



COLLEGE OF MEDICINE AND HEALTH SCIENCES
DEPARTMENT OF PUBLIC HEALTH

DIETARY DIVERSITY AND ASSOCIATED FACTORS AMONG HIV
POSITIVE ADULT PATIENTS ATTENDING ART CLINICS IN WOLKITE
UNIVERSITY SPECIALIZED HOSPITALS, GURAGE, CENTRAL ETHIOPIA,
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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
CD4	<u>Cluster of Differentiation 4</u>
CI	Confidence Interval
DD	Dietary Diversity
ETB	Ethiopian Birr
FANTA	Food and Nutrition Technical Assistance
HHS	Household Hunger Scale
HIV	Human Immune Deficiency Virus
IDDS	Individual Dietary Diversity Score
OR	Odds Ratio
PLWHA	People Living With HIV/AIDS
PPS	Proportional to Population Size allocation
SSA	Sub-Saharan Africa
WHO	World Health Organization

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ABSTRACT

Introduction: Nutrition is one of the necessary elements of comprehensive care for people living with HIV/AIDS. Poor individual dietary diversity in People living with HIV is more urgent issue as they are highly prone to opportunistic infections. This significant public health problem is highly prevalent in Africa especially Ethiopia. Despite the government is taking many interventions, the problem is rampant and evidence regarding the burden and associated factors of this problem are limited in Gurage zone, central Ethiopia.

Objective: to assess diversified diet consumption and associated factors among HIV positive adult patients attending wolkite university specialized hospitals in, Gurage zone, central Ethiopia.

Methods: Institutional based cross-sectional study was conducted at wolkite university specialized hospital from 3rd December, 2024 to 18th January, 2024. Total of 368 HIV positive adults who were attending ART clinic was selected by systemic random sampling technique. Data was collected by pre-tested semi-structured questionnaires using interview data collection method. Data was entered into Epi.Data software version 7.02 and transferred and analyzed by SPSS version 27.0. A binary logistic regression model was fitted to identify associated factors. Variables with a p -value < 0.25 in binary logistic regression was a candidate for multivariable logistic regression. Multivariable logistic regression analysis with backward likelihood ratio method was conducted. **Hosmer–Lemeshow goodness-of-fit** statistic was used to check model fitness. Adjusted odds ratio with 95% confidence interval and corresponding p -value was used to identify statistically significant factors. P -value < 0.05 was used to declare statistical significance.

Results: This study shows 64.4% of patients have poor dietary diversity. Greater than five year duration cotrimoxazole (AOR: 0.532, 95% CI: 0.318-0.890) and poor dietary counselling (AOR =0.185, 95% CI: 0.068-0.504) were factors associated with poor dietary diversity.

Conclusion: Good dietary diversity is low in HIV-positive patients attending ART clinic in our study area. Taking cotrimoxazole and dietary counseling were the factors associated with low dietary diversity. To alleviate these problems, exceptional attention in nutritional care should be

given to HIV-positive patients and they require appropriate counseling and support during early initiation of ART.

KEY WORD: 24-h food recall, Dietary diversity, HIV-positive adults, Anti-retroviral therapy

1, INTRODUCTION

1.1. Background

Nutrition is one of the necessary elements of comprehensive care for people living with HIV/AIDS and it is very important in developing countries with limited resource where malnutrition and food insecurity are endemic. The cellular effect of malnutrition and HIV is seemed to be similar as both are responsible for compromising immune system by decreasing CD4 T cells, suppression of delayed hypersensitivity and abnormal B-cell responses[1]

Dietary diversity is the number of different foods or food groups consumed over a given reference period[2]. Dietary diversity or diversified diet is a qualitative measure of food consumption that reflects household access to a variety of food. It is a proxy for nutrient adequacy of the diet of individuals[3]. Dietary diversity can be measured at either the household or the individual level and higher scores represent a more diversified diet. For households, a higher score is an indicator of increased economic access to a varied diet for household members[2]. An increased individual dietary diversity score is related to increased nutrient adequacy of the diet. These scores have been positively associated with adequate micronutrient and macronutrient adequacy of the diet for adolescents[4].

Nutrition is a significant factor at all stages of HIV. Clinical studies show that People Living With HIV (PLHIV) have reduced appetite and ability to consume food, as well as a higher incidence of diarrhea resulting in malabsorption and nutrient losses [5]. Studies have also found that PLHIV are more likely to be deficient in vitamin A, vitamin B12, vitamin C, vitamin D, selenium, zinc, and iron. These micronutrient deficiencies, particularly vitamin B12, zinc, and selenium, have been associated with decreased immune function and a higher risk of disease progression in PLHIV [5]

Dietary management of HIV-positive patients is key to supporting their capacity to continue participating in the workforce and contributing to socio-economic growth. Inadequate dietary intake contributes to micronutrient insufficiencies that lead to further HIV/AIDS disease advancement and to the reduction of CD4 count which increases risk of opportunistic infections in addition to oxidative stress. [6, 7]

HIV has been found to affect nutritional status by increasing energy requirements, decreasing food intake, and badly disturbing nutrient absorption and metabolism. Inability to meet nutritional needs may lead to reduced immunity and increased vulnerability to opportunistic infections (OIs), which can lead to further malnutrition [8, 9]. The association between HIV infection and nutrition and the influence of HIV on nutrition is difficult to determine [10]. Micronutrients are important for sustaining suitable immunological responses so preserving proper nutrition, weight, and immune systems should delay disease advancement, delay the asymptomatic phase and increase lifespan.

1.2. Statement of the problem

Globally, in the last half a century, the food diversity consumed around the world deteriorated [11] and repetitive/monotonous low-quality diets are common in resource-limited countries [12]. Nutritional complications are amongst the first harmful effects of HIV infection. These problems are due to insufficient food consumption and altered metabolic situations, aggravating the reduced balance of energy and nutrients in patients even when they are treated with antiretroviral therapy [13].

Non-diversified diet can have negative consequences on individuals' health, well-being, and development, mainly by reducing physical, social, cognitive, reproductive, and immunological capacities [14]. 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 [15].

Dietary diversity, the consumption of a sufficient variety of food types, is a characteristic of dietary quality and can be considered as an indicator of overall nutritional adequacy [7, 15]. Utilizing a diversified diet among PLHIV is still poor among resource-limited nations in Africa. For instance, studies done in Kenya, Rwanda, Nigeria, and Uganda show that 43% to 62.3% of PLHIV had low dietary diversity [16-18]. According to studies done in Rwanda, Uganda, Nigeria, and Kenya, factors including low educational and economic status; mental health status, physical health status; purchase of food and absence of nutritional counseling were identified as being associated with dietary diversity among HIV patients on ART [16, 19, 20].

Studies done in Ethiopia show that low dietary diversity among HIV-positive patients were at levels of 28.7% to 71% and that lower income or wealth status, occupational status, educational status, separated from husband/ wife, media exposure in household, nutritional counseling, shorter

duration of ART, taking cotrimoxazole prophylaxis are among the most common factors which affect dietary diversity status of HIV patients on ART [7, 8, 18, 21, 22].

Ethiopia had made a notable effort to address the influence of HIV/AIDS on nutrition by establishing national guidelines for taking action to deliver quality care and support to HIV positive patients [23]. Also, it provided livelihood support and food support and strengthened community-based nutrition care and support activities for PLHIV through health extension workers and agriculture extension workers in addition to ART, care, and support [24, 25]. There is an interaction between diversified diet consumption, functional status and HIV/AIDS and nutritional status. In Ethiopia, several studies have been carried out focusing on women and children nutrition [26-28], yet dietary diversity in vulnerable groups like people with HIV/AIDS is limited. Besides, little is investigated about the dietary diversity of people living with HIV and associated factors in Ethiopia.

The study will add some variables; food taboos or individual dietary restriction, wealth index and illicit drug use. Therefore, this study aims to fill this gap by assessing dietary diversity and associated factors among HIV positive adult patient attending ART clinic in Wolkite university specialized hospital, central Ethiopia.

1.3 Significance of the study

The finding of this study will give evidence on dietary diversity and associated factors among HIV- positive adults attending the ART clinic at Wolkite university specialized hospital. This will also help to identify and define the intervention areas for the target groups and ART attendants to ultimately enhance nutrient intake. Hence, it is a vital input for different stakeholders, such as healthcare professionals working in HIV/AIDS care, health facilities, regional health bureau and researchers, who are working so as improve the quality of life and better survival in HIV- infected patients. At the end, we hope this study will serve as base line information for other studies to be conducted in this area that is about dietary diversity among adult patients living with HIV.

2, LITERATURE REVIEW

1.3. Prevalence of dietary diversity

Study conducted among people living with HIV in Nepal show that the individual dietary diversity score was extended from 1 to 7 and the average dietary diversity score of 4.22. It also revealed that 62.3% of study participants were in poor dietary diversity level[29].

Study conducted in Phnom Penh, Cambodia, indicated that dietary diversity which was measured by 24hr recall was founded as; the majority of the respondents consumed foods from grains, roots and tubers (98.3%), fish foods 98.0%, vitamin rich fruits and vegetables 81.2% and other fruits and vegetables 72.8%. It also shows that only 16.1% of the participants had foods from legumes and nuts. From this study the average dietary diversity score was 4.6/7 food groups[30]. Cross sectional study conducted among 452 households in Ghana detected that; the average Household Dietary Diversity score for all households was 6.8; this projects every household consumed almost 7 different food groups on average in the 7-day period prior to the survey[31].

Study conducted in rural Zambia among people living with HIV, found that the average IDD was 23.99[32]. Study conducted in Niger described dietary diversity score of the study respondents in two regions (Zinder and Maradi). Based on the description the mean dietary diversity was 3.5 in Zinder and 2.5 in Maradi. The study also identified food items that were most frequently consumed in both regions. These were; starchy staple foods which accounted for 98.8 in Zinder and 98.4%, in Maradi. Difference in consumption of some food items were also seen like; consumption of dark green leafy vegetables, other fruits or vegetables, and beans or seeds between Zinder and Maradi. The study participants were less consumed flesh foods and eggs in both regions[33].

A study took place among individuals aged 15-65 in Ouagadougou, capital of Burkina Faso, founded that the diet of the respondents was mainly made of cereals and vegetables .i.e. more than 3 times daily and to some extent of oil from vegetable sources were consumed more than twice daily[34]. Study conducted among 598 participants in Uganda, shows that the magnitude of low dietary diversity was 45.32%. Regarding consumption of different food items from food groups in the previous 24 h, about 99.7% of the participants consumed cereals/roots/tubers, 87.0% ate fats & oils, 84.1% ate spices & beverages, and 77.1% sweets[35].

Study that was done at ART Clinic of Mettema Hospital, Northwest Ethiopia; detected that, 335 respondents had high meal frequency within past 24 hour and 70.2% of the study subjects ate three times in a day within past 24 hour prior to the data collection period. In this study the average IDDS was found 3.29 and 58.8% of HIV positive adults had low dietary diversity[7].

Study which was conducted in East Gojjam zone, Northwest Ethiopia, identified that the occurrence of low DD was 70.5% among HIV positive adults. Food items that were consumed most of the time by the patients were; starch staples and legumes and the least consumed were organ meat and milk products[22].

Study conducted at Felege Hiwot referral hospital, Northwest Ethiopia, among adults living with HIV; revealed that forty six point four percent of respondents consumed diet with poor diversified diet[36]. Study done in Hiwot Fana and Dicloran Hospitals, eastern Ethiopia, determined that about 135 out of 303 participants ate four or more time within 24hr prior to the survey. 47.2% had medium IDDS and 35% high IDDS and 26.8% with low DD[21].

Study conducted in Ambo, west Shoa zone Ethiopia, showed that two hundred twenty (71%) of the adult on ART had low dietary diversity score[8]. A cross sectional study that was carried out among HIV-infected individuals receiving highly active antiretroviral therapy in Jimma zone Southwest, Ethiopia, founded that about 55.8% of participants consumed less than the average food diversity score in the past 24hours which is poor dietary diversity score. Almost all of the study subjects (98.1%) ate cereals[37]. Facility based cross-sectional study that was done among 338participants in Butajira, central Ethiopia; indicate that the average household dietary diversity was 4.96 and the low DDS was 38.8%[38]. Institutional based study conducted at Kembata Tembaro Zone, southern Ethiopia, among HIV positive adults who were on ART, showed that poor dietary diversity accounted for 60.1%. Regarding the dietary pattern starchy staples were the most commonly consumed diet[39]. Facility based cross sectional study done in Hosanna, southern, Ethiopia, identified that among 330 respondents, maximum number of them (67.9%) had inadequate diversified food and 84.2% had poor dietary frequency score with in the 24hr prior to the survey[40].

Study conducted among adult patients on highly active antiretroviral therapy in Wolaita Sodo teaching and referral hospital, southern nation's nationalities people's region, Ethiopia, showed that half of the respondents consumed low diversified diet. The most frequently eaten food items were cereals, tubers (99%) and legumes pulses, legumes and nuts 68%[41]. Study conducted in

Arba Minch, Ethiopia, indicated that the mean dietary diversity score of the participants was 4.4[42].

1.4. Factors Associated with Dietary Diversity

Some studies indicated that there were statistically significant associations between dietary diversity and sex. From this study male-headed households had consumed dietary diversity in greater amount when compared to female-headed households. This may be due to the assumption that male can able to earn money higher than females which help the house to access different food items, the study in Ambo, was opposite to that of Ghana because it shows negative association[31, 41, 43]. Result of studies done in Niger and Ethiopia showed that there was statistically significant association between dietary diversity and respondents place of residence[33, 38]. Cross-sectional studies conducted in Ambo, Ethiopia revealed that, marital status was significantly associated with Dietary diversity of patients on ART. The probability of having low DD was reduced among participants who were not living with their wives. This may be due to the reason that they were living alone and can eat outside home any type of food they want[43]. Studies in Ghana and Ethiopia indicated that there were statistically significant associations between dietary diversity and household characteristics such as; household wealth quintile or monthly income, level of education of household head, and source of food. Analysis result of study done in Niger showed that there was statistically significant association between dietary diversity of the respondents and number of eligible farmers in the household. If large number of farmers present different food groups can be produced and this may help in consuming DD[7, 33, 44]. Cross-sectional survey done in Mettema Hospital, Ethiopia showed that employment status was significantly associated with dietary diversity of HIV positive adults. Individual who employed and getting monthly income can have ability to purchase food item he/she want to eat[7]. Study identified that having radio and television as means of source of information was helpful and lead to diversified diet consumption[45].

1.4.1. Individual health related characteristics

Study in Zambia shows that there were significant association between dietary diversity and the independent variable; adherence to ART, perceived barriers to pills taking and perceived stress[32]. Stud done in Mettema and Hiwot Fana Hospitals and Kembata Tembaro Zone, Ethiopia, showed that, duration of anti-retro-viral treatment and Cotrimoxazole prophylaxis use was significantly associated with dietary diversity of HIV positive adults. As the duration of ART increase the likelihood of consuming diversified diet also increase[7, 21, 39]. Analysis of study

done in Northwest Ethiopia shows there was statistically significant association between dietary practices and presence of gastrointestinal symptoms. The odds of having good dietary practice was higher among patients who hadn't gastrointestinal symptom, this may be inability ingest food because of the symptoms or loss of appetite[36].

1.4.2. Nutrition and behavioral characteristics

Result of study done in Niger showed that there was statistically significant association between dietary diversity of the study participants and their Household Hunger Scale. In household where there were high HHS, the probability of having low diversified diet may be very high[33]. Study conducted in Uganda detected that eating outside home had significant association with DDS because participants who ate from a restaurant were highly prone to consume diversified diet[35]. By 2017, study done in northwest Ethiopia, determined that there was statistically significant association between nutrition information and dietary diversity of the respondents. Respondents who had good nutritional knowledge ate different food items a day. The odds of having good dietary practice was higher among patients who had good nutritional knowledge and who ever heard about good nutrition[36]. Dietary diversity of study participants and their meal frequency had found to have significant association by study done in Jimma, Ethiopia[37]. Analysis of the study in Butajira stated that respondents with poor dietary diversity were highly exposed to be food insecure.[38]. There was significant association between food groups and study respondent's stunting and wasting status[30]. Study done in Arba minch, Ethiopia, stated that individuals who ate food from five or more food groups i.e. diversified diet; were found to be less undernourished[42].

1.5. Conceptual framework

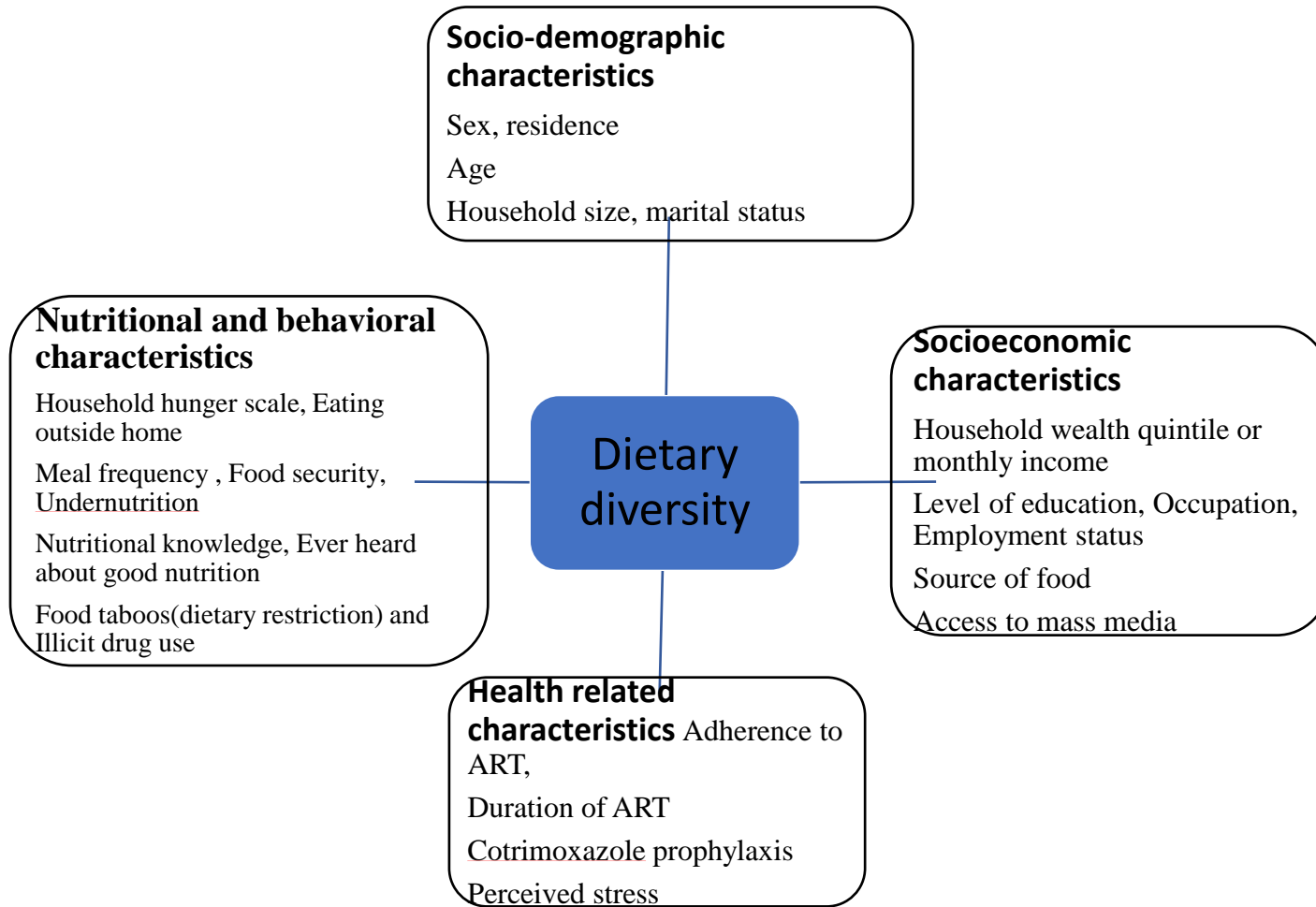


Figure 1. Conceptual framework of dietary diversity and associated factors among HIV positive adult patients attending ART clinic (developed from[7, 36, 39]).

2. OBJECTIVES

2.1. General

- To assess dietary diversity and associated factors among HIV positive adult patients attending ART clinics at wolkite university specialized hospitals Gurage zone, central Ethiopia from.

2.2. Specific

- To determine dietary diversity among HIV positive adult patients attending ART clinics at wolkite university specialized hospitals, Gurage zone, central Ethiopia 24th Dece, 2024 to 13th Jan, 2025.
- To identify factors associated with dietary diversity among HIV positive adult patients attending ART clinics at wolkite university specialized hospitals, Gurage zone, central Ethiopia 24th Dece, 2024 to 13th Jan, 2025.

METHODS AND MATERIALS

Study area and period

The study was conducted in wolkite university specialized hospitals ART clinic, which is found in Wolkite town from 3 December 2024 to January 7 2024. Wolkite town is the capital city of Gurage zone of central Ethiopia. Wolkite town is 153Km far from capital city, Addis Ababa. It has one administrative town and 13 woredas. Wolkite university specialized hospital is secondary referral hospital with approximately 400 beds and nine operating tables serving over 6 million people from the surrounding area [50]. The hospital provides obstetric, pediatrics, internal medicine, ophthalmology, ENT (ear, nose, throat) and orthopedic surgery services. The Wolkite university specialized hospital ART clinic started to functioning since 2020. It has three staff, one out -patient departments and 6500 HIV/AIDS patients registered for ART clinic service.

2.3. Study design

Institution based cross-sectional study was conducted from 3rd December, 2024 to 18th January, 2025.

2.4. Population

2.4.1. Source of population

The source population was all HIV positive adults' patients who were registered at wolkite university specialized hospital ART clinic.

2.4.2. Study population

The study population was all HIV-positive adults who were attending at wolkite university specialized hospital ART clinic during the data collection period.

2.5. Eligibility criteria

2.5.1. Inclusion: HIV positive adult patients who were attending the ART clinics.

2.5.2. Exclusion: pregnant women, patients who are seriously sick, mentally ill, those who are unable to talk and adults who took ART less than 6 months before the beginning of the data collection.

2.6. Sample size determination and sampling technique

2.6.1. Sample size determination

For the first specific objective Sample size was determined by using a single population proportion formula with a 95 % confidence level and a 5 % desired level of precision and by considering the proportion of HIV-positive adult individuals attending public health facilities in Kembata Tembaro who consume diversified diet (39.9%), from this sample size for dietary diversity will be calculated as follows[46].

$$n = \frac{z^2 p (1-P)}{w^2}$$

Where,

= confidence coefficient (Z-value) at a given confidence level of 95%, which is equal to 1.96.

P= proportion people with good dietary diversity which is estimated be 39.9%.

W= marginal error (we take it as 5%)

n= sample size

$$n_o = \frac{(1.96)^2 0.399 (1-0.399)}{(0.05)^2} \quad n_o = 369$$

As the population is fine (<10,000) we need to use the finite population correction formula.

$$n = \frac{n_o}{\left(1 + \frac{n_o}{N}\right)} \quad n = 334$$

After adding non-response rate of 10% of sample population the final sample size will be **368**.

For second objective sample size was calculated using 95%CI, 80% power and Exposed unexposed ratio 1 and EpiInfo.7 was used.

Table 1. Sample size determination for factors associated with dietary diversity to assess dietary diversity and associated factors in wolkite university specialized hospitals, 2024

Exposure variables	AOR	Ratio	Power	% of outcome		10% response rate	Total sample	Reference
				Unexposed	Exposed			
Dietary counseling	0.54	1:1	80%	72.3	55.5	28	306	[46]
Good nutritional knowledge	3.74	1:1	80%	23	57.3	8	82	[47]
Duration on ART	3.77	1:1	80%	28.6	63	8	84	[46]

As the largest sample size from all these was that of dietary diversity, for conducting the study we will use a sample size of DD (368).

2.6.2. Sampling technique

Around 772 HIV-positive patients had followed up every month. the estimated number of HIV-positive patient per three weeks was 579.

The systematic random sampling technique was used to collect data at every K^{th} interval (k is sampling fraction; which is calculated as N/n ; where N is source of population which means the estimated number of HIV positive adult patients registered for care and support at ART clinics of Gurage Zone wolkite university specialized hospital which is 504 per 3 week and n is sample size (368).

$$K=N/n$$

$$K= 50/368, \quad K=2$$

The starting sample was selected by lottery method among the two clients. Then, the procedure continued (the selection of every two client as a study subject) until the required sample size is obtained. In case of exclusion, the next client is taken. Data were collected on every working day.

3.7 Data collection instruments and procedures

3.7.1. Data collection instruments

Interviewer administered semi- structured questioners was prepared and standardized individual dietary diversity score tool with 24-hour food recall method will be used to assess dietary diversity of HIV positive adults. [3]. The questionnaires were containing queries about patient's general characteristics e.g., age, sex, family size, dietary pattern.

3.7.3 Data collection procedure

Data was collected by using a pretested, interviewer administered questioners prepared in English then translated into Amharic. Anthropometric measurements (weight, height) was recorded by investigators. To assess IDD respondents was asked to list any type of food items they ate in home or outside within the past 24hrs prior to data collection time starting from breakfast to dinner including snacks. Then the foods eaten was grouped in to different food groups prepared. Finally, IDDS will be calculated as the summation of food groups consumed over 24hrs.

3.8 Study variables

3.8.1 Dependents variables

- ❖ Individual dietary diversity

3.8.2 Independent variables

Socio-demographic characteristics: sex, age, ethnicity, marital status, religion, family size, residence.

Socio-economic characteristics: Level of education, occupation, wealth index, social support.

Personal health related characteristics: Duration on ART, adherence to ART, ART regimen, side effect of cotrimoxazole, WHO clinical stage, presence of opportunistic infection, follow up interval, CD4 count, stress.

Nutritional and behavioral characteristics: Meal frequency, nutritional, supplementary feeding, 24hr recall, illicit drug use, smoking and alcohol intake, food taboos (cultural or personal food avoidance).

3.9 Operational definitions

Individual dietary diversity: refers to sum of number food groups consumed by individual participant within 24hrs prior to the survey data collection.

Poor individual dietary diversity: When individual consumed less than five food groups from the ten.

Good individual dietary diversity: When participants consumed five or more food groups.

Snack: refers to foods usually eaten between meals.

24hr recall: Record of diet that the participants consumed within the past 24hr prior to the survey.

And the client is asked to recall all the foods and liquids consumed in the previous 24-hour period.

HIV Positive

Adults: Participants in the age 18-65.

Good ART adherence: HIV-positive patient takes >95% of prescribed drug.

Fair ART adherence: HIV-positive patient takes 85-94% of prescribed drug

Poor ART adherence: HIV-positive patient takes < 85% of prescribed drug

3.10 Data quality assurance

The questioners were pretested for relevance, easy understanding and appropriateness using 5% of the sample size by the investigators. Questioners was properly numbered and coded. After collection of data all the questioners was collected together and cross checked for relevance to respective questions.

3.11 Data processing and analysis

The collected data was checked for its completeness and entered to Epi.Data and then transferred to SPSS version 27 for analysis. Cross tabulations was carried out to test for association between respondent characteristics and dietary diversity score which was represented by the total individual dietary scores were first categorized into two; Poor IDDS is equivalent to less than five(<5) food groups and Good IDDS means five or more(≥ 5) food groups[48]. Data was entered into Epi.Data software version 7.20 and transferred and analyzed by SPSS version 27.0. A binary logistic regression model was fitted to identify associated factors. Variables with a p -value < 0.25 in binary logistic regression was a candidate for multivariable logistic regression. Multivariable logistic regression analysis with backward likelihood ratio method was conducted. **Hosmer–Lemeshow goodness-of-fit** statistic was used to check model fitness. Adjusted odds ratio with 95% confidence interval and corresponding p -value was be used to identify statistically significant factors. P -value < 0.05 was used to declare statistical significance.

3.12 Ethical consideration

Before data collection document is submitted to institutional ethical review board of WU, College of Medicine and Health Science, to secure ethical consideration including all ethical principles and receive support letter from school of public health and informed consent will be asked from the study participants before starting the interview.

3.13 Data dissemination

The result of this study will be disseminated to Gurage Zone public health facilities, and to Wolkite University, College of Medicine and Health science, school of Public Health.

4 RESULT

4.1 Socio-demographic characteristics of participants

A total of 368 HIV-positive adults (18–65 years old) attending ART participated, which amounted to a 100 % response rate. Around 201 (54.6 %) were female, those in the age group of 35–44 years totaled 162 (44 %), Orthodox religion followers were 203 in number (55.2 %), Grade 1-8 was 140 (38 %), married persons were 207 (56.5 %). The results of socio-demographic characteristics of study participants is shown in (Table 2)

Table: 2 Socio-demographic of HIV-positive adults attending ART clinic at Wolkite University specialized hospital, Gurage zone, Central Ethiopia, 2024 (n=368)

Variables	Category	frequency	Percent
Sex	Female	201	54.6
	Male	167	45.4
Age category	18-25	14	3.8
	25-34	71	19.3
	35-44	162	44
	>45	121	32.9
Religion	Orthodox	203	55.2
	Muslim	112	30.4
	protestant	48	13

	Catholic	5	1.4
Marital status	Married	207	56.3
	Divorced	51	13.9
	Single	24	6.5
	Widowed	86	23.4
Occupation	Government employee	82	22.3
	Farmer	35	9.5
	Housewife	55	14.9
	Daily laborer	57	15.5
	Private workers	67	18.2
Ethnicity	Gurage	204	55.4
	Amhara	77	20.9
	Hadiya	38	10.3
	Kembata	11	3.0
	Oromia	28	7.6
	Other	10	2.7
Residence	Urban	292	79.3
	Rural	76	20.7
Educational status	Unable to read and write	53	14.4
	Read and write	23	6.3
	Grade 1-8	140	38
	Grade 9-12	104	28.3
	Higher education and above	48	13.0
Family size	≤ 5people	268	72.8
	> 5people	100	27.2
Quintiles of wealth index	Lowest quintile	73	19.8
	Second quintile	74	20.1
	Middle quintile	72	19.6
	Fourth quintile	75	20.4
	Highest quintile	74	20.1

4.2, Health related characteristics

The majority of the study subjects (364;98.9) were in WHO clinical stages I & II and a large proportion of 344(93.4%) were taking first line ART drugs and 183(49.7%) had CD4 count \geq 500 cells/mm. Eighty (21.7%) of respondents were taking Cotrimoxazole prophylaxis of which 263 (91.3%) of them took for less than or equal to five years. 5.1% of the patients developed side effect related to ARV drugs while 4.9% developed side effect Cotrimoxazole. (Table 3).

Table: 3 Health characteristics of HIV-positive adults attending ART clinic at Wolkite University specialized hospital, Gurage zone, Central Ethiopia, 2024 (n=368)

variables		frequency	Percent
Duration on ART	\geq 18month	337	91.6
	6-18month	31	8.4
ART regimen	First line	344	93.5
	Second line	24	6.5
Side effects from taking the ART	Yes	19	5.1
	No	349	94.8
Taking cotrimoxazole	Yes	80	21.7
	No	288	78.2
Duration of cotrimoxazole	\leq 5 years	263	91.3
	>5 years	25	8.6
Side effect of Cotrimoxazole	Yes	14	4.9
	No	274	95.1
WHO stage	Stage I	322	87.5
	Stage II	42	11.4
	Stage III	4	1.1
Opportunity infection	Yes	53	14.4
	No	315	85.6
Follow-up interval	Monthly	315	85.6
	Every 2month	37	10.1

	Other	16	4.3
Last CD4 count	<200 cells/mm ³	14	3.8
	200-349 cells/mm ³	90	24.5
	350-499 cells/mm ³	81	22.0
	≥500 cells/mm ³	183	49.7
Adherence to ART	Good	298	81.0
	Fair	52	14.1
	Poor	18	4.9

4.3. Nutritional and Behavioral Characteristics

The majority of the study subjects, 308 (83.7 %), ate three to four times a day in the past 24 h and their main source of food was purchased 297(80.3). Among the study participants, 95 (25.8 %) drink alcohol. (Table 4).

Table 4 Nutritional and Behavioral Characteristics of ART Patients attending ART clinic at Wolkite university specialized hospital, Gurage zone, central Ethiopia, 2024 (n=368)

variables		frequency	Percent
BMI	<18.5	89	24.18
	≥ 18.5	279	75.81
smoke cigarette	Yes	8	2.2
	No	360	97.8
drink alcohol	Yes	95	25.8
	NO	273	74.8
Chat chewing	Yes	73	19.8
	No	295	80.2
Main source of food	Purchased	297	80.3
	Own garden	65	17.7
	Other	6	1.6
Taking RUTF4	Yes	60	16.3
	No	308	83.7
counseled on nutrition	Yes	368	100

	No	0	0.0
PLWHIV need special attention	Yes	368	100
	No	0	0.0
Meal frequency	<3 meals	34	9.2
	3-4 meals	308	83.7
	>4 meals	26	7.1

4.5. Measurements of 24 h individual DD and level of individual

Among ten food groups, Grains, white roots, and tubers foods (363, 100 %), were the most commonly eaten foods, while were dairy products the least (62, 16.8 %) food types eaten in 24h meals. A minimum of Two and a maximum of six types of food were eaten (Fig. 2).

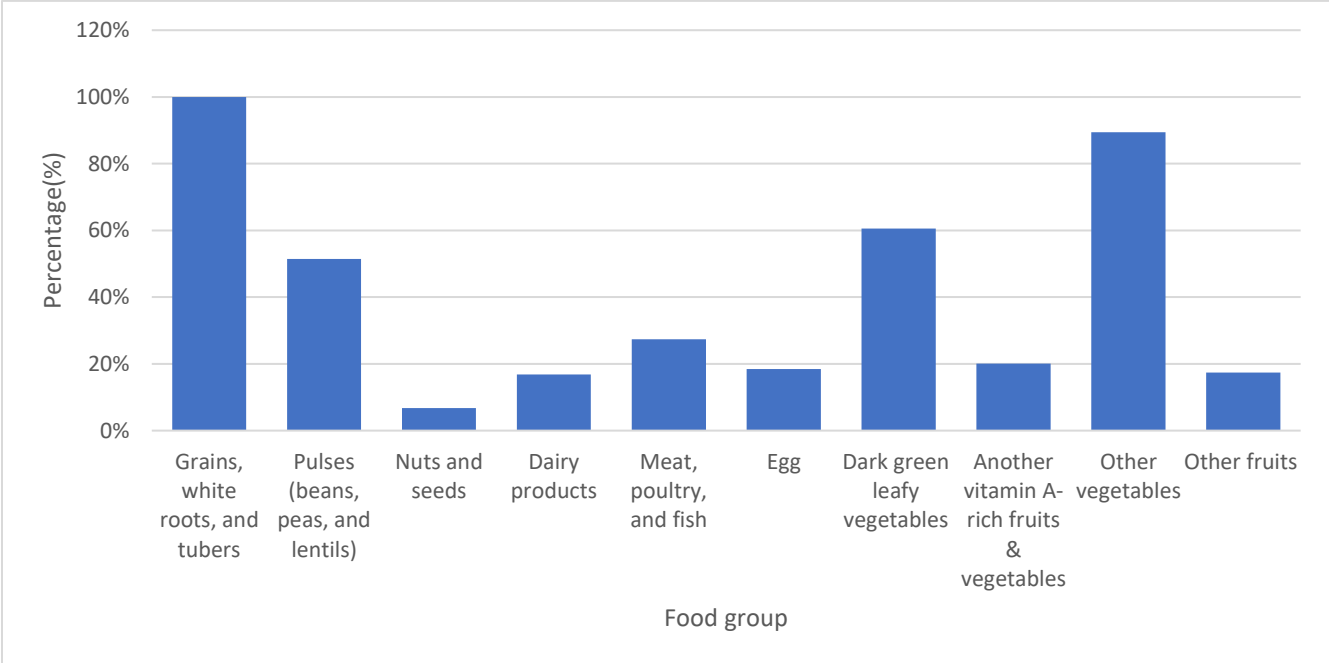


Fig. 2. Bar graph showing food groups consumed in 24 h among HIV-positive adults attending ART clinics at wolkite university specialized hospital, central Ethiopia, 2024 (n = 368).

4.6. Associated factors with Level of Dietary Diversity

In bivariate logistic regression indicators, sex of the respondents, religion, family size, drinking

alcohol, follow up interval, chewing chat, duration of ART, ART regime, Duration of cotrimoxazole, nutritional counselling and frequency of meal were found to be candidate variable to be analyzed in the final model.

After adjusting potential confounder only duration cotrimoxazole and having dietary counselling were significantly associated with individual dietary diversity.

In multivariable logistic regression analyses, Participants taking cotrimoxazole for greeter than Five year were 47% less likely to report good dietary diversity than less than five taking cotrimoxazole (AOR = 0.32, 95% CI:0.318-0.890). Participants had not counselling were 81% less likely to report good dietary diversity than those that had dietary counselling (AOR = 0.185, 95% CI:.0.068,0.504). (Table 5)

Table 5. Bi-variate and multivariable binary logistic regression analyses of variables with individual DD status among HIV-positive adults attending ART clinics at Wolkite university specialized hospital, Central Ethiopia, 2024 (n = 368)

Variables	Category	Individual dietary diversity		COR (95% CI)	AOR (95% CI)	P-value
		Good	poor			
Duration cotrimoxazole	<5year	61	136	1	1	0.016**
	>5 year	70	101	.647(.421,.994)	.532(0.318,0.890)	
Dietary Counselling	Yes	5	42	1	1	0.001**
	NO	126	195	.184(.071,0.478)	.185(0.068,0.504)	
Sex	Female	72	129	1	1	
	Male	59	108	0.979(0.638-1.503)	1.100(0.652-1.857)	0.721*
Religion	Muslim	51	61	1.858(1.154-2.991)	2.408(1.062-5.463)	0.035*
	Orthodox	63	140	1.770(0.891-3.517)	1.107(0.500-2.451)	0.81*
	protestant	17	36	1		
Family size	>5 people	37	63	1.087(0.675-1.752)	1.017(0.546-1.895)	0.97*

	< 5 people	94	174	1		
Drinking alcohol	No	93	180	0.775(0.479-1.253)	0.894(0.480-1.6630)	0.723*
	Yes	38	57	1	1	
Follow up Interval	Monthly	115	200	1	1	
	Ever two months	13	24	0.426(0.102-1.772)	1.026(0.446-2.362)	0.52*
	Other	3	13	0.401(0.112-1.438)	0.574(0.130-2.525)	0.462*
Chat chewing	Yes	29	44	1	1	
	No	102	193	0.802(0.474-1.358)	0.620(0.298-1.291)	0.201*
Duration ART	6-18 month	11	20	1	1	
	>18 month	120	217	1.005(0.466-2.169)	0.998(0.410-2.432)	0.997*
ART regime	First line	124	220	1	1	
	Second line	7	17	0.731(0.295-1.810)	0.790(0.291-2.142)	
Meal frequency	3-4 meal	118	190	1	1	
	>4 meal	5	21	1.292(0.368-4.541)	0.350(0.120-1.024)	0.055*
	<3 meal	8	26	0.495(0.217-1.131)	0.475(0.165-1.374)	0.170*

1-reference categories.

** Significant factor, *Candidate of final model

Note: Significant at p-value <0.05.

Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval.

5) DISCUSSION

This study assessed the magnitude and factors of dietary diversity among adult patients on ART.

The overall magnitude of good dietary diversity in the current study was 35.6%(CI:0.307-0.407)

The result was consistent with studies done in kembata tembaro 39.9% [39] , Nigeria37.7 [17] and

whereas, it was lower than those of studies done in Hiwot and Dilchora Hospitals ART clinics in eastern Ethiopia 71.3% [21], and Kenya 62.7% [16] and it was higher than in studies conducted in

Ambo 29%[8] , Hossana 30.6%[40] , and east Gojjam 29.5% [22]. This difference might be due to differences in study locations, seasonal variability, socio economic status of participants and

cut-off points used to determine the outcome variable.

Duration of cotrimoxazole and dietary counselling the factors associated with dietary diversity among adults on ART.

This study showed that adults who were taking co-trimoxazole prophylaxis for greater than five year duration was less likely to have good DD. The possible reason would be linked to long term use of co-trimoxazole-induced nausea and vomiting[49] , which potentially reduce appetite and thereby affect DD. This finding was in line with the Mettma hospital study, which indicated that adults on co-trimoxazole were more likely to have low DD than those who did not take the drug [7].

This study showed that those adult patients who had nutritional counselling at a health institution were found to have a diversified diet than adults who did not get nutritional counselling. The possible reason would be health education/information on nutrition possibly helps them to diversify their diet. This was in line with Addisu Tesfaw and his colleague's study in Motta [22].

Grain and other vegetable were food groups, predominantly consumed by the participants during the 24-hour recall, 100% and 84.7%, respectively, in Motta public health institutions.

This finding is in line with the study conducted in, Metema Hospital, Nigeria [7, 17, 38]

On the other hand, meat, poultry, fish. Nuts and seeds and dairy products were the least consumed food group during the study periods. Tis is in line with studies conducted at Metema Ethiopia. But in Metema in addition to milk, eggs were the least consumed food groups[7, 38] The reasons might be due to the difference of socioeconomic status, study area, and periods and agrological differences.

6) CONCLUSION

The magnitude of good dietary diversity was low in HIV patients attending ART clinic in the study area. Duration of cotrimoxazole, dietary counselling, were factors significantly associated with dietary diversity among HIV-positive patients on ART.

RECOMMENDATION

Based upon the findings of the study, the following recommendations have forwarded to different concerned bodies: -

To hospital and health professional

- Shall strengthen their efforts to sustain the nutritional counselling service at the clinic through regular updating of the staff working there, adhering to the appropriate counselling methods by considering the background and situation of adults on ART and using different modalities like experience sharing among people on ART, and preparing model sites or simulation areas and educating them through these.
- Lastly, we recommend study to be done in many sites with controlled qualitative study in trained professional.

7) Limitation of the study

This study was excluded those who are pregnant, seriously sick, mentally ill, those who are unable to talk and those who started ART less than 6 month ago, so it reduces the inference to the source population. The study was used dietary diversity score as a proxy measure for dietary quality which does not specifically measures the recommended dietary allowance.

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2. ANNEX

Annex I: Consent Form

Hello. My name is I am a Public health student in wolkit University, College of medicine and health sciences. We are conducting a research on assessment of diversified diet consumption among HIV positive adults. I am here to ask you some questions related to diversified diet consumption. You are selected to participate in this study. We would like to thank very much and appreciate your participation and your participation is solely voluntary. Your name will not be written on this form, and will never be used in connection with any of the information you tell me. As the participation in this study is voluntary; you can ask any question you have and if I should come to any question you don't want to answer, just let me know and I will go on to the next question; or you can stop the interview at any time. Your refusal to participate in this study has no any consequence to the service you get from this facility. However, your honest answers to these questions will help us better understand and alleviate the problem. The interview will take 20-30 minutes. We would greatly appreciate your help in responding to the interview. At this time, do you want to ask me anything about the study?

May I begin the interview now?

Signature of interviewer: Date:

Respondent agrees to be interviewed.....1

Respondent does not agree to be interviewed.....2.

Annex II: Questioners

Questionnaire code: _____

Part-I: Socio-demographic characteristics

Sr. NO	Questions	Coding categories	skip
101	Sex	Male.....1 Female.....2	
102	Age (in years)	18- 25years.....1 25-34 years.....2 35-44 years.....3 ≥ 45 years.....4	
103	Ethnicity	Gurage1 amahara2 hadiya.....3 Oromo.....4 kembata5 other(specify).....99	
104	Marital status	Single1 married2 divorced3 Widowed4	
105	Educational status	Unable to read and write.....1 Read and write.....2	

		Grade 1-8.....3 Grade 9-12.....4 Higher education and above.....5	
106	Religion	Orthodox1 Protestant2 Catholic3 Muslim4 others (specify)99	
107	Occupation	Government employee.....1 Merchant.....2 Daily laborer.....3 House wife.....4 Farmer.....5 Others (specify)99	
108	Weight (kg) and height (m)kg and.....m Patients BMI	
109	Family size	≤ 5people.....1 > 5people.....2	
110	Residence	Urban.....1 Rural.....2	
111	Your main source of food is from?	Purchased.....1 Own garden.....2 Other(food support).....99	
112	Do you smoke cigarette?	Yes.....1 No.....2	
113	Do you drink alcohol?	Yes.....1 No.....2	
114	Do you use any illicit drug or substance?	Yes.....1 No.....2	

Wealth Index

Now I will ask you about some fixed assets that you have at your home.			
		Yes	No
Do you have any of the following properties in your home? (Circle)			
W1	Functioning radio/Tape recorder/CD player	1	0
W2	Functioning Television	1	0
W3	Gas Stove	1	0
W4	Kerosene stove	1	0
W5	Electric stove	1	0
W6	Bicycle	1	0
W7	Motor Cycle	1	0
W8	Cart/Gari	1	0
W9	Watch (Hand/Wall)	1	0
W10	Mobile phone	1	0
W11	Plough	1	0
W12	Sofa	1	0
W13	Spring mattress	1	0
W14	Sponge/Foam mattress	1	0
W15	Cotton mattress	1	0
W16	Grass Mattress	1	0

W17	Chair/Stool	1	0
W18	Generator	1	0
W19	Milling	1	0
W20	Water pump	1	0
	Do you have any of the following animals at home?	1. Yes	0. No
W21	Oxen		
W22	Cows		
W23	Horse/Mules		
W24	Goats/Sheep		
W25	Chickens		
W26	Donkey		

Part-II: Nutritional and personal health related characteristics

Sr. NO	Questions	Coding categories	Skip
201	Are you on ART?	Yes.....1 No.....2	
202	If yes, for how long?	6-18 months.....1 ≥18month.....2	
203	Which ART regimen you are using currently?		
204	Have you had any side effects from taking the ARV's in the last 1 month?	Yes.....1 No.....2	
205	Are you taking cotrimoxazole?	Yes.....1	

		No.....2	
206	If yes for Q503, for how long?	≤ 5 years.....1 >5 years2	
207	Side effect of Cotrimoxazole	Yes.....1 No.....2	
208	WHO stage	Stage I.....1 Stage II.....2 Stage III.....3 Stage IV.....4	
209	Opportunity infection	Yes.....1 No.....2	
210	Follow-up interval	Monthly1 Every 2month2 Other99	
211	Are you taking supplementary feeding?	Yes.....1 No.....2	
212	How much is your CD4 count?	<200 cells/mm3.....1 200-349 cells/mm3.....2 350-499 cells/mm3.....3 ≥500 cells/mm3.....4	
213	Adherence to ART	Good.....1 Fair2 Poor3	
214	Do you ever counseled on nutrition for the PLWHIV?	Yes1 No2	
215	Do you think that PLWHIV need special attention on diet?	Yes1 No2	
216	How many numbers of meals in average do you consume per day?	<3 meals1 3-4 meals2 >4 meals3	

217	Is there any food taboo or restricted food in your society?	Yes1 No2	

Part III: 24 hour dietary recall-Dietary diversity score tool

Place a **one (1)** in the box if the food in question was eaten; place a **zero (0)** in the box if the food was not eaten.

Yesterday during the day or at night, what did you eat, whether you ate it at home or anywhere else? Morning, mid-morning, noon, afternoon, evening, late evening			
	Food groups	List of foods	1. Yes 0. No
301	Grains, white roots, and tubers	Porridge, bread, rice, noodles, or other foods made from grains White potatoes, white yams, cassava, or any other foods made from roots	
302	Pulses (beans, peas, and lentils)	Mature beans or peas (fresh or dried seed), lentils, or bean/pea products	
303	Nuts and seeds	Any tree nut, groundnut/peanut or certain seeds, or nut/seed “butter” or pastes	
304	Dairy products	Milk, cheese, yogurt, or other milk products but not including butter,	
305	Meat, poultry, and fish	Liver, kidney, heart, or other organ meats. Any meat, such as beef, lamb, goat, chicken, Fresh or dried fish	

		Liver, kidney, heart, or other organ meats, including wild game, Beef, lamb, goat, wild game meat, chicken, or other bird Fresh or dried fish	
306	Egg	Eggs from poultry or any other bird	
307	Dark green leafy vegetables	List examples of any medium-to-dark green leafy vegetables, including wild/foraged leaves	
308	Another vitamin A-rich fruits & vegetables	Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside Ripe mango, ripe papaya	
309	Other vegetables	Vegetables (tomato, kale, salad, sugar beet,)	
310	Other fruits	Fruits (avocado, banana, orange, lemon)	

Record foods eaten or drank yesterday during day and night, whether at home or outside the home.

Start with the first food or drink of the mornig.

Breakfast	Snack	Lunch	Snack	Dinner	Snack

N.B: After the respondent recall is complete, fill in the food groups based on the information recorded above. For any food groups not mentioned, ask the respondent if a food item from this group was consumed.