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Original Article

Dietary diversity and associated factors among HIV positive adults attending antiretroviral therapy clinics of Southern Ethiopia: A facility-based cross-sectional study

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Abstract

Background: People living with HIV are at higher risk of malnutrition due to reduced food intake, poor nutrient absorption, and altered metabolism, which can worsen HIV progression, weaken the immune system, and reduce the effectiveness of antiretroviral therapy. With over 1.3 million people affected, Ethiopia is one of the most affected countries in sub-Saharan Africa. This study assesses how dietary diversity influences health outcomes among adults living with HIV on antiretroviral therapy. The study aimed to assess the prevalence of diet diversity and the factors that influence it, to highlight the importance of nutrition interventions to improve the health of this vulnerable group.

Method: An institutional-based cross-sectional study was conducted from May 2022 to June 2022. A total of 345 HIV patients attended the ART clinic at Hawassa University Comprehensive Specialized Hospital and Yirgalem General Hospital. Data were collected by six trained nurses using pre-tested structured standard questionnaires and from patients' medical records. Data entered and analyzed by SPSS version 20. Multi-variable logistic regression was used to determine factors associated with dietary diversity and significance declared at p-value ≤ 0.05.

Results: The mean age of the study participants was 39.5 (±9.02) years and most of them were female (61%). **The** prevalence of low dietary diversity was found to be 46.7%. Dietary diversity was statistically significantly associated with high-income level [AOR = 0.48, 95% CI: (0.28, 0.83)], and nutritional counseling service [AOR = 7.89, 95% CI: (4.41, 14.15)].

Conclusion and recommendation: The findings indicate that significant proportions of adult HIV patients experience low dietary diversity. Factors such as income level, and access to nutritional counseling significantly

influence dietary diversity. Improving access to nutritional counseling for people living with HIV and increasing the involvement of stakeholders in income-generating activities are crucial to improving the diversity of their diets.

Keywords: Dietary diversity, adult HIV patients, antiretroviral therapy**,** Southern Ethiopia

Introduction

In 2017, around 36.9 million people lived with HIV (PLHIV) globally, and the vast majority (76%) of victims were located in sub-Saharan Africa, but the least able to cope (1, 2). Ethiopia is among the seriously affected countries in sub-Saharan Africa with an estimated prevalence of 1.1%., but there is substantial prevalence variation by region, in Southern Nations, Nationalities and Peoples' Region (SNNPR) it accounts for 0.7% (3).

Great strides have been made over the last 20 years in the long-term management of HIV. Infection in developing countries, results in improved immune function, reduced mortality, and prolonged survival (4, 5). Despite substantial improvements in morbidity and mortality, ART alone has not eliminated the need to be concerned about the nutritional status of people living with HIV (PLHIV). Numerous studies in lower source settings have shown that clinical undernutrition, as indicated by low body mass index (BMI) at the time of ART initiation is a strong and independent predictor of mortality (6-8).

HIV/AIDS and malnutrition effects are interrelated and exacerbate one another in a vicious cycle (9). HIV specifically affects nutritional status by increasing energy requirements, reducing food intake, and adversely affecting nutrient absorption and metabolism (10). Asymptomatic and symptomatic adults have energy requirements of 10% and 30% respectively to maintain body weight and physical activity (11-13). Dietary diversity is defined as the number of food groups consumed over a reference period and it reflects the concept that increasing the variety of foods and food groups in the diet helps to ensure adequate intake of essential nutrients (14). In most developing countries micronutrient malnutrition is still a major problem of public health attention due to the intake of monotonous, cereal-based diets that lack diversity (15, 16). Most diets in developing countries lack vegetables, fruits, and animal source foods (17).

The effect of poor nutrition in the case of PLHIV is more urgent as they have to grapple with opportunistic infections. Dietary management of PLHIV is the key to sustaining the ability to continue participating in the workforce and contributing to socioeconomic development (18). Food insecurity and poor nutritional status may speed up the progression of AIDS-related illnesses (19). Therefore, the objective of this study was to determine the magnitude and factors associated with dietary diversity among HIV-positive adults (≥ 18 years) attending ART clinics in two selected public Hospitals of Sidama region, South Ethiopia.

Methods and materials

Study design, period, and setting

An institutional-based cross-sectional study was carried out in two selected public Hospitals from May to June 2022. The study settings were Hawassa University Comprehensive Specialized Hospital (HUCSH) and Yirgalem General Hospital. Both are found in the Sidama region and they are located 275 km and 320Kms respectively to the south of the capital city of Ethiopia, Addis Ababa. HUCSH is a tertiary

level hospital and Yirgalem Hospital is a General Hospital, currently giving ART service for 2553 and 1821 adult HIV patients' respectively.

Population, sample size, and sampling procedures

The source population was HIV patients attending ART clinics in the two selected public Hospitals. Adult HIV patients aged 18 years and older who visited these hospitals during the data collection period were included in the study. However, pregnant women and lactating mothers were excluded, as their nutritional requirements can differ significantly from those of other adult HIV patients. The sample size for the study was determined using a formula for estimating single population proportions. The computation was made with the inputs of a 95% confidence level (Z =1.96) and a 5% margin of error (d). The expected prevalence (P) was taken from earlier studies conducted elsewhere in the country, 28.7% (20). For the sake of accommodating possibilities of non-response 10% contingency was added. Accordingly, the calculated sample size was 345. Proportional allocation was used to determine the number of study units to be sampled from each Hospital. A systematic random sampling method was employed to select the participants for the study, ensuring a representative sample by choosing individuals at regular intervals.

Data collection tools and procedure

Six data collector clinical nurses and two supervisors who are Master of Public Health (MPH) were trained for two days. Face-to-face interviews were conducted by using structured pre-tested questionnaires to collect data on sociodemographic, economic, behavioral, and lifestyle information. Data abstraction format was also used to collect data from patients' medical records on clinical-related characteristics such as duration on ART, CD4 count, and the World Health Organization (WHO) clinical stage. To collect data on Dietary diversity the Food and Nutrition Technical Assistance (FANTA) indicator guide for Household Dietary Diversity Score (HDDS) was used (21). The first categorization of individual food scores was made into terciles as, Low IDDS (1–3 food groups); Medium IDDS (4–5 food groups); and High IDDS (≥6 food groups). Further, this score is dichotomized into two categories low dietary diversity score, having 0-4, and high dietary diversity scores (22). Height was measured using a stadiometer by positioning them at the Frankfert plane to the nearest 0.1 cm. Weight was measured using a calibrated adult weight scale to the nearest 0.1kg. Normal weight was defined as a BMI of 18.5 to 24.9 kg/m^2, overweight as a BMI of 25 to 30 kg/m^2, and obesity as a BMI of more than 30 kg/m^2. The questionnaire was prepared in English and translated into Amharic language and back translated into English to check its consistency.

Data management and analysis

The data were coded, cleaned, entered into SPSS version 20.0 statistical software, and analyzed. Percentages of respondents concerning food groups and number of meals eaten by each respondent in a 24-hour recall period were computed. Variables that exhibit a p-value of less than 0.25 in the binary logistic regression analysis will be incorporated into the multivariable analysis. Adjusted odds ratio (AOR) with 95% CI, was estimated to assess the presence and strength of associations, and statistical significance was declared at a p-value ≤ 0.05. Finally, results were compiled and presented using tables, graphs, and texts.

Results

Socio-demographic characteristics

A total of 345 participants participated in this study, giving a response rate of 100%. The mean age of the study participants was 39.5 (±9.02) years. Most participants were female 212 (61%), single 153 (44.3%), had a secondary level of

education 128 (37%), orthodox christians 181 employed 89 (25.8%). Two hundred six (59.7%) participants had family size ranges from 3-6 and (52.5%), urban residents 320 (92.8%) and private about 197 (57.1%) had monthly household income of ≤1500 Ethiopian birr (Table 1).

Table 1: Socio-demographic characteristics of adult HIV patients (≥ 18 years) at HUCSH and Yirgalem General Hospital, South Ethiopia, 2022 (n = 345).

Variable	Categories	Number	Percent
Sex	Male	133	38.6
	Female	212	61.4
Age	<20	4	1.2
	21-30	52	15.1
	31-40	160	46.4
	41-50	88	25.5
	51-60	41	11.9
Marital status	Single	153	44.3
	Married	57	16.5
	Divorced	60	17.4
	Widowed	75	21.7
Education level	No formal education	36	10.4
	Primary education	81	23.5
	Secondary education	128	37.1
	Tertiary education	100	29.0
Religion	Orthodox	181	52.5
	Muslim	46	13.3
	Protestant	114	33.0
	Others	4	1.2
Place of residence	Urban	320	92.8
	Rural	25	7.2
Occupation	Government employee	66	19.1
	Private employee	89	25.8
	Daily-laborer	31	9.0
	House wife	11	3.2
	Merchant	76	22.0
	Others	72	20.9
Family members	<3	98	28.4
	3-6	206	59.7
	≥7	14	11.9
Monthly income	<500	197	57.1
	≥500	148	42.9

Health and nutrition related characteristics of study participants

Most, 325 (94.2%) of participants were in clinical stage I and had been on ART for ≥24 months, 265 (76.8%). Nearly half, 204 (54%) of participants did not practice regular physical exercise. Majority of participants had no history of alcohol consumption and cigarette smoking, 298 (86.4%) and 340 (98.6%) respectively. More than half, 209 (60.6%) participants had recent CD4 count ≥500, had normal weight, 198 (57.4%) and had high, 184

(53.3%) IDDS, but not received nutritional counseling, 206 (59.7%) (Table 2).

Table 2: Health and nutrition related characteristics of adults HIV positive patients attending antiretroviral therapy clinics in HUCSH and Yirgalem Hospital, South Ethiopia, 2022 (n = 345).

Variable	Categories	Number	Percent
WHO clinical stage	Stage I	325	94.2
	Stage II	9	2.6
	Stage III	9	2.6
	Stage IV	2	.6
ART regimen started	AZT-3TC-EFV	65	18.8
	AZT-3TC-NVP	71	20.6
	TDF-3TC-EFV	162	47.0
	Others	47	13.6
Duration of ART	<24	80	23.2
	≥24	265	76.8
CD4 count	<200	27	7.8
	200-349	52	15.1
	350-499	57	16.5
	≥500	209	60.6
Regular physical exercise	Yes	141	40.9
	No	204	59.1
History of alcohol consumption	Yes	47	13.6
	No	298	86.4
History of cigarette smoking	Yes	5	1.4
	No	340	98.6
BMI	Underweight (<18,5)	47	13.6
	Normal weight (18,5-24,9)	198	57.4
	Overweight (25-30)	73	21.2
	Obese (>30)	27	7.8
Nutritional counseling	Yes	139	40.3
	No	206	59.7
IDDS	High	184	53.3
	Low	161	46.7

Individual dietary diversiy score

Within the past 24 hours before data collection, cereals and condiment were the most commonly eaten foods by the participants, 345 (100%) and 309 (89.6%), respectively. Fish and eggs were the least eaten foods, 2% and 6.9% respectively (Figure 1).

Determinants of dietary diversity In the bivariate analysis, the variables that demonstrated a significant association ($p \leq 0.25$) with individual dietary diversity included income, duration of ART, nutritional counseling, and alcohol use, all of which were subsequently analyzed in the multivariate analysis. In the multivariable logistic regression model, income and nutritional counseling continued to show significant association with dietary diversity ($p \leq 0.05$). Specifically, participants with low income experienced a 52% decrease in dietary diversity compared to those with high income [AOR: 0.48, 95% CI: (0.28, 0.83)]. Furthermore, patients who received nutritional counseling were eight times more likely to have high dietary diversity than those who did not receive this service [AOR:7.89, 95% CI: (4.41, 14.15)] (Table 3).

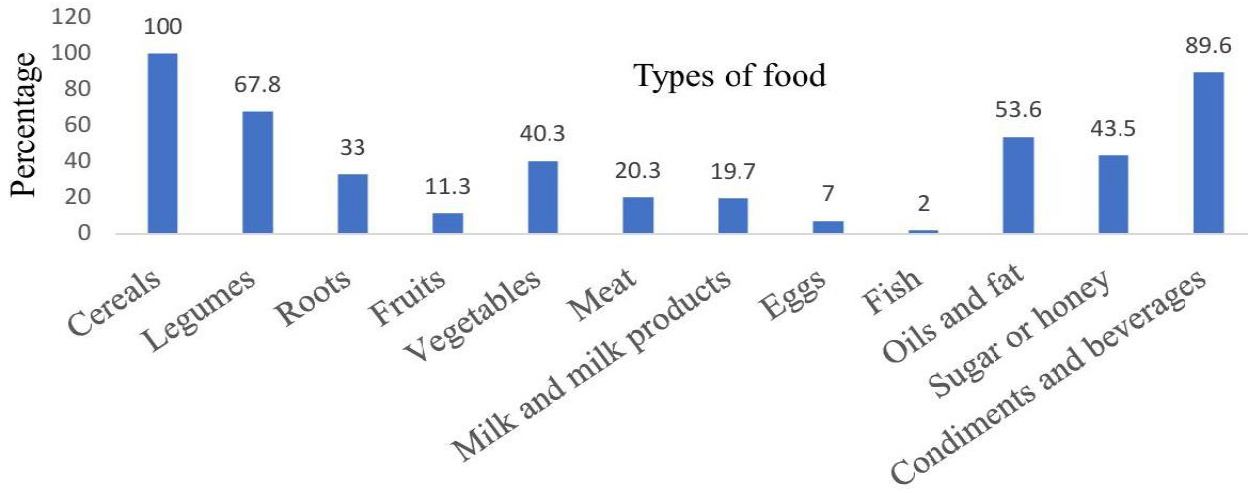

Figure 1: Types of foods eaten within 24 hours among adult HIV positive adults attending antiretroviral therapy clinics in two public hospitals, South Ethiopia, 2022 (n=345

Table 3 Determinants of dietary diversity score in multivariable logistic regression analysis, among adult ART patients of public hospital in South Ethiopia, 2022. (N=345)

Factor variable	Dietary diversity status		N	COR (95% CI)	AOR (95% CI)
	Low N (%)	High (%)			
Income					
Low	127	70		0.35(0.22,0.54) *	0.48 (0.28,0 .83) *
High	57	91		1	1
Nutritional counseling					
Yes	71	135		8.26 (4.94, 13.82) *	7.89 (4.41, 14.15) *
No	113	26		1	1
Duration of ART					
<24	48	32		0.70 (0.42, 1.17)	1.40 (0.73, 2.72)
≥24	136	129		1	1
Alcohol					
Yes	30	17		1.16 (0.92, 1.47)	0.59 (0.27, 1.32)
No	154	144		1	1

Discussion

The present study found a low dietary diversity rate of 46.7%, which is notably lower than the rates reported in previous studies from Jimma, Motta, and Mettema in Ethiopia, as well as Jinja town in Eastern Uganda, where low dietary diversity scores were recorded at 55.8%, 70.5%, 58.8%, and 59%, respectively (23-26). Conversely, our findings indicate a higher prevalence compared to a study conducted in two hospitals in Eastern Ethiopia, which reported a rate of 28.7% (20). This variation in dietary diversity rates can likely be attributed to several factors, including geographic differences, socio-cultural

influences, and the specific timeframes in which the studies were conducted. These elements can significantly impact dietary habits and access to diverse food sources, highlighting the importance of context in understanding dietary diversity.

The current study identified cereals and legumes as the most commonly consumed food groups, a finding that aligns with research conducted in Eastern and North West Ethiopia (20, 27). Conversely, fish emerged as the least consumed food group among participants, consistent with findings from Eastern Ethiopia (27), but contrasting with a study from Uganda (28). This discrepancy may be attributed to limited awareness of the nutritional benefits of fish and restricted access to fish in the current study area.

The current study revealed that as income was associated with dietary diversity among adult HIV patents. Those HIV positive adult patients with low-income level were found to have low dietary diversity than those who had high income. The current study finding is in line with findings which were obtained from Mettema, Ambo and Butajra in Ethiopia (24, 26, 29), Ruwanda (30) and Mali (31). The possible reason might be, as it is known income level determines the ability of an individual to afford diversified food, this intern can lead to poor intake of adequate food and results in inadequate nutrient intake of an individual.

Nutritional counseling is the other factor which was found to have an association with dietary diversity. The current study revealed that HIV positive patients who had got nutritional counseling service were found to have high dietary diversity than those who didn't have. This finding is line with the study conducted in Motta town of south west Ethiopia (27). Study conducted in South Africa also indicated as nutrition counselling improve body weight for people living with HIV/AIDS, especially when provided early in the disease process by creating an awareness on dietary intake (32). Incorporating regular nutritional counseling as a fundamental component of HIV care and treatment programs could be one of the most effective strategies to address this issue. This would entail training healthcare providers to offer practical nutritional guidance in conjunction with antiretroviral therapy.

As a limitation, our study was cross sectional, which didn't allow to see the trend of dietary habit. Additionally, the assessment of dietary diversity relied on self-reported data, which is susceptible to social desirability bias. This bias can lead to both the underreporting and overreporting of dietary practices, potentially skewing our findings.

Conclusion

In conclusion, our study identified low dietary diversity among adult HIV-positive patients, which was significantly linked to low income and insufficient nutritional counseling. To address this issue, all stakeholders involved in HIV care must focus on enhancing income-generating opportunities for these patients. Additionally, healthcare professionals should prioritize and intensify their efforts in providing nutritional counseling to improve the overall nutritional status of adult HIV patients.

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also the data collectors and the study participants.

Ethical considerations

The Institutional Review Board (IRB) of Hawassa University evaluated and approved the study protocol. The ethical approval letter was made on May 7, 2021, with reference number IRB/216/2021. Before the start of the data collection, informed consent was obtained and signed or verified by a fingerprint from all the participants. All data were anonymously collected and analyzed.

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of interest

The authors declare that they have no conflicts interests.

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This research work was financed by Hawassa University, College of Medicine and Health Sciences, Ethiopia. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Authors' contributions

YT took part in planning the study, monitoring the data collection process and analyzing the data, writing the result and the manuscript. KT, MR, and AT participated in the data collection process and writing the manuscript. All authors read and approved the final manuscript.

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