



Dietary Diversity and Associated Factors among HIV Positive Adults Attending Antiretroviral Therapy Clinic in Hawassa City Health Institutions, South Ethiopia

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ABSTRACT

Background: Nutritional care is considered a crucial component of comprehensive care for people living with Human Immunodeficiency Virus particularly in resource-limited settings and low quality monotonous diets are the norm. Undiversified diet can have negative consequences on individuals' health, well-being, and development, mainly by reducing physical, social, cognitive, reproductive, and immunological capacities. Therefore the aim of the study was to assess dietary diversity and associated factors among HIV positive adults attending Anti-Retroviral Therapy (ART) clinic in Hawassa city health institutions.

Methods: An Institution based cross sectional study design was conducted from May to June 2020 among 532 Anti Retro Viral Therapy attendants in Hawassa city. Systematic sampling method was employed to get the study participants. A structured pre-tested questionnaire was used to collect the data. The data was entered into Epi data version 3.1 and then was exported to SPSS version 20 for analysis. Bivariate and multivariable analysis was done by using binary logistic regression. Results was statistically significant at p-value ≤ 0.05 at 95% CI.

Results: A total of 532 respondents (with 97.8% response rate) were included in the study. Individual dietary diversity score of HIV positive adult individuals showed that 46.1% (95% CI: 41.8%, 50.3%) had sub optimal dietary diversity. Marital status, wealth index, age dependency ratio, duration of antiretroviral treatment and CD4 count were the factors associated with dietary diversity.

Conclusion: Sub optimal dietary diversity was found to be a nutritional problem among HIV positive adults. Therefore, appropriate dietary therapy of healthy eating, immunity booster foods and diet diversification and also strength counseling to appropriate dietary management of common side effects of ART for clients on early period of initiation of ART.

Keywords: Dietary diversity score; People living with HIV; Healthy eating

INTRODUCTION

Dietary Diversity (DD) is defined as, the number of different food groups consumed over a given period of time. Diversified diet is recommended in most dietary guidelines. This idea clarified that there is no any single food which contains all the required nutrients for optimal health [1,2]. In people living with Human Immune Deficiency virus (HIV), nutrition supports overall health and helps to maintain the immune system. Good nutrition also helps

people with HIV to get healthy weight and absorb HIV medicines [3]. Dietary Diversity Score (DDS) at the individual level is a proxy indicator of nutritional adequacy [4]. Intake of diversified foods is an internationally accepted recommendation for a healthy diet, and it is associated with good health outcomes [5].

Nutrition is a substantial component of comprehensive care for individuals living with HIV/Acquired Immune Deficiency Syndrome (AIDS) particularly in our set up [6,7]. Adequate

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and diversified nutrition is required to manage opportunistic infections, maintain the immune system, enhance response to medical treatment, and support optimal quality of life in People Living with HIV/AIDS (PLWHA) [8].

The World Health Organization (WHO) recommends that HIV positive patients should consume diversified foods [9]. Malnutrition and HIV/AIDS are both highly prevalent in many parts of the world and undiversified food and malnutrition are public health concerns worldwide, especially in developing countries [10]. In developing countries with high nutrient demands, chronic patients like HIV/AIDS are at high risk due to consumption of low-quality, monotonous food which leads to nutrient deficits [11].

The relationship between HIV infection and nutrition and impact of HIV on nutrition is very complex and related to each other. The effects are interconnected and exacerbate one another in a vicious cycle [12]. Both HIV and inadequate intake can independently cause progressive damage to the immune system and increased susceptibility to infection, morbidity, and mortality through opportunistic infections, fever, diarrhea, loss of appetite, nutrient mal absorption, and weight loss, increasing energy [9], reducing food intake, and adversely affecting nutrient absorption and metabolism [13].

Inadequate dietary intake leads to malnutrition [14], and malnutrition adds fuel to the fire by accelerating the progress of HIV infection to AIDS. HIV/AIDS is associated with biological and social factors that affect the individual's ability to consume, utilize, and acquire food [15].

Inadequate dietary intake could contribute to micronutrient deficiencies that further leads to HIV/AIDS disease progression and to the reduction of CD4 count which increases risk of opportunistic infections [16].

Depressive disorders are common among 20% to 32% of people with HIV disease but are frequently unrecognized. Major depression is a recurring and disabling illness that typically responds to medications, cognitive psychotherapy, education, and social support. A large percentage of the emotional distress and major depression associated with HIV disease results from immunosuppression, treatment, and neuropsychiatric aspects of the disease [17].

The level of dietary diversity and its associated factors on HIV positive individuals will play a vital role in improving quality of nutritional care and counseling provided by healthcare providers which in turn improves client's quality of life and physical and social capacity [18]. This study was try to assess variables such as anxiety and depression, and age dependency ratio that were not addressed in previous studies done in Ethiopia, in relation to dietary diversity among HIV positive adults attending ART clinics. Therefore the aim of the study was to assess dietary diversity and associated factors among HIV positive adults attending ART clinic in Hawassa city health institutions.

METHODOLOGY

Study design and setting

Institution based cross-sectional study was conducted in in Hawassa city health institutions on those receiving ART services from May to Jun 2020. Hawassa is the administrative city for both South Region Nation Nationality and People Representatives (SNNPR)

and Sidama regional state. It is located 275 Km southern of the capital city, Addis Ababa. The city is divided into 8 sub city and 32 kebeles. Currently in Hawassa city 7 ART health institutions which were included in the study, which were providing ART service for a total of 6194 clients living with HIV/AIDS, from those 5,812 were adults [19].

Participants

The Source Populations were all adult people living with HIV/AIDS who were enrolled to ART care in Health institutions of Hawassa city. Systematically selected adult people living with HIV/AIDS enrolled to ART care in health institutions of Hawassa city during data collection period were the study population. Those who were following ART care in Hawassa city health institutions 18-64 years and lived equal to or greater than 6 month were included in the study. However, HIV positive adults receiving ART care and previously diagnosed pregnancy, and those who were admitted for inpatient management were excluded from the study.

Sample size and sampling technique

Separate sample size was calculated for each specific objective. For the first specific objective single population proportion formula by taking Proportion (P) of low dietary diversity score among adult ART users 71% which was obtained from study conducted in Ambo West Shoa Zone [20], at 95% of confidence level and a marginal error (d)=4%. To determine sample size for the second objective Computer based Epi info7 software Statcalc was used. Finally, the sample size of first objective was greater than that of the second objective. The final sample size including 10% non-response rate was 544.

The sampling procedure in general: first of all the last 4 weeks data of HIV positive adult in all health institutions was taken for the purpose of sample allocation and to determine their sharing's. The sample was proportionally allocated for each health facilities based on clients flow and then systematic random sampling technique was used. The sampling interval was calculated for each health facility by dividing the expected number of ART clients per month. Then at every 4th intervals (4 was sampling fraction, which was calculated as N/n for each health institutions). The starting sample was selected by lottery method. The procedure was continued until the required sample size was obtained.

Data collection tools and procedure

Interviewer-administered questionnaire was developed by reviewing different literatures and designed to capture socio-demographic and economic, health and behavioral related and nutrition related characteristics of study participants. Individual dietary diversity score [4] was used to assess dietary diversity of adult PLHIV. The dietary diversity scores consist of a simple count of food groups that an individual has consumed during the preceding 24 hours [4]. Based on the Food and Agriculture Organization (FAO)/ Food and Nutrition Technical Assistance Project (FANTA) 2010 recommendation, foods eaten by the respondents was classified into 9 food groups, i.e. starch staples, legumes, nuts and seeds, dark green leafy vegetables, vitamin-A rich fruits and vegetables, other fruits and vegetables, meat and fish, organ meat, egg, and milk and milk products. Oils and fats do not contribute much to micronutrient density of the diet [21], this food groups are not used in estimating individual dietary diversity score. But oils and

fats food groups are energy dens and important for the absorption of fat soluble vitamins as a result proportion of study participants consuming this food group was also estimated alone. Participants were received 1 point if they consumed food at least once during the last 24 hours within each subgroup and 0 point if they never consumed the food. Data on health related characteristics such as duration of ART, Cotrimoxazole prophylaxis, current CD4 count, World Health Organization (WHO) clinical stage and opportunistic infections was collected by reviewing patient clinical records.

Data quality control

The questionnaire was first prepared in English by reviewing literatures and translated into Amharic version, which later back translated to the English version to check its consistency and comparability of the finding. Training was given for 7 BSc nurse data collectors and 1 health officer supervisor for one day. Pre-test was performed on 5% of clients in Leku primary hospital one of Woreda of Sidama Region. Possible clarifications and corrections was done on the questionnaires after the pretest. A supervisor and principal investigator were closely following the day to day data collection process and ensure completeness and consistency of the collected questionnaires on a daily basis. Proper coding and categorization of data was maintained for the quality of the data to be analyzed.

Dependent variables

Dietary diversity.

Independent variables

Socio-demographic and Socioeconomic factors, nutritional factors, Psychosocial and Behavioral factors, Clinical and health related characteristics.

Operational definitions

Dietary diversity score: In the study was created by summing up the number of food groups consumed over a 24 hours period by an individual. Then classified as

Optimal dietary diversity: HIV positive adult who received foods > or equal to five food groups out of the nine food group [20].

Sub optimal dietary diversity: HIV positive adult who received foods < five food groups out of the nine food groups [20].

Age dependency ratio: Age dependency ratio was calculated at household level using the standard formula of age dependency ratio.

Wealth index: Wealth index was developed based on ownership of fixed asset using PCA then it was ranked by tertertial and recorded as low, middle and high [22].

Anxiety: Those patients with HADs score for anxiety 8 and above were considered having the problem [23].

Depression: Those patients with HADs score for depression 8 and above were considered having the problem [23].

Nutritional knowledge: Around 18 nutritional knowledge assessment questions were employed and patients who answered below mean value labeled as poor and those scored above mean

value were labeled as good knowledge [24].

Data processing and analysis

The data were coded, and entered into Epi data version 3.1, then exported to SPSS window version 20 for analysis. Then, cleaned, recoded and stored to facilitate its analysis. The analysis was done by computing proportions and summary statistics. Then the information was presented by using frequency table, chart, graphs and cross-tabulation. Principal Component Analysis (PCA) was used for wealth index from EDHS. Bivariate Logistic Regression analysis was used to check association between dependent and independent variables. Variables with p-value <0.25 on bivariate analysis were entered to multivariable logistic regression model to identify the factors that affect dietary diversity of adult PLWHIV. Multi-collinearity was checked by Variance Inflation Factors (VIF) and model fitness checked by Hosmer-Lemeshow p-value, which was >0.05. Results were claimed statistically significant when p-value was ≤ 0.05 at 95% CI.

RESULTS

Socio demographic characteristics

In this study, a total of 532 participants were involved making response rate of 97.8%. Out of the total respondents 324 (60.9%) were females and the mean (±SD) age of respondents was 40.42 (10.4). Three hundred fifty three (47.6%) respondents were protestant and 241(45.3%) were Orthodox Christian. Out of the total 202(38%) were married and 334(62.8%) had taken secondary school and above. The mean family size of respondents was 3.4 with standard deviation of 1.63 and 43.6% were living in the household size of four and above. The mean age dependency ratio of respondents was 0.368 with standard deviation of 0.52 and 41% of respondents were above the mean (Table 1).

Health related and nutritional Characteristics

From the total, 9.8% respondents had comorbidities. Larger proportions of HIV positive adults, 449(84.4%) were taking ART for greater than two years. More than half of respondents 319(60%) were taking Cotrimoxazole prophylaxis. Four hundred twenty seven (80.3%) had CD4 count greater than 350 cells/mm³ and 442(83.1%) respondents were fall under WHO clinical stage I. Eighty one(15.2%) respondents had opportunistic infection. Around one third (34.8%) respondents had received nutritional counseling on general feeding (Table 2). Regarding nutritional knowledge, 257(48.3%) respondents had poor nutritional knowledge.

Psychological and behavioral characteristics

From total respondents, 85(34.7%) among sub optimal and 75(26.1%) among optimal dietary diversity of respondents had experienced depression (Figure 1). Regarding smoking status, 11 (2.1%) participants were ever smoked cigarette, from those 9(81.8%) respondents were currently smoke cigarette. Seventy nine (32.8%) of respondents had consumed alcohol drink in the past one year and more than half (57%) of respondents had consumed alcohol drink currently. About half 23(52.2%) respondents were chewed khat currently (Table 3).

Table 1: Socio-demographic characteristics of HIV positive adult patients in Hawassa city health institutions South Ethiopia, 2020 (n=532).

Variables	Categories	Frequency (n=532)	Percent (%)
fSex	Female	324	60.9
	Male	208	39.1
Age	18-29	73	13.7
	30-40	226	42.5
	>40	233	43.8
Educational status	Secondary education and above	334	62.8
	Primary education	160	30.1
	No formal education	38	7.1
Marital status	Married	202	21.1
	Single	112	38
	Divorced	87	16.4
	Widowed	131	24.6
Family size	≤ 3	300	56.4
	≥ 4	232	43.6
Age dependency ratio	Below mean	314	59
	Above mean	218	41
Household wealth	High	159	29.9
	Middle	185	34.8
	Low	188	35.3

Table 2: Health related and nutritional characteristics of HIV positive adult patients Hawassa city health institutions South Ethiopia, 2020 (n=532).

Variables	Classification	Dietary diversity	
		Frequency	
		Sub optimal DD	Optimal DD
Comorbidity	No	223(91.0%)	259(90.2)
	Yes	22(9.0%)	28(9.8%)
Type of Comorbidity	HTN	12(42.9%)	10(45.5%)
	DM	9(32.1%)	10(45.5%)
	Other	7(25.0%)	2(9.1%)
Duration of ART	>2 year	192(78.4%)	257(89.5%)
	1-2 year	29(11.8%)	18(6.3%)
	<1 year	24(9.8%)	12(4.2%)
Cotrimoxazole prophylaxis	Yes	145(59.2%)	174(60.6%)
	No	100(40.8%)	113(39.4%)
CD4 count	>350 cells/mm ³	174(71.0%)	253(88.2%)
	200-350 cells/mm ³	46(18.8%)	28(9.8%)
	<200 cells/mm ³	25(10.2%)	6(2.1%)
WHO clinical stage	I	182(74.3%)	260(90.6%)
	II	47(19.2%)	20(7.0%)
	III	16(6.5%)	7(2.4%)
OI	No	193(78.8)	258(89.9)
	Yes	52(21.2)	29(10.1)
Type of OI	Bacterial pneumonia	25(86.2%)	44(78.8%)
	PTB	4(13.8%)	11(21.2%)
Nutritional counseling	Yes	80(32.7)	105(36.6)
	No	165(67.3%)	182(63.4)
Notional knowledge	Good knowledge	83(33.9%)	192(66.9%)
	Poor knowledge	162(66.1%)	95(33.1%)

Note: OI: Opportunistic Infection

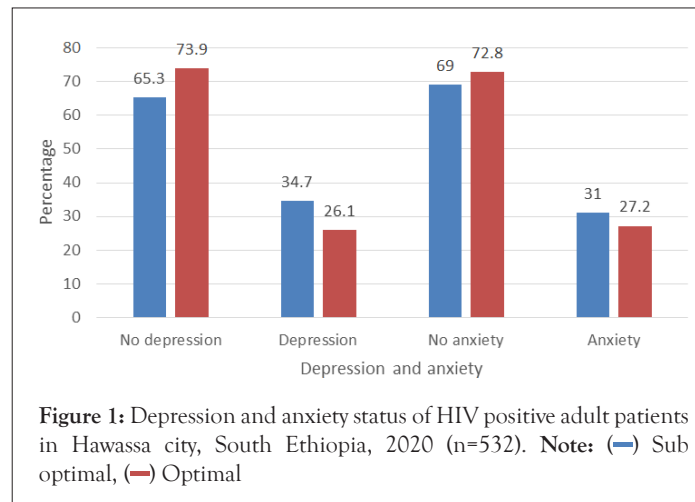


Figure 1: Depression and anxiety status of HIV positive adult patients in Hawassa city, South Ethiopia, 2020 (n=532). **Note:** (→) Sub optimal, (→) Optimal

Table 3: Psychological and Behavioral characteristics of HIV positive adult patients in Hawassa city health institutions, South Ethiopia, 2020 (n=532).

Variables	Classification	Dietary diversity	
		Sub optimal DD	Optimal DD
Ever smoked cigarette	No	237(96.7%)	284(99.0%)
	Yes	8(3.3%)	3(1.0%)
Currently smoke cigarette	No	2(25.5%)	0
	Yes	6(75.0%)	3
Ever consumed alcohol	No	128(52.2%)	163(56.8%)
	Yes	117(47.8%)	124(43.2%)
Consumed alcohol within the past one year	No	74(63.2%)	88(71.0%)
	Yes	43(36.8%)	36(29.0%)
Frequency of alcoholic drink	5-6 days/ week	4(9.3%)	3(8.3%)
	1-4 days / week	9(20.9%)	3(8.3%)
	1-3 days/ month	27(62.8%)	16(44.4%)
	<1/month	3(7.0%)	14(38.9%)
Consumed alcohol within the past 30 days	No	16(37.2%)	18(50.0%)
	Yes	27(62.8%)	18(50.0%)
Ever chewed khat	No	227(92.7%)	261(90.9%)
	Yes	18(7.3%)	26(9.1%)
Currently chewed khat	No	7(38.9%)	14(53.8%)
	Yes	11(61.1)	12(46.2%)

Level of dietary diversity

The mean (+SD) individual dietary diversity score of HIV positive adult was 4.34 (+1.415). Two hundred fort five (46.1%) HIV positive adults got sub optimal dietary diversity. Starch staples and other fruits and vegetable were food groups predominantly consumed by the clients with 100% and 94.5% respectively, whereas the least consumed food groups by the clients were fish and sea foods (2.4%) and vitamin A rich fruits and vegetables (25.0%) (Figure 2).

Bi-variable and multi variable analysis

Variables that fulfill the criteria in bivariate analysis were entered in to multivariable analysis model. After conducting Multivariable logistic regression analysis marital status, age dependency ratio above mean score, low and middle wealth index, <1 year duration and 1-2 years of ART duration and <200 cells/mm³ CD4 count were significantly associated with dietary diversity (Table 4).

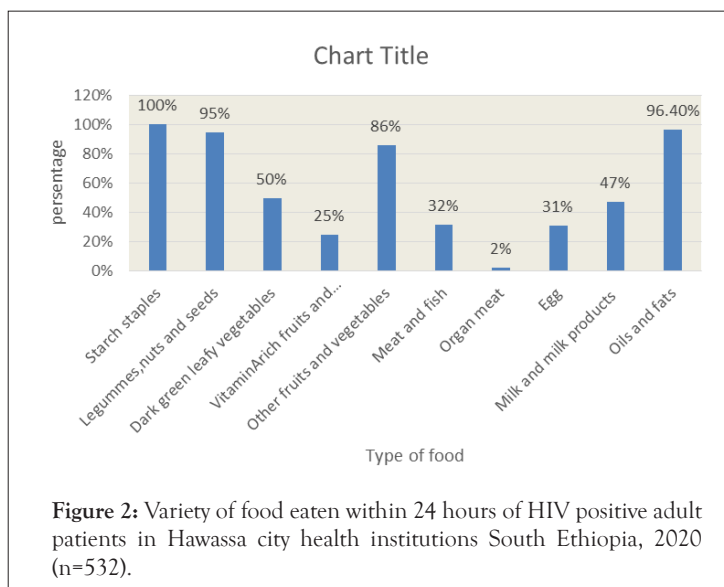


Figure 2: Variety of food eaten within 24 hours of HIV positive adult patients in Hawassa city health institutions South Ethiopia, 2020 (n=532).

Table 4: Bivariate and multivariable logistic regression output showing factors associated with dietary diversity of HIV positive adult patients in Hawassa city health institutions South Ethiopia, 2020 (n=532).

Variables	Dietary diversity		(95% CI)	
	Sub optimal	Optimal	Crude OR	Adjusted OR
Sex				
Female	157(64.1)	167(58.2)	1	1
Male	88(35.9)	120(41.8)	0.78(0.55,1.11)	1.16(0.75,1.82)
Educational status				
Secondary education and above	138(56.3)	196(68.3)	1	1
Primary education	82(33.5)	78(27.2)	1.49(1.02,2.18)	1.01(0.62,1.65)
No formal education	25(10.2)	13(4.5)	2.73(1.35,5.53)	1.32(0.54,3.24)
Marital Status				
Married	80(32.7)	122(42.5)	1	1
Single	44(18.0)	68(23.7)	0.99(0.62,1.58)	1.14(0.629,2.062)
Divorced	37(15.1)	50(17.4)	1.13(0.68,1.88)	0.72(0.38,1.37)
Widowed	84(34.3)	47(16.4)	2.73(1.73,4.30)	3.28(1.85,5.80)**
Family size				
≤ 3	145(59.2)	155(54.0)	1	
≥ 4	100(40.8)	132(46.0)	0.81(0.57,1.14)	
Age dependency ratio				
Below mean	121(38.5)	193(67.2)	1	1
Above mean	124(56.9)	94(32.8)	2.10 (1.48,2.99)	3.38(2.12,5.39)**
Wealth index				
Middle	98(40.0)	87(30.3)	0.53(0.34, 0.83)	0.48(0.28,0.80)*
Low	39(15.9)	149(51.9)	0.12(0.08 , 0.20)	0.14(0.08, 0.26)**
Duration of ART				
>2 year	192(78.4%)	257(89.5%)	1	1
1-2 year	29(11.8%)	18(6.3%)	2.16(1.16 ,3.99)	2.38(1.14,4.98)*
<1 year	24(9.8%)	12(4.2%)	2.68(1.31,5.49)	2.76(1.14,6.64)*
CD4 count				
>350 cells/mm ³	174(71.0%)	253(88.2%)	1	1
200-350 cells/mm ³	46(18.8%)	28(9.8%)	2.39(1.44,3.94)	1.49(0.696-3.20)
<200 cells/mm ³	25(10.2%)	6(2.1%)	6.06(2.44,15.06)	4.34(1.19,15.84)*

WHO clinical stage				
I	182(74.3%)	260(90.6%)	1	1
II	47(19.2%)	20(7.0%)	3.36(1.92,5.86)	1.62(0.71,3.73)
III	16(6.5%)	7(2.4%)	3.27(1.32,8.097)	0.70(0.17,2.85)
Illness in past one week				
No	206(84.1%)	262(91.3%)	1	1
Yes	39(15.9%)	25(8.7%)	1.98(1.16,3.339)	0.82(0.40,1.50)
OI				
No	193(78.8)	258(89.9)	1	1
Yes	52(21.2)	29(10.1)	2.40(1.47,3.97)	1.04(0.50,2.17)
Depression				
No depression	160(65.3)	212(73.9)	1	1
Depression	85(34.7)	75(26.1)	1.50(1.04,2.18)	0.90(0.55,1.47)

Note: Indicates reference category; *: Indicates significant association at p value ≤ 0.05; **: Indicates highly significant association at p value <0.001

DISCUSSION

The finding of this study revealed that 46.1% (95% CI: 41.8%, 50.3%). of HIV positive adults had sub optimal dietary diversity, which is lower than the reports from a study done in Ambo, west shoa zone (71%) [20], Motta East Gojjam Zone (70.7%) [25], Metema Hospital (58.8%) [26], Jimma University specialized hospital (55.8%) [21], Nigeria (62.3%) [27], Algeria(68%) [28] and Uganda(59.0%) [29].This difference may be due to variations of study periods, geographical location, seasonal variability, and other socio-demographic factors.

Among socio demographic factors marital status widowed were 3.28 times more likely to have sub optimal dietary diversity as compared to those who were married. This might be due to without wife/husband may experience sub optimal dietary diversity at higher rates due to a lack of social supports [30]. Other possible explanation could be independents in the household may decrease and therefore when the number of independents (working age) in the households decreases there may not be access to sufficient diversified diet [31].

Age dependency ratio was also other associated factor of dietary diversity among the study participants. Adults those who were above mean value 3.38 times more likely to have sub optimal dietary diversity as compared to below mean value. This could be explained by the fact that the dependency ratio is an age-population ratio of those typically not in the labor force and as the ratio increases there may be an increased burden on the productive part of the population [32]. As a result dietary habit or food consumption pattern of HIV positive individuals with high age dependency ratio may largely base on least nutritious and monotonous food groups.

Household wealth index of low and middle 86.0% and 52.0% less likely to have sub optimal dietary diversity than those HIV positive adults at highest wealth index respectively, But a studies done in Mettema [26]and Rwanda[33] contradict with the above finding. This difference might be due to diets having changed across the low- and medium-income countries to converge on what we often term the “Western diet”. This is broadly defined by high intake of refined carbohydrates, added sugars, fats, and animal-source foods [34]. In other words people in high wealth might be depending on fat and high animal source foods which have high price and they can afford it. As a result dietary habit or food consumption pattern of HIV positive individuals with high wealth may largely base on sub optimal dietary diversity.

Respondents who were ART use for less than 1 year and 1-2 years were 2.76 and 2.38 times more likely to have sub optimal dietary diversity than those on ART for more than 2 years respectively. This finding was consistent with the studies finding in Metema Hospital and Eastern Ethiopia [26,35]. This might be due to most ART drugs were found with gastro-intestinal tract related side effects like nausea, change in food test, anorexia, diarrhea, stomatitis and dyspepsia [36]. In the early periods of initiation of ART, Clients may face challenges in adapting the above side-effects and might increase the likelihood of having reduced food consumption as compared to taking ART for longer duration[37]. This condition might increase the likelihood of having reduced food consumption and sub optimal dietary diversity.

Those participants with CD4 count <200 cells/mm³ were 4.34 times more likely to have sub optimal dietary diversity than those who were CD4 count >350 cells/mm³. This is due to the fact that HIV infection gradually destroys the body's immune system, which makes it harder for the body to fight infections. HIV infection causes a quantitative depletion of CD4 lymphocyte count, which increases the risk of opportunistic infections [16].This may leads to other infections and lower food intake because of reduced appetite and/or impaired nutrient absorption and sub optimal dietary diversity.

From health related factors, Cotrimoxazole prophylaxis had not significant association with dietary diversity which is consistent with studies conducted in Eastern Ethiopia [35], Ambo [20] and Motta town, East Gojjam [25]. But a study finding in Metema Hospital revealed that Cotrimoxazole prophylaxis had strong association with level of dietary diversity which is in contrast with this study [26]. This may be attributed to factors such as differences in the study area and study period. Even though this study addressed very important variables related to dietary diversity, it is independent of the limitation of cross sectional study design. Even if using 24 hour food recall method minimizes recall bias, it only provides a snap shoot of information rather than trend of dietary habit and also participants might be susceptible for social desirability bias.

CONCLUSION

This study revealed that nearly half of participants had suffered from sub optimal dietary diversity. The factors that significantly affect dietary diversity were: marital status, age dependency ratio, wealth index: duration of ART and CD4 count. The government

and other stake holders should focus on promoting and well integrating on nutrition programs for HIV positive individuals to improve their dietary quality based on local context; to reduce burden of sub optimal dietary diversity. The health professionals should strengthen awareness session on dietary therapy of healthy eating, immunity booster foods and diet diversification and also strength counseling to appropriate dietary management of common side effects of ART for clients on early period of initiation of ART.

LIMITATIONS OF THE STUDY

- Due to study design (cross sectional) it doesn't indicate temporal relationship.
- Even though using 24 hour food recall method minimizes recall bias, it only provides a snap shoot of information rather than trend of dietary habit.
- Also participants might be susceptible for social desirability bias.

DECLARATIONS

Ethics approval and consent to participate

Prior to data collection, ethical clearance was obtained from Institutional Review Board of Hawassa University. Permission was obtained from Hawassa health department, Medical Directors and head units a of the health institutions. All study participants was briefed about the purpose of the study including how the study was beneficial to them. In addition, confidentiality of information was assured and privacy of the study population was respected and kept as well. Verbal consent was obtained from the participants. Moreover, to ensure confidentiality the name of respondents was not written in the consent form. The collected data was kept in the form of file in secure place where no one can access it except the investigator.

Authors' contribution

FA: Conceptualized the paper, searched literature, trained field researchers for data collection and wrote the results and discussion sections; KH, YM and SS: Contributed to the design of the study, edition and provided advice regarding methods, data interpretation and analysis and also they have critically reviewed the result and prepared the manuscript for publication; Finally all authors have proofread the final manuscript.

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