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Food Insecurity and its Associated Factors among People Living with HIV/AIDS Receiving Anti-Retroviral Therapy at Butajira Hospital, Southern Ethiopia

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Abstract

Background: Food insecurity and HIV/AIDS are common problems in resource limited setting particularly Sub-Saharan countries. Both are intertwined and worsening one another in a vicious cycle through a mixture of various factors. However, the magnitude of food insecurity and its associated factors among People Living with HIV/AIDS are not well studied in Ethiopia.

Objective: The aim of this study was to assess the prevalence of food insecurity and its associated factors among adult people living with HIV/AIDS receiving HAART.

Methods: Institution based cross-sectional study was conducted. A total of 338 study subjects were enrolled in the study and systematic random sampling technique was used to select the study participants. Structured and pre-tested questionnaire was used to collect socio-demographic, clinical and nutrition related data. Both bivariate and multivariate logistic regression analyses were used to assess the effect of the various factors on food insecurity. P-value ≤ 0.05 at 95% CI was considered statistically significant.

Results: The overall prevalence of food insecurity among PLWHA receiving HAART at Butajira hospital was 78.1% (95% CI: 73.7%-82.8%). Mild, moderate and severe food insecurity was observed on 4.4%, 32.0% and 41.7% participants respectively. Multivariate Logistic regression analysis revealed that living in rural area (AOR=1.94; 95% CI: 1.11, 3.38), low monthly income (AOR=7.80; 95% CI: 7.80 (3.55-17.1) and inadequate household dietary diversity (AOR=14.4; 95% CI: 4.90, 42.6) were significantly associated with food insecurity.

Conclusion: Food insecurity is high among PLWHA receiving HAART at Butajira Hospital, Southern Ethiopia. Living in rural area, low monthly income, and inadequate household dietary diversity were the significant factors for food insecurity.

Keywords: Food insecurity; HIV/AIDS; HAART

Abbreviations: AIDS: Acquired Immunodeficiency Syndrome; ART: Anti-Retroviral Therapy; BD FACS: Becton Dickson Fluorescent Activated Cell Sorter; BMI: Body Mass Index; CD: Cluster of Differentiation; CDC: Center for Disease Control; EDHS: Ethiopian Demographic and Health Survey; ETB: Ethiopian Birr; HAART: Highly Active Anti-Retroviral Therapy; HDD: Household Dietary Diversity; HFIAS: Household Food Insecurity Access Scale; HIV: Human Immunodeficiency Virus; PLWHA: People Living with HIV/AIDS; RUTF: Ready to Use Therapeutic Food; SNNPR: Southern Nations Nationalities and People's Region; SPSS: Statistical Package for Social Science; SSA: Sub-Saharan Africa; US: United States; WHO: World Health Organization

Introduction

Globally, over 842 million people were unable to meet their dietary energy requirements, of which 827 million have been reported in developing countries [1]. More than 35 million people are living with Human Immunodeficiency Virus (HIV) and most cases have been reported in low and middle-income countries, particularly in Sub-Saharan Africa (SSA) [2]. In Ethiopia, 1.5% of adult people aged 15-49 are infected with HIV [3]. Ethiopia is one of many SSA countries intensely affected by food insecurity. It is estimated that almost 1 in 10 Ethiopians will struggle to have access to "safe, sufficient and nutritious food" for themselves and for their families in a given year [4]. Tiyou et al and Amberbir et al have reported that high magnitude of food insecurity among PLWHA in Ethiopia [5,6].

Food insecurity and HIV/AIDS are linked in viscous cycle. Food insecurity may increase the acquisition of HIV via vertical and horizontal transmission by compromised nutritional status, mental health and behavioral pathways [7]. It also hastens progression of HIV/AIDS and weaken drug adherence of the patients. HIV/AIDS by itself decreases food security status and adversely affects nutritional status by undermine work capacity and productivity [8].

Food insecurity is associated with diminished baseline CD4 T cell count, reduced ART adherence and decreased survival status of the patients [9-11]. Socio-demographic and economic factors such

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as being a women, low educational status, low household income together with low household food diversity were reported to be the major predictors for food insecurity among PLWHA [9,12,13]. Food insufficiency was also reported in resource rich setting, has been related with poor mental health status in the United States, such as symptoms of major depression, suicide and dysthymia [14,15]. Moreover, it has been associated with increased rates of chronic diseases, including hypertension, diabetes, and cardiac disease [16-18].

Nutrition is a significant component of comprehensive care for individuals living with HIV/AIDS particularly in resource-limited settings where malnutrition and food insecurity are prevalent [19,20]. Adequate and diversified nutrition is necessary to manage opportunistic infections, maintain the immune system, optimize response to medical treatment, and support optimal quality of life in PLWHA [21]. Nutritional supplementation with HAART can improve immune response, Body Mass Index (BMI), drug adherence and improve physical activity in PLWHA [22]. Use of Ready to Use Therapeutic Foods (RUTF) has a vital role in community-based treatment for severe under-nutrition [23]. It has a potential to improve under-nutrition among PLWHA with ART in the clinical settings [24].

The prevalence of food insecurity among PLWHA was reported higher in different parts of the world particularly Asian and African sub continents. However, there are little studies that documented the magnitude of food insecurity among PLWHA in Ethiopia. Moreover, the prevalence of food insecurity and its associated factors among PLWHA is not well studied in the nation in general particularly at Butajira town. Therefore, the aim of this study was to assess the prevalence of food insecurity and its associated factors among adult PLWHA receiving HAART.

Methods

Study area, design and period

The study was conducted at Butajira General Hospital which is found in Butajira town, Gurage Zone, Southern Nations Nationalities and People's Region (SNNPR), located 135 km from the capital-city, Addis Ababa, Ethiopia. The town lies on the average at 2,100 meter above sea level. Butajira hospital is a general hospital with 110 beds that gives health service for people living in Butajira and the surrounding rural kebeles. The study was an institution based cross-sectional study conducted from October, 2013 to June, 2014.

Populations

The source populations were all adult PLWHA in Butajira town and the neighboring area that were registered for ART care at Butajira Hospital. Patients with the age of 18 years and above who were currently receiving ART were the study population. Patients who were receiving ART at Butajira hospital and aged 18 years and above were included in the study. However, seriously ill and cognitive impaired were excluded.

Sample size and sampling technique

The sample size was determined using single population proportion formula taking 63% [5] with 5% marginal error and 95% confidence interval (CI) of certainty (alpha=0.05). In this study, 5% of non-response rate was taken, and the final sample size was determined 376. A systematic random sampling technique was used to select the study participants. According to the hospital report, on average 10-20 patients that were currently receiving ART have been visiting the hospital daily. 660 patients were expected to visit the hospital in three months of study period. Since the sample size was determined 376, the sampling interval was determined two. Of the first two subjects, one patient was randomly selected by lottery method, and then every other patient was selected to participate in the study.

Data collection

The data was collected from March to May 2014 using structured questionnaire. Socio-demographic characteristics, clinical and nutrition related data were collected in three months of interval. One nurse, one health officer and two laboratory technicians were recruited. Two days training were given to data collectors and the data collection process was followed daily by the principal investigator.

CD4+ T cell count was measured with BD FACS machine (US) and categorized according to its clinical significance. Hemoglobin was measured with Cell Dyne hematology analyzer (US). Hemoglobin level ranged between 13-17 and 12-16 g/dl was considered as normal for male and female patients respectively. Patients were graded anemic when the hemoglobin concentration was <12 g/dl and <13 g/dl for male and female patients respectively [25].

Anthropometric measurements (weight, height) were recorded by trained nurse. Weight of the participants was measured in kilograms using standard beam balance to the nearest 0.1 kg and the scale was checked at zero before and after each measurement. Each participant was asked to remove heavy clothes. Measurement of height was conducted using the standard measuring scale and recorded to the nearest 0.5 cm. The participants were asked to take off their shoes, stand erect, and look straight in vertical plain.

Measurements

Household food insecurity access scale (HFIAS)

It is a measure of house hold food insecurity/security of study subjects in the past four weeks. It was calculated based on nine questions of food access and it was categorized in to 1=Food Secure, 2=Food Insecure. When a participants have scored ≤2 affirmative answers were considered as food secure; while participants have scored more than 2 affirmative answers were considered as food insecure [26].

Household dietary diversity (HDD)

It is the economic ability of a household to access a variety of foods during the past 24 hrs. period. Twelve of the questions were used to assess dietary diversity. Participants were asked to report the frequency of consumption of each food using the past 24 hours. Participants received 1 point if they consumed at least once during the last 24 hours of the foods within each subgroup and 0 points if they never consumed the food. The mean household dietary diversity score in the study subjects was calculated. Then tertiles of the dietary diversity score were computed with the highest tertile defined as adequate diversified diet, while the lowest tertiles were inadequate diversified diet [27].

Drug adherence status

It was estimated by percent of missed dose enclosed last six months follow-up time from patient ART follow-up form combined with self-reported adherence measurement technique was used by asking the patients about the number of times they have missed taking their pills each month and recorded. There were classified as: - Good adherence: if the average adherence is greater than 95% (he/she missed <2 doses of 30 doses or <3 doses of 60 doses). Fair adherence: if the average adherence is 85-94% (he/she missed 3-5 doses of 30 doses or 3-9 doses of 60 doses).Poor adherence: if the average adherence is <85% (he/she missed >6 doses from 30 doses or >9 doses of 60 doses) [28].

Data analysis and interpretation

Data was checked for completeness, coded, and first entered in to EPI-info version 7, and then it was rechecked and transferred to Statistical Package for Social Science (SPSS) version 20 for analysis. Bivariate and multivariate logistic regression analyses were used to assess the effect of the various factors on household food insecurity status and to control possible confounders. Thirteen variables (sex, age, marital status, family size, educational status, residence, monthly income, WHO clinical stage, CD4 T cell counts, anemia status, dietary counseling, giving RUTF, HDD) were selected to assess the association in bivariate analysis after multi-co-linearity was checked. The absence of multi-co-linearity was checked by using VIF/tolerance. The model adequacy was checked by using Hosmer and Lemeshow goodness of fit test. P-value ≤0.05 at 95% CI was considered statistically significant.

Ethical consideration

Ethical clearance was obtained from ethical review committee of University of Gondar, College of Medicine and Health Sciences, School of Biomedical and Laboratory Sciences prior to data collection. Permission was taken from Butajira Zonal Hospital administrators. Written informed consent was obtained from each participant after the purpose of the study explained. Participants were told that they had full right not to participate and they were also informed that all the data obtained from them would be kept confidential using codes instead of any personal identifiers. Finally, those participants identified as under-nutrition were given nutritional counseling and RUTF in collaboration with the clinicians working in ART clinic at Butajira hospital.

Results

Socio-demographic characteristics of the study participants

A total of 376 adult PLWHA receiving ART were involved in this study giving a response rate of 90%. Three fifth of the study participants were in the age group of 30-44 years with the mean and Standard Deviation (±SD) age of 39.6 (±9.8) years. The majority of study participants (61.5%) were women. More than half (51.5%) of the study participants were currently married. The majority of participants (58.3%) were urban dwellers and 39% were unable to read and write as shown in Table 1.

Characteristics		Frequency (n)	Percent (%)
Sex	Male	130	38.5
	Female	208	61.5
Age	18-29	38	11.2
	30-44	207	61.2
	≥ 45	93	27.5
Marital status	Single	20	5.9
	Married	174	51.5
	Divorced	46	13.6
	Widowed	89	26.3
	Separated	9	2.7
Family size	≤ 3	154	45.6
	4-6	159	47.0
	>6	25	7.4
Educational status	Unable to read and write	134	39.6
	Able to read and write	43	12.7
	Primary education	89	26.3
	Secondary education	52	15.4
	Tertiary education	20	5.9
Religion	Orthodox	158	46.7
	Muslim	114	33.7
	Protestant and Catholic	66	19.5
Ethnicity	Gurage	197	58.3
	Silitie	59	17.5
	Amhara	48	14.2
	Oromo	15	4.4
	Hadiya	18	5.3
Occupation	Governmental employer	42	12.4
	Self-employer	63	18.6
	Farmer	44	13.0
	Merchant	51	15.1
	Daily laborer	64	18.9
	House wife	53	15.7
	Jobless	21	6.2
Residence	Urban	197	58.3
	Rural	141	41.7
Monthly income in ETB	<1000	293	86.7
	≥ 1000	45	13.3

Table 1: Socio-demographic characteristics of the study participants at Butajira Hospital, Southern Ethiopia, 2014, (n=338).

Clinical profiles, nutritional and ART status of the study participants

Majority of the study participants (61.2%) were at WHO clinical stage I. More than one fourth of participants (27.8%, n=94) were anemic. The median CD4+ T cell count and hemoglobin concentration level of participants were 400 cells/µl with 327 IQR and 13.0 g/dl with 2 IQR respectively (Table 2).

The majority of patients, 142 (42%) were on ART regimen 1e (TDF+3TC+NVP) followed by 1c (AZT+3TC+NVP), (141(41.7%). About three hundred ten participants (91.7%) were a good drug adherence (Table 2).

Regarding on nutritional status of the study participants showed that more than 1/4th (25.5%) of participants were undernourished, of which 9 (2.7%), 22 (6.5%), 55 (16.5%) were mildly, moderately and severely undernourished respectively (Figure 1). About twenty eight (8.3%) participants were received plumpy nuts (RUTF). The mean household dietary diversity was 4.96 with SD ±1.8. Moreover, 131 (38.8%) participants were with inadequate dietary diversity (Table 2).

The overall prevalence of food insecurity among PLWHA receiving ART at Butajira hospital was 78.1% (95% CI: 73.7%-82.8%). Mild, moderate and severe food insecurity was observed on 4.4%, 32.0% and 41.7% participants respectively (Figure 1). The prevalence of food insecurity among male patients was 70.0% (95% CI: 61.8%-77.9%) but 83.2% (95% CI: 77.6%- 88.2%) among females (Table 3).

Factors affecting food insecurity

In this study, both bivariate and multivariate logistic regression analysis was computed. However, on multivariate logistic regression analysis, out of six significant variables associated with food insecurity in bivariate analysis, only three variables (residence, monthly income and HDD) were significantly associated with food insecurity in multivariate analysis. Three variables that showed association on the bivariate model (sex, educational status, marital status) were not statistical associated with food insecurity in the multivariate analysis (Table 4). In addition, being rural dweller was significantly associated with food insecurity. Participants living in rural area were two times more likely to be food in secured as compared to those living in urban areas (AOR=1.94; 95% CI: 1.11, 3.38). Monthly income was also highly significant variables associated with food insecurity at P=0.00.

Variables			Frequency(n)	Percent (%)
WHO clinical stage	Stage I		207	61.2
	Stage II		58	17.2
	Stage III		66	19.5
	Stage IV		7	2.1
CD4+ T cell count	<200 cells/μl		56	16.6
	200-350 cells/μl		80	23.7
	351-500 cells/μl		85	25.1
	>500 cells/μl		117	34.6
Anemia status	Normal		244	72.2
	Anemic		94	27.8
Current/past OI in the past six months	No		190	56.2
	Yes	Problems	148	43.8
		Acute/chronic Diarrhea	53	15.7
		Tuberculosis	86	25.4
		Oral thrush	18	5.3
		Oral ulcer	11	3.3
		Pneumonia	12	3.6
		Zoster	1	0.3
		Pneumocystis carinii	2	0.6
ART regimens	1a (d4T+3TC+NVP)		7	2.1
	1c (AZT+3TC+NVP)		141	41.7
	1d (AZT+3TC+EFV)		15	4.4
	1e (TDF+3TC+EFV)		142	42.0
	1f (TDF+3TC+NVP)		29	8.6
	2b (TDF+3TC+LPV/r)		4	1.2
Drug adherence	Good		310	91.7
	Fair		20	5.9
	Poor		8	2.4
Dietary counseling	No		155	45.9
	Yes		183	54.1
Organizational support other than medication	No		294	87
	Economical support		7	2.1
	RUTF		28	8.3
	Economical and RUTF		9	2.7
Household dietary diversity	Inadequate		131	38.8
	Adequate		207	61.2

N.B: AZT: Zidovudine; d4T: Stavudine; EFV: Efavirenz; NVP: Nevirapine; TDF: Tenofovir; 3TC: Lamivudine; LPV/r: Lopinavir + Ritonavir

Table 2: Clinical profiles and ART status of the study participants at Butajira Hospital, Southern Ethiopia, 2014, (n=338).

Participants who had low monthly income (<1000 ETB) were 7.80 more likely to be food in secured than those had ≥1000 ETB (AOR=7.80; 95% CI: 7.80 (3.55-17.1). HDD was also significantly associated with food insecurity at P=0.00. Participants who had inadequate HDD were 14.4 times more likely to be food in secured as compared to those who had adequate HDD (AOR=14.4; 95% CI: 4.90, 42.6) (Table 4).

Discussion

In this study, the overall prevalence of food insecurity was 78.1% (95% CI: 73.7%–82.8%). This finding was relatively higher than previous reports conducted in San Francisco (USA) (49%) [28], Brasilia (Brazil) (66.2%) [29], British Colombia (Canada) (48%) [13], Ecuador (59.6%) [30], Kenya (33.5%) [31], Jimma (Ethiopia) (63%) [5]. However, the result of the current study was relatively similar with previous report conducted at Dire-Dawa (Ethiopia) (72.4%) [6]. The discrepancy of food insecurity among different parts of the country may reflect the existence of different socio-economic status, the measurement taken in the food security status at household level and other factors such as different cultural and ethnic experiences in the community.

Being rural dweller was significantly associated with food insecurity. Participants living in rural area were two times more likely to be food in secured as compared to those living in urban dwellers? This finding is in accordance with a study conducted at central Texas (USA) [32]. The association might be due to lower socio-economic status, lower food access and diversity, higher infectious disease and narrower availability of infrastructure services in rural dwellers than in urban dweller as these are commonly observed in developing countries.

Monthly income was also a significant variable highly associated with food insecurity at P=0.00. Participants who had low monthly income (<1000 ETB) were 7.80 more likely to be food in secured than those had ≥1000 ETB. This finding is in accordance with the study conducted at Jimma (Ethiopia) [5], British Columbia, Canada [13]. 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, anxiety and uncertainty about the household food supply. Moreover, it will cause the individuals to reduce dietary energy to intakes below daily requirements.

The other relevant predictor were HDD strongly associated with food insecurity at P=0.00. Participants who had inadequate HDD were 14.4 times more likely to be food in secured as compared to those who had adequate HDD. This finding is in similar with the former study conducted at Jimma [5]. Most of the study participants were consumed lower than five food items, which were mainly cereals and kocho (root and tubers). HDD and HFIS are intertwined one another's and one may be the other causes independently. The household food insecurity may increases, if the individuals are unable to acquire sufficient quality and quantity of food to meet household member need.

The limitation of the current study could be the study design as the cross-sectional study design by its nature limits information about cause and effect relationship in the majority of predictors.

Assessment of HFIS and HDD depends on the past one month period and 24 hour recall method, respectively; they may create a possibility of recall bias.

Conclusions and Recommendations

This study revealed that food insecurity is high among PLWHA receiving HAART at Butajira hospital, southern Ethiopia. Living in rural area, low monthly income and inadequate HDD were the major

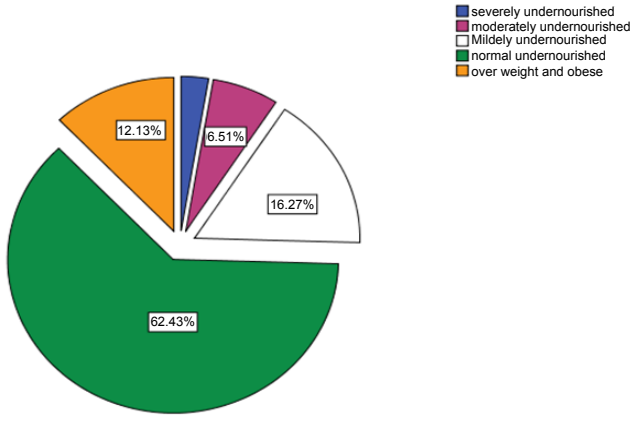

Figure 1: The nutritional status of participants at Butajira Hospital, Southern Ethiopia (n=338).

Predictors	Food in secured		COR (95%CI)
	Yes	No	
Sex			
Male	91	39	1
Female	173	35	2.12 (1.25-3.57)*
Age			
18-29 years	31	7	1
30-44 years	157	50	0.71(0.29-1.71)
>44 years	76	17	1.0(0.38-2.67)
Marital status			
Single	11	9	1
Married	135	39	2.83(1.09- 7.32)*
Divorced	37	9	3.36(1.07- 10.5)*
Widowed	73	16	3.73(1.33-10.5)*
Separated	8	1	6.54(0.68- 62.6)
Residence			
Urban	145	52	1
Rural	119	22	1.94(1.11-3.38)*
Educational status			
Unable to read and write	120	14	12.8(4.49- 36.8)*
Able to read and write	36	7	7.71(2.31- 25.8)*
Primary education	68	21	4.86(1.75-13.5)*
Secondary education	32	20	2.40(0.84- 6.89)*
Tertiary education	8	12	1
Family size			
≤3	117	37	1
4-6	129	30	1.23(0.47-3.17)
>6	18	7	1.67(0.64-4.36)
Monthly income			
<1000 ETB	45	29	9.98(5.0-19.9)*
≥1000 ETB	248	16	1
Dietary counseling			
Yes	143	40	1
No	121	34	0.99(0.59-1.67)
RUTF			
Yes	143	4	1
No	231	70	0.4(0.14-1.17)
WHO clinical staging			
Stage I	152	55	1.10(0.21-5.86)
Stage II	50	8	2.50(0.41-15.1)
Stage III	57	9	2.5(0.42-15.1)
Stage IV	5	2	1
CD4 T cell counts			
<200	41	15	0.67(0.31-1.41)
200-350	56	24	0.57(0.29-1.10)
351-500	73	12	1.49(0.69-3.19)
>500	94	23	1
Anemia			
Yes	78	16	1.52(0.82- 2.80)
No	176	58	1
HDD			
Inadequate	127	4	16.2(5.75-45.7)*
Adequate	137	70	1

N.B: * shows significant in bivariate associations

Table 3: Bivariate association of different variables with food insecurity among PLWHA receiving HAART at Butajira Hospital, Southern Ethiopia, 2014, (n=338).

Predictors	Food in secured		COR (95%CI)	AOR (95% CI)	P-values
	Yes	No			
Sex					
Male	91	39	1		
Female	173	35	2.12 (1.25-3.57)		
Marital status					
Single	11	9	1		
Married	135	39	2.83(1.09- 7.32)		
Divorced	37	9	3.36(1.07- 10.5)		
Widowed	73	16	3.73(1.33-10.5)		
Separated	8	1	6.54(0.68- 62.6)		
Residence					
Urban	145	52	1	1	
Rural	119	22	1.94(1.11-3.38)	2.27(1.17-4.40)	0.01*
Educational status					
Unable to read and write	120	14	12.8(4.49- 36.8)		
Able to read and write	36	7	7.71(2.31- 25.8)		
Primary education	68	21	4.86(1.75-13.5)		
Secondary education	32	20	2.40(0.84- 6.89)		
Tertiary education	8	12	1		
Monthly income					
<1000 ETB	45	29	9.98(5.0-19.9)	8.53(3.99-18.2)	0.00**
≥ 1000 ETB	248	16	1		
HDD				14.1(4.81-41.3)	0.00**
Inadequate	127	4	16.2(5.75-45.7)		
Adequate	137	70	1		

N.B: α=0.05, *shows significant, **shows highly significant
Hosmer and Lemeshow test was at p=0.45
Stepwise (Backward LR) was used in logistic regression

Table 4: Factors associated with food insecurity among PLWHA receiving ART at Butajira Hospital, Southern Ethiopia, 2014, (n=338).

significant factors affecting food insecurity. Improving household food access of patients and nutritional support besides HAART and treating opportunistic infection. Moreover, income generation strategies by creating social network are also recommended to alleviate the problems.

Authors' Contributions

DG participated in the conception, design of the study, reviewing proposal and data analysis. GM, GK, FF, TE and TE assisted in data analysis, data collection and write up. DG prepared the 312 manuscript for publication. All authors read and approved the final manuscript.

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