Research Article

Magnitude of Food Insecurity and Associated Factors among Adult Individuals on Anti-Retroviral Drug at Debre Markos Referral Hospital, Northwest Ethiopia, 2017: Cross-Sectional Study Design

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Abstract

Introduction: Food insecurity and human immunodeficiency virus are highly prevalent in Sub-Saharan Africa and it associated with Human Immuno Virus (HIV). Some people discontinue ART drug due to inadequate food. The success of Anti-Retroviral Therapy associated with lack access to sufficient quantities of foods due to food insecurity.

Objective: To assess the magnitude of food insecurity and associated factors among adult individuals on Anti-Retroviral drug at Debre Markos Referral Hospital, Northwest Ethiopia, 2017.

Materials and methods: Institutional based cross-sectional study was conducted from March 16- April 16/2017 with a total of 394 individuals randomly selected through computer generated simple random sampling technique. Logistic regression model was fitted to identify factors associated with the outcome variable.

Results: The magnitude of food insecurity among adult individuals on ART drug in this study was 333(84.5%), of those 24.8%, 49.0% and 10.7% were mild, moderate and severe food in secured respectively. Factors significantly associated with food insecurity were monthly income (AOR=13.88, 95% CI; 6.81-28.29), house ownership (AOR=6.52, 95% CI; 1.41-30.08), taking Cotrimoxazole Prevention Therapy (AOR=0.327, 95% CI; 0.142-0.753) and individual dietary diversity (AOR=2.51, 95% CI; 1.09-5.74).

Conclusion: Factors significantly associated with food insecurity were monthly income, house ownership, Cotrimoxazole Prevention Therapy (CPT) and individual dietary diversity. Intervention should to address the factors of food insecurity with ART care programs and special attention given for those had low monthly income, low dietary diversity and had not own house.

Keywords: Adult individuals on ART Drug; Cross-sectional; Debre Markos; Food insecurity

Introduction

The concept of food insecurity includes problems with the quantity and quality of the food available, uncertainty about the supply of food, and experiences of going hungry [1]. Food insecurity occurs when there is limited or uncertain availability of nutritionally adequate, safe foods or the inability to acquire personally acceptable foods in socially acceptable ways [2]. Food insecurity is experienced at the individual level experience relates to issues of food consumption and allocation and includes the physiological sensation of hunger [3].

In Ethiopia the adult HIV prevalence is 1.1% and Anti-retroviral treatment coverage reached 62.3%, which is above the sub-Saharan African regional average (53%). Food insecurity highly associated with socioeconomic impacts of the individual and HIV infection itself increase food insecurity and compromises nutritional status by reducing work capacity and productivity, and jeopardizing individual livelihoods [4,5].

Increasing the infection of HIV internationally and as a potential cause of worse health outcomes among people living with HIV/AIDS associated with increasing food insecurity. Food insecurity is influenced by many factors, including economy, consistent access to food, living with chronic diseases like HIV, food production and the availability of resources. Ethiopia, a country that has a lengthy history of challenges linked to rural food insecurity, is currently facing relatively new challenges related to urban food insecurity [6-8].

Food insecurity is common in developing countries; more than three fifths of the food insecure people live in Sub-Saharan Africa and Asia. In Sub-Saharan Africa alone, an estimated two billion people experienced food insecurity. Food insecurity, which affects greater than one billion people worldwide, is associated with HIV epidemic [9,10].

The prevalence of food insecurity is high especially people living with HIV/AIDS across settings in both resource-rich and resource-poor countries. The prevalence of food insecurity among HIV infected people in sub-Saharan Africa where more than 50% from this among adult on Ant-retroviral drug was reported higher in different parts of African sub continents and it associated with the vulnerability and the severity condition of HIV-infection. Today, Ethiopia faces high levels of food insecurity, ranking as one of the hungriest countries in the world, with an estimated 5.2 million people needing food assistance in 2010 [11-13].

In Ethiopia food insecurity is the major problem it leads to morbidity and mortality. The burden of food insecurity is high around 79% Ethiopian population and 48% of Amhara Region was food in secured. Food insecurity leads to worry in the house and currently it is the major challenge of many regions in Ethiopia [14-16].

However, the magnitude of food insecurity and associated factors among adult individuals on ART drug at Debre Markos Referral hospital is not known before. This research is therefore meant to assess the magnitude of food insecurity and associated factors because scientific evidence is needed to answer. The findings of this research could be used as an input to ART programs at health facility levels. The study will be more significant to design appropriate health education, policies and intervene to the problem for the magnitude of food insecurity and associated factors among adult on Anti-retroviral drug at Debre Markos Referral Hospital. The study will provide significant information to those who work on the health of people living with HIV/AIDS. The study will also important to find out solutions of food insecurity problems among adult on Anti-retroviral drug in collaboration with concerned bodies. Additional significance which can be gained by conducting this study is enabling to the base line for other similar studies that may be conducted in the future. Therefore, this study was conducted to assess the magnitude of food insecurity and associated factors among adult individuals on ART drug at Debre Markos Referral hospital, Northwest Ethiopia.

Methods and Materials

Study Area and Period

This study was conducted at Debre Markos Referral Hospital, Northwest Ethiopia. This area is located at Debre Markos town 299 kilo meters from Addis Ababa, the capital city of Ethiopia in the Northwest direction and 264 kilo meters from Bahr Dar in south West direction. The climatic condition is Weynadega. There are 7 kebeles in the town. According to 2007 Population and Housing census, the population of Debre Markos town projected to be 107000. Its altitude is 2400ms above sea level and it has a comfortable weather condition. Debre Markos referral hospital established 1957 E.C., it provides services more than 3.5 million people [17]. By know it has around 324 health workers and 122 administrative staffs. There were 3333 adults registered on Anti-Retroviral drug at Debre Markos referral hospital ART clinic [17]. The study was conducted from March 16- April 16/2017 at Debre Markos Referral Hospital, Northwest Ethiopia.

Study Design and Population

Institutional based cross-sectional study was conducted. All adult individuals on ART drug that were registered for ART care at Debre Markos Referral Hospital. Adult individuals who were currently on ART drug were estimated as average number of clients attending ART care clinic at the data collection period at Debre Markos referral hospital. Adult individuals who were receiving ART drug at Debre Markos referral hospital and age greater than or equal to 18 years up to 64 years were included in the study.

Adult individuals currently on ART drug who is admitted patients and incomplete data record was excluded.

Sample Size and Sampling technique

The required sample size was determined by using single population proportion formula by taking (P) is 63% [18], level of significance (α) = 5%, at 95% level of confidence for two tail tests and a marginal error or level of precision (d)=5%. = Adding a contingency of 10% for non-response = 36, the required total sample size was = 394. To determine the required sample size for the second specific objective of this study factors significantly associated with the outcome variable was considered with the confidence level of 95%, power of the study 80% with ratio of exposed to non-exposed 1:1 and contingency for non-response 10% by using Epi-Info version 3.5.1. After calculating the required sample size for the variables, the maximum sample size was taken. Finally, the required sample size for this study was the maximum from the first objective 394 and the second objective 367 then from this 394 was taken. In Debre Markos referral hospital there were HIV patients on ART attending at ART care clinic. For the selection of respondents for this study first adult individuals on ART drug were identified by using registration lists for ART care in the hospital. Adults living with HIV/AIDS receiving ART drug in the hospital were 3333 [17] by using all registered adult individuals on ART drug as a sampling frame. The Study respondents were adult individuals on ART drug who were attending ART care clinic at Debre Markos referral hospital within the data collection period. Those 1850 Adult individuals on ART drug were estimated as average number of clients attending ART care clinic at the data collection period. The study respondents were selected randomly using their ART unique identification card number by computer generated simple random sampling technique. Data collection was conducted in every working day.

Study Variables and Measurements

The dependent Variables of this study were food insecurity (yes or no). The independent Variables: Socio-demographic characteristics: (Age, sex, religion, marital status, ethnicity, residency, education status, family size), Socio-economic factors: (Current occupation, current monthly average income, monthly expenditure, house ownership, living with, head of house, having fruit/vegetable garden, current food aid /support and current money support), Behavioral factors: (Smoking, alcohol drinking, chat chewing and social discrimination), HIV related health: (Duration of HIV diagnosis, duration of pre-ART follow up, Duration of on ART drug, duration of clinical follow up, current CD4 count, base line CD4 count, viral load, ART regimen, WHO clinical stage, having opportunistic infection, adherence, current use of co-trimoxazole, current use of plumpy nut, HIV care/support). Adult: age is greater than or equal to 18 years up to 64 years [19], Food-secure: when the individual worried about not having enough

food rarely in the past four weeks and had replied 'no' to question number 2 to 9 [20], Mildly food insecure: If they worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely [20], Moderately food insecure: sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes [20], Severely food insecure: individuals had to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating) [20], The individual dietary diversity score - will be used to measured dietary diversity score of individuals. Individuals were categorized into three equal parts of had consumed 3 or less food groups (poor dietary diversity) while individual had consumed 4 to 6 mild dietary diversity and consumed 7 and above had high dietary diversity [21].

Data Collection Methods

Data were collected through face to face interview. The data were collected by using structured, modified, adopted and pretested questionnaire. English language questionnaire was translated into Amharic language (language spoken in the study area). It contains the socio-demographic, socio-economic characteristic, personal and HIV related health factors. Medical records were reviewed to determine WHO clinical stage, CD4 count, and duration of HIV diagnosis, pre-ART follow up, duration on ART drug, ART regimen, viral load, opportunistic infection and taking Cotrimoxazole. When date of diagnosis was not available in the medical record, patient reported dates were used.

Food insecurity: was assessed by using HFIAS tool developed by Food and Nutrition Technical Assistance Project (FANTA) which was adapted to individual level. HFIAS has nine generic question that can be answered by 'yes' or 'no' and if the response is yes, the frequency was asked with a recall period of 30 days [19]. It was computed and dichotomized into two categories; which is food in secured and food secured.

Dietary Diversity Score: was assessed by using Individual Dietary Diversity score (IDDS). IDDS has 14 food groups and the respondents intended to answer whether they eat each group of food in the past 24 hours [21].

Meal frequency: daily eating occasions over the 24-hour period was asked and recorded. It was computed and dichotomized into two categories; which is low (less than four) and high (greater than or equal to four) meal frequency score [21].

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. The average adherence is greater than 95% good adherence (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) [22].

Data Processing and Analysis: After data collection each questioner was checked visually for completeness and code given before data entry. Software was used epidata version 3.1 for controlled data entry and data were exported, leaned and analyzed through SPSS version 20. During analysis simple descriptive statistics such as frequency distribution and percentage was performed for the study variables. Odds Ratios with 95% confidence intervals and a significance level of p-values <0.2 during bivariable and p- values <0.05 during multivariable analysis was used to identify significantly associated factors with the study outcome of food insecurity.

Ethical Consideration: Ethical clearance letter was obtained from Debre Markos University College of Health Science, Department of Public Health Ethical Committee. Then permission was taken from Debre Markos referral hospital and verbal informed consent was received from each study participant after giving adequate information about the purpose of the study. Individuals participating in this study there were not received any direct benefit, but the information will help the researcher to identify the factors associated with food insecurity among adult on ART and to design appropriate future interventions related to the problems exist. It was informed the study was ensured as it was not cause any harm. To assure the confidentiality of the respondents the name and address was not be asked and assured not too given for third party.

Result

Among adult individuals on ART drug participated in the study, the mean (±SD) of age was 39.14 (±10.14) years. Of which about 225 (57.1%) were female adult individuals on ART drug. About 218 (55.3%) of adult individuals on ART drug were married, 70 (17.8%) were divorced, 67(17%) were widowed and 39(9.9%) were single. Regarding to educational status, 126 (32 %) primary school where as 103 (26.1%) unable to read and write (Table1).

Variable	Categories	Frequency (%)
Age	18 - 35	164(41.6)
	36-64	230(58.4)
Religion	Orthodox	363(92.1)
	Others*	31(7.9)

	Amhara	378(95.9)
Ethnicity	Others*	16(4.1)
Family size	≤ 4	330(83.8)
	5 - 9	64(16.2)
Educational status	Cannot read and write	103(26.1)
	Can read and write	20(5.1)
	Primary school	126(32)
	Secondary school	78(19.8)
	College and above	67(17)
Residency	Urban	361(91.6)
	Rural	33(8.4)
Others* (Muslim, Catholic and protestants, Oromo, Tigray)		

Table 1: Socio demographic characteristics of adult individuals on ART drug at Debre- Markos referral hospital, Northwest, Ethiopia 2017 (N=394).

A high proportion 100 (25.4%) of adult individuals on ART drug were merchants and 69(17.5 %) of them were working employed in governmental sectors. About 251 (63.7%) of adult individuals on ART drug had monthly income 33.3-112.1 $ and 195 (49.5%) of them had no their own house. (Table 2).

Variable	Categories	Frequency (%)
Occupation	Merchant	Frequency (%)
	House wife	48(12.2)
	Civil servant	69(17.5)
	Daily laborer	47(11.9)
	Others*	130(33)
Monthly income	<2200 ETB	285(72.3)
	>=2200 ETB	109(27.7)
Monthly expenditure on food	<2200 ETB	311(78.9)
	>=2200 ETB	83(21.1)
	Own house	199(50.5)

House ownership	Privet rent	113(28.7)
	Kebele's rent	78(19.8)
Living with	Living alone	52(13.2)
	Living with family	342(86.8)
Head of the house	Yes	352(89.1)
	No	43(10.9)
Gardening	Had vegetable	39(9.9)
	Had fruit	15(3.8)
Current food support	Yes	17(4.3)
Current money support	Yes	5(1.3)
(ETB= Ethiopian Birr, Others*=farmer, car driver, bar lady, student, unemployed, NGO)		

Table 2: Socio-economic Factors of adult individuals on ART drug at Debre Markos referral hospital, Northwest, Ethiopia 2017 (N=394).

Clinical and ART related characteristics

Larger proportions of adult individuals on ART drug Around 105(26.6%) were taking Cotrimoxazole prophylaxis. From the respondents 11 (2.8%) of them were had tuberculosis, 35 (8.9%) had pneumonia, 69 (17.5%) had diarrhea, 14 (3.6%) had zoster and 53 (13.5%) others. Of those 4 (1.1%), 6 (1.6%), 9 (2.5%) were had good, fair and poor drug adherence respectively and 18(4.6%) were had use of plump nut. Of those

305(77.4%) of them had care giver, 1(0.3%) had smoking some-times, 35(8.9%) of them had used alcohol sometimes, 3(0.8%) of them had chewing chat sometimes and 20 (5.1%) had history of social discrimination. (Table 3).

Variables	Characteristics	Frequency (%)
Duration of HIV diagnosis	<=12 months	22(5.6)
	13-24 months	28(7.1)
	>=25 months	344(87.3)
Duration of Pre-ART	<=6 months	38(9.6)

Follow up	> 6 months	105(26.6)
	<= 12 months	82(20.8)
Duration on ART Drug	13-24 months	204(51.8)
	>=25 months	108(27.4)
Duration of Follow	Monthly	151(38.3)
	Two months	192(48.7)
	Three months	51(13.0)
Current CD4 count	<350mg/dl	123(31.2)
	350-500mg/dl	154(39.1)
	>500mg/dl	117(29.7)
Base line CD4 count	<350mg/dl	318(80.7)
	350-500mg/dl	56(14.2)
	>500mg/dl	20(5.1)
Current viral load count	<500 copies/ml	67(17)
	500-1000 copies/ml	39(9.9)
	>1000 copies/ml	288(73.1)
ART drug regimen	1a(d4T+3TC+NVP) and 1b(d4T+3TC+EFV)	14(3.5)
	1c(AZT+3TC+EFV)	69(17.5)
	1d(AZT+3TC+EFV)	37(9.4)
	1e(TDF+3TC+EFV)	257(65.2)
	1f(TDF+3TC+NVP)	17(4.3)
WHO clinical stage	I	80(20.3)
	II	230(58.4)
	III	58(14.7)
	IV	26(6.6)
(N.B: AZT: Zidovudine; d4T: Stavudine; EFV: Efavirenz; NVP: Nevirapine; TDF: Tenofovir; 3TC: Lamivudine)		

Table 3: HIV related health factors of adult individuals on ART drug at Debre Markos Referral Hospital, Northwest, Ethiopia, 2017 (N=394).

Food Insecurity Access-related Conditions

Among a total of 394 adult individuals on ART drug 56 (14.2 %) have never worried having enough food in the last four weeks and 338 (85.8%) replied that they were worried about food insecurity during the last 4 weeks. About 327 (83%) were inability to eat the preferred food and 329 (83.5%) availability of limited variety of food.

Food Insecurity Access-related Domains

Anxiety (worry about access to enough food) and uncertainty (insecurity about adequacy and sustainability of food supply) about food found in 338 (85.8%) of the respondents. Insufficient quality which include variety and preference of the food found in 328 (83.25%) of adults on ART drug and insufficient food intake and its physical consequence (result of physical sensation of hunger)

were prevalent in 261 (66.2%) adult individuals on ART drug.

Food Insecurity Access Scale Score

The average food insecurity access scale score was 9.64 with mean (±SD) (9.6 ±5.8).

The overall magnitude of food insecurity among 394 adult individuals on ART drug showed that, 84.5% of them were food insecured of those 24.8%, 49.0% and 10.7% were mild, moderate and severe food insecured respectively.

Individual Dietary Diversity Score

The individuals Dietary Diversity score with mean (±SD) was 5.2 with 5.2 (±1.3). Adult individuals on ART drug were categorized into three equal parts (terciles) 12(3.1%) of individuals had consumed 3 or less food groups (poor dietary diversity) while 324 (82.2%) had consumed 4 up to 6 food groups (mild dietary diversity) and consumed greater than or equal to 7 foods groups 58 (14.8%) had high dietary diversity. The meal frequency score of adult individuals on ART drug less than 4 were 286 (72.6%) of them low meal frequency and greater than or equal to 4 were 108 (27.4%) of them had high meal frequency score. Less commonly consumed food groups, fruit (19.3%), egg (6.3%), meat (5.6%), milk (4.1%), dark green vegetables (3.3%), organ meat (1.3%), fish (1.3%) and wild fruit (0.5%) were the least consumed food groups.

Associated Factors of Food Insecurity

The bivariate analysis showed that sex, marital status, educational status, occupation, family size, monthly average income, house ownership, having vegetable garden, having money support, duration of HIV infection, duration on ART drug, duration of clinical follow up, base line CD4 count, WHO clinical stage, having opportunistic infection, Cotrimoxazole use, meal frequency and dietary diversity were factors associated with food insecurity status. The multivariable binary logistic regression model estimates factors significantly associated with food insecurity of the respondents. Four variables were statistically significant and found important in explaining the food insecurity status of adult individuals on ART drug. These are average monthly income, house ownership, taking Cotrimoxazole prevention therapy and individual dietary diversity. Average monthly income of the respondents was significantly associated with food insecurity in this study. Adult individuals on ART drug had monthly income < 2200 ETB 13.8 times (AOR=13.88, 95% CI: 6.81-28.29) food in secured than had average monthly income >=2200 ETB. House ownership of the respondents was significantly associated with food insecurity in this study. Adult individuals on ART drug had Kebele's rent 6.5 time (AOR=6.52, 95% CI; 1.41-30.08) and private's rent 1.7 times (AOR=1.68, 95% CI; 0.81-3.49) more vulnerable for food in secured than those had their Owen houses. Taking Cotrimoxazole prevention therapy of the respondents was significantly associated with food insecurity. Adult individuals on ART drug taking Cotrimoxazole prevention therapy (AOR=0.327, 95% CI; 0.142-0.753) 68% more likely food secured than who had not took Cotrimoxazole prevention therapy. Individual's dietary diversity score of the respondents was significantly associated with food insecurity in this study. Adult Individuals on ART drug dietary diversity score less than or equal to 6 was 2.5 times (AOR= 2.51, 95% CI; 1.09-5.74) more food in secured than individual's dietary diversity seven and above.

Food insecurity status Variables	Yes No. (%)	No No. (%)	COR(95%CI)	AOR(95%CI)	p-value
Monthly income < 2200 ETB	269(94.4)	16(5.6)	11.82(6.28-22.25)	13.88(6.81-28.29)	<0.001*
>=2200 ETB House ownership	64(58.7)	45(41.3)	1	1	
Kebele's rent	76(97.4)	2(2.6)	9.86(2.32-41.84)	6.52(1.41-30.08)	0.01*
Private's rent	96(85.0)	17(15.0)	1.47(.789-2.72)	1.68(.81-3.49)	
Owen (private)	158(79.4)	41(20.6)	1	1	
Taking Cotrimoxazole Yes	94(89.5)	11(10.5)	1.79(0.89-3.6)	.327(.142-.753)	0.001*
Taking Cotrimoxazole No	239(82.7)	50(17.3)	1	1	
IDDS <=6	290(86.3)	46(13.7)	2.19(1.13-4.28)	2.51(1.09-5.74)	0.02*
>6	43(74.1)	15(25.9)	1	1	
(AOR= Adjusted Odd Ratio; CI=Confidence Interval, COR=Crude Odd Ratio; *= statistically significant, $=United States Dollar)					

Table 4: Association of variables with Food insecurity among adults on ART drug as identified by multivariable analysis at Debre Markos Referral Hospital, Northwest, Ethiopia, 2017 (N=394).

Discussion

This study determined the magnitude of food insecurity and associated factors among adult individuals on ART drug which were 84.5% respondents were food in secured. Monthly income, house ownership, taking Cotrimoxazole prevention therapy and individual dietary diversity provides a picture of the higher contribution to food insecurity among adult individuals on ART drug. In this study food insecurity is higher than the study done in Canada 71.26% of people living with HIV/AIDS were food in secured [23] This might be due to the variation in the socio-economic status of the study areas. This study was comparable with the study done in Sidama southern Ethiopia 82.3 % were food in secured [24] The possible reason for this high magnitude could be the prevalence of food insecurity currently it is the major challenge of many regions in Ethiopia [16].

Average monthly income was one of the significantly associated factors of food insecurity status among adult individuals on ART drug. Those who Earned average monthly income less than 2200 ETB per month were being more food in secured compared to those earning more than or equal to 2200 ETB. This was supported by other study in Butajira [25], in Jima [18], study taken place in Tanzania among PLWHA [26], in Brazil [27] and in Ethiopia [28]. In this study low income significantly increased the likelihood of food insecurity among adults on ART drug because low income or lacked income are not able to afford adequate food and therefore are food in secured. Higher education's are more likely to be employed and thus get paid on regular basis or will be paid a much higher wage. On the other hand, highly, educated people are more likely to generate better income from income generating activities. Food insecurity is highly correlated with average income of an individual.

Food insecurity and low income found among adults living with HIV on ART drug in this study could also be a result of HIV/AIDS. This is because frequent illness including opportunistic infections cause significant disability leading to reduced productivity, depletion of savings and inability to earn more incomes [29] this indicates that HIV/AIDS could lead to food insecurity through diminished earning of an individual.

House ownership was significantly associated factor of food insecurity status among adult individuals on ART drug. This was supported by a study done in Canada [30] in San Francisco [31] this shows that housing is an important determinant for adult individuals on ART drug as overall wellbeing.

Taking Cotrimoxazole was the other significantly associated factor of food insecurity status among adult on ART drug. Individuals who had taken Cotrimoxazole 68% more likely food secured than who had not taken Cotrimoxazole. This was inversely supported by the other study done in Mettema Hospital [32] this could be due to Cotrimoxazole Prevention Therapy reduce the risk of opportunistic infection and mortality. Those condition's turn leads to ability perform daily activities and it became food secured [33].

Dietary diversity was the other significantly associated factor with food insecurity. Individual's dietary diversity less than or equal to six 2.5 times more food in secured than those individuals' dietary diversity had seven and above. This was supported by other study taken place in Jima [18] in Butajira [25], in Hosanna [34] in this study, participant's frequency of food consumption from the food groups decreased as the presence of food insecurity increased. Dietary diversity and food insecurity are intertwined one another's and one may be the other causes independently. Food insecurity may increase, if the individuals are unable to acquire sufficient quality and quantity of food to their need. The magnitude of food insecurity was high among adult individuals on ART drug at Debre Markos Referral Hospital, Northwest Ethiopia. Average monthly income, house ownership, Cotrimoxazole prevention therapy and individuals' dietary diversity was significantly associated with food insecurity. Dietary diversity and meal frequency also showed a significant number of adults on ART drug took less than the mean eating occasions and food diversity which is comparable to similar studies done in developing countries. This study showed that, food insecurity was highly prevalent among adult individuals on ART drug. Based on the findings, the following points are recommended.

The Hospital should be to calls for integration of ART program with food insecurity interventions. The Hospital should be intervening to address upstream cases of food insecurity and contribute to improve health-related quality of life and access to health care. Adult individuals on ART drug may practice home gardening even they have crowded space using any materials which is able to plant easily growing vegetables, which have great contribution to food security and food diversity. Adult individuals on ART drug should be practice different income generate strategies to reduce further vulnerability with food insecurity. Debre Markos Referral Hospital, ART care clinic workers should be gives health education and provision of how to gate diversified food from their environment. Further studies with different study design are needed to assess the food insecurity situations.

Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contribution

Weldekiros Chanie, Ayenew Negesse, Zewdu Dagnew were participated in proposal writing, data collection, analyzed the data, and drafted the paper. Ayenew Negesse also prepared the manuscript for publication. All authors revised subsequent drafts of the paper.

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