

Levels and Predictors of Food Insecurity among HIV Positive Adult Patients Taking Highly Active Anti-Retroviral Therapy at Arba Minch General Hospital, Southern Ethiopia, 2016

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Abstract

Background: Food insecurity and HIV/AIDS are interrelated in with each other. Food insecurity is one of a key contributor of the HIV/AIDS related morbidity and mortality in the world. Therefore this study was conducted to determine the Prevalence and predictors of food insecurity in order to give current evidence to design intervention measures for improvement of food security.

Objective: To determine Prevalence and predictors of food insecurity among HIV positive adults attending ART clinic at Arba Minch hospital, Southern Ethiopia March, 2016.

Methods: Hospital based cross sectional study design was carried out from February 15, 2016 to March 30, 2016 at Arba Minch General Hospital. Data was analyzed by using statistical package for social sciences/SPSS version 20. Frequency and cross tabulation was conducted to clean data and describe the study variable in relation to outcome. Binary logistic regression analysis was computed to assess the crude association between dependent and independent variables. Variables which showed association in binary logistic regression analysis and have P-value less than 0.25 were entered in to Multivariable logistic regression model, to identify significant factors associated with outcome variables by controlling confounding factors. Finally the level of significance was set at P-value less than 0.05.

Result: There was 394 study participants involved in this study. Majority of them 260(66%) were females, 127(39.3%) of study participants were in age range of 30-39 years with mean age of 26.65 ± 10.48 years, ranging from 18-60 years. Forty six (11.7%) participants reported that they have experienced HAART related side effect in the past six months. Ninety two (23.4%) consumed less than three meals per day and 26(6.6%) of the respondents consumed below 3 food items. The Prevalence of food insecurity was 77(19.5%). Being female [AOR=2.93(1.16, 7.40)]; Rural residence [AOR=3.59(1.65, 7.836)]; monthly income less than 1000 Eth birr [AOR=6.16(2.33, 16.32)]; Having WHO clinical three & four disease [AOR=4.78(1.95, 11.69)]; Developing OIS [AOR=8.03(3.84, 16.78)] and Poor adherence to treatment [AOR=8.96(3.48, 23.05)] were independent predictors of food insecurity.

Conclusion and Recommendation: In conclusion about one fifth of participants were food insecure. Factors independently predicting food insecurity were being female, Low monthly income, rural residence, having WHO stage III and IV disease, developing opportunistic infection and none adherence to ART treatment. Emphasis should be given by responsible bodies to address these predicting variables to alleviate food insecurity problem.

Keywords: Food insecurity; HIV/AIDS; Arba minch; General hospital; Ethiopia

Abbreviations: AIDS: Acquired Immunodeficiency Syndrome; BMI: Body Mass Index; BWL: Body weight loss; EDHS: Ethiopia Demographic Health Survey; EPHA: Ethiopian Public Health Association; ETB: Ethiopian Birr; HAART: Highly Active Anti Retro Viral Therapy; HIV: Human Immune Deficiency Virus; MOH: Ministry of Health; OIs: Opportunistic Infections; PLWHIVA: People Living with HIV/AIDS; SPSS: Statistical Package for Social Science; WHO: World Health Organization

Introduction

Food insecurity is a temporary or complete lack and/or decline in access to productive resources, deterioration of the household assets position over time, declining resource productivity because of environmental degradation and lack of alternative technologies. It is simply the lack of food security that, at the extreme, is experienced as hunger [1].

Human Immunodeficiency Virus (HIV) and malnutrition can independently cause progressive damage to the host immunity. HIV increases vulnerability to different infections like, fever, diarrhea, loss of appetite, nutrient malabsorption, and weight loss and associated morbidity and mortality [1-3].

In poor localities, numerous HIV infected patients lack access to sufficient quantities of nutritious foods, which leads to non-compliance to treatment. Reduced food intake in HIV affected households could also be secondary to loss of income and food production capacity in the family due to labor loss, psychosocial factors, or medication side-effects [4-6]. Like other chronic care drugs antiretroviral drugs are difficult to take on an empty stomach due to associated side effects, distance from health facility and transportation cost, search of work add additional burden on a patient with impaired immunity influences retention on HIV/AIDS treatment and care [7-9].

Food insecurity is obstacle to adherence to ART and upsurge transmission of HIV by increasing viral load and decreasing CD4 of patients, hence leads to increased HIV-related opportunistic infections and increased hospitalizations [10]. A lack of access to food drives families into social crisis, migration and displacement that subsequently puts them at increased risk of HIV infection and its consequences. In the community where there is High HIV prevalence societies may face cumulative reductions in food supply and increased labor costs and extending the effect of interactions beyond the individual to the household and societal levels [11-14].

Food insecurity not only increases the acquisition of HIV via vertical and horizontal transmission by compromised nutritional status but also barrier to adherence to care and treatment. Millions of HIV infected people live in countries with high levels of poverty and food insecurity. Food insecurity and HIV/AIDS are interlinked and causing significant morbidity and mortality in sub-Saharan Africa [15-17].

In Ethiopia about 10% of general population and 40.4% to 87.4% people living with HIV/AIDS will struggle to have access to "safe, sufficient and nutritious food" for themselves and for their families [18-20]. A similar study conducted in Humera Hospital in Northern Ethiopia among 376 HIV-infected adults, showed that 40.4% were food insecure.

Worldwide, over 842 million people were unable to meet their dietary energy requirements of which 98% have been reported in developing countries. More than 35 million people are living with HIV and most cases have been reported in low and middle-income countries, particularly in Sub Saharan Africa (SSA) [21]. Study conducted in Canada among HIV-infected individuals receiving HAART showed that 71% were food insecure [22]. Study conducted in Democratic Republic of Congo, 57% and in Namibia 92% were food insecure respectively [23,24]. Study conducted in Kenya revealed that 20-50% of patients' were food insecure [25,26]. As research conducted in Kenya revealed that gender, employment, income, drinking water and sanitation were determinants of food insecurity [27].

A cross-sectional study conducted in South Africa revealed that the physiological complications of progression of HIV infection and poverty were determinants of insufficient consumption of a diet of adequate quality and quantity to booster immune function and support medical therapy [28]. Studies conducted in different parts of Africa showed that HIV/AIDS depletes financial capital, social capital and human capital as labor is lost through decreased productivity and the death of the productive member of the family [29,30]. A study conducted in Ethiopia showed that Household wealth assets are important to lessen financial burden of households during events of stress like HIV/AIDS [31].

As survey conducted in Kenya revealed that households affected by HIV/AIDS are particularly susceptible to food insecurity [32]. A study in rural Uganda showed HIV stigma was strongly associated with food

insecurity [33]. Similar report showed that, within households affected by HIV, there is an increased risk of food insecurity secondary to reduced income as sick members are unable to work [34].

Low socio-economic status and desperation may drive people into high risk behavior for HIV like transactional sex, labor migration or engaging in transactional sex that increases the likelihood of infection while malnutrition increases the vulnerability to HIV infection among those who are exposed [35,36]. A research conducted in Uganda indicated that food insecurity is due to the fact that as poor households in urban areas struggle to meet urban expenses, they reduce the type, quantity and quality of food to compensate other absolute expense [37].

Study conducted in Africa revealed that malnutrition and with HIV/AIDS weaken the immunity and, decreases CD4 count leads to appearance of Opportunistic Infections (OIs), the appearance of OIs leads to increase viral replication and further damage to the immune system. HIV/AIDS-related morbidity and mortality is cause of hostile social and economic consequences like food insecurity for the households and society [38]. As cross-sectional study conducted in Zambia and Kenya and Uganda revealed that Food insecurity has been associated with decline in physical health, increased viral load, increased incidence of illness, and mortality [39,40].

HIV/AIDS deteriorates household food insecurity by targeting most productive and economic age group of the society and increasing burden on family caregivers. Food insecurity, leads to increased risk of HIV transmission and rapid disease progression [41]. The effect Food insecurity on adherence to HAART globally is multifactorial and different studies reported that lower levels of medication adherence among food insecure individuals taking HAART [42-44].

Ensuring food security and meeting the special nutritional needs to control disease progression and adhere to ART are vital for PLWHIVA to achieve the desired benefit from treatment provided [23,24]. Despite the fact that there is clear advantage on integrating HIV treatment and nutritional programs, data are deficient, on the optimum content and duration of nutritional support, and on ideal target recipients [45-47]. The status of food insecurity is not well known among adults HIV infected adult patients at Arba Minch General Hospital. Therefore to fill this gap this study was designed to determine the levels and predictors of food insecurity among adult patients taking highly active anti-retroviral therapy at Arba Minch General Hospital, southern Ethiopia.

Methodology

Study area and period

The study was conducted from February 15 to March 30, 2016 on HIV infected individuals in ART clinic of Arba Minch General Hospital, which is located about 500 km south from Addis Ababa, about 275 km from Hawassa, the capital of the SNNPR region. It is a public hospital which provides general health service and higher levels of clinical care for catchment area populations. It serves as training center for Medical and Health sciences student in collaborating with Arba Minch University. Additionally, the Hospital has been providing highly active antiretroviral therapy (HAART) for PLWHIVA Starting from 1996 for RVI Adults and pediatric Patients.

Study design

Hospital based cross-sectional study design was conducted.

Source population

The source population was all adult people who are enrolled in highly active anti-retro viral therapy and have full ART records at ART clinic of Arba Minch general Hospital.

Study population

The study population was selected adult people on antiretroviral therapy at ART clinic of Arba Minch general Hospital during the study period that fulfils the inclusion criteria.

Inclusion and exclusion Criteria

Inclusion criteria

The study includes all adult people on antiretroviral therapy with age of 18 years and more in Arba Minch General Hospital.

Exclusion criteria

- Patients who were seriously ill and/or unable to communicate
- Patients with incomplete clinical records

Sample size determination

Sample size determination was based on single population proportion formula. The prevalence of food insecurity among PLWHA patients was 63% from study conducted in Jimma University Specialized Hospital [19]. With 5% marginal error and 95% confidence interval (CI) and 10% of non-response rate. Finally 394 were enrolled in the study.

$$N = Z^2 \cdot P \cdot (1 - P)$$

d²

Sampling technique

Participated in the study were selected based on daily follow up of patient in chronic follow up clinic during the specified study periods. According to the hospital report, on average 20-30 patients that were currently having follow up in ART have been visiting the hospital daily and by taking average daily visit as 25, approximately 750 patients were expected to visit the hospital in one month of study period. Since the sample size determined was 394, to achieve the desired sample size sampling interval two was used. From the first two subjects, one patient was randomly selected by lottery method, and then every other patient was selected to participate in this study. Study participant exist interview was conducted in ART clinic in private room. Secondary data was collected from patient ART record by using data abstraction sheet [48].

Variables of the study

Dependent variable

Food insecurity

Independent variable

Socio demographic and economic factors: Age, Sex, Marital status, Residence, Educational status, Monthly income, source of food for household.

Behavioral factors: Smoking, khat chewing, alcohol consumption, use of drugs.

Disease condition and clinical related factors: Duration of illness, BMI, opportunistic infection, HIV stage, CD4 count, clinical AIDS staging, ART duration.

Data collection procedure and instrument

Amharic version of the survey questionnaire was used for data collection. The household food insecurity status of participant was assessed by using a short version of the Household Food Insecurity Access Scale (HFIA) developed by the Food and Nutrition Technical Assistance (FANTA) project which was adapted to individual level. Each of the questions was asked with a re-call period of four weeks (30 days). The respondent was first asked an occurrence question that is, whether the condition in the question happened at all in the past four weeks (yes or no). If the respondent answers "yes" to an occurrence question, a frequency-of-occurrence question will be asked to determine whether the condition happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four week. It was computed and dichotomized into two categories; which is food insecure and food secure [49-52]. Weight of participants was taken by using standard beam balance and the scale was checked at zero before and after each measurement. Participants' weight was measured after removing heavy clothes and recorded to the nearest 0.1 kg. Height measurement of participants was done using standard measuring scale after removing their shoes and recorded to the nearest 0.01 cm.

Data quality assurance

Two diploma nurses as data collectors and one B.Sc. nurse as supervisor for maintaining data quality were recruited. Training was given for data collectors and supervisor for one day. Pre-test of the questionnaire was done on 20 clients in the nearby Health Center a week prior to the actual survey for 2 days to check for consistency and possible amendments were made based on findings from pre-test. Data collection process was strictly followed day to day by the supervisor and principal investigators.

Data analysis

The data collected from the respondents was entered in to Epi info 3.5.1 and exported to SPSS for windows-version 20 for analysis. Data analysis was conducted by cross tabulation to see the relationship between dependent and independent variable. Accordingly, simple frequencies, measure of central tendencies and measure of dispersions were calculated. Bivariate logistic regression analysis was computed to assess the crude association between explanatory variables and food insecurity. Finally Variables which showed association in binary logistic regression analysis and having P-value less than 0.25 were entered in to Multivariable logistic regression model, to identify independent predictors associated with outcome variable. Finally the level of significance was set at P-value less than 0.05.

Operational definition

Body Mass Index: was calculated as the weight (in kilograms) divided by the square of the height (in meters). BMI was stratified into the following groups according to established criteria: <17 kg/m² (moderate to severe malnutrition), 17 to 18.5 kg/m² (mild malnutrition), 18.5 to 25 kg/m² (normal) and >25 kg/m² (overweight and obese) [51].

Dietary diversity: is the number of reported different foods and food groups consumed in a household over a 24-hour period. This does not include food group consumed outside home. It is classified as low <3 food items, medium 4-6 food items and ≥ 6 food items as higher based on FANTA/FAO recommendations [52].

Food insecure: Individuals were labeled to be food insecure if they answer “Yes” to all the key questions designed to assess food insecurity and otherwise labeled as food secure.

Meal frequency: is the number of reported daily eating occasions by household members in a household experienced within a day. This does not include eating occasions by the household members experienced outside home. It classified as good when it is 3 and above with additional snack and poor when it is below 3 meals per day and good when >3 feed timers per day [52].

Ethical clearance

The study protocol was reviewed and approved by Arba Minch University ethical clearance committee. Permission letter was obtained from Gamo Gofa Zone health department and Arba Minch Hospital administration before data collection. Informed consent was obtained from respondents after explaining the purpose of study. Privacy and confidentiality also maintained throughout the data collection, analysis and manuscript preparation.

Results

Socio demographic characteristics of the study participants

There were 394 study participants involved in this study with response rate of 100%. Majority of them 260(66%) were females followed by 134 (34%) males. More than one third 127(39.3%) of study participants were in age range of 30-39 years with Mean age of 26.65 ± 10.48 years, ranging from 18-60 years. More than one third 149(37.8%) of study participants completed secondary school and above followed by primary school 145(36.8%). With regard to occupational status about one half 185(46.9%) were government workers followed by 119(30.2%) farmers. Concerning the monthly income more than one third 154(39.0%) of participants earn below 100 ETB per month (Table 1).

Variable		Frequency	Percent
Sex	Male	134	34%
	Female	260	66%
Age	18-29	73	18.50%
	30-39	171	43.40%
	>40	150	38.10%
Residence	Urban	305	77.40%

	Rural	89	22.50%
Ethnicity	Gamo	200	50.80%
	Gofa	28	7.10%
	Wolayta	31	7.90%
	Amhara	71	18.00%
	Tigre	17	4.30%
	Gurage	7	1.80%
	Oromo	24	6.10%
	Others	16	4.10%
Religion	Orthodox	254	64.50%
	Muslim	27	6.90%
	Protestant	105	26.60%
	Catholic	8	1.90%
Educational Status	No Formal Education	100	25.30%
	Primary School	145	36.80%
	Secondary and Above	149	37.80%
Occupational Status	No Job	90	22.80%
	Government Workers	185	46.90%
	Farmer	119	30.20%
Monthly Income in ETB	Less than 1000	154	39.00%
	1000-2000	115	29.10%
	>2000	125	31.70%
Others	Zayse, Oyda, hadiya, Kambata		

Table 1: Socio-demographic characteristics of adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

HIV/AIDS related clinical data

Concerning HIV/AIDS related clinical data only 46(11.7%) participants reported that they have experienced HAART related side effect in the past six months. About one fourth 91(23.1%) of participants had experienced opportunistic infections in the past six months and acute diarrhea 31(34.1%) followed by pulmonary TB 22(24.2%) were commonly reported OIS. About one third 123(31.2%) were on Cotrimoxazole preventive therapy, 22(5.6%) of patients experienced pulmonary TB in the past six months and 18(81.8%) were currently taking anti-TB drugs and the remaining 4(18.2%) completed TB therapy. About one fifth 68(17.3%) of participants were on INH preventive therapy. Regarding WHO clinical staging secondary data from patient sheet revealed that majority 335(85%) having WHO stage I and II disease while 59(15%) with stage III and IV disease. With regard to immunologic status majority 240(60.9%) had CD4 count greater than 500 cells/mm³, 123(31.2%) had CD4 count between 250-500 and only 31(7.9%) had CD4 below 250 cells/mm³. with regard to duration of the disease since diagnosis of HIV/AIDS majority of

respondents 289(73.4%) had HIV/AIDS for greater than 12 months. With regard to adherence to HAART majority 341(86.5%) had good adherence to treatment while 53(13.5%) had poor adherence (Table 2 and Figure 1).

Variables		Frequency	Percentage (%)
Experience of any side effect on HAART in the past six month	Yes	46	11.7
	No	348	88.3
Have you faced Opportunistic infections in the past six month	Yes	91	23.1
	No	303	76.9
Cotrimoxazole preventive therapy	Yes	123	31.2
	No	271	68.8
Isoniazid preventive therapy	Yes	68	17.3
	No	326	82.7
had pulmonary tuberculosis in the past six month	Yes	22	5.6
	No	372	94.4
Currently taking anti-TB drugs	Yes	18	81.8
	No	4	18.2
Experience of any side effect on anti-TB	Yes	6	30
	No	14	70
WHO clinical AIDS staging of a patients	Stage I and II	335	85
	Stage III and IV	59	15
The recent CD4 cell count in cell/mm ³	Less than 250	31	7.9
	250-500	123	31.2
	Greater than 500	240	60.9
Duration of HIV/AIDS since diagnosis	≤ 12 month	105	26.6
	>12 months	289	73.4
Adherence to HAART in past six month	Good adherence	341	86.5
	Poor adherence	53	13.5

Table 2: HIV/AIDS related clinical characteristics of adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

Behavioral factors

Concerning behavioral factors majority 229(58.1%), 279(70.8%) and 317(80.5%) of participants reported that they do not smoke cigarette, do not drink alcohol and do not chew chat respectively. About one fifth 86(21.8%) of participants reported they were currently smoking cigarette, 26(6.6%) reported that they currently drink alcohol and 25(6.3%) were currently chewing chat (Table 3).

With regard to BMI of participants majority 250 (63.5%) were normal (18.5-25 kg/m²), 45(11.4%) were severely malnourished <17 kg/m², 25(6.3%) moderately malnourished (17.1-18.5 kg/m²) and the rest 74(18.8%) were overweight 25-30 kg/m² (Figure 2).

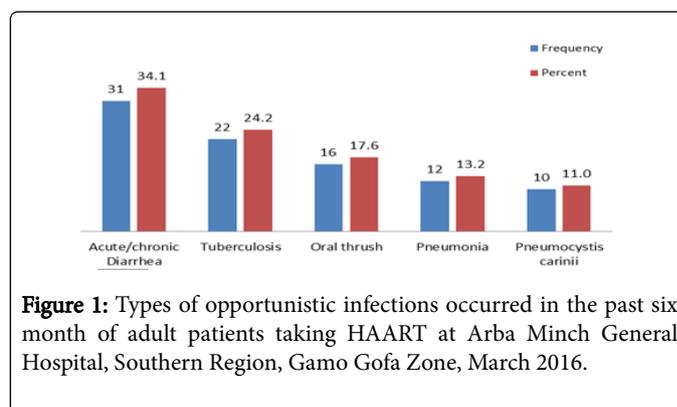


Figure 1: Types of opportunistic infections occurred in the past six month of adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

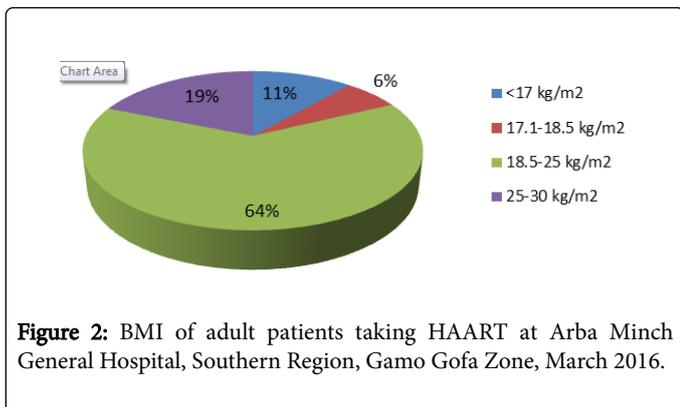


Figure 2: BMI of adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

Nutritional status, dietary diversity

Concerning Daily eating pattern 92(23.4%) consumed less than three meals per day. The dietary diversity score analysis indicates that 26(6.6%) of the respondents consumed low dietary diversity which less than 3 food items per day. The rest 109(27.7%) and 259(65.7%) of respondents consume medium (4-5 food groups) and high (6-12 food groups) respectively. Majority of respondent 354(89.8%) get their food by purchasing followed by 24(6.1%) from house hold farm and 16(4.1%) from relatives or organization support. Concerning meal frequency one fourth of them had below 3 meals per day (Table 4).

Behavioral related factors		Frequency	Percent
Have you ever smoked cigarette?	Yes	86	21.8
	No	229	58.1
	Ex-smoker	79	20.1
Have you ever drunk alcohol?	Yes	26	6.6
	No	279	70.8
	Ex-drunker	89	22.6
Have you ever used chat	Yes	25	6.3
	No	317	80.5
	Ex-user	52	13.2

Table 3: Behavioral factors of adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

Variables		Frequency	Percent
Daily eating pattern of last 6 month	Three meals and above	250	63.5
	Two meals and eating between meals	52	13.2
	Below three meals	92	23.4
Dietary diversity in the last 24 hrs	Less than three food items	26	6.60%
	4-5 food items	109	27.7
	6 and above food items	259	65.70%
Main source of food for your household the last six month	Purchase(Market/grocery store)	354	89.8
	Household farm/garden	24	6.1
	Relatives and friends	16	4.1

Table 4: Nutritional status and dietary diversity of adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

Concerning type of food households consumed in 24 hrs almost all households had consumed cereal based foods followed by oil and fat,

vegetables, and legumes. The consumption of animal source (fish, meat, milk and egg) foods groups was low (Figure 3).

Prevalence of food insecurity and coping strategy

Respondents were asked 20 series of questions, 10 main and 10 minor questions adapted from household Food Insecurity Access Scale (HFIAS) developed by the Food and Nutrition Technical Assistance (FANTA). One hundred thirty five (34.3%) reported that they worried about finding enough food for household, 247(62.7%) were Not able to eat the kinds of foods they preferred, 276(70.1%) consume a limited variety of foods due to a lack of resources, 317(80.5%) consume some foods that they really did not want to eat, 80(20.3%) consume less meal than they felt they needed, 302(76.6%) consume fewer than three meals in a day. Seventy eight (19.8%) of Households didn't have food on hand, 102(25.9%) went to sleep at night hungry and 77(19.5%) lived a whole day without eating anything. The Prevalence of food insecurity was 77(19.5%) while 317(80.5%) were food secure (Table 5).

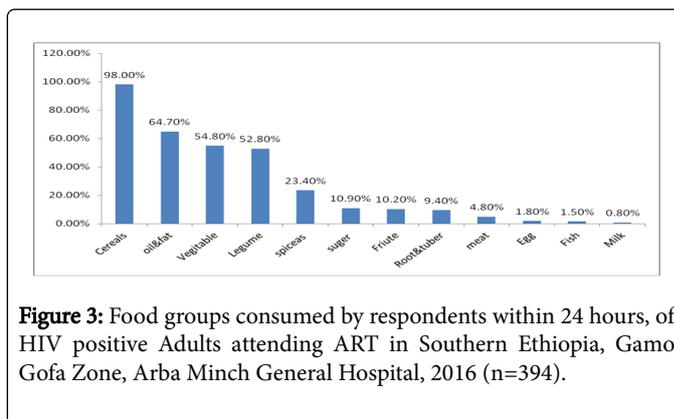


Figure 3: Food groups consumed by respondents within 24 hours, of HIV positive Adults attending ART in Southern Ethiopia, Gamo Gofa Zone, Arba Minch General Hospital, 2016 (n=394).

S.No.	Factors related to food security status		Frequency	Percent
1	Households worry about finding enough food	Yes	135	34.3
		No	259	65.7
2	How often	Rarely	96	71.1
		Sometimes	28	20.7
		Often	11	8.1
3	Not able to eat the kinds of foods you preferred	Yes	247	62.7
		No	147	37.3
4	How often	Rarely	17	6.9
		Sometimes	162	65.6
		Often	68	27.5
5	Eat a limited variety of foods due to a lack of resources	Yes	276	70.1
		No	118	29.9
6	How often	Rarely	26	9.4
		Sometimes	250	90.6
7	Eat some foods that you really did not want to eat	Yes	317	80.5
		No	77	19.5
8	How often	Rarely	168	53
		Sometimes	149	47
9	Eat less meal than you felt you needed	Yes	80	20.3
		No	314	79.7
10	How often	Rarely	23	28.8
		Sometimes	35	43.8
		Often	22	27.5
11	Eat fewer than three meals in a day	Yes	302	76.6
		No	92	23.4
12	How often	Rarely	210	69.5

		Sometimes	32	10.6
		Often	60	19.9
13	Household do not have food on hand	Yes	78	19.8
		No	316	80.2
14	How often	Sometimes	52	66.7
		Often	26	33.3
15	Households faced no way of getting more food	Yes	85	21.6
		No	309	78.4
16	How often	Rarely	18	21.2
		Sometimes	67	78.8
17	Go to sleep at night hungry	Yes	102	25.9
		No	292	74.1
18	How often	Rarely	8	7.8
		Sometimes	94	92.2
19	Household member go a whole day without eating anything	Yes	77	19.5
		No	317	80.5
20	How often	Rarely	58	75.3
		Sometimes	19	24.7

Table 5: Food security status in the past four weeks of adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

Factors associated with food insecurity

In this study, both binary and multivariate logistic regression analysis were computed. Binary logistic regression analysis was computed to show factors associated with food insecurity. Being female [COR=4.31(2.13, 8.68)]; Rural Residence [COR=4.71(2.76, 8.06)]; Monthly income less than 1000 Eth birr [COR=6.54(3.07, 13.94)] and those between 1000- 2000 Eth birr [COR=4.78 (2.47,9.28)]; being WHO clinical stage three and four [COR=6.95(3.82,12.65)]; Developing OIS [COR=7.08(4.11, 12.22)] and poor treatment adherence [COR=10.02(5.32,18.89)] were

significantly associated with food insecurity. Multivariable logistic regression was computed to identify independent predictors of food insecurity after excluding confounding factors and Being female [AOR=2.93(1.16, 7.40)]; Rural residence [AOR=3.59(1.65, 7.836)]; monthly income less than 1000 Eth birr [AOR=6.16(2.33, 16.32)] and those between 1000- 2000 Eth birr [AOR=5.72(2.47, 13.38)]; Having WHO clinical three and four disease [AOR=4.78(1.95, 11.69)]; Developing OIS [AOR=8.03(3.84, 16.78)] and Poor adherence to treatment [AOR=8.96(3.48, 23.05)] were independent predictors of food insecurity (Table 6).

Food insecure(a)	Variables		Food insecurity		COR with 95% CL	AOR with 95% CI	P-value
			Yes (n=77)	No (n=317)			
Sex	Male		10(13.0%)	124(39.1%)	1	1	1
	Female		67(87.0%)	193(60.9%)	4.31(2.13,8.68)	*2.93(1.16,7.40)	0.023
Residence	Urban		40(51.9%)	265(83.6%)	1	1	1
	Rural		37(48.1%)	52(16.4%)	4.71(2.76-8.06)	*3.59(1.65,7.836)	0.001
Monthly Income in Birr	<1000		55(71.4%)	99(31.2%)	6.54(3.07,13.94)	*6.16(2.33,16.32)	0.0001
	1000-2000		9(11.7%)	106(33.4%)	4.78(2.47,9.28)	*5.72(2.47,13.38)	0.0001
	>2000		13(16.9%)	112(35.3%)	1	1	1

	WHO Stage of disease	Stage I & II	46(59.7%)	289(91.2%)	1	1	1
		Stage III & IV	31(40.3%)	28(8.8%)	6.95(3.82,12.65)	*4.78(1.95,11.69)	0.001
	Developing OIS	Yes	43(55.8%)	48(15.1%)	7.08(4.11, 12.22)	*8.03(3.84,16.78)	0.001
		No	34(44.2%)	269(84.9%)	1	1	1
	Adherence to treatment	Good adherence	45(58.4%)	296(93.4%)	1	1	1
		Poor adherence	32(41.6%)	21(6.6%)	10.02(5.32, 8.89)	*8.96(3.48,23.05)	0.001
Reference category is food secure ^a							
*significant factors							

Table 6: Binary and Multivariable logistic regression of Variables predicting the likelihood food insecurity among adult patients taking HAART at Arba Minch General Hospital, Southern Region, Gamo Gofa Zone, March 2016.

Discussion

This study revealed the level and factors associated with food insecurity among adult patients taking highly active anti-retroviral therapy and the prevalence of food insecurity was 77(19.5%). This finding relatively similar to study done in Kenya prevalence of food insecurity ranged from 20-50% [25] but lower than study conducted in different part of Africa like Uganda [37.9%], Democratic Republic of the Congo [57%], Windhoek, Namibia [67%] [28-30] as well as in different parts of Ethiopian Public Health Hospital such as in Humera Hospital in Northern Ethiopia, the prevalence of food insecurity among 376 HIV-infected adults was [40.4%], Butajira Hospital, Jimma University Referral Hospital and Fitcha Zonal Hospital in Oromia region the prevalence of food insecurity was 67.5%, 83% and 87.4% respectively [18-20,31]. The variation among different parts of the countries could be due to the existence of different socio-economic status, the health intervention measurement taken, difference in study years and study setting. In addition the low prevalence of food insecurity due to variation in tools used to measure food insecurity.

These study showed that females were 2.9 times [AOR=2.93 (1.16, 7.40)] more likely food insecure than males. This finding is in line with study conducted in South Africa [33]. This is due to the fact that women who had increased food insecurity due to limited resources and low paid job opportunity in this set up. Participant who have low income less than 1000 Ethiopian birr and from 1001-2000 ETB per month were 6 times [AOR=6.16(2.33, 16.32)] and 5 times [AOR=5.72 (2.47, 13.38)] respectively more likely exposed for food insecurity as compared those who earn more than 2000 ETB per month. This finding is in line with research conducted in Chulaimbo Sub-District Hospital in Kenya [32], Butajira, Jimma University referral Hospital and Fitcha which reveals that socio demographic factors such as gender, employment and income were closely related determinants of food insecurity [18-20]. This due to the fact that HIV infection associated impaired productivity and become unemployed due to frequent illness, finally end up food insecure. In addition to this HIV/AIDS is affecting all spheres of human activity and performance. It depletes financial capital (savings and investments), social capital, as it affects demography of the family and human capital as labor is lost through the death of the productive member of the family [34]. In addition to this when income diminishes in household may cause inadequate quality and quantity of food intake due to unable to purchase variety and preferences of the type of food. Moreover, it will cause the individuals to reduce dietary energy intake below daily requirements.

Rural residents were 3.6 times [AOR=3.59 (1.65, 7.836)] more likely to be food insecure than those living in urban area. This finding is consistent with a study conducted at Butajira Hospital, Southern Ethiopia [18]. This association might be due to lower socio-economic status, lower food access and diversity, higher infectious disease and lack of infrastructure services in rural residence than in urban residence.

This study revealed that participants who are on WHO stage III and IV were 4.7 times [AOR=4.78(1.95, 11.69)] more likely to develop food insecurity as compared to WHO stage I and II. This finding is supported by research conducted in Zambia and Kenya, As WHO staging increase the patient become physically weak and CD4 count decreased it result to be less productive. As indicated in different studies food insecurity has been associated with a range of adverse clinical effects among PLWHA, including declines in physical health status, decreased viral suppression increased incidence of serious illness and end up in food insecurity [47]. Furthermore HIV/AIDS worsens family food insecurity because of the debilitation of the most productive household members, decreased individual and household economic capacity, and increased cost of expense on medical for medical activity which expose families for food insecure.

In this study patients Non-adherent treatment were 8.9 times [AOR=8.96 (3.48, 23.05)] more likely exposed to food insecurity as compared to patients adhered to treatment. This is strongly supported by Studies from British Columbia and San Francisco [49], have found lower levels of medication adherence among food insecure individuals on ART. Study conducted in rural Uganda showing that food insecurity is associated with non-adherence to ART [46]. Food insecurity has emerged as a key structural barrier that affects adherence to ART in both resource-rich and constrained settings. This could be explained by non-adherence related treatment failure and immunologic weakness that could reduce patient performance and associated CD4 cell reduction which could give opportunity for development of opportunistic infections that could further limit patients' ability to work and reduce productivity.

This study also revealed that patients who developed opportunistic infection were 8 times [AOR=8.03(3.84, 16.78)] more likely exposed to food insecurity as compared to their counter parts. This is consistent with study conducted in Fitcha Zonal Hospital in Oromia region [20]. This could be due to the frequent illness caused significant disability leading to reduced productivity depletion of savings and inability to earn more incomes.

Conclusion

In conclusion about one fifth of participants were food insecure. The prevalence of food insecurity is relatively lower than similar studies in different settings in Ethiopia. About one tenth of participants reported that they had experienced HAART related side effect in the past six months. One quarter of participants consumed less than three meals per day. Almost all individual have consumed cereal based foods followed by oil and fat but animal source food feeding practice was poor. Majority of respondents depended on help from a friend or relatives as copying strategy. Factors like being female, low monthly income, rural residence, having WHO stage III and IV disease, developing opportunistic infection and non-adherence to ART treatment were independent predictors of food insecurity.

Limitation of the Study

The findings of this study should be interpreted in light of its limitations. This study used patient interview about events in the past six month there could be associated recall bias; there is possibility of desirability bias by patients as they might report what seems right not the actual practice. It cannot show causality of food security in this population.

Recommendations

Based on findings from this study the following recommendations were made to the following three responsible bodies:

1. To people living with HIV/AIDS

Designing strategies to improve adherence to treatment, to control prevent disease progression and to improve immune status and patient wellbeing so that they can be productive to further reduce the reported food insecurity.

2. To Arba Minch General hospital

It is important to Screen patients for OIs, awareness creation about HIV/AIDS and adherence counselling to medical treatment to improve health status to improve economic productivity.

3. To Government and stakeholders

Females, rural residents and earning low monthly income were highly vulnerable to food insecurity. Therefore it is important to empower these segments of population to alleviate food insecurity problem.

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Competing Interests

There is no financial or personal relationship(s) which may have inappropriately influenced us during writing this article.

Authors' Contributions

Zelalem Nigatu and Mende Mensa conceived the study, analyzed the data and prepared the draft for publication and polished the language and we Approved the final manuscript.

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