2020-10

# Prevalence of Undernutrition and its Associated factors Among Adolescents Living with Hiv in East Gojjam Zone, Amhara Region, Ethiopia, 2020.

: Teju, Anteneh


# BAHIR DAR UNIVERSITY

## COLLEGE OF MEDICINE AND HEALTH SCIENCES

## SCHOOL OF PUBLIC HEALTH

## DEPARTMENT OF NUTRITION AND DIETETICS

# PREVALENCE OF UNDERNUTRITION AND ITS ASSOCIATED FACTORS AMONG ADOLESCENTS LIVING WITH HIV IN EAST GOJJAM ZONE, AMHARA REGION, ETHIOPIA, 2020.

**By: TEJU ANTENEH (BSC)**

**A THESIS SUBMITTED TO THE DEPARTMENT OF NUTRTION AND DIATETICS SCHOOL OF PUBLIC HEALH, COLLEGE OF MEDICINE AND HEALTH SCIENCE, BAHIRDAR UNIVERSITY, IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF MASTER IN NUTRITION AND DIETETICS**

OCTOBER, 2020

BAHIR DAR, ETHIOPIA

**BAHIR DAR UNIVERSITY**

**COLLEGE OF MEDICINE AND HEALTH SCIENCES**

**SCHOOL OF PUBLIC HEALTHDEPARTMENT OF NUTRITION AND DIETETICS**

# PREVALENCE OF UNDERNUTRITION AND ITS ASSOCIATED FACTORS AMONG ADOLESCENTS LIVING WITH HIV IN EAST GOJJAM ZONE, AMHARA REGION, ETHIOPIA, 2020.


Name and address of Investigator

TEJU ANTENEH (BSC)

Tell +251920261943

E-mail Tejuanteneh@gmail.com

Name and Address of Advisers

1. Dr DEREJE BIRHANU (MPH, PHD, ASSISTANT PROFFESOR)

   Tell: +251918146608

   E-mail:derejefrae@gmail.com

2. MULAT TIRFIE (MSc, ASSISTANT PROFFESOR)

   Tell: +251912692308

   E-mail:mulatbonny@gmail.com

## Acknowledgements

My gratitude goes to Bahir Dar University for giving me the Opportunity to conduct this research. I would also like to express my deepest appreciation and thanks to my Advisors Dr Dereje Birhanu and Mr. Mulat Tirfie for their unreserved support. My special thanks and appreciation goes to all the study participants who voluntarily participated in this study, and data collectors and supervisors for their unreserved work.

## Abstract

**Background**: Malnutrition is a major threat to the health of HIV infected individuals and associated with increased risks of morbidity and mortality. The nutritional status (stunting, thinness) of HIV infected adolescents has a great impact on overall health, growth and development. Literature is dearth regarding the issue.

**Objective**: To assess the prevalence of under nutrition and its associated factors among adolescents living with HIV in east Gojjam zone, Ethiopia, 2020.

**Methods:** Institutional based cross sectional study was conducted among 300 adolescents living with HIV from March 25 to April 30, 2020 in East Gojjam Zone. All the study participants in the data collection time were included until required sample size was reached.

Interviewer administered questionnaire was used to collect the data. WHO anthro plus was used to convert anthropometric data and analyzed by SPSS v- 23. Having a p-value < 0.05 in multivariable logistic regression analysis was used to conclude the presence of statistically significant association. Finally the results were presented by texts, tables and graphs.

**Results:** A total of 300 adolescents living with HIV were participated (100% response rate). About 39% were stunted and 14% were thin. Being male was two times more likely to be stunted AOR=2.35, (95% CI: 1.30-4.26). Participants whose residence urban was 3.4 times more likely to be stunted AOR=3.4, (95% CI: 1.66-6.96). Participants who had not nutritional counseling were two times more likely to be stunted AOR=2.06, (95%CI: 1.05-4.03). Participants whose hemoglobin level ≥12mg/dl were 62% less likely to be stunted than their counter parts AOR= 0.38, (95% CI: 0.15-0.93) and Participants who didn't skip their meal was 74% less likely to be stunted AOR=0.26, (95% CI: 0.13-0.50). Participants who were male were 2.73 times more likely to be thin (AOR=2.73, (95% CI: 1.07-6.95). Participants who didn't Skip their meal were 76% less likely to be thin AOR=0.24, (95% CI: 0.08-0.69). Participants, with hemoglobin level1 ≥12mg/dl were 93% less likely to be thin (AOR=0.07, (95% CI: 0.025-0.23).

**Conclusion:** The prevalence of stunting was (39%) and thinness was (14%) among the HIV infected adolescents. Sex, Skipping meal, residence, nutritional counseling and hemoglobin level were associated with stunting and thinness. Only increasing access to ART can't solve problem of malnutrition, therefore nutrition counseling and support as an adjunct to the initiation of ART should be considered.



**Key words**: Under-nutrition, Adolescents, HIV/AIDS, Ethiopia.

## Acronyms and abbreviations

AIDS---------- Acquired Immune Deficiency Syndrome
ART---------- Anti-Retroviral Therapy
ALHIV---------- Adolescents Living With HIV
EDHS ---------- Ethiopian Demographic and Health Survey
ECSA ---------- Ethiopian Central Statistical Agency
FANTA ---------- Food & nutrition Technical Assistance
FAO ---------- Food and Agriculture Organization
HAART ---------- Highly Activate Anti-Retroviral Therapy
HAFAS---------- Household Food Insecurity access Scale
HIV---------- Human immune deficiency Virus
HSTP---------- Health Sector Transformation Plan
LMIC---------- Low and Middle Income Countries
MoH ---------- Ministry of Health
OIs ---------- Opportunistic Infections
PLWH ---------- People Living With HIV
SPSS ---------- Statistical Package for Social Science
SSA---------- Sub Saharan Africa
UNICEF---------- United Nations Children's Fund
UNAIDS----------United States Agency for International Development
WHO ----------World Health Organization

# Table of Contents

## List of Tables

## List of Figures

# 1. Introduction

## 1.1 Background

HIV is a virus that attacks cells that help the body fight infection, making a person more vulnerable to other infections and diseases. First identified in 1981, HIV is the cause of one of humanity's deadliest and most persistent epidemics. It is spread by contact with certain body fluids of a person with HIV, most commonly during unprotected sex, sharing with sharp materials, Blood, Semen and pre-seminal fluid, rectal fluids, vaginal fluids and breast milk. Within 2 to 4 weeks after infection with HIV, about two-thirds of people will have a flu-like illness. This is the body's natural response to HIV infection, Such as fever, chills, rash, night sweats, muscle aches, sore throat, fatigue, swollen lymph nodes and mouth ulcers (1, 2).

Combining strategies were used in the management of HIV to reduce infectiousness of HIV-positive person's susceptibility to opportunistic infections. Most early HIV prevention policies focused heavily behavioral risk reduction, condoms uses, male circumcision, and treat curable infections, use of antiretroviral medications and nutrition assessment counseling and support (NACS) (3).

AIDS is the late stage of HIV infection that occurs when the body's immune system is badly damaged because of the virus. People with HIV by taking Anti Retro-viral Therapy, can live long and healthy lives and prevent transmitting HIV to their sexual partners and child. In addition, there are effective methods to prevent getting HIV through sex or drug use, including condoms, pre-exposure prophylaxis and post-exposure prophylaxis (4).

Adolescence is a period of transition through which young people acquire not only new capacities for progress towards adulthood but it is also a time during which rapid physical growth, physiological and psycho-social changes, the development of secondary sexual characteristics and reproductive maturation(5).

Adolescence is a second window of opportunity for growth next to the first one thousand days. They need protein, iron, and other micro-nutrients to support the growth spurt and meet the body's increased demand. However, many boys and girls in the developing countries enter adolescence undernourished, making them more vulnerable to disease and premature death. Low maternal per-pregnancy body mass index is a known determinant of low birth weight, and contributes to the inter-generational cycle of malnutrition (6).

Nutrition is important at all stages of HIV infection. Therefore, malnutrition affects the immune system, increasing the risk of opportunistic infections and diseases. In turn, infection increases nutritional needs while increasing nutrient losses, and reducing intake and absorption of nutrients. The ensuing deterioration of nutritional status affects the immune system, body strength, and the cycle continues with disease progression and further worsening of nutritional status (7).

### 1.2 Statement of the problem

HIV is the virus that causes AIDS, has become one of the world's most serious health and development challenges. The human body can't get rid of HIV and no effective HIV cure exists. So, once you have HIV, you have it for life. Approximately 75 million people have become infected with HIV since the start of the epidemic. 37.9 million People currently living with HIV, 1.7 million people became newly infected, and 32 million people have died from AIDS-related illnesses since the beginning of the epidemic up to 2018. Over two thirds of (25.7 million) all people living with HIV live in African (8, 9).

Adolescent in Sub-Saharan Africa (SSA) accounts for 18.5% of the global Population. In comparison to any other region, adolescents in SSA make up the greatest proportion (25%) of the general population. Globally, more than 2.1 million adolescents are living with HIV/AIDS; of this around 80% live in Sub Saharan Africa (10).

Malnutrition and HIV work in tandem; while HIV can lead to malnutrition, malnutrition might worsen the impact of HIV. People living with HIV(PLWHV) need to consume up to 30% more calories than uninfected counter parts, making nutritional support a key component of care for those living with HIV, including adolescents (11).

HIV infection is an important contributing factor to malnutrition among adolescents. Infections can reduce appetite, decrease the body's absorption of nutrients, and make the body use nutrients faster than usual to repair the immune system. HIV can cause or aggravate malnutrition through reduced food intake, increased energy needs, and poor nutrient absorption. In turn, malnutrition can fasten the progression of HIV and worsen its impact by weakening the immune system (12).

Ethiopia has one of the highest rates of malnutrition in Sub-Saharan Africa, and faces acute and chronic malnutrition and micro-nutrient deficiencies (5). While rates of stunting have dropped in

many areas of the country over the past decade, Ethiopia still faces a huge burden from malnutrition with 40% of children stunted and more than 15% acutely malnourished in some region (13).
Adolescents are not considered as a priority target group for nutrition interventions, yet adolescence is a time of rapid change and growth that increase the need for energy and micro-nutrients. Physical changes that require extra nutrition include changes in weight and height. Approximately 25% of person's height is achieved during adolescence. This growth depends on adequate nutrition. Chronic under-nutrition during this period can lead to stunting (14). Nearly all adolescents consider themselves as healthy but poverty-related illnesses remain common and treatable conditions can have permanent impacts (15).

As the number of vertically infected ALHIV continues to grow, there is an increased need to support these individuals as they transition from pediatric to adult care. These unique considerations for ALHIV include potential pubertal delays, developmental delays, stigma and isolation, gender based violence, anxiety and depression. Adolescents who suffer from depression are more likely to be non-adherent to their medication and use alcohol or other substances (16).
Therefore, good nutrition during adolescences was critical to child hood and should include nutrients required to meet the demands of physical and cognitive development. While several studies have been conducted to elucidate the nutritional status of adults and children living with HIV Therefore this study was designed to determine the magnitude and associated factors of under-nutrition among ALHIV.

## 1.3 Significant of the study

This study gives the opportunity to help ALHIV maintain their health for as long as possible. For this reason it will enable them to monitor their health and provide with good advice for adopt to increase their chances of being healthy and strong. These include maintaining a healthy life style, eating energy-rich foods, drinking clean water, having regular health checks for weight and taking appropriate medicines.

A considerable effort is still required to understand what works best for this population. It gives more evidence to perform innovative and targeted interventions for adolescent HIV policy. This will improve outcomes for adolescents and help to reach global targets for an AIDS-free generation by 2030. While several studies have been conducted to elucidate the nutritional status of adults and children living with HIV, no known studies have done specifically targeted nutritional status of adolescents living with HIV in Ethiopia. Therefore, this study will provides important information on the nutritional status of adolescents living with HIV (ALHIV) for health professionals, program implementers, policy makers and other stakeholders working in the area of HIV/AIDS control and prevention to planned implement effective strategies for improving quality of life for Adolescents.

## 2. Literature review

### 2.1 Prevalence of undernutrition

A cross sectional study conducted in Saudi Arabia reported that among School female adolescents 19.2% was found under-weight(17). High levels of stunting among HIV infected adolescents have been reported in developing countries. For example, study conducted in Uganda reported that 36.2% and 18% of adolescent living with HIV/AIDS were stunted and thin respectively(18). According to Ethiopian Demographic and Health Survey 2019 report the prevalence of stunting and thinness among children were 37% and 7% respectively (19) .

The study conducted in two food insecure zones in Ethiopia, the prevalence of stunting and thinness were 18.4% and 15.0% respectively (20). The study conducted in Rural Ethiopia among Children the prevalence of malnutrition was 48.5% (21). A cross-sectional study conducted in Eastern Ethiopia among pediatrics age children attending antiretroviral therapy that 24.7% of the children were stunted and 28.2% were wasted (22).A cross-sectional study conducted in Arbaminch district the prevalence of undernutrition was 18.2% (23).

In Ethiopia, study conducted in, Jimma University Specialized Hospital and Dilla University Referral Hospital on adult HIV/AIDS patients the overall prevalence undernutrition were27.2% and 25.2% respectively (24, 25). A cross sectional study conducted in Tehuledere District school of adolescents indicated that the overall prevalence of stunting was 15.5%(26).

A cross-sectional study conducted among School adolescents in Mekelle the prevalence of stunting was 37.8% (27). Another study conducted in Siltie Zone and Bahir Dar Town among people affected by Human immune deficiency virus on antiretroviral therapy prevalence of chronic energy deficiency were 24.1% and 25.5% respectively (28, 29).A cross sectional study conducted in Dangla the prevalence of stunting and thinness were 24.8 % and 7.1 %, respectively (30).

### 2.2 Factors influencing under nutrition

A cross-sectional study conducted among school female adolescents in Saudi Arabia was a significant relationship observed between nutritional statuses with the mother's occupation and education, family size, and a number of meals taken per day(17).

A cross-sectional study conducted in Uganda on Nutritional Status of HIV-infected adolescents enrolled in to HIV-care, According to this study being male and living in rural area was considered to be predictor of malnutrition (18).

In Ethiopia the study conducted on assessments of adult nutritional status and associated factors among ART users in Arba Minch Zuria District and West Shewa Zone, Central Ethiopia prevalence of undernutrition was significantly association with monthly family income ,interrupted treatment, tobacco users, tuberculosis, duration on antiretroviral therapy, unemployment, WHO clinical stages are significantly associated (23, 31).

A study conducted in Tehuluder among school adolescents Socio-demographic factors like being male, early adolescents, having no latrine and using unsafe drinking water supply were associated with being stunting (26).

A study conducted in Chiro town among school adolescents Socio-demographic factors like being early adolescents, male, chewing chat, having fathers with no formal education were associated with being underweight (32).

A cross-sectional study conducted in Eastern Ethiopia among pediatrics age children attending antiretroviral therapy that, food insecurity, anemia and advanced WHO clinical stages were significantly associated with stunting. While being male, anemia and low family monthly income were significantly associated with wasting (22).

Another study conducted in Siltie Zone and Bahir Dar Town among people affected by Human immune deficiency virus on antiretroviral therapy, Food insecurity, feeding practice and absence of dietary counseling were found to be independent predictors of chronic energy deficiency among HIV positive adults (28, 29). A cross-sectional study conducted in Dangla town among school adolescents, being male, unavailability of latrine and family size were in dependent predictors of stunting and thinness (30) .

## 3. Conceptual framework

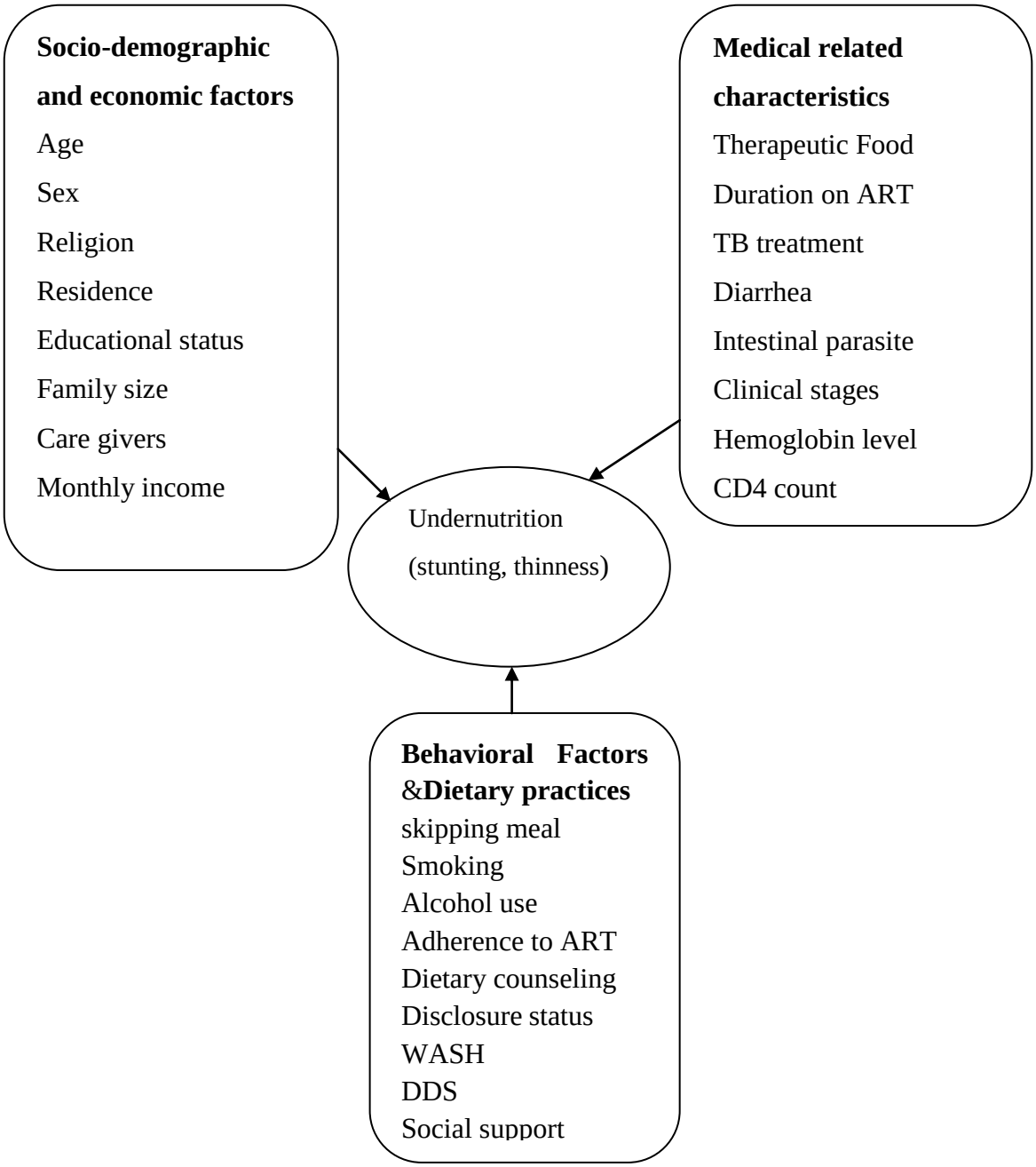


Figure 1**:** Conceptual framework for Undernutrition (developed from the literature (19, 22))

# 4. Objective

## 4.1 General objective

To assess the prevalence of undernutrition and its associated factors among adolescents living with HIV in East Gojjam Zone, Amhara region, Ethiopia, 2020

## 4.2 Specific objectives

1. To determine the prevalence of stunting among adolescents living with HIV
2. To determine the prevalence of thinness among adolescents living with HIV
3. To identify factors associated with stunting among adolescents living with HIV
4. To identify factors associated with thinness among adolescents living with HIV

## 5. Method and materials

### 5.1 Study design and period

A facility based cross-sectional study was conducted from March 25 to April 30, 2020.

### 5.2 Study area

This research was conducted in East Gojjam zone, Amhara region, Ethiopia. Debre Markos is the capital city of this zone; it is 299 Km far from Addis Ababa. In East Gojjam zone the total population of the year 2020 according to the 2007 population projection was 2,719,118, of whom 679, 779 were adolescents. In the zone their were535 (423 health post, 10 hospitals and 102 health centers) and 112 private health facilities, of these 30 health facilities were providing ART services.**(33)**

### 5.3 Population

#### 5.3.1 Source population

All adolescents living with HIV enrolled at health facilities in East Gojjam Zone

#### 5.3.2 Study population

All adolescents living with HIV enrolled in the randomly selected health facilities.

### 5.4 Inclusion and exclusion criteria

#### 4.4.1 Inclusion criteria

Adolescents living with HIV who visited the health facilities for ART service during the study period,

#### 5.4.2 Exclusion criteria

An adolescent, who had physical deformity (kyphosis) or pregnant was excluded.

### 5.5 Sample size and sampling procedures

#### 5.5.1 Sample size determination

**Sample size determination for 1st objective**

The sample size was calculated by using single population formula taking the proportion (p) of respondents considered as stunting, thinness to be 50%, a precision of 5% and with 95% confidence level.

$$n = \frac{[Za/_2]^2 \times [p\ (1-p)]}{d^2}$$

n=sample size

p=proportion of HIV infected adolescents with stunting (taken as 50%).

d=maximum allowable error (margin of error) =0.05

Z=value of standard normal distribution (Z-statistic) at 95% confidence level (z=1.96)

$$n = \frac{[1.96 \times 0.5 \times 0.5]}{0.05^2} = 384$$

Since the source population was less than 10,000; finite population, correction formula was used to decreased the sample size as follows

$$n_f = ni\ /1+\ (ni/N) \qquad n_f = \frac{384}{1+384/940} = 273$$

By adding 10% non-response rate the final sample size was 300

**Sample size determination for 2nd objective**

Table 1: Sample size determination for the second objective

| NO | Factors | Confidence Level | Power | Ratio unexposed/Exposed | % of un exposed | Odd ratio | Sample size | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | Resident | 95 | 80 | 1 | 20.8 | 14.4 | 28 | |
| 2 | Family size | 95 | 80 | 1 | 37.5 | 2.7 | 140 | (17) |
| 3 | Dietary diversity | 95 | 80 | 1 | 19.3 | 2.6 | 182 | |
| 4 | Food security | 95 | 80 | 1 | 9.7 | 7.6 | 60 | (20) |

By comparing the sample size of the first (300) and the second objective (182), the maximum 300 was used

### 5.5.2 Sampling procedure

From the 30 ART service providing health facilities, 8 health facilities (Debre-Markos Refferal Hospital, Bichena primary Hospital, Debre Markos health center, Bichena health center, Debre work health center, Dejjen health center, Yetmen health center and Yeduha health center) were selected randomly.

There were about 17, 500 HIV patients on HAART in the study area, among these 940 were adolescents and 570 adolescents were in the randomly selected health facilities (34). The total sample size was proportionately allocated to each health facility according to the case load as stated in the figure below. All study participants in the data collection time were included until the allocated sample size was reached.

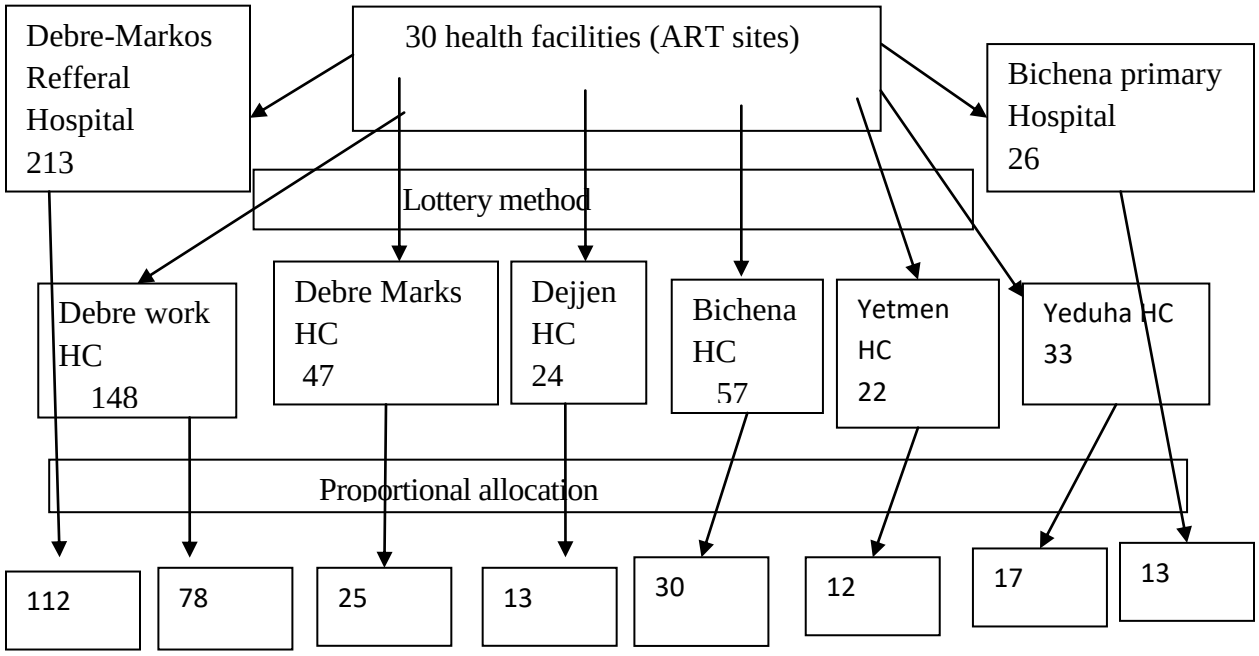


Figure 2: Schematic presentation of sampling procedures

### 5.6 Study variables

#### 5.6.1 Dependent variable

Undernutrition (stunting, thinness)

#### 5.6.2 Independent variables

Socio-demographic and economic characteristics: age, sex, religion, educational status, family size, residence, food insecurity and monthly income.

Behavioral Factors and Dietary practices: skipping meal**,** dietary counseling, alcohol use, cigarette smoking, disclosure status, social support and adherence to ART.

Medical related characteristics: Clinical stages, duration on ART, therapeutic food, diarrhea, Intestinal parasite, TB, anemia, clinical stages, CD4 count and Hemoglobin level

.

### 5.7 Operational definition /definition of terms

**Stunting**; height below two standard deviations a reference population (height- for-age< -2SDZ-score) and

**Thinness**: weight below two standard deviation from median a reference population (BMI– for- age< -2SDZ-score) (35).

**Dietary counseling**: participants who get nutritional care for encouraging the modification of eating habits. If they answer from 4 questions at least two yes or more conceders as get nutritional counseling**.**

**Alcohol consumer -** in the current study classified individual as alcohol consume if he/she using at least one alcohol unit with local conventional measures at least once per week.

**Cigarette smoker-** A respondent was considered as smoker if he/she had been smoking cigarette for a minimum of one stick per week.

**Social support-** For the purposes of this survey, we defined social support including food, cloth, education materials and economic support.

**Adolescent**: the phase of life stretching between childhood and adulthood (10-19) years (36).

**Adherence**: percentage ≥95% or ≤3 doses missed per month is considered as good, adherence percentage 85–94% or 4–8 doses missed per month considered as Fair, and adherence percentage≤ 85% or ≥9 doses missed per month is considered as Poor.(37)

**Food secure Household:** Household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely, otherwise food insecure household

**Dietary diversity:** It is a qualitative measure of food consumption that reflects household access to a variety of foods and is also a proxy for nutrient adequacy of the diet of individuals. In the current study, a DDS of 7 or above is considered as high DDS, while a DDS of less than 7 is low.

**Disclosed**: Adolescents who knows their HIV status

### 5.8 Data collection materials and procedures

Data collection was carried out using semi-structured questionnaires. The questionnaires were prepared in English and translated into Amharic and translated back into English by third person to check the consistency. Anthropometric measurements (height and weight) were taken following standard procedures (38).

Food security status of the household was measured using household food insecurity access Scale. Household food insecurity measured by asked the study participants to report the frequency of worrying about what to eat to the range of remaining hunger day and night in the previous four weeks before the survey. Household dietary diversity of respondents were assessed using the questions specifically covered food consumption during the past 24 hours containing Cereals, Vegetables, Fruits, Meat, Milk/Milk products, Eggs, Fish, Legumes, Root/Tubers ,Oils/Fats, Honey/Sugar and condiments. Participants were asked to report the frequency of consumption of each food in the past 24 hours. Participants received 1 point if they consumed at least once in the last 24 hours of the foods within each subgroup and 0 points if they never consumed that food. The dietary diversity score ranged from one to twelve (HAFAS) (39, 40).

**Height measurement:** Height was measured standing with his or her back against the measuring board. The head was in the Frankfurt plane during measurement, knees were straight and the heels buttocks and the shoulders blades touched the vertical surface of the stadiometer. The participants' legs were placed together making the knees and ankles touching each other. The study participants were asked to take a deep breath. Height measurement was taken at maximum inspiration and the height was recorded to the nearest 0.1 cm.

**Weight measurement:** The study participants were weighted using weight scales. The scales were validated with standard weights before actual weighting of the adolescents. The scales were placed on a hard flat surface and adolescents were weighed (excluding jackets, shoes and belts). Each study participant were measured and recorded to the nearest 0.1 kg (35).

### 5.9 Data processing and analysis

The collected data from the questionnaire were coded and entered into Epi-data version 4.01 and was cleaned. WHO anthro plus was used to convert anthropometric raw data in to indices. BMI-for-Age (BAZ) and Height-for-age (HAZ) were measured of thinness and stunting respectively, and exported to SPSS v-23 for further analysis. Standard deviation (SD) scores (Z-scores) was applied to determine the nutritional status. Adolescents whose BAZ and HAZ were less than-2SD were considered as thin and stunted respectively. Variables with p-value < 0.25 in the Bi-variable analysis were included in to multivariable logistic regression to identify possible factors associated with outcomes. Variables with p-value < 0.05 were considered statistically significant. Adjusted odds ratio; with its 95% confidence interval was used to indicate strength of association. Finally the results were presented by texts, tables, graphs or diagrams.

### 5.10 Data quality management

Data was collected by 8 ART trained clinical nurses and supervised by two ART trained Public health officer. The data collectors and supervisor were had one day of data collection training on how to conduct interview and anthropometric measurements by the principal investigator. The weight scales were validated by using standardized weight before actual weighting of the study participants. The quality of data was assured through careful design, translation and pretesting of questionnaire, closes supervision and proper handling of the data. Before the actual data collection pretest was conducted 5% (15) in Bichena health center. The data was monitored during data collection and collected questionnaires were examined for completeness and consistency during interview and at the end of each day.

### 5.11 Ethical consideration

Before the beginning of the actual data collection process, the study proposal protocol was approved by Bahir Dar University College of Medicine and Health Sciences ethical review committee. Similarly, permission letter was obtained from Amhara national regional health bureau and respective health authorities of zone and district levels. Official letters of co-operation was written to all health institutions and concerned bodies. After getting permission from the zone, the principal investigator was set a date of data collection with the health facility head. Adolescents and their parents were notified and necessary explanations were given about the purposes, procedure, and all the confidentiality issues. Written consent was obtained from adolescents in the age group 18-19 years and for those participants aged <18 years, assent was obtained from their parents. The Respondent's confidentiality of information was assured by excluding names and any identifiers from the questionnaire and they will be informed that they can refuse participation at any time of data collection.

### 5.12 Data dissemination

The research findings would be presented to Bahir Dar University, College of Medicine and Health Sciences and School of public Health, different conferences and manuscript would be submitted for publication and shared to East Gojjam Zone health offices.

## 6. Result

### 6.1 Socio-demographic characteristics

A total of 300 adolescents living with HIV responded to the questionnaire, 100% response rate. Of the total study participants 44% were males. Regarding the age of respondents, 15.4(±2.7) was the mean age and 61.7% were late adolescent.

About four-fifth (83.3%) of respondents were Orthodox Christian. As to the family size, more than two-third (70%) of participants had ≤4 family members. Concerning educational status (66.3%) of respondents was attended primary school and with respect to primary cares givers more than two-third (72.7%) of participants was lived with their parents. (Table 2)

Table 2: Socio-demographic characteristics of adolescents living with HIV in East Gojjam Zone, Ethiopia, 2020

| Variable | Response category | Frequency | Percent |
|---|---|---|---|
| Age | 10 -14 | 115 | 38.3 |
| | 15-19 | 185 | 61.7 |
| Sex | Male | 132 | 44 |
| | Female | 168 | 56 |
| Religion | Orthodox | 250 | 83.3 |
| | Muslim | 35 | 11.7 |
| | Protestant | 15 | 5 |
| Residence | Urban | 187 | 63 |
| | Rural | 113 | 37 |
| Educational status of participant | No formal | 20 | 6.7 |
| | Primary | 199 | 66.3 |
| | secondary and above | 81 | 27 |
| Educational status of Care giver | No formal | 185 | 61.7 |
| | Primary | 54 | 18 |
| | Secondary& above | 61 | 20.3 |
| Parental status | Two live | 110 | 36.7 |
| | One live | 129 | 43 |
| | No live parents | 61 | 20.3 |
| Relationship to care givers | Parents | 218 | 72.7 |
| | Other family members | 64 | 21.3 |
| | Relatives | 12 | 4 |
| | Others | 6 | 2 |
| Family size | ≤4 | 210 | 70 |
| | >4 | 90 | 30 |
| Family income (Ethiopian birr) | <1500 | 158 | 52.7 |
| | 1500-4000 | 115 | 38.3 |
| | >4000 | 27 | 9 |

### 6.2 Behavioral characteristics, Household food insecurity and dietary diversity

Concerning behavioral characteristics of adolescents living with HIV in East Gojjam zone, more than half of the participants 171 (57%) were got nutritional counseling during their follow up and few of the participants (8.7 %) got social support. In addition, assessment of dietary habits of respondents shows that about half (47.3 %) of study participants were skip their meal. Among these 79(26.3%) of the study participants skip breakfast. Concerning smoking and alcohol 31 (10.3%) of the study participants were drinking alcohol, but none of the respondents were not smoking cigarette. The analysis of household dietary diversity of respondents show that 284(94.7%), 279(93%) and 132(44%) of the respondents consume food containing cereals, legumes and vegetables respectively, in the previous twenty four hours. (Table 3)

Table 3: Behavioral characteristics, Household food insecurity and dietary diversity of adolescents living with HIV in East Gojjam Zone, Ethiopia, 2020, n=300

| Variables | Response category | Frequency | Percent |
|---|---|---|---|
| Skipping meal | Yes | 142 | 47.3 |
| | No | 158 | 52.7 |
| Type of meal skip | Breakfast | 79 | 26.3 |
| | Lunch | 12 | 4 |
| | Snack | 90 | 30 |
| | Dinner | 3 | 1 |
| Alcohol use | Yes | 26 | 8.7 |
| | No | 274 | 91.3 |
| Nutritional counseled | No | 129 | 43 |
| | Yes | 171 | 57 |
| Social support | Yes | 26 | 8.7 |
| | No | 274 | 91.3 |
| Source of drinking Water | water Piped | 223 | 75 |
| | Protected well | 77 | 25 |
| Availability of latrine | Yes | 235 | 78 |
| | No | 65 | 22 |
| **Dietary diversity** | | | |
| Cereals | Yes | 284 | 94.7 |
| | No | 16 | 5.3 |
| Legumes | Yes | 279 | 93 |
| | No | 21 | 7 |
| Vegetables | Yes | 132 | 44 |
| | No | 168 | 56 |

| | | | |
|---|---|---|---|
| Fruits | Yes | 38 | 12.7 |
| | No | 268 | 87.3 |
| Root/tuber | Yes | 79 | 26.3 |
| | No | 221 | 173.7 |
| Meat /poultry | Yes | 58 | 19.3 |
| | No | 242 | 81.7 |
| Eggs | Yes | 32 | 10.7 |
| | No | 268 | 89.3 |
| Fish and sea foods | Yes | 1 | .3 |
| | No | 299 | 99.7 |
| Milk and milk products | Yes | 53 | 17.7 |
| | No | 247 | 82.3 |
| Oil | Yes | 294 | 98 |
| | No | 6 | 2 |
| Sugar | Yes | 109 | 36.3 |
| Condiments(others) | No | 191 | 63.7 |
| | Yes | 12 | 4 |
| | No | 288 | 96 |
| HH dietary Diversity score | low | 254 | 84.7 |
| | high | 46 | 15.3 |
| Household food Insecurity | Secure | 14 | 4.7 |
| | Insecure | 286 | 95.3 |

### 6.3 Medical related characteristics

As regards to the clinical characteristics of study participants; majority of the participants (89.3%) were disclosed their HIV status and about two-third (65.3%) of the participants had CD4 count >500 cells/µL, Concerning duration on ART more than half (54%) of the participants were ≥5 years on ART. Relating to treatment adherence about three-fourth (73.3%) of the study subjects had good adherence, and 273(91%) of the participant had got INH prophylaxis. WHO-t stage of the respondents shows 209(69.7%) were in the first stage. Regarding opportunistic infections 3 (1%) of study participants were on TB treatment, and 32 (10.7%) of the participant had diarrhea in the last two weeks. (Table 4)

Table 4: Medical related characteristics of adolescents living with HIV in East Gojjam Zone, Ethiopia, 2020

| Variables | Response | Frequency | Percent |
|---|---|---|---|
| WHO clinical stages | One | 209 | 69.7 |
| | Two | 30 | 10 |
| | Three | 45 | 15 |
| | Four | 16 | 5.3 |
| CD4 count (cells/µl) | <500 | 104 | 34.7 |
| | ≥500 | 196 | 65.3 |
| Disclosed HIV status | Yes | 268 | 89.3 |
| | No | 32 | 10.7 |
| Therapeutic feeding | Yes | 86 | 28.7 |
| | No | 214 | 71.3 |
| INH prophylaxis | Yes | 273 | 91 |
| | No | 27 | 9 |
| Treatment adherence | Good | 220 | 73.3 |
| | Fair | 27 | 9 |
| | Poor | 53 | 17.7 |
| On TB treatment | Yes | 3 | 1 |
| | No | 297 | 99 |
| Hemoglobin level(mg/dl) | <12 | 39 | 13 |
| | ≥12 | 261 | 87 |
| Duration on ART | <5 | 140 | 46.7 |
| Treatment in year | ≥5 | 160 | 53.3 |
| Diarrhea for two weeks | Yes | 32 | 10.7 |
| | No | 268 | 89.3 |
| Pneumonia | Yes | 36 | 12 |
| | No | 264 | 88 |
| Intestinal parasite | Yes | 20 | 6.7 |
| | No | 280 | 93.3 |
| Malaria | Yes | 6 | 2 |
| | No | 294 | 98 |
| Gastro enteritis | Yes | 6 | 2 |
| | No | 294 | 98 |
| Eating problem | Yes | 10 | 3.3 |
| | No | 290 | 96.7 |
| Skin infection | Yes | 17 | 5.7 |
| | No | 283 | 94.3 |
| Loss of appetite | Yes | 35 | 11.7 |
| | No | 265 | 88.3 |
| Difficulty of swallowing | Yes | 10 | 3.3 |
| | No | 290 | 96.7 |

### 6.4 Prevalence of stunting

The prevalence of stunting among respondents was 39% (95% CI: 34.3-44.0). Among those using the WHO cut of point height for age (≤ -3SD) 41 (13.7%) severely stunted and (-3SD - -2SD) 76 (25.3%) moderately stunted. (N=300) (Figure 3)

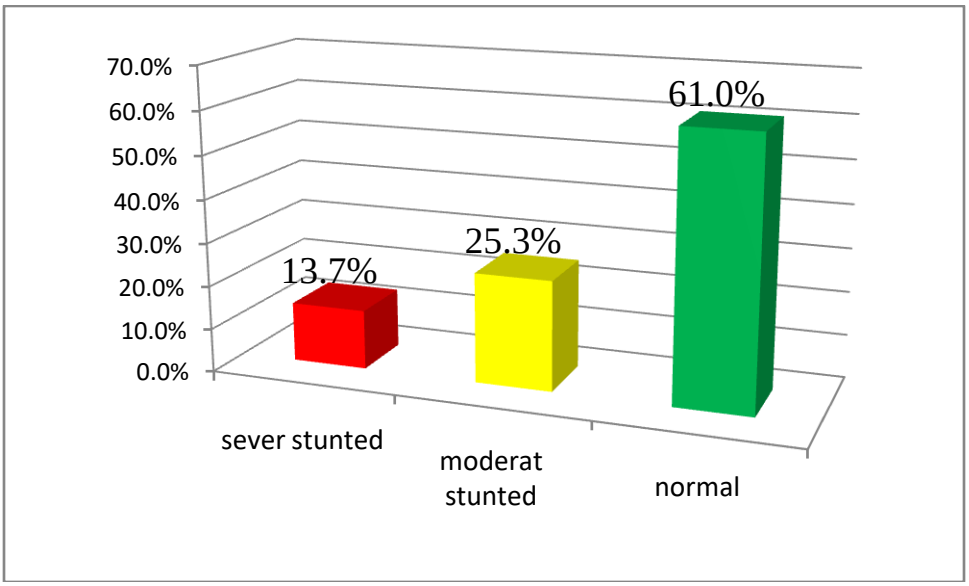


Figure 3: Prevalence of stunting among adolescent living with HIV in East Gojjam Zone, Ethiopia, 2020

### 6.5 Factors associated with of stunting

Variables with p-value less than 0.25 such as sex, age, residence, educational status of participants, educational status of care givers, alcohol drinking, availability of latrine, source of drinking water, skipping of meal, family size, family income, nutritional counseling, dietary diversity, hemoglobin level, disclosure status, adherence, diarrhea, pneumonia, vomiting and WHO clinical stage were fitted in to multivariable logistic regression. Then sex, residence, skipping meal, nutritional counseling and hemoglobin level were statistically significant associated with stunting. Being male was 2.35 times more likely to be stunted AOR 2.35(1.30-4.26). Participants whose residence urban was 3.4 times more likely to be stunted compared with rural residence AOR 3.40(1.66-6.96). Participants who had not nutritional counseling were two times more likely to be stunted compared with their counter parts AOR 2.06(1.05-4.03). Participants whose hemoglobin level ≥12 were 62% less likely to be stunted than their counter parts AOR 0.38 (0.15-0.93) and Participants who didn't

skip their meal was 74% less likely to be stunted compared with those who skip their meal AOR 0.26 (0.13-0.50). (Table 5)

Table 5: Predictors of stunting among adolescent living with HIV in East Gojjam Zone, Ethiopia, 2020

| characteristics | | Stunted (<-2z-score) | Normal (>-2z-score) | COR[ 95% CI] | AOR (95%CI) | p-value |
|---|---|---|---|---|---|---|
| Sex | Male | 65(55.6%) | 67(36.6%) | 2.16(1.34-3.47) | 2.35(1.30-4.26) | 0.005 |
| | Female | 52(44.4%) | 116(63.4%) | 1 | 1 | |
| Age | 10-14 | 54(46.2%) | 61(33.3%) | 1.6(1.05-2.73) | 1.7(0.84-3.58) | 0.13 |
| | 15-19 | 63(53.8%) | 122(66.7%) | 1 | | |
| Residence | Urban | 84(71.8%) | 103(56.3%) | 1.97(1.20-3.25) | 3.40(1.66-6.96) | <0.0001 |
| | Rural | 33(28.2%) | 80(43.7%) | 1 | 1 | |
| Educational level of participant | | | | | | |
| No formal education | | 10(8.5%) | 10(5.5%) | 2(0.74-5.38) | 0.82(0.19-3.45) | 0.79 |
| Primary | | 80(68.4% ) | 119 (65%) | 1.2(0.52-2.45) | 0.80(0.35-1.79 | 0.59 |
| Secondary and above | | 27(23.1% ) | 54(29.5%) | 1 | 1 | |
| Educational level of care giver | | | | | | |
| No formal education | | 75(64.1%) | 110(60.1%) | 1.5(0.81-2.79 | 1.89(0.83-4.27 | 0.12 |
| Primary | | 23(19.7%) | 31(16.9%) | 1.16(0.76-3.52) | 2.02(0.76-5.36) | 0.15 |
| Secondary and above | | 19(16.2%) | 42(23%) | 1 | 1 | |
| Family size | ≤ 4 | 69(59%) | 141(77%) | 0.42(0.25-0.70) | 0.53(0.27-1.03) | 0.06 |
| | >4 | 48(41%) | 42(23%) | 1 | 1 | |
| Family income (E. birr) | <1500 | 84(45.9%) | 72(61.5%) | 3.4(1.42-10.90) | 2.01(0.53-7.64 | .0.30 |
| | 1500-4000 | 76(41.5%) | 40(34.2%) | 2.4(0.85-6.85) | 2.75(0.75-10.03) | 0.12 |
| | >4000 | 23(12.6) | 5(4.3%) | 1 | 1 | |
| Skipping meal | No | 39(33.3%) | 119(65%) | 0.26(0.13-0.50) | 0.26(0.13-0.50) | <0.0001 |
| | Yes | 78(63.7%) | 64(35%) | 1 | 1 | |
| Nutritional counseling | No | 72(61.5%) | 57(31.1%) | 3.3(2.05-5.39) | 2.06(1.05-4.03) | 0.033 |
| | Yes | 45(38.5%) | 126(68.9%) | 1 | 1 | |
| Dietary diversity score | | | | | | |
| | High | 9(7.7%) | 38(20.8%) | 0.31(0.14-0.68) | 0.43(0.17-1.12) | 0.085 |
| | Low | 108 (92.3%) | 145(79.2%) | 1 | 1 | |
| Hemoglobin level (mg/dl) | ≥12 | 90(76.9% | 171(93.4% | 0.22(0.11-0.48) | 0.38(0.15-0.93) | 0.035 |
| | < 12 | 27(23.1%) | 12(6.6%) | 1 | | |
| WHO clinical stage | 1 | 71(60.7%) | 138(75.4%) | 0.40(0.11-1.11) | 1.10(0.23-5.12) | 0.90 |
| | 2 | 11(9.4%) | 19(10.4%) | 0.45(013-1.54) | 0.57(0.09-3.28) | 0.52 |
| | 3 | 26(22.2%) | 19(10.4%) | 1.06(0.33-3.36) | 0.65(0.13-3.25) | 0.60 |
| | 4 | 9(7.1%) | 7(3.8%) | 1 | 1 | |

### 6.6 Prevalence of thinness

The prevalence of thinness was 14 %, with 95% CI; (10%-18%). Among those by using the WHO cut of point BMI for age (≤ -3SD) 17 (5.7%) severely stunted and (-3SD - < -2SD) 25 (8.3%) moderately stunted. (N=300) (Figure 4)

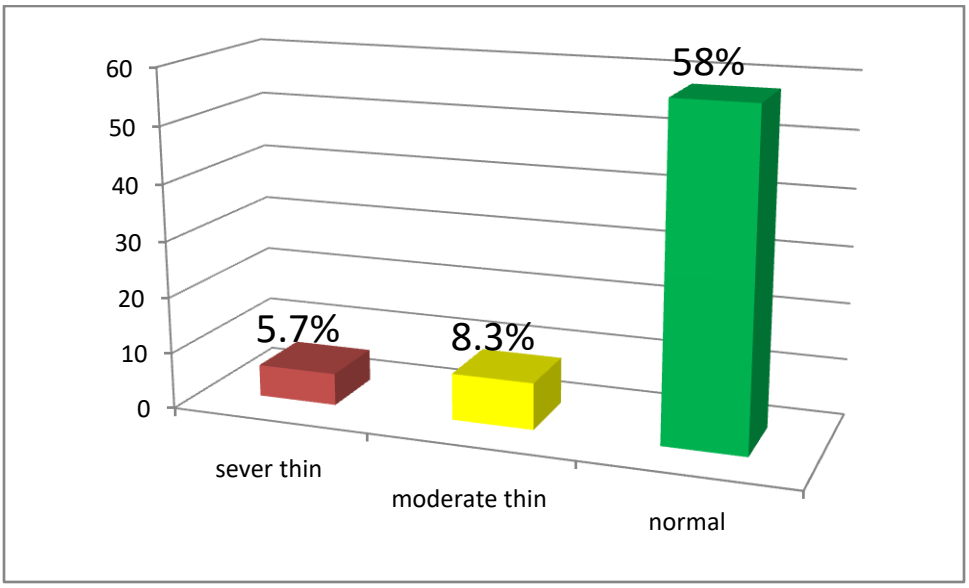


Figure 4: Prevalence of thinness among adolescent living with HIV in East Gojjam Zone, Ethiopia, 2020

### 6.7 Factors Associated with thinness

Tables 6 revealed that about two-third (66.7%) of thin participants were males and three-fourth (78.6%) of the thin adolescents had achieved an education level of primary. Concerning residence more than half (54.8%) of the thin adolescents were urban.

Table 6: Factors Associated with thinness among adolescent living with HIV in East Gojjam Zone, Ethiopia, 2020

| Variable | Responses | Thinness (<_2z-score) | Normal (>-2 z-score) | Total |
|---|---|---|---|---|
| Sex | Male | 28(66.7%) | 104(40.3%) | 132(44%) |
| | Female | 14(33.3%) | 154(59.7%) | 168(56%) |
| Age | 10-14 | 21(50%) | 92(35.7%) | 113(37.7%) |
| | 15-19 | 21(50%) | 166(64.3%) | 187(62.3%) |
| Residence | Urban | 23(54.8%) | 165(64%) | 188(62.7) |
| | Rural | 19(45.2%) | 93(36%) | 112(37.3) |
| Religion | Orthodox | 37(88.1%) | 213(82.6%) | 250(83.3%) |
| | Muslim | 4(9.5%) | 31(12%) | 35(11.7%) |
| | Protestant | 1(2.4%) | 14(5.4%) | 15(5%) |
| Educational level of participant | No formal education | 2(4.8%) | 18(7%) | 20(6.7%) |
| | Primary | 33(78.6%) | 166(64.3%) | 199(66.3%) |
| | Secondary& above | 7(16.7%) | 74(28.7%) | 81(27%) |
| Educational level of care giver | No education | 26(61.9%) | 159(61.6%) | 185(61.7%) |
| | Primary | 10(23.8%) | 44(17.1%) | 54(18%) |
| | Secondary& above | 6(14.3%) | 55(21.3%) | 61(20.3%) |
| Parenteral status of participant | Two live | 9(21.4%) | 101(39.1%) | 110(36.7%) |
| | One live | 23(54.8%) | 106(41.1%) | 129(43%) |
| | No live | 10(23.8%) | 51(19.8%) | 61(20.3%) |
| Relationship to care giver | Parents | 28(66.7%) | 191(74%) | 219(73%) |
| | Family members | 11(26.2%) | 52(20.2%) | 63(21%) |
| | Relatives | 2(4.8%) | 10(3.9%) | 12(4%) |
| | Others | 1(2.4%) | 5(1.9%) | 6(2%) |
| Family size | ≤4 | 18(42.9%) | 192(74.4%)) | 210(70%) |
| | >4 | 24(57.1%) | 66(25.6%) | 90(30%) |
| Family income (E birr ) | <1500 | 31(73.8%) | 127(49.2%) | 158(52.7%) |
| | 1500-4000 | 9(21.4%) | 106(41.1%) | 115(38.3%) |
| | >4000 | 2(4.8%) | 25(10.1%) | 27(9%) |
| Social support | Yes | 1(2.4%) | 25(9.7%) | 6(2%) |
| | No | 41(97.6%) | 233(90.3%) | 247(91.3%) |
| Source of drinking Water | Piped water | 23(54.8%) | 200(77.5%) | 223(74.3%) |
| | protected well | 19(45.2%) | 58(22.5%) | 77(25.7%) |
| Availability of latrine | Yes | 23(54.8%) | 213(82.6%) | 236(78.7%) |
| | No | 19(45.2%) | 45(17.4%) | 64(21.3%) |
| Drinking alcohol | Yes | 8(19%) | 18(7%) | 26(8.7 %) |
| | No | 34(81%) | 240(93%) | 274(81.3%) |
| Skipping meal | No | 10(23.8%) | 148(57.4%) | 141(47%) |
| | Yes | 32(76.2%) | 110(42.6%) | 159(53%) |
| Nutritional Counseling | No | 23(54.8%) | 106(41.1%) | 129(43%) |
| | Yes | 19(45.2%) | 152(58.9%) | 171(57%) |

| | | | | |
|---|---|---|---|---|
| TB treatment | Yes | 1(2.4%) | 2(0.8%) | 3(1%) |
| | No | 41(97.6%) | 255(99.2%) | 296(99%) |
| Adherence | Good | 26(61.9%) | 194(75.2%) | 220(73.3%) |
| | Fair | 0 | 27(10.5%) | 27(10.5%) |
| | Poor | 16(38.1%) | 37(14.3%) | 53(17.7%) |
| Hemoglobin (mg/dl) | ≥12 | 21(50%) | 239(92.6%) | 261(87%) |
| | <12 | 21(50%) | 19(7.4%) | 39(13%) |
| WHO clinical stage | 1 | 23(54.8%) | 186(72.1%) | 209(69.7%) |
| | 2 | 3(7.1%) | 27(10.5%) | 30(10%) |
| | 3 | 12(28.6%) | 33(12.8%) | 45(15%) |
| | 4 | 4(9.5%) | 12(4.7%) | 16(5.3%) |
| CD4 count cells/µl | <500 | 20(47.6%) | 82(31.8%) | 104(34.7%) |
| | ≥500 | 22(52.4%) | 176(68.2%) | 196(65.3%) |

### 6.8 Multivariate analysis for thinness

In the Bivariate analysis variables such as sex, age, educational status of participant, Parenteral status, educational status of care giver, family size, family income, source of drinking water, availability of latrine, drinking alcohol, therapeutic feeding, skipping meal, nutritional counseling, presence of diarrhea, intestinal parasite, treatment adherence, clinical stage, hemoglobin level, and CD4 count with p-value less than 0.25 were fitted into multivariable logistic regression model. Of these variables, three of the variables retain their statistical significance at P <0.05. Participants who were male were 2.73 times more likely to be thin compared with female AOR=2.73, (95% CI: 1.07-6.95). Participants who didn't Skip their meal were 76% less likely to be thin compared with their counter parts AOR=0.24, (95% CI: 0.08-0.69). Participants whose hemoglobin level1 ≥2 were 93% less likely to be thin compared with that hemoglobin level <12mg/dl AOR=0.07, (95% CI: 0.025-0.23). (Table 7)

Table 7: Multivariate analysis for thinness and associated factors among adolescent living with HIV in East Gojjam Zone, Ethiopia, 2020

| Characteristics | | Thinness No (%) | Normal No (%) | COR (95%CI) | AOR (95%CI) | P-Value |
|---|---|---|---|---|---|---|
| Sex | Male | 28(66.7%) | 104(40.3%) | 2.96(1.48-5.89) | 2.73(1.07-6.95) | 0.034 |
| | Female | 14(33.3%) | 154(59.7%) | | 1 | |
| Age | 10-14 | 21(50%) | 94(36.4%) | 1.7(0.905-3.36) | 3.2(1.01-10.06) | 0.57 |
| | 15-19 | 21(50%) | 164(63.6%) | 1 | 1 | |
| Educational level of participant | | | | | | |
| No formal education | | 2(4.8%) | 18(7%) | 1.17(0.22-6.13) | 0.16(0.01-1.94) | 0.15 |
| Primary | | 33(78.6%) | 166(64.3%) | 2.10(0.88-4.96) | 0.62(0.15-2.43) | 0.49 |
| Secondary& above | | 7(16.7%) | 74(28.7%) | 1 | 1 | |
| Educational level of participant | | | | | | |
| No formal education | | 26(61.9%) | 159(61.6%) | 1.49(0.58-3.83) | 1.11(0.30-4.11) | 0.87 |
| Primary | | 10(23.8%) | 44(17.1%) | 2.08(0.70-6.17) | 4.07(0.91-18.17) | 0.06 |
| Secondary& above | | 6(14.3%) | 55(21.3%) | 1 | 1 | |
| Family size | ≤ 4 | 18(42.9%) | 192(74.4%) | 0.25(0.13-0.50) | 0.40(0.15-1.03) | 0.06 |
| | >4 | 24(57.1%) | 66(25.6%) | 1 | | |
| Therapeutic Feeding | Yes | 16(38.1%) | 71(28.5%) | 1.62(0.82-3.19) | 1.20(0.44-3.29) | 0.71 |
| | No | 26(61.9%) | 187(72.5%) | 1 | 1 | |
| Nutritional counseling | No | 23(54.8%) | 106(41.1%) | 1.73(0.90-3.34) | 0.45(0.15-1.38) | 0.16 |
| | Yes | 19(45.2%) | 152(58.9%) | 1 | 1 | |
| Skipping meal | No | 10(23.8%) | 148(57.4%) | 0.23(0.11-0.49) | 0.24(0.08-0.69) | 0.008 |
| | Yes | 32(76.2%) | 110(42.6%) | 1 | 1 | |
| Hemoglobin (mg/dl) | ≥12 | 21(50%) | 239(92.6%) | 0.07(0.03-0.17) | 0.07(0.02-0.23) | <0.0001 |
| | <12 | 21(50%) | 19(7.4%) | 1 | 1 | |

## 7. Discussion

This study focused on to assess the nutritional status and associated factors of adolescents living with HIV. In this study the prevalence of stunting in adolescents living with HIV (ADLHIV) who attend in chronic care was 39%, with 95% CI: (34.3-44.0). This finding was consistent with the cross-sectional study conducted in Uganda on nutritional Status of HIV-infected adolescents stunting 36.2% (18) and cross-sectional study conducted among school adolescents in Mekelle 37.8% (27).

The prevalence of stunting in a study finding among children in Rural Ethiopia was 48.5% (21). Even if there were not HIV infected still the prevalence of stunting was high. The prevalence of stunting in this study was higher than a study finding in Eastern Ethiopia among pediatrics age children attending antiretroviral therapy 24.7% (22). This discrepancy might be due to the difference in socioeconomic status and cultural variation between the study subjects. It was also higher than a cross-sectional study conducted among adult HIV/AIDS patients in Jimma hospital 27.2%, Dilla hospital 25.2%, Siltie zone 24.1% and Bahir Dar town 25.5% (24, 25, 28, 29) respectively. This discrepancy might be due to the difference in habit of food intake, socioeconomic status and cultural variation between the study subjects.

In the present study, the prevalence of thinness among adolescents living with HIV was 14%, with a 95%, CI (10-18.3) ,which was almost comparable with the study done in Uganda 18% (18), two food insecure zones in Ethiopia 15% (21) and Arba Minch 18.2% (23). That means the prevalence of thinness among children and adult still high.

The prevalence of thinness in this study was lower than a study finding in Saudi Arabia (19.2%), Eastern Ethiopia (28.2%), Jimma University hospital (27.2%), Dilla (25.2%) and Chiro town (24.4%) (17, 22, 24, 25, 32) respectively. The discrepancy might be due to the time gap between studies, socioeconomic status and cultural variation between the study subjects.

Thinness in this study was higher than a study finding in Dangla which was 7.1% (30). This discrepancy could be due to HIV infection. It is an important contributing factor to malnutrition among adolescents. Infections can reduce appetite, decrease the body's absorption of nutrients, and make the body use nutrients faster than usual to repair the immune system. HIV can cause or aggravate malnutrition through reduced food intake, increased energy needs, and poor nutrient absorption.

The likelihood of stunting was higher among boys when compared to girls. This result was in line with the study findings in Uganda and different parts of Ethiopia (18, 26, 30, 32). The reason for high prevalence of stunting among males than females might be related to biological, behavioral, and socio-cultural mechanisms.

Adolescents who live in urban residence were 3.4 times more likely to be stunted than rural residence. This study finding was different from the study finding in Uganda and Chiro town (18, 32), This discrepancy might be due to the socioeconomic status, seasonal variation and geographical characteristics of study area.
Participants who had not nutritional counseled were two times more likely to be stunted compared with their counter parts. This result was in line with the study findings in Siltie zone (28).

Participants who did not skip meal were 74% less likely to be stunted. This result was similar with study finding in Siltie zone (28). This is fact infrequent taking of food is less likely to meet the nutritional requirement, that menace frequent meal is important for HIV infected people. The ensuing deterioration of nutritional status affects the immune system, body strength, and the cycle continues with worsening of nutritional status.

In this study, current hemoglobin level ≥12 were 62% less likely to be stunted. This is in line with previous studies conducted in Eastern Ethiopia (22).

Male study participants were found that 2.73 times more likely to be thin compared with female. This result was in line with the study findings in Eastern Ethiopia, Mekelle, Dangla and Chiro (22, 27, 30, 32) respectively. This might be due to variation of maturation time in boys and girls, for which girls reached maturation earlier than boys, and also may be explained by the increased caloric requirements experienced by males due to the greater increases in height, weight, and lean body mass as opposed to that occurring among females

The odds of having thinness was lower in adolescents whose current hemoglobin level ≥12 as compared to adolescents' hemoglobin level <12. This finding was in line with previous studies conducted in Eastern Ethiopia (22).

Participants who did not skip meal were 76% less likely to be thin. This result was in line with the study findings in Saudi Arabia (17). If adolescents' feed infrequent and limited meal patterns, it will interfere with the distribution of nutrients they receive over the course of a day, resulting in low energy intake and insufficient micronutrient intake and leads to be thin.

## 8. Limitation of the study

This study had some limitations. We did not examine some potentially important factors that could influence the nutritional status of HIV infected adolescents including antiretroviral therapy regimen and the reason why skip their meal. Alcohol use and cigarette smoking was not assessed with a standard definition. Frequency food questionnaire was collected on items consumed by adolescents for 24 hours frequency with which, adolescents eat listed food. But it did not show the actual habit of dietary diversity. Social desirable bias and seasonal variation was not conceder (the data was collected during fasting).

## 9. Conclusion

The prevalence of stunting and thinness among HIV infected adolescents in this area were (39%) which was consistence to EDHS 2019 (37%) and 14% which was higher than EDHS report 2019 (7%) respectively. Sex, Skipping meal, residence, nutritional counseling and hemoglobin level were associated with stunting and Sex, Skipping meal and hemoglobin were associated with thinness. Only increasing access to ART can't solve problem of malnutrition, Therefore, more attention should be given in promoting nutritional education and counseling for HIV-positive Adolescents including feeding practices to strengthen the immune system.

## 10. Recommendation

As nutritional problems are very common among adolescents living with HIV, there is a need for specific adolescents' nutrition intervention in the national nutrition program.

To clinicians and other health professionals working on HIV/AIDS prevention and control program more attention should be given in promoting nutritional education for HIV-positive adolescents including dietary counseling and feeding practices to strengthen nutritional status and the immune system.

Further research will need to better define the factors of malnutrition and larger studies to fully ascertain predictors and interventions to mitigate the problem of malnutrition in HIV infected adolescents.

## 11. References


1. USAID. Basics Federal response digital tools events blog home HIV basics overview : about HIV & AIDS : Symptoms of HIV. 2019.
2. UNAIDS. CDC National HIV Testing Day Dear Colleague Letter Share Facebook Twitter Email 2019.
3. UNAIDS. National consolidated guidelines for comprehensive HIV prevention, care and treatment World health organization August, 2018
4. Adem. R, Weahkee M. HIV Testing DayNational HIV Testing Day,HIV.gov. 2019.
5. Ethiopia MoH. HSTP Health Sector Transformation Plan 2015/16 - 2019/20. . August 2015.
6. Ethiopia MoH. National adolescent and youth health strategy (2016-2020)October 2016.
7. Nutrition assessment, counseling and support for adolescents and adults living with HIV. UNAIDS / JC2628 (English original, July 2014.).
8. WHO. Home/Newsroom/Fact sheets/Detail/HIV/AIDS. october 2019.
9. WHO. Global health sector strategy on HIV, 2016-2021.https://www.int.news-room/fact. November, 2019.
10. UNAIDS. HIV Estimates. Available at:http://aidsinfo.unaids.org. Accessed 7. Geneva, Switzerland November, 2017.
11. USAID. Nutrition assessment, counseling and support for adolescents and adults living with HIV. . July, 2014.
12. USAID. Ethiopia: Nutrition Profile February 2018
13. Ethiopia MoH. Save the Children International Legal information. 2019.
14. ECSA-HC, FANTA, LINKAGES. Nutrition and HIV/AIDS: A Training Manual for Nurses and Midwives 2014.
15. Jones N, Presler-Marshall E, Hicks J, Baird S, Chuta N, Gezahegne K. Adolescent health, nutrition, and sexual and reproductive health in Ethiopia. A report on GAGE Ethiopia baseline findings. London: Gender and Adolescence: Global Evidence. 2019.
16. USAID. ASaTAR. tool kit for transition of care and ther services for adolescents living with HIV training manual. January 2014.
17. Waseem Fatima, Alqhatani NSM, Ahmad Lm. Assessment of Nutritional Status and its Related Factors among Female Adolescent Girls: A School based Study in Arar city, Kingdom of Saudi Arabia. International Journal of Medical Research & Health Sciences. 2019;8(2):133-44.
18. Francis Lwanga, K. R, Wanyenze, Joseph KB Matovu, Teddy Chimulwa, Orach CG. Nutritional Status of HIV-infected Adolescents Enrolled into an HIV- care Program in Urban and Rural Uganda. World Journal of Nutrition and Health. 2015;3(2):35-40.
19. Rockville, Maryland, USA:, EPHI, ICF. Ethiopia Mini Demographic and Health Survey Ethiopian Public Health Institute (EPHI) [Ethiopia] and ICF. 2019.
20. Shimelis Beyene, Mary S Willis, Martha Mamo, Belaineh Legesse, Teshome Regassa, Tsegaye Tadesse, et al. Anthropometric Assessment of Adolescent Nutritional Status in Two Drought-Prone Areas of Ethiopia. Journal of Nutrition & Food Sciences. 2019;9(2):755.
21. Neima Endris, Henok Asefa, Dube L. Prevalence of Malnutrition and Associated Factors among Children in Rural Ethiopia. BioMed Research Internationa. 2017;2017:6.
22. Betelihem Haileselassie, Kedir Teji Roba, Weldegebreal F. Undernutrition and its Associated Factors among Pediatric Age Children Attending Antiretroviral Therapy in Eastern Ethiopia. East African Journal of Health and Biomedical Sciences. 2019;3(1):1-12.
23. Zale Zemede, Befikadu Tariku, Mesfin Kote, Estifanos W. Undernutrition and associated factors among HIV-positive adult patients enrolled in antiretroviral therapy (ART) clinics in the Arba Minch area, southern Ethiopia. BioMed Research International. 2019;11:147-54.
24. Melese Sinaga Teshome, Selam Bogale Gissa, Beakal Zinab Tefera , Tefera Belachew Lema. Undernutrition and its predictors among people living with HIV/AIDS attending antiretroviral therapy clinic

in Jimma University Specialized Hospital. International Journal of Nutrition and Metabolism. September 2017;9(8):67-74.
25. Mahlet Birhane, Eskindir Loha, Alemayehu FR. Nutritional status and associated factors among adult HIV/AIDS patients receiving ART in Dilla University Referral Hospital, Dilla, Southern Ethiopia. https://wwwresearchgatenet/publication/320427217. October 2017.
26. Abay Woday, Menber Y, Tsegaye D. Prevalence of and Associated Factors of Stunting among Adolescents in Tehuledere District, North East Ethiopia. Woday et al, J Clin Cell Immunol 2018;9(2).
27. Hadush Gebremariam, Seid O, Assefa H. Assessment of nutritional status and associated factors among school going adolescents of Mekelle City, Northern Ethiopia International Journal of Nutrition and Food Sciences. 2015;4(1):118-24.
28. Mewuba Shamil Saliya, Telake Azale, Alamirrew A, Tesfaye DJ. Assessment of nutritional status and its associated factors among people affected by human immune deficiency virus on antiretroviral therapy: a cross sectional study in Siltie zone, south Ethiopia. 2015.
29. Molla Daniel, Mazengia F, Birhanu D. Nutritional status and associated factors among adult HIV/AIDS clients in Felege Hiwot Referral Hospital,Bahir Dar, Ethiopia Science Journal of Public Health. 2013;1(1):24-31.
30. Yeshalem Mulugeta Demilew, Emiru AA. Under nutrition and associated factors among school adolescents in Dangila Town, North west Ethiopia: a cross sectional study. . African Health Sciences. 2018;18(3):756-66.
31. Delelegn Yilma Gebremichael , Kokeb Tesfamariam Hadush, Ermiyas Mulu Kebede , Zegeye RT. Food Insecurity, Nutritional Status, and Factors Associated with Malnutrition among People Living with HIV/AIDS Attending Antiretroviral Therapy at Public Health Facilities in West Shewa Zone, Central Ethiopia. BioMed Research International. 2018:9.
32. Tolessa Dekeba Damie, Mektie Wondafrash, Teklehaymanot AN. Nutriti onal status and associated factors among school adolescent in Chiro Town, West Hararge, Ethiopia. Gaziantep Medical Journal 2015;21(1):32-42.
33. Zone EG. Population projection. 2019.
34. CDC. East Gojjam Zone, 4th Quartor HIV report. 2019.
35. Gibson SR. Principles of nutritional assessment. Second, editor. New York: oxfored Uiversity press,Inc.2005.
36. WHO. Adolescence: a period needing special attention. Recognizing adolescence.Accssed on November 17,2019
37. Health Mo. National comprehensive HIV prevention, Care and Treatment Training for Health care Providers training manual 2017. 143-54 p.
38. WHO. Growth reference data for 5–19 years 2007.
39. Anne Swindale, Bilinsky P. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide. Food and Nutrition Technical Assistance III Project (FANTA) FHI 360 1825 Connecticut Avenue, NW Washington, DC 20009-5721. September 2006.
40. Coates J, Swindale A, Bilinsky P. Food and Nutrition Technical Assistance III Project (FANTA) FHI 360 1825 Connecticut Avenue, NW Washington, DC 20009-5721. August 2007.

# 12. Appendixes

### 12.1 Participant Consent Information Sheet

#### 12.1.1 Patient information sheet

My name is Teju Anteneh and I am MPH student in Nutrition at Bahir Dar University. I am doing a research title on Prevalence and associated factors of undernutrition among adolescents living with HIV in East Gojjam zone, Amhara region, Ethiopia, 2020.

**Dear Participants,**

This study is under taken by a graduate student of Bahir Dar University, College of Medicine and health science, school of public Health department of nutrition and dietetics. This letter serves to ask consent from you to take part in this research. The purpose of the research is to assess the prevalence and associated factors of undernutrition among adolescents who are getting care and support at health facility in East Gojjam zone. Your participation in this research is voluntary. If you decide not to participate, there will not be negative consequences for you. If you do decide to participate, there will not be benefits for you; but it is very useful since your answer will provide information for further nutrition intervention program. There is no any risk will occur to you because of your participation in this study. All the responses given by you and results obtained will be kept confidential using coding system whereby no one will have access to your response. Without permission from you and legal body, any part of this study will not be disclosed to the third person. You have full right to refuse and with draw all to participate in this study if you do not wish. The interview period will take about 20 minutes. The study will be conducted through interviewer administered questionnaire and by taking Anthropometric measurements. The participants are selected by chance. If you are willing to participate in this study, you need to understand and sign the agreement form, and then you will be asked to give your responses to data collectors. If you want more information, you can contact the principal investigator and advisors.

**Principal Investigator:** Teju Anteneh, Tel: 0920261943

**Advisors:** Dereje Birhanu, Tel: 0918146608, Mulat Tirfie, Tel: 0912692308

**Coordinating office**: Bahir Dar University, School of Public Health

Are you willing to participate in this study? 1. Yes 2. No Thank you!!

**NB:** 1. if the study subjects agree to participate in the study, go to consent form

2. No need of enforcing the clients to be included in the study

### 12.1.2 Consent form for Adolescents

I, the under signed have been informed about the purpose of this particular research project. I have been informed that I am going to respond to this question by answering what I know concerning the issue. I have been informed that the information I give will be used only for the purpose of this study and my identity as well as the information I give will be treated confidentially. I have also been informed that I can refuse to participate in the study or not to respond to questions if I am not interested. Furthermore I have been informed that I can stop responding to the questions at any time in the process. Based on the above information, I agree to participate in this research voluntarily.

Signature:_____

Date:_____

**NB:**

1. If the study subject is voluntary to participate in the study, start the interview.
2. Interviewer signature certifying that informed consent has been given verbally by the respondent.

Name_____

Signature_____

Date_____

3. If there are things that require clarification please don't hesitate to ask the interviewer or the Principal investigator for clarification.

**Address of the principal investigator**

tejuantenen@gmail.com Mobile: 0920261943

Bahir Dar University

College of Medicine and Health Science

School of Public Health nutrition department

**12.3 English questioner**

**Part 1 _Questions pertaining to socio demographic characteristics of respondents**

ID No……..

| S.NO | Question | Category and code | Skip |
|---|---|---|---|
| 101 | Sex | Male……1<br>Female…….2 | |
| 102 | How old are you?(completed years) | _____ | |
| 103 | What is Your Religion? | Orthodox……1<br>Muslim……2<br>Protestant……3<br>Othe (Specify)…..... | |
| 104 | Where is your place of residence? | Urban……1<br>Rural……..2 | |
| 105 | What is Your Educational Status? | Cannot read and write…....1<br>Can read and writer…....2<br>Primary …….……..3<br>Secondary……..4<br>Higher education and above…..5 | |
| 106 | Parental status | Two living parents……..1<br>One living parent…….2<br>No living parents……..3 | |
| 107 | Relationship to caregiver | Parents……1<br>Family member….....2<br>Relatives……...3<br>Others…… | |
| 108 | Educational status of care giver? | Cannot read and write…....1<br>Can read and writer…....2<br>Primary …….……3<br>Secondary……..4<br>Higher education and above….5 | |
| 109 | How many people are living in your home? ***check family matrix***) | …… | |
| 110 | Do you have any **social support**? | Yes…….1<br>No…….2 | |
| 111 | If your answer is yes, from whom you get it?<br>***(ask the care giver***) | NGO……..…1<br>Government……..….2<br>Others (specify)…….. | |

| | | | |
|---|---|---|---|
| | | | |
| 112 | What kind of support do you get? | Financial ……..1<br>Food aid ……2<br>Educational material……..…4<br>Other (specify)……..…5 | |
| 113 | What is your monthly income? | _____Birr/months | |
| 114 | Source of drinking water | Pipe water ……...1<br>Protected well……..2 | |
| 115 | Do you have toilet? | Yes……..1<br>No……..2 | |

**Part 2 Questions related to behavioral factors and medical condition of respondents**

| | | | |
|---|---|---|---|
| 201 | Do you smoke cigarette? | Yes……1<br>No…….2 | |
| 202 | If yes, How often did you have smoked cigarette | Every day ……1<br>Every two days…….2<br>Every week ……..3<br>Every month…….4<br>Occasionally…….5<br>No response……999 | |
| 203 | Do you drink alcohol? | Yes……..1<br>No……2 | |
| 204 | If yes, How often did you drink alcohol | Every day ……1<br>Every two days …….2<br>Every week ……3<br>Every month……4<br>Occasionally ……..5<br>No response……..99 | |
| 205 | Do you skip meal in the previous two weeks? | Yes……..1<br>No……2 | |
| 206 | If yes, which one do you frequently skip? | Breakfast…….1<br>Lunch……2<br>Snack……..3<br>Supper…….4 | |

| | | | |
|---|---|---|---|
| 207 | Did you get Nutritional counseling at Health facility in your previous appointment? | Yes……..1<br>No……...2 | |
| 208 | If Yes, what was the counseling about? | Eating balanced diet……..1<br>Avoiding raw food ……2<br>Keeping hygiene of meal ……..3<br>Eating fresh food ……4<br>Other (specify)----------5 | |
| 209 | Do you have gate therapeutic food | Yes……1<br>No…….....2 | |
| 210 | Do you Have illness in the last one month? | Yes……1<br>No ……2 | |
| 211 | If yes, What was your diagnosis?<br>( ***check follow up card***) | Pneumonia……...1<br>Diarrhea…..…….....2<br>Skin infections……..3<br>malaria …… 4<br>Intestinal parasite……..5<br>Gastro enteritis……..6<br>Other specify…… | |
| 212 | Do you have diarrhea in the past two weeks? | Yes……1<br>No ……2 | |
| 213 | Do you Have Eating problem? | Yes……1<br>No ……2 | |
| 214 | If yes, What was your eating problem? | Loss of appetite……1<br>Difficulty of swallowing…..2<br>Vomiting……3<br>Others specify…… | |
| 215 | What was your Current hemoglobin? | ..... | |
| 216 | Adherence to medication?<br>(***check follow up card***) | Good……1<br>Fair……2<br>poor ……..3 | |
| 217 | Current WHO T stage ***check follow up card***) | Stage1……..1<br>Stage2…….2<br>Stage3……..3<br>Stage4……..4 | |
| 218 | Have you ever taken INH Prophylaxis | Yes……..1<br>No……...2 | |
| 219 | Are you currently on TB treatment | Yes……..1<br>No……...2 | |
| 220 | What was your CD4 count in the previous | | |

| | | | |
|---|---|---|---|
| | six month<br>(***check follow up card***) | …….. | |
| 221 | Disclosure status<br>***(ask the care giver***) | disclosed……1<br>not disclosed…… . . 2 | |
| 222 | Duration on ART<br>(***check follow up card***) | ……years……month | |

**Part 3 Questions pertaining to household food insecurity measurements**

| | | | |
|---|---|---|---|
| 301 | Did you worry that your household would not have enough food in the past four weeks? | Yes.....1<br>No.....2 | |
| 301a | If your answer is yes, How often did this happen in the past four weeks? | Rarely (once or twice )……..1<br>Sometimes(three to ten times)…2<br>Often (more than ten times)……3 | |
| 302 | Did you or any member of your household would unable to eat the kinds of foods you preferred because of a lack of resources, in the past four weeks? ( **ask by giving specific example)** | Yes.....1<br>No .....2 | |
| 302a | If your answer is yes how often this did happen in the past four weeks? | Rarely (once or twice )……1<br>Sometimes(three to ten times)….2<br>Often (more than times )…….3 | |
| 303 | Did you or any household member eat a limited variety of foods due to a lack of resources In the past four weeks? ( **ask by giving specific example)** | Yes.....1<br>No .....2 | |
| 303 a | If your answer is yes, how often did this happen in the past four weeks? | Rarely (once or twice)……...1<br>Sometimes(three to ten times)…2<br>Often (more than ten times)……3 | |
| 304 | Did you or any household member eat some foods that you really did not want to eat because of lack of resources to obtain other types of food, In the past four weeks?<br>**(ask by giving specific example)** | Yes.....1<br>No …….. …..…..…..2 | |
| 304 a | If your answer is yes, how often did this happen in the past four weeks? | Rarely (once or twice )……..1<br>Sometimes (three to ten times)...2<br>Often (more than ten times)…...3 | |

| | | | |
|---|---|---|---|
| 305 | Did you or any household member eat a smaller m eal than you felt you needed because there was not enough food, In the past four weeks? | Yes.....1<br>No.....2 | |

| | | | |
|---|---|---|---|
| 305a | If your answer is yes, How often did this happen in the past four weeks? | Rarely(once or twice)……1<br>Sometimes (three to ten times in)…2<br>Often(more than ten times )…….3 | |
| 306 | Did you or any other household member have less preferred food due to lack of enough food, in the past four weeks? ( **ask by giving specific example)** | Yes.....1<br>No .....2 | |
| 306a | If your answer is yes How often this did happen in the past four weeks? | Rarely (once or twice)……1<br>Sometimes (three to ten times) ...2<br>Often(more than ten times )…….3 | |
| 307 | In the past four weeks, Was there ever no food to eat any kind of food in your household because of lack of resources to get food ( **ask by giving specific example)** | Yes.....1<br>No.....2 | |
| 307a | If your answer is yes, How often did this happen in the past four weeks? | Rarely(once or twice )…….1<br>Sometimes (three to ten times) …2<br>Often (more than ten times……..3 | |
| 308 | In the past four weeks ,did you or any household member go to sleep at night hunger, because there was not enough food, ( **ask by giving specific example)** | Yes.....1<br>No.....2 | |
| 308a | If your answer is yes, How often did this happen in the past four weeks? | Rarely (once or twice)……..1<br>Sometimes (three to ten times)...2<br>Often (more than ten times …..3 | |
| 309 | Did you or any household member remain a whole day and night without eating anything because there was not enough food ,in the past four weeks, ( **ask by giving specific example)** | Yes..... ...1<br>No ..... ...2 | |
| 309a | If yes, how often did this happen in the past four weeks? | Rarely (once or twice )…….1<br>Sometimes (three to ten times)…2<br>Often (more than ten times)……3 | |

**Section 4: Food Diversity & Consumption Score**

**Please describe the foods (meals and snacks) that you ate yesterday (in the last 24 hours) during the day and night, whether at home or outside the home. Start with the first food eaten in the morning.**

| **Occasion** | **Place of eaten** | **Food or drink** | **Detail Description** |
|---|---|---|---|
| Morning before breakfast | | | |
| Breakfast | | | |
| After breakfast | | | |
| Lunch | | | |
| After lunch | | | |
| Snack | | | |
| After snack | | | |
| dinner | | | |
| Over night | | | |
| Other | | | |

**Part 5 Anthropometric measurements**

| | | | |
|---|---|---|---|
| 501 | Weight | …….kilo grams | |
| 502 | Height | ……meters | |

## 12.4 Amharic questioner

**በባህርዳር ዩኒቨርስቲ የህክምና እና ጤና ሳይንስ ኮሌጅ ትምህርት ክፍል**

**በጥናቱ ለሚሳትፉ ግለሰቦች የፈቃድ መጠየቂያ ፎርም**

**.....እባላለሁ፡፡**

**በባህርዳር ዩኒቨርስቲ የህክምና እና ጤና ሳይንስ ኮሌጅ ትምህርት ክፍል የስነ-ምግብ የማስተርስ ዲግሪ ተማሪ የሆነዉ አቶ ጠጁ አንተነህ በመንግሥት ጤና ተቋም የጤና ክትትል የሚያደርጉ ወጣቶች (10-19) የአመጋገብ ሁኔታን የሚዳስስ የዳሰሳ ጥናት ነዉ፡፡ ጥናቱ የሚካሔደዉ በተቋም ክትትል የሚያደርጉ ወጣቶች የአመጋገብ ሁኔታን የሚዳስስ ጥናት መረጃ ሰብሳቢዉ በሚያቀርበዉ መጠይቅ ይሆናል:: መጠይቁ የአንተን/ቺን የአመጋገብ ሁኔታን የተመለከተ ይሆናል፡፡በዚህ ጥናት ላይ መሳተፍህ/ሽ በፍቃዳኝነት ላይ የተመሠረተ ሲሆን ማንኛዉንም ጥያቄ አለመመለስ ወይም በመሀል የማቋረጥ መብት/ሽ የተጠበቀ ነዉ፡፡ የምትሰጠኝ/ጪኝ መረጃ ምስጢራዊነቱ የተጠበቀ ሲሆን ስምህ/ሽ ለጥናቱ አያስፈልግም፡፡ በዚህ ጥናት ላይ መሳተፍህ/ሽ ምንም ዓይነት ጥቅም ወይም ጉዳት አይኖረዉም፡፡ ነገር ግን ከአንተ/ከአንቺ የሚገኘዉ ምላሽ የወጣቶችን የአመጋገብ ሁኔታን ለማሻሻል ለሚመለከተዉ አካል ለመጠቆም ይረዳናል፡፡በጥናቱ ለመሳተፍ ፈቃደኛነህ/ሽ?**

1. **አዎ** 2. **አይደለሁም**

**ማንኛዉንም ገለጻ የሚስፈልጋቸሁም ነገሮች ካሉ መረጃ ሰብሳቢዉም ሆነ ዋና ተመራማሪዉን በአካልም ሆነ በአድራሻ ይጠቁ፡፡**

**የዋናዉተመራማሪአድራሻ**

**ባህር ዳር ፤ ጤናሳይንስ ኮሌጅ ፤ ህብረተሰብ ጤና ት/ቤት፡፡ ጠጁ አንተነህ ስልክ ቁጥር--0920261943**

**ከታች ፊርማዬን ያኖርኩት ግላሰብ ለዚህ ጥናት አላማ ለምጠየቀዉ ጥያቄ የማዉቀዉን ለመመለስ ዝግጁ መሆኔን በተጨማሪም የምሰጠዉ መረጃ ለዚህ ጥናት አገልግሎት ብቻ የሚዉል መሆኑን እና የምሰጠዉ መረጃ በምስጢር እንደሚጠበቅ የተነገረኝ ሲሆን ፤ ፍላጎት ከሌለኝ በጥናቱ ያለመሳተፍ፣ጥያቄ ያለመመለስና ፤ በጥያቄዉ ወቅት አቋርጦ መተዉ እንደምችል ተነግሮኛል፡፡በዚሁ መሰረት ጥናቱ ላይ ለመሳተፍ ፈቃደኛ መሆኔን በፊርማዬ አረጋግጣለሁ፡፡**

**ፊርማ.....**

**ክፍል 1 ፤ የማህበራዊና ኢኮኖሚያዊ ሥነ- ባህርያት መገለጫ መጠይቅ**

| መለያቁጥር | | ..... | |
|---|---|---|---|
| | መጠይቅና ማጣሪያ | ኮድ | ይለፍ |
| 101 | ጾታ | ወንድ----------1<br>ሴት----------2 | |
| 102 | ዕድሜህ/ሽ ስንት ነዉ ? | --------ዓመት | |
| 103 | ሀይማኖትህ/ሽ ምንድ ነዉ ? | ኦርቶዶክ----------1<br>ፕሮቴስታንት----------2<br>.ሙስሊም----------3<br>ካቶልክ----------4<br>ሌላ----------5 | |
| 104 | የመኖሪያ ቦታ | ከተማ.....1<br>ገጠር..... 2 | |
| 105 | የትምህርት ደረጃዎ | ማንበብና መጣፍ የማይችል.....1<br>ማንበብና መጣፍ የሚችል.....2<br>አንደኛ ደረጃ .....3<br>ሁሌተኛ ደረጃ .....4<br>ከፍተኛ ትምህርትእና ከዚያ በላይ.....5 | |
| 106 | የወላጅ ሁኔታ | ሁለቱም በህይወት ያሉ .....1<br>አንደኛው በህይወት ያለ.....2<br>ሁለቱም በህይወት የሌሉ.....3 | |
| 107 | ከማን ጋር ትኖራለህ/ሽ? | ከወላጅ ጋር ..... 1<br>ከዘመድ ጋር.....2<br>ከጎአደጎ ጋር..... 3<br>ሌላ ካለ ይጠቀስ..... | |
| 108 | ያሳዳጊ የትምህርት ደረጃ | ማንበብና መጣፍ የማይችል..... 1<br>ማንበብና መጣፍ የሚችል.....2<br>አንደኛ ደረጃ .....3<br>ሁሌተኛ ደረጃ .....4<br>ከፍተኛ ትምህርትእና ከዚያ በላይ.....5 | |
| 109 | በቤታችሁ ስንት ሆናችሁ ትኖራላችሁ? | ..... | |
| 110 | ከቤተሰብ ዉጭ የሚረዳህ//ሽ አካል አለህ? | አዎ----------1<br>የለም----------2 | |
| 111 | መልስህ/ሽ አዎን ከሆነ የሚረዳህ/ሽ አካል ማን ነዉ? | መንግስታዊ ያልሆነ ድርጅት----1<br>መንግስት.....2<br>ሌላ.....3 | |
| 112 | ምን ዓይነት ድጋፍ ያደርጉልሃል/ሻል? | የገንዘብ እርዳታ----------1<br>የምግብ እርዳታ----------2<br>የትምህርት መርጃ ቁሳቁስ----------3 | |
| 113 | የወር ገቢያችሁ ስንት ነው? | _____ ብር | |
| 114 | ምትጠጡት ዉሃ ከየት የመጣ ነው? | የቧንቧ.....1<br>የጉድጓድ.....2 | |
| 115 | ሽንት ቤት አላችሁ? | አዎ.....1<br>የለንም.....2 | |

ክፍል 2 የስነ-ባህርያትመገለጫ መጠይቆች እና የጤንናት ሁኔታ ላይ የሚያተኩሩ መጠይቆች

| | | | |
|---|---|---|---|
| 201 | ሲጋራ ታጨሳለህ/ሽ? | አዎ----------1<br>አላጨስም----------2 | |
| 202 | አዎ ከሆነ፣ስንት ጊዜ ሲጋራ ያጨሱ ነበር? | በየቀኑ.....1<br>በየሁለት ቀኑ.....2<br>በየሳምንቱ.....3<br>በየወሩ..... 4<br>አልፎ አልፎ.....5 | |
| 203 | አልኮል ጠጥተህ/ሽ ታውቃለህ/ሽ? | አዎ----------1<br>አልጠጣም----------2 | |
| 204 | መልስዎ አዎ ከሆነ ስንት ጊዜ አልኮል ጠጥተዋል? | በየቀኑ.....1<br>በየሁለት ቀኑ.....2<br>በየሳምንቱ..... 3<br>በየወሩ.....4<br>አልፎአልፎ.....5 | |
| 205 | በለፉት ሁለት ሳምንት ምግብ የመዝለል (ሳት-መገብ/ቢ) የመተዉ ባህሪ ነበረህ/ሽ? | አዎ----------1<br>የለም----------2 | |
| 206 | መልስህ/ሽ አዎ ከሆነ በአብዛኛዉ የትኛዉን ነዉ የማት-መገበዉ//ዊዉ? | ቁርስ----------1<br>ምሳ----------2<br>መክሰስ----------3<br>እራት----------4 | |
| 207 | በዚህ ጤና ተቋም ከዛሬ በፍት በነበረ ህ/ሽ ቀጠሮ ስለ አመጋገብ ሁኔታ የ ምክርአገልግሎት አግኝተሃ ል/ሻል? | 1.አዎ----------1<br><br>2.አላገኘሁም----------2 | |
| 208 | መልስህ/ሽ አዎ ከሆነ የምክር አገልግሎቱ ስለ ምን ነበር? | ቤት ያፈራዉን የተመጣጠኑ ምግቦችን አዘወትሮ ስለ መመገብ.....1<br>ጥሬ የሆኑ ምግቦችን አለመጠቀም.....2<br>ምግብ ከመሰናዳቱ በፍትም ሆነ በኋላ በንፅህና መያዝ.....3<br>ትኩስ ምግቦችን ስለመጠቀም ወይም ዉስዉ ያላደሩ ምግቦችን ስላለመጠቀም.....4<br>ሌላ ከሌ ይጠቀስ.....5 | |
| 209 | የምግብ ህክምና አግኝተህ/ሽ ታውቃለህ/ሽ? | አዎ----------1<br>የለም----------2 | |
| 210 | ባለፉት ሁለት ሳምንታት በህመም ምክንያት ወደዚ ህ ጤና ተቋም መጥተህ/ሽ ተዉቃለህ/ሽ? | አዎ----------1<br><br>የለም----------2 | |
| 211 | መልስህ/ሽ አዎ ከሆነ ህማሙስ ምን ነበር?( ለጠያቂ ፤ ከህክምና ካርድ የሚወሰድ) | የሳንባ ምች.....1<br>የቆየ ተቅማጥ ፤ ትዉከት.....2<br>የቆዳ ማሳከክ.....3<br>ወባ .....4<br>የሆድ ትላትል.....5<br>የጉሮሮ እና ተያያዥ ችግር.....6 | |

| | | | |
|---|---|---|---|
| 212 | ባለፉት ሁለት ሳምንታት ተቅማጥ ታመህ/ሽ ታዉቃለህ/ሽ? | አዎ----------1<br>የለም----------2 | |
| 213 | ምግብ ለመመደብ ትቸገራለህ/ሽ? | አዎ----------1<br>የለም----------2 | |
| 214 | መልስህ/ሽ አዎ ከሆነ ህመሙስ ምን ነበር? | የምግብ ፍላጎት አለመኖር……1<br>ምግብ የመዋጥ ችግር……..2<br>ትውከት ……...3<br>ሌላ ካለ የጠቀስ……4 | |
| 215 | የደም መጠን ምን ያህል ነው? | ---------- | |
| 216 | የህክምና ክትትልህን/ሽን ምን ይመስላል (ለጠያቂ ፤ ከህክምና ካርድ የሚወሰድ) | ጥሩ……1<br>በቂ ……2<br>ዝቅተኛ……3 | |
| 217 | የዓለም ጤና ድርጅት የህክምና ደረጃህ/ሽ ስንት ነዉ? (WHO Tstage) (ከህክምና ካርድ የሚወሰድ) | አንደኛ----------1<br>ሁለተኛ----------2<br>ሶስተኛ----------3<br>አራተኛ----------4 | |
| 218 | የሳንባ በሽታ መከላከያ መድሀኒት ተጠቅምህ/ሽ ታዉቃለህ/ሽ? (ከህክምናካርድየሚወሰድ) | አዎ----------1<br>የለም----------2 | |
| 219 | የሳንባ በሽታ ህክምና ክትትል ላይ ነህ/ሽ? | አዎ----------1<br>አይደለም----------2 | |
| 220 | ያለፈዉ ስድስት ወር የCD4 መጠንህ/ሽ ስንትነዉ?(ለጠያቂ ፤ ከህክምና ካርድየሚወሰድ) | …… | |
| 221 | የጤንነት ሁኔታ ግንዛቤ( disclosure status)አለህ/ሽ (አስታማሚን መጠየቅ) | አዎ……1<br>የለም……2 | |
| 222 | በህክምና ላይ የቆይታ ጊዜህ/ሽ ወይም ዋናዉን መድሀ ኒትከጀምርክ/ሽ ምን ያህል ጊዜ ነዉ? (ለጠያቂ ፤ ከህክምና ካርድ የሚወሰድ) | ……አመት…….ወር | |

## ክፍል 3 የቤተሰብ የምግብ ዋስትና መለኪያ ጥያቄዎች

| | | | |
|---|---|---|---|
| 301 | ባለፈዉ አንድ ወር በቤታችሁ በቂ ምግብ የሌምብለህ/ሽ ተጨንቀህ/ሽ ታዉቃለህ/ሽ | አዎ.....1<br>የለም.....2 | |
| 301a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎ አልፎ(በወር ፤ አንድ ወይም ሁለት ጊዜ---1<br>አንዳንዴ (በወር ከሶስት እስከ አስር ጊዜ)--------2<br>ብዙጊዜ (በወር ከአስር ጊዜ በላይ)----------3 | |
| 302 | በለፈዉ አንድ ወር አንተ/ቺ ወይም ሌላ የቤተሰብአባል በማጣት (በችግር) ምክንያት የምትፈልጉትን የምግብ ዓይናት ሳትመገቡ ቀርቸዋል?(ለጣያቂ ፤ ለምሳሌሥጋመብላትፈልገዉ አልበሉም) | አዎ----------1<br><br>የለም----------2 | |
| 302a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል ? | አልፎአልፎ (በወር ፤ አንድ ወይም ሁለጊዜ---------1<br>አንዳንዴ (በወር ከሶስት እስከ አስር ጊዜ)----------2<br>ብዙጊዜ (በወር ከአስር ጊዜ በላይ)----------3 | |
| 303 | በለፈዉ አንድ ወር አንተ/ቺ ወይም ሌላ የቤተሰብ አባል በማጣት (በችግር) ምክንያት ሁሌ አንድ አይነት ምግብ ተመግባች ታዉቃላችዉ? (ለጣያቂ ፤ ለምሳሌ ሁሌ ምስር) | አዎ----------1<br><br>የለም----------2 | |
| 303a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎ አልፎ (በወር ፤ አንድ ወይም ሁለት ጊዜ)---1<br>አንዳንዴ(በወር ከሶስት እስከ አስር ጊዜ).....2<br>ብዙጊዜ (በወር ከአስር ጊዜ በላይ ).....3 | |
| 304 | በለፈዉ አንድ ወር አንተ/ቺ ወይም ሌላ የቤተሰብ አባል በማጣት (በችግር) ምክንያት በአከባቢ ማህበረሰብ ያልተለመደ ምግብ ተመግባችሁዋል? (ለጣያቂ ፤ ለምሳሌ በችግርጊዜ ብቻ የሚበላ ምግብ) | አዎ----------1<br><br>የለም----------2 | |
| 304a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎ አልፎ(በወር ፤ አንድ ወይም ሁለት ጊዜ)....1<br>አንዳንዴ(በወር ከሶስት እስከ አስር ጊዜ).....2<br>ብዙ ጊዜ(በወር ከአስር ጊዜ በላይ).....3 | |
| 305 | በለፈዉ አንድ ወር አንተ/ቺ ወይም ሌላ የቤተሰብ አባል በቂ ምግብ ባለመኖሩ ያነሰ የምግብ መጠን ተ መግባችኋል? (ለጣያቂ ፤ ለምሳሌ ብዙ ሰዉ ሆኖ አን ድ እንጀራ መመገብ ሊሆን ይችላል።) | አዎ----------1<br>የለም----------2 | |
| 305a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎ አልፎ(በወር ፤ አንድ ወይም ሁለት ጊዜ)---1<br>አንዳንዴ(በወር ከሶስት እስከ አስር ጊዜ)---------2<br>ብዙ ጊዜ (በወር ከአስር ጊዜ በላይ)----------3 | |
| 306 | በለፈዉ አንድ ወር አንተ/ቺ ወይም ሌላ የቤተሰብ አባል በቤታችሁ በቂ ምግብ ባለመኖሩ በቀን ዉስጥ ከተለመደዉ ጊዜ ያነሰ ምግብ ተመግባችኋል? (ለጣያቂ ፤ ለምሳሌ በቀን ሦሥት ጊዜ ይመገቡከሆነ ከሦሥት ጊዜ በታች ሊሆን ይችላል) | አዎ----------1<br><br>የለም---------2 | |

| | | | |
|---|---|---|---|
| 306a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎአልፎ(በወር ፤ አንድ ወይም ሁለት ጊዜ).....1<br>አንዳንዴ(በወር ከሶስት እስከ አስር ጊዜ).....2<br>ብዙ ጊዜ (በወር ከአስር ጊዜ በላይ).....3 | |
| 307 | ባለፈዉ አንድ ወር በችግር ምክንያት በቤታችሁ በቂ ምግብ በለ መኖሩ የሚሳስ /የሚቀመስ ጠፍቶ ያዉቀል? | አዎ----------1<br>የለም----------2 | |
| 307a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎአልፎ(በወር ፤ አንድወይምሁለት ጊዜ).....1<br>አንዳንዴ(በወር ከሶስት እስከ አስር ጊዜ).....2<br>ብዙ ጊዜ (በወር ከአስር ጊዜ በላይ)----------3 | |
| 308 | በለፈዉ አንድ ወር አንተ/ቺ ወይም ሌላ የቤተሰብ አባል በቤታችሁ በቂ ምግብ ባለመኖሩ ሳትበሉ ያዳራቹበት ቀን አለ? | አዎ----------1<br>የለም----------2 | |
| 308a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎአልፎ (በወር ፤ አንድወይም ሁለት ጊዜ).....1<br>አንዳንዴ (በወር ከሶስት እስከ አስር ጊዜ)----------2<br>ብዙጊዜ (በወር ከአስር ጊዜ በላይ)----------3 | |
| 309 | በለፈዉ አንድ ወር አንተ/ቺ ወይምሌላ የቤተሰብ አባል በቤታችሁ በቂ ምግብ ባለመኖሩ ሳትበሉ ዉላችሁ ያዳራቹበት ቀን አለ? | አዎ----------1<br>የለም----------2 | |
| 3p09a | መልስህ/ሽ አዎ ከሆነ፤ ይህ ችግር ለምን ያህል ጊዜ ተከስቶአል? | አልፎ አልፎ (በወር ፤ አንድወይምሁለጊዜ.....1<br>አንዳንዴ(በወር ከሶስት እስከ አስር ጊዜ).....2<br>ብዙ ጊዜ(በወር ከአስር ጊዜ በላይ).....3 | |

ክፍል 4 በ24 ሰአት ውስጥ ቤተሰብዎ የተለያዩ አይነት ምግቦች ተመግበው እንደሆነ እጠይቀዎት አለሁ::

| ሰዓት | የተበላበት ቦታ | የተበላና የተጠጣ | ምግቡ እና መጠጡ የተዘጋጀበት |
|---|---|---|---|
| ጠዋት ከቁርስ በፊት | | | |
| ቁርስ | | | |
| ከቁርስ በኋላ | | | |
| ምሳ | | | |
| ከምሳ በኋላ | | | |
| መክሰስ | | | |
| ከመክሰስ በኋላ | | | |

| | | | |
|---|---|---|---|
| እራት | | | |
| ሌሊት | | | |
| ሌላ ካለ ይጠቀስ | | | |

**ክፍል 5 ፡ የአካላዊ አቋም መለኪያ**

| ተ.ቁ | አካላዊ አቋም | | |
|---|---|---|---|
| 501 | ክብደት | ..... ኪ/ግ | |
| 502 | ቁመት | .....ሜትር | |

BAHIR DAR UNIVERSITY

SCHOOL OF PUBLIC HEALTH DEPARTMENT OF NUTRITION AND DIETETICS APPROVAL OF THESIS FOR DEFENSE RESULT

**12.5 Declaration**

I, the undersigned, senior MPH student declare that this thesis is my original work in partial fulfillment of the requirements for the degree of masters of public health in Nutrition and Dietetics. All sources of materials used for this thesis have been acknowledged.

Name: Teju Anteneh. Signature _____

Place of submission, school of public health college of Medicine and health sciences,

Bahir Dar University

Date of submission _____

This thesis work has been submitted for examination with my approval University advisors.

Nam 1. Dr Dereje Birhanu (MPH, PHD, Assistant professor)

Signature _____

Date _____

2. Mr Mulat Tirfie (Assistant professor)

Signature _____

Date _____

BAHIR DAR UNIVERSITY

SCHOOL OF PUBLIC HEALTH DEPARTMENT OF NUTRITION AND DIETETICS APPROVAL OF THESIS FOR DEFENSE RESULT

Examiners' Approval Form

As members of the board of examiners, we examined this thesis entitled "The prevalence of under nutrition and its associated factors among adolescents living with HIV in east Gojjam zone, Amhara, Ethiopia, 2020" By Teju Anteneh Almaw". We hereby certify that the thesis is accepted for fulfilling the requirements for the award of the degree of "master".

Board of Examiners

1. Dr Netsanet Fantahun (PHD, Assistant professor)

Signature _____

Date _____

2. Hanna Demelarsh (MPH, Assistant professor)

Signature _____

Date _____