

Research Article

Dietary Diversity and Associated Factors among HIV Positive Adult Patients Attending Public Health Facilities in Motta Town, East Gojjam Zone, Northwest Ethiopia, 2017

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Introduction. Dietary diversity is defined as the amount of different food groups or foods that are consumed over a specific reference time. The human immune deficiency virus problem remains one of the main public health challenges, especially in low and middle income countries. Nutrition has been linked to both the transmission of human immune deficiency virus and poor outcomes related to human immune deficiency virus. **Objective.** To assess dietary diversity and associated factors among human immune deficiency virus positive adult patients in Motta administrative town, Northwest Ethiopia, 2017. **Methods.** A facility based cross-sectional study design was conducted on 410 study participants selected using a stratified sampling technique with proportional allocation. The data were collected using semi-structured and pretested questionnaire. Data were entered into Epi-Data version 3.1 and analysis was performed using SPSS version 20. Descriptive statistics were used to describe the number and percentage of the study variables. The bivariate and multivariable logistic regression analyses were done to identify the independent factors associated with dietary diversity among adult human immune virus (HIV) positive patients. **Result.** A total of 410 study participants were included in the analysis. Of the total, 121 (29.5%) of adult HIV positive respondents consumed diversified diet with the mean dietary diversity score of 3.2 (SD±1.88). The predominant food item consumed during the study periods was starchy staples (96.1%) and legumes (81.7%). Having means of communication cell phone (mobile phone) [(AOR= 2.13 (1.16, 3.60)], media exposure status in the household [(AOR =1.95 (1.22, 3.11)] and nutrition counselling [(AOR =2.17 (1.09, 4.67)] were significant factors associated with dietary diversified feeding at 95% CI. **Conclusion.** The study revealed that low dietary diversity score was significant nutritional problem among HIV positive adults in Motta town health facilities. Having mobile cell phone, media exposure status and nutritional counselling were significantly associated with dietary diversity score. Therefore efforts should be strengthened to improve the counseling service at each health institution and encourage the patients to use media for the source of information.

1. Background

Dietary diversity is a quantitative number of food groups which is used extensively as a method of ascertaining variety and nutrient adequacy of diets. It is the number of different food groups consumed over a given reference period. Diversified diets that include a variety of foods from different food groups (vegetables, fruits, grains, and animal source foods) provide a balance of nutrients that promote healthy growth and development. It is indeed strongly associated with nutrient adequacy [1]. Increasing the variety of foods across and

within food groups is recommended in most dietary guidelines. This explained that there is no any single food which contains all the required nutrients for optimal health [2].

Undiversified food and malnutrition are public health concerns worldwide, especially in developing countries [3]. In developing countries with high nutrient demands, chronic patients like HIV/AIDS are of high risk due to consumption of low-quality, monotonous food which leads to micronutrient and macronutrient deficiencies [4].

HIV/AIDS and malnutrition are both highly prevalent in many parts of the world, especially in Sub-Saharan Africa.

The effects are interrelated and exacerbate one another in a vicious cycle [5]. Both HIV and malnutrition can independently cause progressive damage to the immune system and increased susceptibility to infection, morbidity, and mortality through opportunistic infections, fever, diarrhea, loss of appetite, nutrient absorption, and weight loss. HIV specifically affects nutritional status by increasing energy requirements, reducing food intake, and adversely affecting nutrient absorption and metabolism [6].

Nondiversified diet can have negative consequences on individuals' health, well-being, and development, mainly by reducing physical, social, cognitive, reproductive, and immunological capacities [2]. The level of dietary diversity and its determinant on HIV positive individuals will play a crucial role in improving quality of nutritional care and counseling provided by healthcare providers which in turn improves clients quality of life and physical and social capacity [7].

Dietary diversity problem in Ethiopia occurs at all times of the year. The number of relief dependent population has increased from time to time, which indicate that famine has become more prevalent than worse food diversity problems [8]. If adequate measures are not taken, the catastrophic nature of HIV will ground down the economic activities of countries because the global number of People Living with HIV (PLHIV) is seriously increasing [9]. Food diversity problem in Ethiopia derives directly from dependence on undiversified (monotonous) livelihoods style based on low-input, low-output rain fed agriculture and awareness problem [10, 11].

Inadequate dietary intake to meet the increased metabolic demands associated with HIV infection is likely to affect nutritional status in PLHIV, further lowering their immunity and hastening disease progression hence increased morbidity and mortality. The Ministry of Health has taken remarkable steps in addressing nutrition among PLHIV by developing the national nutrition in HIV/AIDS guidelines. Dietary diversity among HIV positive adults (18 years) is influenced by different factors. So, the current study assessed those factors which are significant for dietary diversity. There is also limited research document in Ethiopia and no published study conducted on this topic in the study area; therefore, it is essential to assess the current magnitude of dietary diversity and associated factors among People Living with HIV receiving care and support in the study area. Hence this study will be conducted to identify the level of dietary diversity and associated factors among PLHIV attending antiretroviral therapy (ART) clinics of Motta administrative town ART sites.

2. Methods

2.1. Study Design and Setting. Facility based cross-sectional study was conducted in Motta administrative town, East Gojjam zone, the Amhara Regional State from April 15 to 30, 2009 E.C. It is located 370 Km, Northwest of Addis Ababa, and the capital city of Ethiopia and 120 km Southwest of Bahir Dar city, the capital of the Amhara National Regional State,

respectively. The town had two ART sites. These were Motta Hospital and Motta Health Center. Motta Hospital started ART chronic care in 1998 E.C. and it served more than two thousands nearby woreda HIV patients. Motta Health Centre served about 355 HIV patients [12, 13].

2.2. Participants. The source population was all HIV positive adults aged 18 years and above registered for chronic medical care in Motta administrative town ART sites and those patients who were currently on ART attending Motta administrative town ART clinic during the data collection period were included in the study, while those respondents who were too sick and unable to communicate were excluded.

2.3. Sample Size Determination and Technique. The required sample size was calculated using a formula for the determination of sample size for a single population proportion, considering 58.8% [9] as the proportion of low dietary diversity (P) with 5% level of significance (α), at 95% level of confidence for two-tail test and a marginal error or level of precision (d)=5%. The sample size (n) then was calculated as follows:

$$n = \frac{(Z_{\alpha/2})^2 [P(P - 1)]}{(d)^2} = \frac{(1.96)^2 [0.588(0.588 - 1)]}{(0.05)^2} \quad (1)$$

$$= 373$$

The final sample by adding 10% nonresponse rate becomes 410.

Stratified sampling was used to select the required samples. First classify the health institutions stratified into two strata. Those were Hospital and Health Centre. Sampling frame was constructed by using the list from daily patient flow from both health institutions and proportionally allocated sample for each health institution and then simple systematic random sampling technique was used to select study units (participants) at every K^{th} (4^{th}) intervals (k was sampling fraction, which was calculated as $N/n=1433/329 \approx 4$ for Motta Hospital and $N/n=355/81 \approx 4$ for Motta Health Centre). The numerators 1433 and 355 were the number of HIV positive clients currently on chronic care at Motta Hospital and Motta Health Center, respectively. The starting sample was selected by lottery method among the first four clients. The procedure was continued until the required sample size was obtained.

2.4. Data Collection Tools and Procedures. Structured questionnaire and standardized individual dietary diversity score tool [14] were used to assess dietary diversity of adult PLHIV. The questionnaire was first prepared in English by reviewing literatures and translated into Amharic version, which later on translated to the English version to check its consistency and comparability of the finding. Four data collectors (diploma clinical nurses) and one supervisor (health officer) were recruited for data collection process in Motta town administrative ART sites. A one-day training was given for data collectors and supervisors on the objectives of the study, data collection methods, how to fill the information in the structured questionnaire, and the ethical aspect of how to

approach the patient. Supervisors had checked completeness and consistency of the collected data by reviewing each completed questionnaire daily and onsite supervision was carried out during data collection periods.

2.5. Data Quality Control. The questionnaire was designed and modified into local context from previous related literatures. It was first prepared in English and then translated into the local language Amharic and then retranslated back to English by an expert who was fluent in both languages to maintain its consistency. Training was given for data collectors and supervisor. Pretesting of the questionnaire was made on 5% of sample size in the Gindewoyin Health Center prior to the actual data collection process. There after adjustments and corrections were effected to the tools after review following the pretest. The data collection process was strictly followed day to day by the supervisor and principal investigator.

2.6. Data Processing and Analysis. Data were coded and entered into Epi-data version 3.1 and were exported to SPSS version 20.0 for analysis. The data that needs coding were first recoded before analysis. Descriptive statistics like frequency and cross-tabulation was computed. The bivariate logistic regression analysis was used to assess the association between dependent and independent variables. Each independent variable was entered in the bivariate logistic regression. Finally, variables, which show associations in the bivariable logistic regression at P value of less than 0.2 with 95%CI, were entered into multivariable logistic regression and were declared statistically significant at P value of less than 0.05 with at 95% CI.

2.7. Ethical Consideration. Ethical clearance was obtained from Debre Markos University, College of Health Sciences, Ethical Review Committee, and letter of permission was obtained from Motta town administrative ART sites. The purpose of the study was explained to respondents and verbal informed consent will be obtained from participants. Confidentiality of information was maintained by omitting any personal identifier from the questionnaires. The collected data were kept in the form of file in secure place where no one can access it except the investigator.

3. Results

3.1. Sociodemographic and Economic Characteristics. 410 study participants were included in the analysis with overall response rate of 100%. The majority of the respondents, 150 (36.6%), belonged to age group of 35-44 years with the mean age of 37.0 (± 9.63) years. Majority, 359 (87.6%), were Christian orthodox followers and 279 (68.0%) of the respondents were females. All of the respondents (100%) were Amhara and 192 (46.8%) were married. Majority, 214 (52.2%), of the respondents cannot read and write. Regarding to occupation, 125 (30.5%) of respondents were daily labourer and 315 (76.8%) of respondents' place of residence were urban (Table 1).

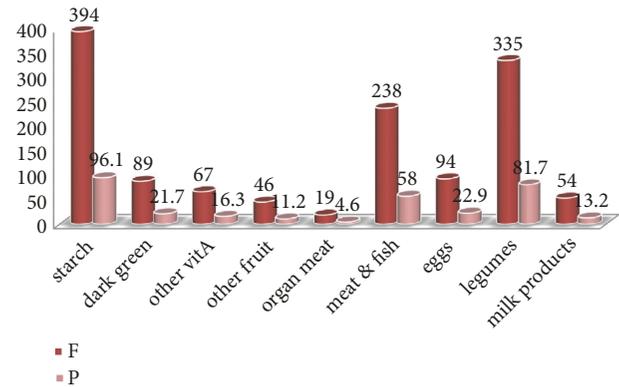


FIGURE 1: Twenty-four-hour food group consumption of adult HIV patients in Motta town public health facilities, April, 2017.

3.2. Behaviors Related Characteristics. Among the respondents, 140 (34.1%) were counseled about drugs, 23 (5.6%) about the illness, and 243 (59.3%) about feedings. Most patients 391 (95.4%) were counseled by healthcare providers whereas the others 17 (2.2%) were by case managers. One hundred twenty-three (30%) of the respondents were alcohol drinker and 11 (2.7%) were chat chewer.

3.3. Health Related Characteristics. Regarding working status, 405 (98.8%) of respondents could work their daily activities. One hundred seventy-three (33.4%) of respondents were taking Cotrimoxazole prophylaxis of which 116 (67.0%) of them took for less than six years. 5.4% of the patients developed side effect related to ARV drugs while 0.7% and 3.9% developed side effect related to INH and CPT, respectively. 192 (46.8%) of patients took AZT-3TC-NVP based regimens and 5 (1.2%) took second-line regimen. Among respondents 176 (42.9%) of them took ART for less than three and half years (42 months). 405 (98.8%) of respondents were currently under WHO clinical treatment stage one (T-1) and 230 (68.3%) had baseline CD4 count of less than 350 cells/mm³. Majority 376 (91.7%) of the respondents had monthly follow-up and 392 (95.6%) of the respondents had good adherence even if 2.9% of them lost due to their own reason (Table 2).

3.4. Level of Dietary Diversity. By considering the mean individual dietary diversity score, about 29.5% of HIV positive adults got diversified food. Starch staples (96.1%) and legumes were food groups predominantly consumed by the patients with 96.1% and 81.7%, respectively, whereas the least consumed food groups by the patients were organ meat (4.6%) and milk products (13.2%) (Figure 1).

3.5. Factors Associated with Level of Dietary Diversity. In multivariable logistic regression analysis, those patients who had cell phone means of communication were 2.13 times more likely to get diversified diet (AOR =2.13, 95% CI= 1.16, 3.60) compared to those who had not mobile cell phone. Those patients who had radio and television as means of source of information were 1.95 times more likely to get

TABLE 1: Sociodemographic characteristics of adult HIV positive patients in Motta administrative town ART sites, April, 2017.

Sociodemographic variables		Frequency (N=410)	Percent (%)
Sex	Male	131	32.0
	Female	279	68.0
Age of the respondent	<25 years	27	6.6
	25-34 years	139	33.9
	35-44 years	150	36.6
	≥ 45 years	94	22.9
Religion of the respondent	Orthodox	359	87.6
	Muslim	51	12.4
Educational status	Can't write and read	214	52.2
	Write and read	93	22.7
	Primary school	38	9.3
	Secondary school	54	13.2
	Certificate and above	11	2.7
Marital status	Single	34	8.3
	Married	192	46.8
	Divorced	152	37.0
	Widowed	32	7.8
Occupation	Farmer	109	26.6
	Government employed	54	13.2
	Merchant	90	22
	Daily laborer	125	30.5
	Student	9	2.2
	Others	23	5.6
Residence	Rural	95	23.2
	Urban	315	76.8
Family size	≤ 5 people	389	94.9
	> 5 people	21	5.1
Monthly income	<500 birr	105	25.6
	≥ 500 birr	305	74.4
Source of food	Farm/garden	118	28.8
	Purchase	279	68.0
	Relatives	13	3.2
Farmland ownership	Yes	122	29.8
	No	288	70.2
Livestock ownership	Yes	80	19.5
	No	330	80.5
Dummy cultivating land	Yes	65	15.9
	No	345	84.1
Milk in the house	Yes	28	6.8
	No	382	93.2
Chicken and eggs in the house	Yes	63	15.4
	No	347	84.6
Mobile phone	Yes	220	53.7
	No	190	46.3
Exposure to media sources	Yes	104	25.4
	No	306	74.6

TABLE 2: Health related information of adult HIV patients in Motta administrative town, April, 2017.

Health related variables		Frequency	Percent (%)
Working status of the respondent	Working	405	98.8
	Other	5	1.2
Taking Cotrimoxazole prophylaxis	Yes	137	33.4
	No	273	66.6
Duration of Cotrimoxazole	≤ 5 years	116	67.0
	>5years	21	33.0
Side effect of Cotrimoxazole	Yes	16	3.9
	No	121	29.5
INH preventive therapy	Yes	30	7.3
	No	380	92.7
INH side effect	Yes	3	0.7
	No	27	6.8
ART regimen	AZT-3TC-NVP	192	46.8
	AZT-3TC-EFV	30	7.3
	TDF-3TC-NVP	33	8.5
	TDF-3TC-EFV	148	36.1
	Other/second line	5	1.2
ART duration	6-18 months	50	12.2
	19-42 months	126	30.7
	≥43 months	234	57.1
Side effect of ART	Yes	22	5.4
	No	388	94.6
WHO stage	T-1	405	98.8
	T-2	4	1
	WHO-1	1	0.2
Opportunity infection	Yes	42	10.2
	No	368	89.8
Follow-up interval	Monthly	376	91.7
	Every 2 months	33	33.8
	Others	1	0.2
Supplementary feeding	Yes	57	13.9
	No	353	86.1
Baseline CD4	<200 cells/mm ³	149	36.3
	200-349 cells/mm ³	131	32.0
	350-499 cells/mm ³	70	17.1
	≥500 cells/mm ³	60	14.6
Current CD4	<200 cells/mm ³	38	9.3
	200-349 cells/mm ³	69	16.8
	350-499 cells/mm ³	97	23.7
	≥500 cells/mm ³	206	50.2
Adherence	Good	392	95.6
	Fair	10	2.4
	Poor	8	2.0

diversified diet (AOR =1.95, 95% CI= 1.22, 3.11) compared to those who had not media source and patients who got nutritional counseling were 2.17 times more likely to get diversified diet (AOR =2.17, 95% CI=1.09, 4.67) compared to counterparts (Table 3).

4. Discussion

This cross-sectional study was conducted to determine dietary diversity in adult HIV positive patients in Motta town public health institutions, North West Ethiopia. The

TABLE 3: Multivariate and bivariate logistic regression output showing factors associated with dietary diversity in adult HIV patients in Motta town public health facilities, April, 2017.

S. No.	Variables	Diversified diet		COR at 95% CI	AOR at CI 95%	
		Yes	No			
1	Having media exposure	Yes	62	42	3.65(1.56,8.56)*	1.95(1.22,3.11)***
		No	227	79	1.00	1.00
2	INH preventive therapy	Yes	15	15	2.59(1.22,5.47)*	1.47(0.467,4.61)
		No	274	106	1.00	1.00
3	Cotrimoxazole	Yes	81	35	2.59(0.72,9.37)*	2.42(0.65,9.06)
		No	19	3	1.00	1.00
4	Availability of Mobile phone	Yes	138	8	2.30(1.47,3.59)*	2.13(1.16,3.60)***
		No	151	39	1.00	1.00
5	Food source	Farming	154	76	1.48(0.96,2.29)*	0.79(0.36,1.85)
		Other	135	45	1.00	1.00
6	Nutritional counseling	Yes	117	113	2.77(0.97,4.46)*	2.17(1.09,4.67)***
		No	172	8	1.00	1.00
7	Marital status	Married	127	65	1.48(0.96,2.27)*	1.20(0.53,2.72)
		Not ever married	162	56	1.00	1.00

Significant at * p value < 0.2 and *** p value < 0.05.

finding of this study revealed that 29.5% of HIV positive adults have got diversified diet before 24 hours preceding the survey. This was in line with the study conducted in Hossana town, Ethiopia (32.1%) [15]. But it was lower than the study conducted in Metema Hospital (42.2%) [9], Jimma (44.2%) [16], Kenya (37.7%) [17], Eastern Uganda (41%) [18], and Butajira Hospital, Ethiopia (61.2%) [19]. This difference may be due to variations of study periods, geographical location, seasonal variability, and other sociodemographic factors.

Starch staples and legumes were food groups, predominantly consumed by the participants during the 24-hour recall, 96.1% and 81.7%, respectively, in Motta public health institutions. This finding is in line with the study conducted in Butajira, Metema Hospital, Nigeria [3, 19, 20]. On the other hand, organ meat, milk, and milk products were the least consumed food group during the study periods. This is in line with studies conducted at Butajira, Ethiopia, and Metema, Ethiopia. But in Metema in addition to milk, eggs were the least consumed food groups [3, 19]. The reasons might be due to the difference of socioeconomic status, study area, and periods and agrological differences.

This study finding revealed that adult HIV patients who had media exposure were two times more likely to get good diversified diet compared to counterparts. This finding is in line with studies done in central Uganda and South Gondar [15, 20]. The probable reason for this finding may be adult HIV patients who exposed to media sources might capture information about feeding from local media sources. Currently in Ethiopia there are local media that broadcast nutrition and health messages. On the other hand, this study also showed that those patients who had mobile cell phone were more than two times more likely to have got diversified diet as compared to those who had not mobile cell phone. This could be due to patients who had mobile access to close contact with the healthcare provider and could get counseling

and it is important for defaulter tracing mechanism to trace those defaulted individuals.

Those adult HIV patients who got nutritional counseling were more likely to have diversified diet as compared to those who did not get. The probable reason for this finding might be that those adult HIV patients who got nutritional counseling had higher chance to get advice about feeding pattern.

The study also showed that taking alcohol and smoking cigarettes had no association with dietary diversity which is in line with a study done in Uganda [21]. A finding in Botswana showed that age, marital status, and educational status affects the dietary diversity of the individual [22]. Other studies in Filipino [23] and Jimma [16] showed that household income had positive correlation with dietary diversity of the individual. Occupational status, sex, raising small animals, and cultivated dummy vegetables in the garden had significant association with an individual dietary diversity in Jimma [16] and South Gondar [24]. But the above listed variables did not show any association with dietary diversity in this study. A study finding in Metema Hospital also revealed that employment status, duration of anti-retro-viral treatment, and Cotrimoxazole prophylaxis had strong association with level of dietary diversity of an individual which is also in contrast with this study [3]. This may be attributed to many factors such as differences in the study area, study period, and study design.

This study may have certain limitations like recall bias and social desirability bias. And also since this is cross-sectional study design, it does not show real association.

5. Conclusion and Recommendations

The finding of this study revealed that diversified diet is a significant nutritional problem among HIV positive adults in

public health facilities in Motta town. Nutritional counseling, having radio/television for source of information access, and having mobile were the factors contributing for dietary diversity. Therefore healthcare provider should focus on nutritional counseling and encourage the patients to use cell phone and increase awareness about the importance of media exposure.

Abbreviations

3TC:	Lamivudine
AIDS:	Acquired immune deficiency syndrome
AOR:	Adjusted odds ratio
ART:	Antiretroviral therapy
AZT:	Zidovudine
CD4:	Cluster of differentiation 4
CI:	Confidence interval
DDS:	Dietary diversity score
EDHS:	Ethiopian Demographic and Health Survey
PLWHIV:	People Living with HIV AIDS
WHO:	World Health Organization.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author. The data will not be shared in order to preserve participant anonymity.

Ethical Approval

Ethical clearance was obtained from Debre Markos University, College of Health Sciences, Ethical Review Committee.

Consent

Letter of permission was obtained from Motta town administrative ART sites. The purpose of the study was explained to respondents and verbal informed consent was obtained from participants. Confidentiality of information was maintained by omitting any personal identification from the questionnaires. The collected data was kept in the form of file in secure place where no one can access it except the investigator.

Conflicts of Interest

The authors have declared that no conflicts of interest exist.

Authors' Contributions

Addisu Tesfaw was responsible for conceptualization. Addisu Tesfaw, Habtamu Temesgen, and Dube Jara were responsible for formal analysis; development or design of methodology; entering data into computer software; supervision; writing original draft; writing review and editing. Habtamu Temesgen and Dube Jara were responsible for validation. All authors read and approved the final manuscript.

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Supplementary Materials

The supplementary file contains the questionnaire. The questionnaire has five parts: Part 1: sociodemographic factors of the respondents; Part 2: socioeconomic related questions; Part 3: behaviour and information related questions; Part 4: health related/clinical questions; Part 5: dietary diversity score questionnaire and additionally firstly there is information sheet and consent form. (*Supplementary Materials*)

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