change of feeding style				
Yes	29	165	.41(.25-.66)	.60(.29-1.23)
No	84	197	**1**	**1**
Food support				
Yes	25	25	3.83(2.09-699)	1.50(.57-3.93)
No	88	337	**1**	**1**
IDDS				
LDDS	53	110	2.99(1.37-6.51)*	1.250(.42-3.66)
MDDS	51	196	1.61(.75-3.49)	1.328(.42-3.84)

HDDS	9	56	1	1
Food consumption score				
Poor	18	34	2.29(1.15-4.55)*	10.1(3.12-32.5)*
Borderline	62	185	1.45(.90-2.33)	2.09(.94-4.54)
Acceptable	33	143	1	1
Presence of GI symptoms				
Yes	55	80	3.3(2.14-5.21)*	1.2(.51-2.88)
No	58	282	1	1
WHO staging				
Stage 1	18	213	.04(.90-.92)	.03(.01-.09)*
Stage 2	39	117	.19(.10-.33)	.19(.07-.51)*
Stage 3and 4	56	32	1	1
CD4 count				
<200 cell/mm3	43	46	7.58(3.94-14.5)	2.13(.79-5.74)
200-349 cells/mm3	37	100	3.00(1.60-5.63)	2.26(.96-5.30)
350-499 cells/mm3	16	78	1.66(.79-3.48)	1.21(.47-3.11)
>500 cells/mm3	17	138	1	1
Anemia				
Yes	71	83	5.68(3.61-8.94)	3.02(1.42-6.43)*
No	42	279	1	1
Eating problems				
Yes	52	99	2.26(1.46-3.5)	.80(.36-1.77)
No	61	263	**1**	**1**
Current ART Regimen				
1C	18	49	1	1
1D	7	48	.82(.24-2.82)	2.86(.4-20.35)
1E	61	147	2.32(.86-6.30)	8.3(1.55-44.03)*
1F	22	90	1.37(.47-3.95)	2.65(.49-14.24)

*P<0.05

4.2. DISCUSSION

This study focused on assessing the magnitude of under nutrition and its associated factors among adult PLWHA taking antiretroviral therapy in Addis Ababa hospitals. The study found that the magnitude of under nutrition among people living with HIV/AIDS is23.8% (95% CI: 17.6-24.2).Based on the Nutrition Landscape Information System (NLIS) cut-off values, the burden of under nutrition in this study was higher.

The magnitude of under nutrition seen in this study is higher than similar studies conducted in Nepal (19.93%) (Thapa et al, 2015), Dilla12.3 % (Solomon et al, 2015) and 10.3% among women in sub-Saharan Africa (Uthman,2008). In the contrary, the magnitude is lower than similar studies conducted in different part of Ethiopia like wolita sodo 26.6% (Lula et al,.2016),Addis Ababa 25% (Habtamu et al,2009), Felge Hiwot 25.5%(Daniel et al,.2013), Humera 42.3% (Hailemariam,2013), Butajira 78.1% (Dereje et al,.2015), Gonder 42.5% (Waise et al,2014).This difference in result may be due to geographical location, study setting, socioeconomic factors,different feeding stylesand year of current study.

According to the finding of this research, there was statistically significant association between being divorced and undernutrition.Those participants who weredivorced were4.8 times more likely to develop under nutrition than the married counterparts. Similar study in Wolita (Lula et al,2017) indicates that the likelihood of under nutrition was higher among widowed study participants compared to married counter parts and alsostudyin Nepal(Thapa et al, 2015) showed that those who are unmarried were 3.7 times more likely to be undernourished than those who were married. This might be due to the emotion encountered, and loss of spousal support, marital disruption, a stressful life event, elevates the risk of psychological distress thereby contributing to poor dietary habit and health outcomes which adversely affects their nutritional status.

This study found a significant positive association between anemia and under nutrition. Those who were anemic are 3 timesmore likely to be undernourished than those who were not anemic. Similarly study conducted in Butajira showed that those who were anemicwere 1.94 more likely to be malnourished than those who were not anemic(AOR = 1.94; 95% CI: 1.05, 3.57) (Dereje et al,2015).

Another study conducted indembia showed that those PLWHIV who were anemicwere 3.17 more likely to be malnourished than those who were not anemic (AOR = 3.17,95 % CI: 1.70, 5.92)(Anbesawet al,2016).This may be due to the fact that some of the participants took zidovudine which could lead to anemia.

In this studyfood consumption score were found to be significantly associated with under nutrition.Respondents with poor food consumption score were 10 times malnourished than with acceptable food consumption score. This is similar with studies conducted in Nepal shows that household with food insecure had highest odds of being undernourished than food secure households (Thapa et al, 2015).similar study conducted in Hossana shows that respondents who were food insecure were more than two times malnourished than food secured individuals (Mekuria et al, 2015).This was obviously due to lack of access to sufficient food to meet dietary needs for productive and health life and it leads to deficiency of macro and micronutrient.

WHO clinical staging characterizes the patient clinically into one of the four WHO HIV stages (Baveewo et al, 2011). The current study showed Independent of all other variables, WHO-T-clinical stage has significant effect on the likelihood of under nutrition,Clients who werein WHO-T- clinical stageI and II were less likelyundernourished than clients in WHO-T-clinical stage III and IV. Those respondents in stage I were 97% less likely to be undernourished than stage III and IV. Similarly clients in stage II were 81% less likely to become undernourished than clients in stageIII and IV.This finding is supported by a study done in Nepal which revealed that PLHIVs in stage III and IV were more than twice as likely to be under-nourished than PLWHIV in WHO stage I and II.

Identical studies inDilla (Solomon et al 2013) showed that WHO clinical stage four has significant effect on the likelihood of malnutrition development. Similar study inHosanna indicates clinical stage III and IV (AOR = 3.91, 95% CI: 1.57, 9.73) were significantly associated with under nutrition (Alemayehu et al, 2015).

Another study in Dembia, indicates obviously late clinical stage of HIV increases the odds of developing under nutrition, mainly through higher nutritional requirement coupled with poor food intake, and malabsorption of nutrients (Anbesaw et al, 2016).

This is due to the fact that Malnutrition is usually encountered at the advanced phase or end of the HIV infection. As the disease progresses, there will be increment in energy need and development of different opportunistic infections which affects the appetite, absorption, and utilization of nutrients from the diet.

In this study those participant who took ART regimen 1e(TDF+3TC+EFV) were 8.3 times more likely to be under nourished than those who took second line ART regimen. There is no study that support or oppose this finding. This may be due to most of the clients currently taken 1e regimen and this regimen has its own gastro intestinal side effect.

4.2.1 Strength and limitation of the study

The study didn't assess the degree of malnutrition using body weight loss calculated by reference to the usual body weight.

Recall bias by study respondents on the type of foods consumed in the week preceding the survey and the frequency of their consumption. This may have led to incorrect calculation and misclassification of food consumption score. But, we have made efforts to reduce recall bias, including regular supervision, and training on how to probe the clients to remember their food intake.

CHAPTER5. CONCLUSION AND RECOMENDATION

5.1 Conclusion

The results of this study provide data on the magnitude of under nutrition of HIV-positive patients and important associated factors. The prevalence of under nutrition is 23.8% adults on ART in Addis Ababa public hospitals.The odd of under nutrition is significantly associated withmarital status,presence of anemia,WHO T-staging ,food consumption scoreand current ART regimen were positively associated with under nutrition.

5.2 Recommendation

- Efforts should be strengthened to provide emotional support and psychological reassurance to divorced HIV positive adults

-Assessment and management of anemia of PLHIV should be the vital part of HIV care management

- The nutritional status of the patients must be dealt according to their WHO clinical staging.

- Comprehensive nutritional assessment during follow-up and routine nutritional supplement therapy for undernutrition.

-Attention needs to be given to improve food consumption score of PLWHIV in addition of ART.

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Annex

Annex 1: English version

Informed Consent

How are you, I am LubabaDebebe, master degree student at Bahirdar university in order to full fill master's degree in applied human nutrition. This is an interview to conduct field study on Assessment of under nutrition and associated factors among adults living with HIV/AIDS in some selected public hospitals Addis Ababa, Ethiopia 2018.This interview will take 25 minutes.

Your participation in the study is very important in reducing the adult HIV patients morbidity and mortality, which is caused by under nutrition. Your name & address will not be written in this form and will never be used in connection with any information you tell us. All the information given by you was kept strictly confidential and only used for this study. Your participation is voluntary and you are not obligated to answer any question which you do not wish to answer. If you fill discomfort to respond to any of the question, please fill free to drop it any time you wish to do so. Thank you in advance for your participation in the study.

Could I have your permission to continue?

1. Yes -

2. No - Stop the interview and thank the respondent.

Code number _____

PART 1 Socio demographic characteristics of the participants				
No	**Questions**	**Categories**	**Code**	**Skip**
101	Sex	Male Female	1 2	
102	Age	_____years		
103	Religion	Orthodox Muslim Protestant Others	1 2 3 4	
104	What is your educational status?	No formal Education Primary school Secondary school Preparatory School University/College	1 2 3 4 5	
105	What is your marital status?	Single Married Divorced Widowed	1 2 3 4	
106	What is your current occupation?	Student Government Employee Daily laborer Self-Employee	1 2 3 4	

		Housewife Private Employee No job	5 6 7	
107	Income of participants	**_____ birrr**		

PART 2Nutrition related characteristics

201	Have you ever Change of feeding style after knowing HIV status?	Yes No	1 2	**If no skip to 203**
202	Which type of feeding style you change?	Frequency Food quality Quantity	1 2 3	
203	How is your Meal frequency pattern in the last 24 hour?	Three meals and above Less than three meals I do not remember	1 2 3	
204	Have you ever received food support?	Yes No	1 2	IF No, Skip to 206
205	How long is your duration of food support?	< 1 month 1-3 months >3 months	1 2 3	
206	Have you ever received dietary counseling?	Yes No	**1** **2**	

Part 3 Food diversity assessment questions

Question Number	Food group , Examples	Yes=1	No=0	Dk =2	
DDM1	Any porridge or gruel (made from grains other than teff any cerifam, fafa, milupa, babylac, mother's choice or other commercially fortified baby food?				
DDM 2	Bread, pasta, rice, noodles, biscuits, cookies or any other food made from oats, maize, barley, wheat, sorghum, millet, or other grain?				
DDM 3	Any food made from teff, like injera, kita, or porridge?				
DDM 4	Any white potatoes, white yams, bulla, kocho, cassava, or any other foods made from roots?				
DDM 5	Any pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside?				
DDM 6	Any dark green, leafy vegetables like kale, spinach or amaranth leaves?				
DDM 7	Any ripe mangoes, ripe papayas				
DDM 8	Any other fruits or vegetables?				
DDM 9	Any liver, kidney, heart or other organ meats?				
DDM 10	Any beef, pork, lamb, goat, rabbit [or wild game meat such as antelope or deer]?				
DDM 11	Any chicken, duck or other birds?				
DDM 12	Any eggs?				
DDM 13	Any fresh or dried fish or shellfish?				
DDM 14	Any foods made from beans, peas, lentils or pulses?				
DDM 15	Any nuts or seeds such as peanuts, sesame or sunflower seeds?				
DDM 16	Any cheese, yogurt, milk or other milk products				
DDM 17	Any foods made with oil, fat, or butter?				
DDM 18	Any other solid or semi-solid food?				

Part4 : Household food consumption score

"In the past 7 days, how often have you eaten	0 Never	1 <1/wk	2 1-2/wk	3 often 3-6/wk	4 Always Every day
Any food made from grains injera, teff, millet, sorghum, maize, rice, wheat, bread, biscuits, or any other grain product or any food made from tubers potatoes, sweet potatoes, carrots, or other foods made from roots or tubers?					
Any pulses (beans, lentils, peas)?					
Any vegetables?					
Any fruits?					
Any meat: beef, lamb, goat, fish, chicken, or, liver, kidney, or other organ meats?					
Any eggs					
Any dairy products—milk, cheese, yogurt (not including butter)?					
Any sugar or honey?					
Any oil, fat, or butter?					

PART 5 Medical related characteristics

501	How long have took ART medication?	<1 year 1-5 years 5-10 years >10 years	1 2 3 4	
502	Side effect of medication in the past six month	Yes No	1 2	IF No, Skip to308
503	If yes, what are the side effects?	Neuropathy Hepatotoxicity Food & drug interaction Rash Vomiting Others	1 2 3 4 5 6	
504	Current/previous opportunistic infection within the last 6 months after initiation of ART	Acute/chronic Diarrhea Mouth sore & ulcer Tuberculosis Pneumonia Herpes zoster Others None	1 2 3 4 5 6 7	
505	Presence of Gastrointestinal symptoms in the past six months	Yes No	1 2	
506	Did you have eating problem in the past 6 months?	Yes No	1 2	IF No, Skip to part
507	If yes, What are the problems?	Loss of appetite Nausea/Vomiting Swallowing problem Mouth/throat pain & sore Other	1 2 3 4 5	

PART 6 Behavioral characteristics

601	Do you smoke cigarette?	Yes No	1 2	
602	If yes How often do smoke per day	Once per day 2-3 times per day More than 3times per day	1 2 3	
603	Do you drink alcohol?	Yes No	1 2	
604	On average, how often do you usually drink alcohol	Once per week or less 2-3 days per week 3-6 days per week Every day	1 2 3 4	
605	Did you chew chat?	Yes No	1 2	
606	How often do you smoke?	Once per week 2-3 days per week 3-6 days per week Every day	1 2 3 4	
PART 7 Anthropometric Measurement				
701	Weight in (kilogram)	_____(kg)		
702	Height in (meter)	_____(m)		
703	BMI in kg/m^2	_____(kg/m^2)		

Part 8 Information from client chart (record)

801	Hemoglobin level	_____		
802	Current CD4 count?	<200 cell/mm^3 200-349 cells/mm^3 350-499 cells/mm^3 >500 cells/mm^3	1 2 3 4	
803	Current WHO clinical staging?	Stage 1 Stage 2 Stage 3 and Stage 4	1 2 3	
804	Current regimen of ART drug	1c((AZT+3TC+NVP) 1d((AZT+3TC+EFV) 1e(TDF+3TC+EFV) 1f(TDF+3TC+NVP) Second line regimen	1 2 3 4 5	
805	Adherence to ART medication in the past 2month?	Good adherence Fair adherence Poor adherence	1 2 3	
806	History of treatment failure	Yes No	1 2	

Annex II Amharic version

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