

# Under nutrition and Associated Factors Among Adult People Attending Highly Active Anti-Retroviral Therapy in Health Facilities of Bench Maji Zone, South West Ethiopia, 2018.

Tilahun Mekonnen Regassa (✉ [tilahunmekonnen69@yahoo.com](mailto:tilahunmekonnen69@yahoo.com))

Mizan-Tepi University

Tesfaye Abera Gudeta

Mizan-Tepi University

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## Research

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# Abstract

**Background** - Malnutrition is a condition in which a nutrition deficiency, excess or imbalance of energy, protein, and other nutrients causes adverse effects on tissue/body form. Nutritional issues are common in HIV disease. At some point, almost everyone living with HIV will face challenges in maintaining good nutrition.

**Objective** - To assess under nutrition and associated factors among Adult Clients on Highly Active Antiretroviral Therapy in Health Facilities of Bench Maji Zone, South West Ethiopia, 2018.

**Methods** - Institutional based cross sectional study design with quantitative data collection was employed from May 01 – June 30/2018 . A total sample size was 1007 and the participants were selected by using consecutive sampling technique from selected health facilities. EpiData Statistical software version 3.1 and Statistical Package for Social Sciences (SPSS) software version 21.0 were used for data entry and analysis. Logistic regression analysis was used to identify factors associated to under nutrition in adults attending ART. Odds ratios with 95 % confidence intervals were used to examine associations between dependent & independent variables. P. value less than 0.05 was considered significant.

**Result:** The magnitude of under nutrition among peoples on ART in this study was 154 (16.0%). In multivariable logistic regression analysis, factors contributing to under nutrition were identified; Age [AOR 2.4, 95% CI (1.1-5.4)], marital status [AOR 2.2, 95% CI (1.3-3.7)], occupational status [AOR 0.4, 95% (0.2-0.9)], developing GI symptoms [AOR 2.6, 95% CI (1.5-4.5)] and WHO clinical stage [AOR 3.1, 95% CI (1.4-6.8)]. were found to have statistically significant association with among peoples on ART.

**Conclusion:** Significant numbers of peoples on ART drugs in the study area were under nutrition .Age, marital status, occupational status, WHO clinical stage of disease and developing gastro intestinal symptoms were identified factors of under nutrition among adult people on ART. The health care workers and experts work on the ART clinic should focuses on patient counseling about early prevention, detection and treatment of opportunistic infection, early health seeking behaviors before AIDs stage.

## Introduction

Malnutrition and HIV are highly related to each other, which mean that malnutrition contributes for HIV infection and more likely to progress faster to AIDS also HIV-infection increases the risk of malnutrition because of reduced food intake, poor absorption, metabolic changes, chronic infections and illnesses, anorexia, diarrhea, fever, nausea/frequent vomiting, thrush and anemia. Beside to this everybody living with HIV will face challenges in maintaining good nutrition at some point, because of HIV infection itself and the effects of highly active anti retro virus (HAART). The virus can infect some of the immune cells in the intestines, leading local inflammation and making it more difficult to absorb nutrients and medicines, so that it can result in weight loss or mineral and vitamin deficiencies. Therefore, all people with HIV/

AIDS have special nutritional needs. Once the individuals start HAART, still nutrition is an important plan to keep healthy and body's immune system strong [1, 2].

Globally about 36 million persons are living with HIV/AIDS, 25 million of them in Africa and the HIV/AIDS epidemic is occurring in populations where malnutrition is already endemic [2, 3]. HIV/AIDS epidemic is increasingly driven by and contributes to create malnutrition. Integration of nutrition into the essential package of care, treatment and support for people living with HIV/AIDS and efforts to prevent infection is the urgent response to this situation [4].

In Ethiopia HIV is epidemic. In 2007, about 980,000 people were living with HIV/AIDS: of these 260,000 including 16,000 children were in demand of ART [5]. The national prevalence of HIV infection in Ethiopia is 1.2% (1.6% for females and 0.8% for men) among adult population in 2014. The prevalence of HIV infection in the same year is 3.3% (male 2.3%, female 4.4%) in urban and 0.5% (male 0.3%, female 0.6%) in rural area [6].

The prevalence of both HIV/AIDS and malnutrition is high in numerous parts of the world, including sub-Saharan Africa. Their consequences are interrelated and aggravate one another. Both malnutrition and HIV can individually cause advanced damage to the immune system and increased vulnerability to infection, morbidity and mortality through opportunistic infections, diarrhea, fever, loss of appetite, nutrient mal-absorption, and weight loss. HIV specifically affects nutritional status by increasing energy demands, decreasing food intake, and impairs nutrient absorption and metabolism [7]. Studies have showed that people living with HIV who have a healthy diet can well tolerate HIV drugs, maintain a healthy weight, and feel better overall [8].

A nutritional assessment done in Ethiopia showed that 15% of clients on ART had a BMI less than 18.5 [5]. But, the current magnitude of malnutrition status among adults on HAART in the study areas is not known. The results of the study provide valuable information for the design of possible programs and interventions that health professionals will use to improve the quality of life of people living with HIV/AIDS. Thus this study was aimed to assess under nutrition and associated factors among ART attending adult clients in Bench Maji Zone health facilities.

## **Methods And Materials**

### **Study area and period**

This study was conducted from May 01 – June 30/2018 in Bench Maji Zone. Bench Maji Zone is one of the Zones of the Ethiopian Southern Nations, Nationalities and Peoples Region (SNNPR) and found 565 km away from the capital city. Bench Maji is bordered on the south by the Ilemi Triangle, on the west by South Sudan, on the northwest by the Gambela Region, on the north by Sheka, on the northeast by Keffa, and on the east by Debub Omo. The Omo River defines much of its eastern border with Debub Omo. The administrative center of Bench Maji Zone is Mizan Aman. This zone consists of one city administration, 10 woredas. Currently there are 2499 people are on HAART in the Bench Maji Zone in 12

health Facilities where this service is being given. In the Bench Maji Zone there is one teaching Hospital and 39 Health centers.

## Study design

Institutional based cross sectional study design with quantitative methods of data collection was employed to assess malnutrition and associated factors among adults attending HAART clinic.

## Source population

The sampled adult clients taking HAART in the selected health facilities from all adults receiving HAART in facilities of Bench Maji zone were the study subjects included in the study.

## Inclusion and exclusion criteria

All adults 18 years and above and started HAART in selected Health facilities were included in the study. Patients who have kyphoscoliosis (for height measurement), critically ill and unable to communicate, HIV cases, not yet started ART, and pregnant woman were excluded from the study.

## Sample size determination and sampling technique

The sample size was calculated using a single population proportion sample size calculation formula using the assumptions of margin of error of 3% with 95% confidence intervals,  $\alpha = 0.05$  (level of significance),  $P = 31.2\%$  (9) assumed the proportion under nutrition among peoples on ART. After adding 10% non-response rate, the final sample size was 1007.

From the health facilities that are giving the ART service, five health facilities were selected by SRS technique of lottery method. Based on the source of population, the sample size was proportionally allocated to each HF. The study subjects were interviewed consecutively until the sample size was achieved.

## Study Variables

### Dependent variables

Under nutrition in adults on HAART

### Independent variables

- **Socio-demographic characteristics:** Age, Sex, Marital status, Occupation, Educational status, residence, Family size.
- **Medical factors :** Clinical stage, CD4 count, Opportunistic infection, Duration of ART, Current regimen of ART ,Side effect of ART, Drug adherence
- **Nutritional related factors :** Meal frequency ,Food diversity, Nutritional support ,Food support ,Dietary counseling

- **Life style** :Consumed Alcohol, Smoking Cigarette, Chewing chat, Living condition, Source of drinking water, Physical exercise

## Operational definition and definition of terms

**Under nutrition**-in this study operationalized if the BMI is less than 18.5, after calculating by using the formula: **BMI = Weight in kgs/ (Height in mts)<sup>2</sup>**[7]. Measurement on body weight was conducted using a standard beam balance that is used in the medical setup recorded to the nearest 0.1 kg. The body weight was taken with subject light clothed and shoes taken off. Besides, over worn closes such as scarf in case of women was also asked to remove during body weight measurements. Similarly height measurements was carried out while the subject removed his/her shoes, stand erect, looking straight in a horizontal plane with feet together and knees straight. During this measurement the heels, buttocks, shoulder blades and the back of the head was adjusted to touch against the wall and the measurements was recorded to the nearest 0.5 cm [10].

### Dietary diversity

was computed and dichotomized into two categories; from the 9 food items score if less than 4 score it was taken as **low dietary diversity** score and **high dietary diversity** score if greater than 5 score.

### Good adherence

there is good adherence if the average adherence is greater than 95% (he/she missed  $\leq 2$  doses of 30 doses or  $\leq 3$  doses of 60 doses).

### Fair adherence

there is 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

there is poor adherence if the average adherence is  $< 85\%$  (he/she missed  $\geq 6$  doses from 30 doses or  $> 9$  doses of 60 doses) [11].

## Data collection technique and tools

The data was collected using pre-tested structured questionnaire. The structured questionnaire adapted reviewing different literatures [10–15]. Dietary diversity was calculated using questionnaire adopted from FAO guidelines [16]. A food frequency and diversity questionnaire was used to obtain information about usual food consumption pattern of the client and a total dietary diversity score was calculated from a 24 hrs recalled list of food items consumed over the previous day. Food frequency is score the individual eat less than three per day is poor food frequency. All medical factors were assessed according to ART follow

up on registration book .The face to face validity was checked by experts. The questions and statements were grouped and arranged according to the particular objectives that they can address.

## **Data collectors and Data Collection Procedure**

Eight data collectors who are clinical nurses those work in ART clinic were recruited purposively and two supervisors who have Msc in health were recruited. Data was collected through face to face interview using pre – tested structured questionnaire and patient ART registration book.

## **Quality control measures**

The quality of the data was assured by using pre-tested questionnaires. Prior to the actual data collection, pre-testing was done on 5% of the total study eligible subjects and have similar characteristics on non-selected health facility which was not be included in the analysis of the actual study and based on findings necessary amendments were made .Data collectors were trained for two days intensively on the study instrument and data collection procedure that includes the relevance of the study, objective of the study, confidentiality of the information, informed consent and interview technique. The data collectors worked under close supervision of the supervisors to ensure adherence to correct data collection procedures. Supervisors (investigators) reviewed the filled questionnaires in between data collection for completeness. Moreover, the data were carefully entered and cleaned before the beginning of the analysis.

## **Data processing and analysis**

EPI data Statistical software version 3.1 and Statistical Package for Social Sciences (SPSS) software version 21.0 were used for data entry and analysis. After organizing and cleaning the data, frequencies & percentages were calculated to all variables that are related to the objectives of the study. Variables with P- value of less than 0.25 in binary logistic regression analysis were entered into the multivariable logistic regression analysis to control confounds so that the separate effects of the various factors associated with under nutrition were assessed. Odds ratios with 95% confidence intervals were used to examine associations between dependent & independent variables. P. value less than 0.05 was considered significant. Finally the result was presented using tables, charts and narrative form.

## **Ethical considerations**

Ethical clearance from Mizan Tepi University, Institutional research committee (Dr.Henok kassa, Dr.desaleng ,Mr.muktar sano,Mrs.Nardos Delelegne,Mr.melak Menberu) and permission letter from respective authorities and verbal consent of respondents' was obtained before the data collection. To get full co-operation, respondents were reassured about the confidentiality of their response. They were also be ensured their voluntarily participation and right to take part or terminate at any time they wanted. Since the subject of the study could raise ethical issues care were taken in the design of the questionnaire. The research assistants were trained by the principal investigators on how to keep the confidentiality and anonymity of the responses of the respondents in all aspect.

# Communication of the findings

Final report of the study was given to the relevant offices as soon as the report was submitted to the Research office of Mizan-Tepi University. In addition to this, a copy of the final report of this study will be published and the journal will be disseminated to different national and international agencies.

## Result

### Socio- demographic characteristics of the study participants

Out of the total 1007 participants, 961 participants were participated in the study that gives 95.4% of response rate. More than half 588(61.2%) of the study participants were female and 412(42.9%) were found between 30–39 age group. Around half 550 (57.2%) participants were married and majority 681(70.9%) of the study participants were urban by their residence. More than half 555(57.8%) of participants were orthodox followed by protestants, and 411(42.8%) of the study participants had primary cycle regarding their educational status. Most of the study participants 905(94.2%) had less than or equal to five family size and around half 503(52.3%) of them live with their spouse and children. Five hundred seventy eight(60.1%) were used tap water as source of water for drinking and half of study participants were got less than 1000ETB average family monthly income (Table 1).

Table 1  
Socio-demographic characteristics of the study participants at Bench Maji Zone, southwest, Ethiopia, 2018.

Variable	category	Frequency (n = 961)	Percent (%)
Age	18–29	320	33.3
	30–39	412	42.9
	40–49	179	18.6
	>=50	50	5.2
Sex	Male	372	38.8
	Female	588	61.2
Marital status	Single	181	18.8
	Married	550	57.2
	Widowed	97	10.1
	Divorced	133	13.8
Residence	Urban	681	70.9
	Rural	280	29.1
Religion	Orthodox	555	57.8
	Muslim	192	20.0
	Protestant	210	21.9
	other	3	0.3
Educational status	Illiterate	221	23.0
	Can read and write	60	6.2
	Primary Cycle(1–8)	411	42.8
	Secondary school (9–12)	206	21.4
	Diploma and above	63	6.6
Occupation	Housewife	227	23.6
	Farmer	145	15.1
	Governmental employee	110	11.4
	Non-govt. employee	36	3.7
<i>Others*-students, police, drivers, mining, prisoners, privates</i>			



Variable	category	Frequency (n = 961)	Percent (%)
	Merchant	215	22.4
	Laborer	157	16.3
	Others*	71	7.4
Family size category	<=5	905	94.2
	> 5	56	5.8
Live with	Parent	173	18.0
	Relatives	57	5.9
	Spouse	48	5.0
	Spouse and Children	503	52.3
	Alone	180	18.7
Source of drinking water	Tap	578	60.1
	Spring	251	26.1
	River	51	5.3
	Well	81	8.4
Family monthly income	< 1000	487	50.7
	1001–2000	346	36.0
	> 2000	128	13.3
<i>Others*-students, police, derivers, mining, prisoners, privates</i>			

## Prevalence of under nutrition

The magnitude of under nutrition among peoples on ART in this study was 154 (16.0% (95% CI = 13.8–18.3))

## Life style of participants

From the total study participants, most of them 887 (92.3%) did not smoke cigarette and only 206 (21.4%) participants drunk alcohol. Few study participants 106 (11.0%) chewed chat and majority 692 (72.0) participants were performing regular physical exercise.

## Medical and health status of the participants

From the participants majority of them 870(90.5%) were on stage I of WHO clinical stage of disease in the last 6 months. The recent CD4 number of the participants ranged between 23-2000 cell/mm<sup>3</sup> with mean 610 ± 273.6 and the CD4 number of most of the participants 651(67.7%)was greater than 500

cell/mm<sup>3</sup>. Only 100(10.4) of the study subjects developed opportunistic infection previously, of which 329(32%) accounted Tuberculosis and 107(11.1) developed other gastrointestinal symptoms from which poor appetite/ anorexia accounted 47(43.1) and PUD of Dyspepsia 47(43.1) followed by difficulty of eating 35(35%). Most of the participants 633(65.95) spend more than 5 years since diagnosed HIV infected. The most used ART regimen 597(62.1%) was TDF + 3TC + EFV followed by AZT + 3TC + NVP 200(20.8%) and majority of them 693 (72.1%) spend greater than 3 years since started ART drugs. Only 47(4.9%) developed Side effect of HAART and most of them were 899 (93.5%) on good drug adherence (Table 2).

Table 2

Variable related to medical factor of the study participants at Bench Maji Zone, southwest, Ethiopia, 2018.

Variable	category	Frequency (n = 961)	Percent (%)
WHO Clinical stage of the disease	Stage-I	870	90.5
	Stage-II	34	3.5
	Stage-III	51	5.3
	Stage-IV	6	0.6
Recent CD4 count of the patient	< 200	64	6.7
	200–499	246	25.6
	> 500	651	67.7
Previous Opportunistic infection	Yes	100	10.4
	No	861	89.6
Type of previous opportunistic infection the patient developed (n = 100)	Oral Candidiasis	18	18.0
	Tuberculosis	32	32.0
	Chronic Diarrhea	21	21.0
	Anemia	13	13.0
	Other^	16	16.0
Other gastrointestinal symptoms developed	Yes	107	11.1
	No	854	88.9
Type gastrointestinal symptoms developed (n = 109)	Poor appetite/ Anorexia	47	43.1
	Difficulty of eating	39	35.8
	Nausea and vomiting	23	21.1
	PUD or Dyspepsia	47	43.1
Time since HIV Diagnosis in months	< 12 months	82	8.5
	12–36 months	134	13.9
Other*- TDF + 3TC + ATV/r, ABC + 3TC + LPV/r, ABC + 3TC + ATV/r.			
Other^ -pneumonia, epilepsy, herpes zoster			

Variable	category	Frequency (n = 961)	Percent (%)
	36–60 months	112	11.7
	> 60 months	633	65.9
Current ART regimen	1c (AZT + 3TC + NVP)	200	20.8
	1d (AZT + 3TC + EFV)	90	9.4
	1e (TDF + TC + EFV)	597	62.1
	1f (TDF + 3TC + NVP)	47	4.9
	1 g (ABC + 3TC + EFV)	4	0.4
	2b (TDF + 3TC + LPV/r)	3	0.3
	2c (TDF + 3TC + LPV/r)	2	0.2
	2e (AZT-3TC-LPV/r)	1	0.1
	2f (AZT-3TC-ATV/r)	5	0.5
	Other*	12	1.2
Duration of ART in month	< 6 months	49	5.1
	6–12 months	67	7.0
	12-36months	152	15.8
	> 36months	693	72.1
Side effect of HAART	Yes	47	4.9
	No	914	95.1
Doses of ART drug	30 doses	404	42.0
	60 doses	275	28.6
Other*- <i>TDF + 3TC + ATV/r, ABC + 3TC + LPV/r, ABC + 3TC + ATV/r.</i>			
Other^ <i>-pneumonia, epilepsy, herpes zoster</i>			

Variable	category	Frequency (n = 961)	Percent (%)
	90 and 180 doses	282	29.3
Adherence status	Poor	44	4.6
	Fair	18	1.9
	Good	899	93.5
Other*- <i>TDF + 3TC + ATV/r, ABC + 3TC + LPV/r, ABC + 3TC + ATV/r.</i>			
Other^ - <i>pneumonia, epilepsy, herpes zoster</i>			

## Nutritional related factors

Among the participants only 64(6.7%) got food aids of which 495.1(5.1%) aids got this aid from government. Among the types of this food aids 43(68.3%) was plump nut. High number of the participants 610(63.5%) got dietary counselling and most of them 884(92.0%) of them had good food frequency (diet more than three times per day).

## Diversified Diet

A total dietary diversity score was calculated from a 24 hrs recalled list of food items consumed over the previous day. According to the dietary diversity score about half 489(50.9%) got diversified diet

## Factors Affecting under nutrition among peoples on HAART

In multivariable logistic regression analysis, factors contributing to under nutrition were identified. Adult people on HAART age greater and equal to 50 years old were two times more likely develop under nutrition as compared to younger age [AOR 2.4, 95% CI(1.1–5.4)]. Being a single in marital status was two times more likely develop under nutrition in adult people receiving ART as compared to their counterpart [AOR 2.2, 95% CI (1.3–3.7)]. Being merchants among adult people on ART were less likely develop under nutrition by 60% as compared to employed individuals in government and non-government organization [AOR 0.4, 95% (0.2–0.9)] and those who manifested other GI symptoms were three times more likely faced under nutrition as compared to who didn't manifest [AOR 2.6, 95% CI (1.5–4.5)]. Adult client who were on WHO clinical stage III were three times more likely to be under nutrition as compared to their counterpart [AOR 3.1, 95% CI (1.4–6.8)] (Table 3).

Table 3

Multivariable logistic regression analysis of under nutrition among peoples on HAART in Health facilities of Bench Maji Zone, Southwestern Ethiopia, 2018.

Variable	Category	Under nutrition		COR (95% CI)	AOR (95% CI)
		No	Yes		
Age	18–29	267	53	1	<b>1</b>
	30–39	354	58	0.8(0.6–1.2)	1.1(0.7–1.9)
	40–49	149	30	1.0(0.6–1.7)	1.4(0.8–2.5)
	>=50	37	13	1.8(0.9–3.6)	<b>2.4(1.1–5.4)*</b>
Marital status	Married	480	70	<b>1</b>	<b>1</b>
	Single	136	45	2.3(1.5–3.5)	<b>2.2(1.3–3.7)*</b>
	Widowed	78	19	1.7(1.0–2.9)	1.1(0.6–2.1)
	Divorced	113	20	1.2(0.7–2.1)	0.9(0.5–1.7)
Residence	Urban	578	103	<b>1</b>	<b>1</b>
	Rural	229	51	1.3(0.9–1.8)	1.2(0.8–2.0)
Educational status	Illiterate	223	58	1.8(0.8–4.0)	2.6(0.9–7.1)
	Primary (1–8)	349	62	1.2(0.6–2.7)	2.0(0.7–5.2)
	Secondary school(9–12)	180	26	1.0(0.4–2.3)	1.4(0.5–3.6)
	Diploma and above	55	8	1	1
Occupational status	Employee(Gov't &NGO)	119	27	1	1
	Farmer & house wife	307	65	0.9(0.6–1.5)	0.6(0.3–1.1)
	Merchant	191	24	0.6(0.3–1.0)	<b>0.4(0.2–0.9)*</b>
	Laborer	131	26	0.9(0.5–1.6)	0.5(0.2–1.1)
	Other	59	12	0.9(0.4–1.9)	0.6(0.2–1.4)
Source of drinking water	Tape water	487	91	1	<b>1</b>
	Spring water	213	38	1.0(0.6–1.4)	0.9(0.6–1.5)
	Liver water	38	13	1.8(0.9–3.6)	1.7(0.8–3.7)

\* Statistically significant

	Well water	69	12	0.1(0.5–1.8)	0.9(0.4–1.9)
CD4 count	< 200	45	19	2.3(1.3-4.0)	1.5(0.8-3.0)
	200–499	213	33	0.8(0.5–1.3)	0.7(0.5–1.1)
	>=500	549	102	1	
OI	Yes	69	31	2.7(1.7–4.3)	0.9(0.5–1.8)
	No	738	123	1	1
GI symptom	Yes	67	40	3.9(2.5-6.0)	<b>2.6(1.5–4.5)*</b>
	No	740	114	1	<b>1</b>
WHO clinical stage	Stage one	745	125	1	1
	Stage two	27	7	1.5(0.7–3.6)	1.5(0.6–3.7)
	Stage three	32	19	3.5(1.9–6.4)	<b>3.1(1.4–6.8)*</b>
	Stage four	3	3	6.0(1.2–29.9)	3.0(0.4–20.6)
Time since HIV diagnose	< 12 months	60	22	2.1(1.2–3.6)	1.2(0.3–4.8)
	12–36 months	112	22	1.1(0.7–1.9)	0.8(0.3-2.0)
			77		
	36–60 months	96	16	1.0(0.5–1.7)	0.7(0.3–1.4)
	> 60 months	539	94	1	1
Current ART regimen	1c(AZT + 3TC + NVP)	164	36	1	1
	1d(AZT + 3TC + EFV)	73	17	1.1(0.6-2.0)	1.2(0.6–2.5)
	1e (TDF + 3TC + EFV)	504	93	0.8(0.6–1.3)	0.7(0.4–1.1)
	Other	66	8	0.6(0.2–1.3)	0.5(0.2–1.1)
Duration on ART	< 6 months	35	14	2.3(1.2–4.5)	1.5(0.3–6.7)
	6–12 months	55	12	1.3(0.7–2.5)	1.0(0.3–3.8)
	12–36 months	125	27	1.3(0.8-2.0)	1.5(0.7–3.4)
	> 36 months	592	101	1	1
Side effect of ART	Yes	34	13	2.1(1.2–4.1)	1.5(0.7–3.3)

\* Statistically significant

	No	773	141	1	1
Drug adherence	Poor	32	12	2.1(1.0-4.1)	1.7(0.7–3.8)
	Fair	14	4	1.6(0.5–4.9)	1.4(0.4–4.7)
	Good	761	138	1	1
Food frequency	Poor	54	23	2.4(1.5–4.1)	1.6(0.9-3.0)
	Good	753	131	1	
Diet counseling	Yes	505	105	1	1
	No	302	49	0.8(0.5–1.1)	0.7(0.5–1.1)
* Statistically significant					

## Discussion

The magnitude of under nutrition in this study was 154 (16.0% [95% CI = 13.8–18.3]). This implies that the significant number of peoples attending the ART clinic developed under nutrition and HIV/AIDS has direct or indirect impact on nutritional status of the client those receiving HAART. The finding of this study was lower than the study done in Brazil[17], in Ethiopia: Bahir Dar [18], Dembia district [12], Nekemte referral hospital[10], Wolaita Sodo [14], Butajira [11] and Hosana [9] which were 43%, 25.5%, 23.2%, 27%, 26.6% 25.2% and 31.2% respectively. The discrepancy might be due to study period, increased health seeking behaviour of the community from time to time which enhance early detection and treatment of HIV, and other reason is due to difference in socioeconomic status of the community which has direct relation with under nutrition and increased government intervention like early initiation of HAART and supplementation diet.

The finding of this study was higher than the study done in Zimbabwe [19] and Dilla university referral hospital (15) which was 10% and 12.3% respectively. The might be due to study area and the difference intervention given the study area on dietary practice.

In this study some associated factors were identified. Among socio demographic age, marital status and occupation were significantly associated with under nutrition in peoples on ART. This is consistent with the study done in Brazil [20]. It is known that as age increases the immunity decreases that put the orders on different diseases and OI that affects the appetite and food intake of individuals. In this study being single in marital status is also associated with under nutrition in peoples on ART. This may indicate that unmarried individuals may at risk to develop HIV infection and if infected OI may follow that affects the food intake. The study done in Amhara region of Ethiopia, Dembia district indicated that widowed people were associated to under nutrition among people on ART [12]. In addition to this the finding of this study indicated that peoples those who merchants in occupation were less likely develop under nutrition. This might be due to the income of merchants is high than of employed to afford in getting the food.



The other factor associated with under nutrition among adult peoples on ART in this study was developing gastro intestinal symptoms within last six months. This is consistent with the study conducted in Ethiopia, Bahir Dar, that indicated feeding difficulty was the predictor [18] and also similarly the study conducted at Dilla University Referral Hospital of the same country showed that gastrointestinal symptoms were associated factors of under nutrition among adult people taking ART drugs [15]. This might be due to that peoples with gastro intestinal symptoms cannot take food well and poor absorption of the food may also occur. In this study also WHO clinical stage of AIDS disease was significantly associated with being under nutrition in peoples on ART drugs. This finding is similar with the study done in Ethiopia at Nekemt referral hospital, Dilla University Referral Hospital, Hosanna town [9, 13, 15]. This is known that in Clinical stage four of AIDs diseases the patient develop many opportunistic infections that affects the appetite of the patients and even it is the stage at which the peoples become unable to feeding.

## Limitation of the study

This research might be subjected to certain limitations like there might be inter observer error during measurements.

## Conclusion

Significant numbers of peoples on ART drugs in the study area were under nutrition .Age, marital status, occupational status, WHO clinical stage of disease and developing gastro intestinal symptoms were identified factors of under nutrition among adult people on ART

## Abbreviations

**AIDS** (Acquired Immunodeficiency Syndrome), **ART** (Antiretroviral Treatment),**ARV** (Antiretroviral),**BMI**( Body Mass Index),**FMOH** (Federal ministry of Health),**HAART**(Highly Active Antiretroviral Therapy), **HAPCO** ( HIV and AIDS Prevention and Control Office), **HIV** (Human Immuno-Deficiency Virus), **MUAC**(Measurement of upper Arm Circumferences),**PPLHIV** (People living with HIV/AIDS) ,**RUTF** (Ready to use therapeutic food)

## Declarations

## Competing interests

The authors declare that they have no competing interests.

## Availability of data and materials

The data was stored and kept in personal computer of authors.

# Ethics approval and consent to participate

The ethical issue of the research was assured by obtaining ethical approval letters from the ethical committee of Mizan-Tepi University and permission letter from respective authorities and verbal consent of respondents' was obtained before the data collection. To get full co-operation, respondents were reassured about the confidentiality of their response. They were also be ensured their voluntarily participation and right to take part or terminate at any time they wanted. Since the subject of the study could raise ethical issues care were taken in the design of the questionnaire. The research assistants were trained by the principal investigators on how to keep the confidentiality and anonymity of the responses of the respondents in all aspect.

## Consent to publish

Not applicable.

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The study was funded by Mizan Tepi University.

## Authors' contributions

The authors' responsibilities were as follows: Designed and supervised the study and ensured Quality of the data and assisted in the analysis and interpretation of the data. All authors critically reviewed the manuscript. The corresponding author did the analysis & drafted the manuscript and had the responsibility to submit the manuscript for publication.

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