2022-08-29

Determinants of Stunting Among Adolescent Girls in Schools of Digo Tsion Town, Northwest Ethiopia: Unmatched Case Control Study

Ambaw, Abebaw

BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF PEDIATRICS AND CHILD HEALTH NURSING

DETERMINANTS OF STUNTING AMONG ADOLESCENT GIRLS IN SCHOOLS OF DIGO TSION TOWN, NORTHWEST ETHIOPIA: UNMATCHED CASE CONTROL STUDY

PRINCIPAL INVESTIGATOR: AMBAW ABEBAW (BSc N)

A THESIS PAPER SUBMITTED TO SCHOOL OF HEALTH SCIENCE, DEPARTMENT OF PEDIATRICS AND CHILD HEALTH NURSING, BAHIR DAR UNIVERSITY FOR THE PARTIAL FULFILMET OF THE REQUIREMENTS FOR DEGREE OF MASTERS OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING

AUGUST 2022

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF PEDIATRICS AND CHILD HEALTH NURSING

NAME OF INVESTIGATOR	AMBAW ABEBAW (BSc N.)
NAME OF ADVISORS	1 Mr. GETASEW TESFA (MSc, ASS.PROF) 2 Mr. YENENEH AYALEW (MSc, LECTURER)
TITLE	DETERMINANTS OF STUNTING AMONG ADOLESCENT GIRLS IN SCHOOLS OF DIGO TSION TOWN, NORTH WEST ETHIOPIA, 2022: UNMATCHED CASE CONTROL STUDY
DURATION OF THE STUDY	MAY 13 – JUNE 13 /2022
STUDY AREA	DIGO TSION TOWN
ADDRESS OF THE INVESTIGATOR	Cell Phone: +251918100749 Email: ambabebaw@gmail.com

DECLARATION SHEET

Through my signature below, I declared and affirmed that this thesis is my work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis, and completion of this thesis work. All scholarly matter that was included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis work. This thesis is submitted for partial fulfillment of a Master of Science in Pediatrics and Child Health Nursing, College of Medicine and Health Sciences, Bahir Dar University. The thesis would be deposited in the library of Bahir Dar University and will be made accessible for readers under the rules of the library. I solemnly declared that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

Submitted by: Ambaw Abebaw (BSc Nurse)

Signature: _____ Date: _____

Place of submission: Department of Pediatrics and Child Health Nursing, College of Medicine and Health Sciences, Bahir Dar University.

APPROVAL BY THE BOARD OF EXAMINATION

This thesis work by Ambaw Abebaw is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters of science in Pediatrics and Child Health Nursing.

Advisors

Name	**Signature**	**Date**
1. Mr. Getasew Tesfa (MSc, Ass't. prof.)	_____	_____
2. Mr. Yeneneh Ayalew (MSc, Lecturer)	_____	_____

Examiners

1. Dr. Getachew Arage (PhD)	_____	_____
2. Mr. Awoke Kebede (MSc, Ass't. prof.)	_____	_____

Department Head

1. Mrs. Azeb Gedef (MSc, Lecture)	_____	_____

ACKNOWLEDGMENT

I would like to express my deepest heartfelt thanks to my advisors, Mr. Getasew Tesfa (MSc, Assistant professor) and Mr. Yeneneh Ayalew (MSc, Lecturer) for their repeated constructive comments throughout the work of my thesis project. I would like to acknowledge Bahir Dar University, College of Medicine and Health Sciences, department of pediatrics and child health nursing for giving me the chance to write this research paper. I also want to say thanks to the study area school directors, Bibugn health center for their willingness, cooperativeness, and supply of necessary measuring instruments. Finally, I appreciate the data collectors, supervisors and study participants for their patience and informativeness.

TABLE OF CONTENT

LIST OF ACRONYMS

AOR	Adjusted Odds Ratio
BMI	Body Mass Index
COR	Crude Odds Ratio
EDHS	Ethiopian Demographic and Health Survey
GDHS	Ghana Demographic and Health Survey
HEW	Health Extension Worker
NCD	Non-Communicable Disease
NNP	National Nutritional Program
SPSS	Statistical Package for Social Science
WHO	World Health Organization

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Introduction: Stunting is a height-for-age (Z-score) less than minus two standard deviations below the mean of the reference standard. It is the most important sign of long-term chronic undernutrition and a public health problem in Ethiopia. Even though stunting in adolescents reflects poor nutrition, infection, and environmental stress, identifying determinants of stunting is still not well addressed in the semi-urban and rural areas of the country.

Objective: To identify determinants of stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022.

Methods and materials: Unmatched case-control study was conducted among 417 adolescent girls (104 cases and 313 controls) in schools of Digo Tsion Town from May 13 to June 13, 2022. Computer generated simple random sampling was employed. Stadiometer and World Health Organization Anthroplus 2007 software were used for screening. A structured interviewer-administered questionnaire was used. The data was collected by epicollect5 mobile application through a fac-to-face interview. The data was entered in epi data 4.6 and exported into Statistical Package for Social Science version 26. Variables with p- value ≤ 0.25 in bivariable analysis were candidate for multivariable analysis. Model fitness was checked by Hosmer and Lemon show fitness of test. Variables having a P-value < 0.05 in multivariable analysis were declared as statistically significant at 95% Cl. The result was presented by a statement, figures, and tables.

Results: A total of 409 adolescent girls (100 cases and 309 controls) participated, with a response rate of 96% for cases and 98.72% for controls. Food insecurity (AOR = 2.13, CI [1.15, 3.93]), low dietary diversity score (AOR = 1.99, CI [1.06, 3.73]), drinking coffee/tea immediately while eating meals (AOR = 2.19, CI [1.22, 3.95]), not getting nutritional counsel (AOR = 2.07, CI [1.17, 3.66]), chronic illness (AOR = 3.78, CI [1.16, 12.3]), and not visited by health extension workers at home (AOR = 1.85, CI [1.03, 3.31]) were statistically significant determinants of stunting.

Conclusion and recommendation: Stunting was significantly influenced by a low dietary diversity score, a food insecure household, drinking coffee/tea immediately while eating a meal, not receiving nutritional counseling, having chronic illness, and not being visited by health extension workers. Parents/guardians, adolescent girls, school communities, health care professionals, and concerned organizations better to work on factors of this study finding.

Key words: Stunting, Adolescent girl, Determinant, Digo Tsion Town

1. INTRODUCTION

1.1 Background

Stunting is defined as having a height-for-age z-score (HAZ) that is less than minus two standard deviations (-2 SD) below the mean of a reference standard, and those who are less than minus three standard deviations (-3 SD) are termed severely stunted (1). It is the most important sign of long-term chronic undernutrition, indicating a failure to achieve linear development as a result of protracted food deprivation and diseases during childhood (2). That means, low height-for-age is the outcome of chronic or recurring malnutrition, which is more common among children and adolescent individuals. Previously, stunting was classified as mild, moderate and severe but nowadays, this classification is not recommended(3).

Undernutrition can be wasting, stunting, underweight, and micronutrient (vitamin and mineral) deficiencies. Children and adolescents, in particular, are more susceptible to sickness and mortality as a result of malnutrition(4). The pace of progress in addressing all forms of malnutrition is inexcusably sluggish. Although there has been significant progress in reducing early childhood stunting, the number of stunted individuals remains at 150.8 million all over the World(5).

Adolescents are defined by the United Nations and World Health Organization as those between the ages of 10 and 19. This age group accounts for 1.2 billion people in the world today, and making up 16% of the world's population. Globally, there are an estimated 600 million adolescent girls(6). Adolescence is a critical period in a person's life since it marks the transition from childhood to maturity. For adolescent girls, a range of body and social changes take place during and following puberty. It is a time of intense physical, psychosocial, and cognitive development(7).

Adolescents' dietary state has a significant impact on their current and future health. Diet is the sequence and balance of meals in a day. It is concerned with the eating patterns of individuals or groups. Some people eat twice a day, while others eat four times a day (breakfast, lunch, snack, and dinner); still others appear to chew all day(8). Nutrition is the interaction between food and the body. It is about the nutrients contained in food, and their actions, interactions and balance in relation to health and disease. It is the process by which people can ingest, digest, absorb, transport, utilize and excrete food substances(9)

Nutrition during adolescence plays an important role in the individual's life. Increased nutritional needs in adolescents who gain up to 50% of their adult weight, more than 20% of their adult height, and 50% of their adult skeletal mass(10). A sustained healthy diet and healthy eating practices during this period have the potential to address nutritional deficits and linear growth faltering generated during the first and second decades of life and limit harmful behaviors contributing to the epidemic of non-communicable diseases (NCDs) in adulthood(11).

Nutritional needs during adolescence are influenced mainly by the onset of puberty with its associated increased growth rate, changes in body composition and organ systems, especially in adolescent girls(12). Adolescent girls may be especially vulnerable to stunting due to internal and external influences such as peer pressure, the desire to fit in among friends, and aggressive food marketing. This means that these and other factors can heavily influence what adolescent girls eat(13). Therefore, assessing the determinants of stunting among adolescent girls is important to address the problems of the coming generation. stunting is frequently associated with a variety of factors, ranging from early childhood to adolescence(3).

1.2 Statement of the problem

Worldwide, there are an estimated 600 million adolescent girls aged 10 to 19, with one-third of them living in South Asia, with the greatest rate of child and adolescent malnutrition(14). Malnutrition continues to be a major public health problem worldwide, especially in South-East Asia and sub-Saharan Africa (15). It is one of the most common causes of morbidity and mortality among children and adolescents throughout the world(16). Malnutrition affects almost two billion people globally, with adolescents accounting for more than half of the population, with 161 million youngsters stunted and underweight for their age(17).

Undernutrition is the primary risk factor related to several of the leading causes of adolescent deaths in the world, accounting for approximately 60% (588,000) of deaths among those aged 15 to 19, which is late adolescent(3). Almost one-third of the world's population is currently malnourished, and this is one of the most serious issues confronting the global community's development(18). According to study conducted in Pakistan 22.7%, West Java, Indonesia 48%, and West Bengal, India 54% of teenage girls suffer from stunting(19-21).

In Ethiopia, undernutrition among adolescents, particularly among school-aged females, is a major public health problem of which reasons are still under investigation. It accounts for about 34% of late adolescent mortality (15- 19 years). The percentage of adolescent childbearing is high, which accounts 12.5% (22). According to the Ethiopia Nutrition Profile, approximately 22% of women of reproductive age are malnourished, which puts their children at risk for low birth weight, short stature, lower infection resistance, and a higher risk of sickness and mortality(23). Because nutritional status has an effect on growth plate chondrocytes, nutritional status can alter linear bone growth throughout puberty(24). Based on the Ethiopian Demographic and Health Survey (EDHS 2016), the odds of being stunted among adolescent girls were different in each region(25).

Children and adolescents that are stunted are unable to reach their full physical and mental potential (26). Stunting in adolescence reflects poor nutrition, infection, and environmental stress accumulated from the fetal period through young adulthood. Malnutrition, frequent illnesses, and a lack of social stimulation or a combination of these are the most common causes of stunting (24, 27). As body mass index (BMI) estimations have been selected as a reporting metric for children and adolescents, limited data on adolescent stunting has been released. Adolescent girls are potentially at a higher risk of stunting as they are traditionally married at an early age in low-

income countries, including Ethiopia(28). Furthermore, because short-statured women are a significant risk factor for giving birth to stunted babies, it is critical to identify the risk factors of stunting in adolescent girls in order to address future generations' problems(29).

Ethiopia's government has created a national nutritional program II (NNP II) with the goal of preventing and controlling malnutrition among children and adolescents. One of the program's strategic goals is to reduce teenage malnutrition in all of its forms(30). However, stunting had been primarily studied in late infancy, particularly in children under the age of five, with little evidence available at the adolescent age. So, assessing adolescent nutritional status and the determinant factors were the second window of opportunity after the first 1000 days for preventing chronic malnutrition, especially stunting in the population(31).

Furthermore, previous studies focused on the prevalence of stunting, and they recommended conducting new studies on factors influencing stunting. Also, there is a need for current and updated information to evaluate the implementation of different nutritional strategies, especially among adolescent girls. There are only a few studies done by a case-control study design with limited information about the determinants of stunting among school adolescent girls in semi urban and rural areas of the country. Even though, stunting is a public health concern, there was no similar study conducted in this study area. Therefore, the aim of this study was to assess determinants that contribute to stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022.

1.3 Significant of study

This study aimed to identify determinants of stunting among adolescent girls in elementary, secondary and preparatory schools in Digo Tsion Town. Therefore, the finding will be useful for health planners, governmental and nongovernmental organizations (NGOs) working on issues such as the National Nutritional Program (NNP) and undernutrition control. It will help dieticians and health care professionals in designing interventional projects aimed at improving adolescent nutritional health and reducing stunting.

The outcomes of the study will also intend to assist in revising the existing National Nutritional Program strategic objectives by including nutritional screening and counseling among teenage school-aged girls. It will increase public knowledge about teenage stunting and the factors that influence it. It could also expand health professionals' existing knowledge and competence. In addition, it will also improve adolescent girls' feeding practices by themselves to reduce stunting. Furthermore, researchers will use this work as a reference for future study on determinant.

2. LITERATURE REVIEW

2.1 Determinant factors

2.1.1 Sociodemographic factors

Studies conducted in Assam, the eastern part of India and Tanzania revealed that factors such as age of the adolescent, father's occupation, and house hold income were significantly associated with stunting(32, 33). A systematic review conducted in Sub-Saharan Africa showed that a mother's education, mother's occupation, and household income were determinants significantly associated with stunting(34). The Ghana Demographic and Health Survey (GDHS) found that adolescent age was significantly associated with stunting(35).

Based on studies conducted in Damot Sore Woreda, Hadiya and Wolytia Zones, family size, father's education, older adolescence, mother's occupation (farmer and government employee) and mother's education (secondary and above) were significantly associated factors with stunting(36, 37). Based on the Nutrition Surveillance Project conducted in Northwest Ethiopia, rural residence and age are significantly associated factors with stunting(38). Another school based study conducted at Finote Selam Town revealed that place of residence and family income are significantly associated factors with stunting(39).

2.1.2 Nutritional services and dietary factors

A study conducted in Debark district found that food insecure households were significantly associated with stunting(40). A study conducted on nutritional status among adolescent girls revealed separate decision making for nutrition service was associated factor with stunting(37). Inadequate media exposure (inability to use mass media), a lack of nutritional counseling, fewer than three meals per day (less than three times), and a dietary diversity score of less than four were all associated factors for stunting in adolescent girls(41, 42). Likewise, a study conducted in North east Ethiopia revealed, snack frequency was significantly associated with stunting(43). According to study conducted in Gonder town, tea and coffee drinking habits was significant predictors of stunting(44).

2.1.3 Personal hygiene, sanitation and environmental factors

A study conducted in Eastern Ethiopia revealed that the source of drinking water (consuming unsafe water), unavailability of waste disposal space and home latrine were the independent

predictors of stunting(45, 46). Based on studies conducted in Northern and South-east Ethiopia, washing hands before eating and after using the toilet, not using detergents or soap for hand washing, and infrequent hand washing were significantly associated with stunting(47, 48).

2.1.4 Health and health service-related factors

Based on studies conducted in Awash Town and Hadiya Zone, beginning menstruation, lack of deworming (not receiving deworming), and not being visited by a health extension worker at home (HEW) were associated factors for stunting(37, 46). A cross sectional study conducted in Gonder revealed that anemia and malaria were a significant predictor of stunting(44).

2.3 Conceptual framework

This conceptual framework was developed by reviewing different ideas from several studies(32-48). Stunting is multi-factorial in its cause and risk factors, but this conceptual framework revealed that sociodemographic factors, dietary and nutritional service, environmental, sanitation, and health related factors that could have an association with stunting.

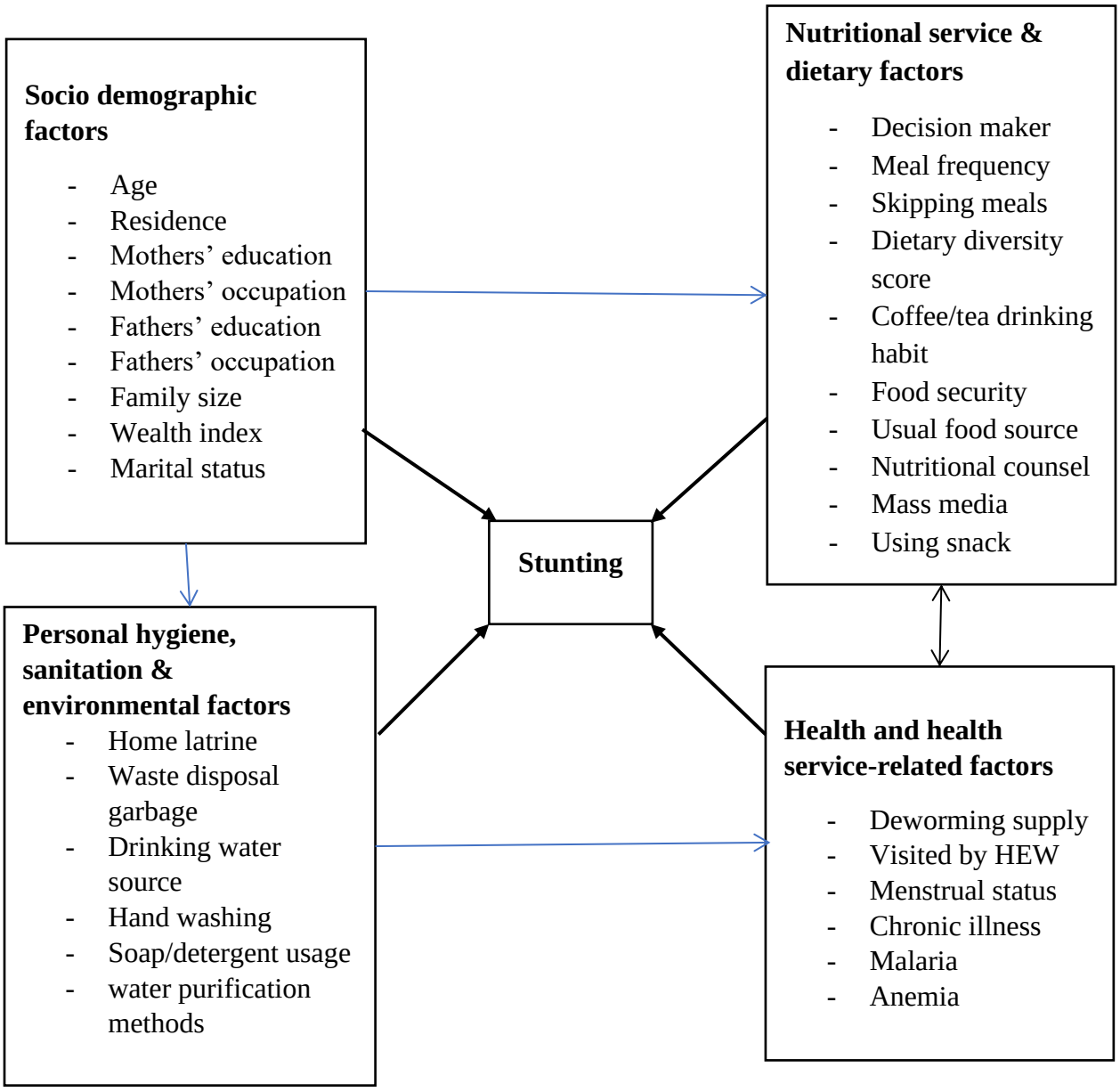

Figure 1: Conceptual frame for determinants of stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022

3. OBJECTIVE

To identify determinants of stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022.

4. METHODS AND MATERIALS

4.1 Study design and period

A school based unmatched case control study was conducted from May 13 to June 13, 2022.

4.2 Study area and settings

The study was conducted in the schools of Digo Tsion Town (administrative Town of Bibugn Wereda), which is located 365 km from Addis Ababa to the north and 142 km away from Bahir Dar City. The town has one high school, two primary schools, and one preparatory school. According to the Town Education Office report, there were a total of 7520 students among those 5232 were adolescent students and 2556 were adolescent girls, in all schools of the town registered for the academic year 2022 (49).

4.3 Population

4.3.1 Source population

Cases: All adolescent girls in the schools of Digo Tsion Town with a height for age of less than -2 Standard Deviation (Z score).

Controls: All adolescent girls in the schools of Digo Tsion Town with a height for age ≥ -2 Standard Deviation (Z score).

4.4.2 Study population

Cases: All adolescent girls in schools of Digo Tsion Town with height for age less than -2 Standard Deviation (Z score) in 2022.

Controls: All adolescent girls in schools of Digo Tsion Town with height for age ≥ -2 Standard Deviation (Z score) in 2022.

4.3.3 Study unit

Cases: Selected school adolescent girls with height for age less than -2SD (Z score).

Controls: Selected school adolescent girls with height for age ≥ -2SD (Z score).

4.4 Eligibility criteria

4.4.1 Inclusion criteria

Cases: School adolescent girls with height for age less than -2SD and attended during data collection were included.

Controls: School adolescent girls with height for age ≥ -2SD and attended during data collection were included.

4.4.2 Exclusion criteria

School adolescent girls with spinal curvature, who could not stand properly and walked with a wheelchair were excluded for both cases and controls.

4.5 Sample size determination and procedure

4.5.1 Sample size determination

To determine the sample size, significant predictors from different literatures were considered. Accordingly, the sample size was determined by considering a double population proportion formula by using Epi-info version 7 statistical package and assuming a two-sided significant level (α) of 5%, a 95% confidence level, power of 80%, and a 1:3 ratio of cases to controls. Drinking water source, residence, and food security status were used as significant predictors of stunting in the most recent studies (Table 1).

Table 1: Sample size calculation for determinants of stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022

Variables		P_1, P_2 and OR	Sample size
Residence**(39)**	Rural Urban	P_1 = 68%, P_2 = 47.21% and OR= 2.38	N= 235
Food security**(40)**	Insecure Secure	P_1 = 59.2%, P_2 = 42.6% and OR = 1.951	N= 379
Drinking water source **(46)**	Pipe & protected River	P_1 = 43.1%, P_2 = 21.31% and OR = 2.80	N= 182

P_1: the percent of case exposed, **P_2:** the percent of control exposed, **OR:** Odds ratio

Sample size from food security was selected since it gives the optimal sample size. Finally, after adding 10% non-response rate = 38, the largest sample size was (N_f = 417). That is 104 cases and 313 controls were selected as the final sample size for the study.

4.5.2 Sampling technique and procedure

Computer generated simple random sampling method was employed to select study participants after screening all adolescent girls in schools of the town for stunting. The height of each adolescent girl was measured by stadiometer and recorded with their ages. And then, cases and controls were identified based on World Health Organization Anthroplus 2007 software. A code was given for each screened adolescent girl, and a sampling frame was prepared in computer with

their school ID, section code and Z–score values. Then, one hundred four (104) cases and 313 controls that fulfilled inclusion criteria were selected. Proportional allocation was done to select the number of female adolescent students from each school (Figure 2).

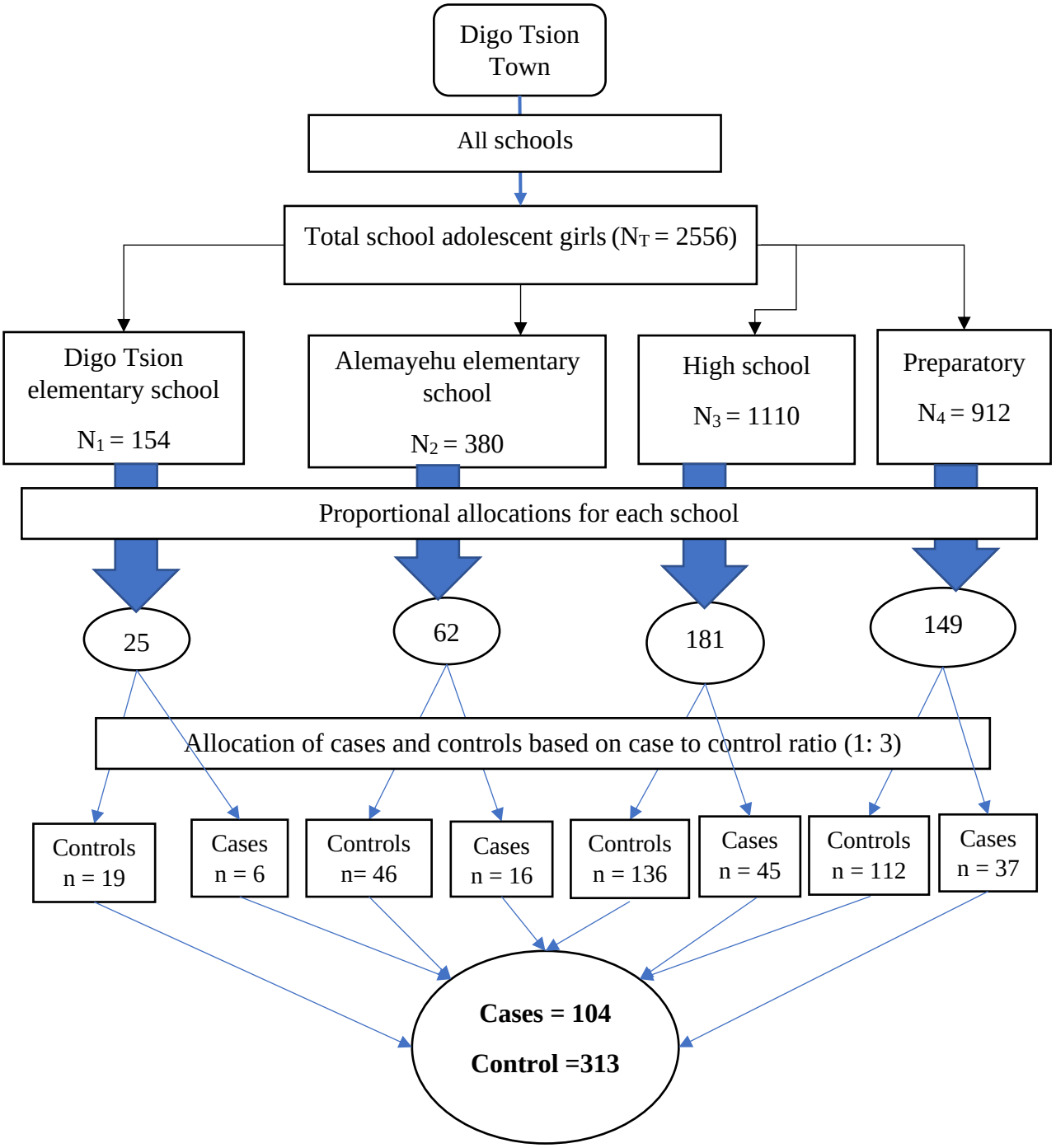

Figure 2 Schematic presentation of sampling procedure for the determinants of stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022

4.6 Study variables

4.6.1 Dependent variable

Stunting (yes/no)

4.6.2 Independent variables

Sociodemographic factors: age, marital status, place of residence, family size, household wealth index, mother's education and occupation, father's education and occupation.

Dietary and nutritional service plus information factors: meal per day, decision-maker, coffee/tea drinking habit, skipping regular meals, snack use, usual food source, dietary diversity score, food security, nutritional counsel and using mass media.

Health and health service-related factors: receiving deworm tablet, home-to-home visit of HEW, menstrual status, malaria, chronic illness and anemia.

Personal hygiene, sanitation and environmental factors: home latrine, waste disposal garbage, drinking water source, water purification methods, hand washing and using soap/detergent for hand washing.

4.7 Operational definition

Stunting: is a chronic malnutrition which is height for age less than -2SD (Z score) from the WHO reference population(7).

Decision-maker: an individual who makes a decision for nutritional service in family member(37).

Food secure household: were considered the availability of foods in homes in which every family member can access to consume, did not live-in hunger or fear of starvation in the households and answered the question for the presence of food worrying as 'no or rarely'. A food secure household had score of < 2 out of twenty seven for the food security assessment scale(50, 51).

Food insecure household: were considered when the households sometimes or often worried about not having enough food and replied "yes" to any one of the remaining questions in the food security assessment tools. A food insecure household had a score ≥ 2 out of twenty seven for the food security assessment scale (50, 51).

Low dietary diversity score: eating ≤ 4 groups of food from ten groups of foods in the last 24 hours(30).

Adequate dietary diversity: eating ≥ 5 groups of food from ten groups of foods in the last 24 hours(30).

Improved water source: water from piped water in home, public taps, protected dug wells, protected springs and rainwater (25).
Unimproved water source: water from unprotected dug wells, unprotected springs and surface water/river water(25).

Wealth index: households are given score based on the number and kind of consumer goods they own ranging from television to car, housing characteristics and the score are derived using principal component analysis(25).

4.8 Data collection tool and procedure

After reviewing different studies and reading supporting guidelines, a structured questionnaire was adapted. The questionnaire was prepared in English version and translated to Amharic, which was used for communication in the local community and then re-translated back to English to check for consistency by language experts. The questionnaire comprises information on socio-demographic characteristics, personal hygiene, sanitation and environmental factors, health and health related information, as well as nutritional services and dietary-related factors.

A stadiometer with a sliding headpiece attached to it was used to measure the height of the adolescent girls before data collection. The height was measured to the nearest 0.1 cm in a standing position with bare feet. After each measurement, the stadiometer was calibrated. And then, World Health Organization (WHO) Anthroplus 2007 software was used to identify cases and controls before the actual data collection.

Three data collectors and one supervisor were recruited from those who are familiar with the study area and have the capacity to do the task. And then, a one-day intensive and complete training was provided for both the data collectors and the supervisor. The training focused on the procedures of interviewing approaches (techniques) and how to use Epi collect5 mobile application to collect data. Then, data was collected by those data collectors using pretested and structured questionnaire via Epicollect5 mobile application through a face-to-face interview. During the actual data collection, the supervisor visited each site to follow the data collection, as well as manage any ambiguous activities immediately. The principal investigator was responsible for coordination of the overall data collection process. And also, check and evaluate all the completed questionnaires to ensure completeness, correctness and recoding just after data collection every night.

4.9 Data quality assurance

The data quality was maintained through a careful designing of questionnaires, collecting data by well-trained data collectors and being supervised by trained supervisor. The content and face validity of the tool were checked. The questionnaire was pretested on 21 adolescent girls, which was (5%) of the sample of adolescent girls in Woinwuha elementary and secondary schools to ensure reliability. Feedback from the pre-test was incorporated into the final questionnaire design and necessary amendments especially, ordering of the questionnaire and removing ambiguous questions were made. Every day, the collected data was reviewed and checked for completeness and consistency by the supervisors as well as the principal investigator.

4.10 Data processing and analysis

The epicollect5 data was checked for completeness and consistency daily by the supervisor and principal investigator. Data was cleaned and coded in epicollect5 software to be downloaded into a CSV spread sheet. And then, data entry and recoding were done by epi data manager version 4.6 and exported to Statistical Package for Social Science (SPSS) software version 26 for analysis. Descriptive statistics such as frequency, percent, median and interquartile range were used to describe the study population in relation to relevant variables. A bivariable and multivariable logistic regression analysis were done identify determinants of stunting among adolescent girls.

First, bivariable logistic regression was used to assess the association of one independent variable with the dependent variable. Variables with a P- value ≤ 0.25 in bivariable analysis were a candidate for multivariable logistic regression analysis. Principal Component Analysis (PCA) was done to compute wealth index via SPSS version 26. Multicollinearity was checked using tolerance, Variance Inflation Factor (VIF) and Spearman's correlation coefficient test. There was no multicollinearity since all variables had a tolerance > 0.1, VIF < 10, and Spearman's correlation coefficient of between -0.7 to + 0.7. The Hosmer-Lemeshow goodness-of-fit was used to test for the model fitness, and a P-value for the Hosmer and Lemeshow test was 0.63. A multivariable logistic regression model was used to identify potential significant determinants of stunting after controlling of all possible potential confounders. And then, variables with a P- value < 0.05 at 95% Cl were declared as statistically significant. Finally, the study was presented by statements, figures and tables.

4.11 Ethical consideration

Ethical clearance was obtained from the College of Medicine and Health Science, Institutional Review Board (IRB) with protocol number 403/2022. A permission letter was also obtained from Bibugn Wereda Education and Health Bureau as well as from each school. Informed assent was obtained from each study participants age < 18 years old. Then after, a written consent letter was sent to parents/guardians by those participants who had signed on the assent. Written consent was also obtained from participants whose age ≥ 18 years old. Study participants were assured that, there was no physical or emotional harm resulting from participating in the study and were informed about the aim of the study. The participation of the respondents was voluntary, and they were free to withdraw their participation at any time. Participants' confidentiality was strictly held by the research team.

4.12 Dissemination of results

The findings of this study will be disseminated to Bahir Dar University, College of Medicine and Health Science, Department of Pediatrics and Child Health Nursing to serve as reference material for subsequent research and teaching purpose. The study findings will be submitted to Digo Tsion Town Health and Education Bureau. The study will be presented at different conferences at the university and scientific conferences. An attempt will be made for publication in peer-reviewed national or international journals.

5. RESULT

5.1 Socio demographic characteristics

In this study, a total of 409 adolescent girls (100 cases and 309 controls) participated with a response rate of 96% for cases and 98.72% for controls. The median age of study participants with an Inter Quartile Range (IQR) was 17 (15–18) and 17 (16-18) years for cases and controls respectively. The vast majority of cases 75 (75%) and controls 157 (50.8%) lived in rural areas. About 71(71%) and 273(88.3%) of cases and controls lived with both parents respectively. Cases and controls had significant difference in terms of residence (X^2 = 17.04, DF =1, P = 0.001), marital status (X^2 = 10.61, DF =2, P = 0.005) and family size (X^2 = 10.22, DF =1, P = 0.001). On the other hand, cases and controls had no significant difference in terms of age (X^2 = 0.29, DF =2, P = 0.862) (Table 2).

Table 2: Socio demographic characteristics of adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022, (n = 409)

Variable	Category	Case N (%)	Control N (%)	Total N (%)	X^2	DF	P – value
Age	Early adolescent	10 (10)	26 (8.4)	36 (8.8)	0.29	2	0.862
	Middle adolescent	34 (34)	111 (35.9)	145 (35.5)			
	Late adolescent	56 (56)	172 (55.7)	228 (57.7)			
Residence	Rural	75 (75)	157 (50.8)	232 (56.7)	17.04	1	0.001
	Urban	25 (25)	152 (49.2)	177 (43.3)			
Marital status	Single	88 (88)	298 (96.7)	386 (94.4)	10.61	2	0.005
	Married	9 (9)	7 (2.2)	16 (3.9)			
	Divorced	3 (3)	4 (1.1)	7 (1.7)			
Living with	Both parents	71 (71)	273 (88.3)	344 (84.1)	25.51	3	0.001
	Father only	12 (12)	5 (1.6)	17 (4.2)			
	Mother only	12 (12)	23 (7.4)	35 (8.6)			
	Other*	5 (5)	8 (2.6)	13 (3.1)			
Family size	< 5 members	19 (19)	114 (36.9)	133 (32.5)	10.22	1	0.001
	≥ 5 members	81 (81)	195 (63.1)	276 (67.5)			
Educational status of father	Unable to read and write	48 (48)	73 (23.6)	121(29.6)	22.49	4	0.001
	Read and write only	22 (22)	89 (28.8)	111(27.1)			
	Primary school	11 (11)	43 (13.9)	54(13.2)			
	Secondary school	8 (8)	38 (12.3)	46(11.2)			
	College/University	11 (11)	66 (21.4)	77(18.8)			

Table 2 continued……

Occupation of fathers	Farmer	82 (82)	185 (59.9)	267(65.3)	23.9	5	0.001
	Daily laborer	4 (4)	4 (1.3)	8(2)			
	Merchant	2 (2)	33(10.3)	35(8.6)			
	Government employ	8 (8)	68 (22)	76(18.6)			
	Unemployed	1 (1)	7 (2.3)	8(2)			
	Other**	3 (3)	12 (3.9)	15(3.7)			
Educational status of mother	Unable to read and write	54 (54)	95 (30.7)	149 (36.4)	20.90	4	0.001
	Read and write only	20 (20)	93 (30.1)	113 (27.6)			
	Primary school	11 (11)	35 (11.3)	46 (11.2)			
	Secondary school	7 (7)	25 (8.1)	32 (7.8)			
	College/University	8 (8)	61 (19.7)	69 (16.9)			
Occupation of mother	Farmer	75 (75)	177 (57.3)	252 (61.6)	17.74	4	0.001
	Merchant	10 (10)	24 (7.8)	34 (8.3)			
	Government employ	4 (4)	56 (18.1)	60 (14.7)			
	House wife	9 (9)	49 (15.9)	58 (14.2)			
	Other***	2 (2)	3 (1)	5 (1.2)			

*Grandparents, Ante, Uncle, Siblings, **Driver, Clergy man, Carpenter, ***Daily laborer, Waiter

Cases and controls had significant difference in terms of wealth index (X2 = 11.18, DF =4, P = 0.025). About 29 (29%) of cases and 63 (20.4%) of controls were at first level (Poorest), while ten (10%) of cases and 54 (17.5%) of controls were at the highest level (Figure 3).

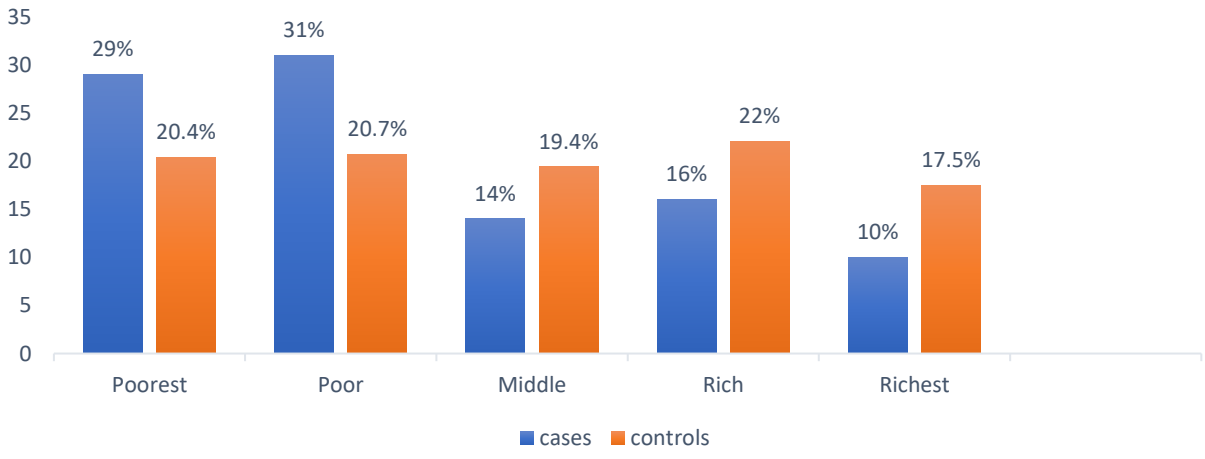

Figure 3: Household wealth index of adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022, (n = 409)

5.2 Dietary and nutritional service information

Nearly half 52 (52%) of the cases group used wheat, barely, maize and potatoes as their usual food while 148(47.9%) of the controls group used teff, maize, wheat and barley. Only two (2%) of cases and four (1.3%) of controls used only teff as their usual food. Regarding, regular meal skipping per day 46 (46%) of cases and 62(20.1%) of controls skipped their regular meal. The majority of the respondents in both cases, 82(82%) and controls, 190 (61.5%) used their own products and market-purchased food sources for daily consumption. Approximately 69 (69%) of cases drank coffee/tea immediately while eating a meal, and 63 (63%) drank occasionally. More than half of the controls 180(54.7%) did not drink at all. Cases and controls had significant difference in terms of meal frequency, usual food type, etc. Using snack did not show significant difference (Table 3).

Table 3: Dietary and nutritional service information of adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022, (n = 409)

Variables	Category	Case N (%)	Control N (%)	Total N (%)	X^2	DF	P-value
Usual food type in household	Teff only	2(2)	4(1.3)	6(1.5)	139.75	4	0.001
	Teff, maize, wheat	5(5)	70(22.7)	75(18.3)			
	Teff, maize, wheat, barely	27(27)	148(47.9)	175(42.8)			
	Teff, maize, wheat, barely, potato	14(14)	76(24.6)	90(22)			
	Maize, wheat, barely, potato	52(52)	11(3.6)	63(15.4)			
Decision maker in household	Mother & father	24(24)	76(24.6)	100(24.4)	11.57	3	0.009
	Mother only	58(58)	212(68.6)	270(66)			
	Father only	8 (8)	11 (3.6)	19 (4.6)			
	Others*	10 (10)	10 (3.2)	20 (4.9)			
Source of food for consumption	Market purchase	17(7)	115(37.2)	132(32.2)	14.40	2	0.001
	Own product & market purchase	82(82)	190(61.5)	272(66.5)			
	Own product	1 (1)	4 (1.3)	5 (1.2)			
Meal per day	≤ Two times	47 (47)	64 (20.7)	111(27.1)	25.09	1	0.001
	≥ Three times	53(53)	245(79.3)	298(72.9)			
Snack usage	Yes	44 (44)	132(42.7)	176(43)	0.01	1	0.913
	No	56 (56)	177(57.3)	233(57)			

Table 3 continued……

Skipping regular meal	Yes	46 (46)	62(20.1)	108(26.4)	24.83	1	0.001
	No	54(54)	247(79.9)	301(73.6)			
Drinking coffee/tea immediately with meal	Not at all	31(31)	169(54.7)	200(48.9)	19.32	2	0.001
	Sometimes	63(63)	118(38.2)	181(44.3)			
	Always	6(6)	22(7.1)	28(6.8)			
Dietary diversity score	≤ 4	66(66)	108(35)	174(42.5)	28.54	1	0.001
	>4	34(34)	201(65)	235(57.5)			
Food security	Secured	51(51)	243(78.6)	294(71.9)	27.21	1	0.001
	Insecure	49(49)	66(21.4)	115(28.1)			
Nutritional counseling	Yes	43(43)	208(67.3)	251(61.4)	17.83	1	0.001
	No	57(57)	101(32.7)	158(38.6)			
Using mass media	Yes	42(42)	234(75.7)	276(67.5)	37.64	1	0.001
	No	58(58)	75(24.3)	133(32.5)			

* Grandparents, Antes, Uncle, Siblings, Self, X^2 = chi square, Df = degree of freedom

5.3 Personal hygiene, household and environmental-sanitation information

More than three fourth (88%) of cases and 304(98.4%) of controls had latrine facilities in their house. Thirty-five (35%) of cases and 50(16.2%) of controls used unimproved water sources for drinking. About two (2%) of participants from cases and 11(3.6%) from controls used water purification method. Cases and controls had significant difference in terms of availability of latrine (X^2 =17.92, DF = 1, P = 0.001), drinking water source, and hand washing after using toilet. Water purification methods and waste disposal site did not show significance difference. (Table 4).

Table 4: Personal hygiene, household and environmental-sanitation information of adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022, (n = 409)

Variables	Category	Case N (%)	Control N (%)	Total N (%)	X^2	DF	P-value
Available latrine facility in house	Yes	88(88)	304(98.4)	392(95.8)	17.92	1	0.001
	No	12(12)	5(1.6)	17(4.2)			
Drinking water source	Tape water	21(21)	149(48.2)	170(41.6)	136.7	5	0.001
	Protected dug water	25(25)	110(35.6)	135(33)			
	Protected spring water	19(19)	-	19(4.6)			

Table 4 continued …….

	Unprotected dug water	6(6)	42(13.6)	48(11.7)		
	Unprotected spring water	26(26)	7(2.3)	33(8.1)		
	Other*	3(3)	1(0.3)	4(1)		
Using water purification method	Yes	2(2)	11(3.6)	13(3.2)	0.198	1	0.656
	No	98(98)	298(96.4)	396(96.8)			
Type of water purification method	Wuha agar	2(100)	8(72.7)	2(15.4)	0.709	2	0.701
	Boiling	-	2(18.2)	10(76.9)			
	Others*		1(9.1)	1(7.7)			
Hand washing before eating	Always	91(91)	305(98.7)	396(96.8)	12.18	1	0.001
	Sometimes	9(9)	4(1.3)	133.2			
Hand washing after using a toilet	Yes	87(87)	289(93.5)	376(91.9)	4.34	1	0.037
	No	13(13)	20(6.5)	33(8.1)			
Using soap for hand washing	Yes	55(55)	229(74.1)	284(69.4)	12.11	1	0.001
	No	45(45)	80(25.9)	125(30.6)			
Separate waste disposal site in	Yes	2(2)	8(2.6)	10(2.4)	0.11	1	0.740
	No	98(98)	301(62.1)	399(97.6)			

*****Surface water, river water, **String through cloth

5.4 Health related and health service information

Health extension workers visited the homes of approximately 36 (36%) of cases and 188 (60.8%) of controls. During the home visit, 3 (3%) of cases and 43 (22.9%) of controls received information about adolescent nutrition. More than half 60(60%) of cases did not receive deworming tablets while 169(54.7%) of controls received. The majority of study participants in cases and controls had seen their first menstruation. Among those, 56(56%) of cases and 171(65.5) of controls saw first menarche at a middle adolescent stage. Cases and controls had significant difference in terms of receiving deworming tablet (X^2 =5.95, DF = 1, P = 0.015), and HEW visit (X^2 =18.82, DF = 1, P = 0.001). On the other hand, cases and controls had no significant difference in terms of anemia (X^2 =0.21, DF = 1, P = 0.651), malaria (X^2 =0.912, DF = 1, P = 0.34), chronic illness (X^2 =1.521, DF = 1, P = 0.218) and menstrual status (X^2 =0.321, DF = 1, P = 0.571) (Table 5).

Table 5: Health related and health service information of adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022, (n = 409)

Variables	Category	Case N (%)	Control N (%)	Total N (%)	X^2	DF	P-value
Receiving deworm	Yes	40(40)	169(54.7)	209(51.1)	5.95	1	0.015
	No	60(60)	140(45.3)	200(48.9)			
Anemia	Yes	3(3)	5(1.6)	8(2)	0.21	1	0.651
	No	97(97)	304(98.4)	401(98)			
Malaria	Yes	2(2)	15(4.9)	17(4.2)	0.912	1	0.34
	No	98(98)	294(95.1)	392(95.8)			
Chronic illness	Yes	8(8)	13(4.2)	21(5.1)	1.521	1	0.218
	No	92(92)	296(95.8)	388(94.9)			
First menstruation	Yes	88(88)	265(85.8)	353(86.3)	0.321	1	0.571
	No	12(12)	44(14.2)	56(13.7)			
Age at first menarche	10-13	32(32)	94(35.5)	12635.69	21.45	1	0.001
	14-16	56(56)	171(65.5)	227(64.31)			
HEW visit	Yes	36(36)	188(60.8)	224(54.8)	18.82	1	0.001
	No	64(64)	121(39.2)	185(45.2)			
Nutritional information by HEW	Yes	3(3)	43(22.9)	46(20.5)	3.07	1	0.080
	No	33(33)	145(77.1)	178(795)			

HEW = Health Extension Worker

5.5 Determinants of stunting among school adolescent girls

In bivariable analysis, eighteen variables were identified as candidates for the multivariable analysis. These variables were residence, family size, educational status of fathers and mothers, wealth index, drinking water source, eating frequency per day, skipping regular meals, drinking coffee/tea immediately while eating meals, dietary diversity score, food security status of household, having ever gotten nutritional counseling in school, ever used mass media, hand washing after using toilet, soap/detergent use for hand washing, receiving deworming tablets and ever had chronic illness and health extension workers visit at home.

The result of the multivariable analysis identified six statistically significant factors with P-value < 0.05 at 95% Cl. These were low dietary diversity score (AOR = 1.99, CI [1.06, 3.73]), food insecurity (AOR = 2.13, CI [1.15, 3.93]), drinking coffee/tea immediately while eating meals (AOR = 2.19, CI [1.22, 3.95]), did not get nutritional counseling in school (AOR = 2.07, CI [1.17,

3.66]), having chronic illness (AOR = 3.78, CI [1.16, 12.3]) and did not visit by health extension workers (HEW) at home (AOR = 1.85, CI [1.03, 3.31]).

Adolescent girls who ate a low-diversified diet were nearly two (1.99) times more likely to be stunted compared with their counterparts who ate adequately diversified meals (AOR = 1.99, CI [1.06, 3.73]). Adolescent girls living in food insecure households were 2.13 times more likely to be stunted compared with those girls in food secure households (AOR = 2.13, CI [1.15, 3.93]). Those who drank coffee/tea immediately while eating meals experienced 2.19 times more stunts compared with their counterparts (AOR = 2.19, CI [1.22, 3.95]).

Adolescents who did not get nutritional counseling in school were 2.07 times more likely to be stunted compared with those who got counseling (AOR = 2.07, CI [1.17, 3.66]). Girls with chronic illness were 3.78 times more likely to be stunted than girls who had no chronic illness (AOR = 3.78, CI [1.16, 12.3]). Adolescent girls who were not visited by HEW at their home were nearly two (1.85) times more likely to be stunted compared with their counterparts (AOR = 1.85, CI [1.03, 3.31]) (Table 6).

Table 6**:** Bivariable and multivariable logistic regression analysis showing determinant of stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia, 2022, (n = 409)

Variable		Case (%)	Control (%)	COR (95% CI)	AOR (95% CI)	P – value
Residence	Rural	75(75)	157(50.8)	2.9[1.75, 4.81]	1.32[0.55, 3.16]	0.535
	Urban	25(25)	152(49.2)	1	1	
Family size	< 5 members	19(19)	195(63.1)	1	1	
	≥ 5 members	81(81)	114(36.9)	2.49[1.44, 4.32]	1.75[0.89, 3.44]	0.101
Educational status of fathers	Unable to read and write	48(48)	73(23.6)	3.95[1.89, 8.23]	1.96[0.66, 5.82]	0.224
	Read and write only	22(22)	89(28.8)	1.48[0.67, 3.27]	1.11[0.36, 3.43]	0.855
	Primary school	11(11)	43(13.9)	1.54[0.61, 3.85]	1.35[0.39, 4.59]	0.632
	Secondary school	8(8)	38(12.3)	1.26[0.47, 3.41]	1.29[0.36, 4.63]	0.687
	College/University	11(11)	66(21.4)	1	1	
Educational status of mothers	Unable to read and write	54(54)	95(30.7)	4.33[1.93, 9.74]	1.01[0.33, 3.11]	0.990
	Read and write only	20(20)	93(30.1)	1.64[0.68, 3.96]	0.62[0.19, 2.01]	0.428
	Primary school	11(11)	35(11.3)	2.4[0.88, 6.52]	0.99[0.29, 3.36]	0.983
	Secondary school	7(7)	25(8.1)	2.14[0.69, 6.52]	1.16[0.30, 4.46]	0.825

Table 6 Continued …….

	College/University	8(8)	61(19.1)	1	1	
Wealth index of households	Poorest	29(29)	63(20.4)	2.49[1.11, 5.56]	1.04[0.32, 3.34]	0.951
	Poor	31(31)	64(20.7)	2.62[1.18, 5.82]	1.29[0.41, 4.11]	0.659
	Middle	14(14)	60(19.4)	1.26[0.52, 3.07]	0.48[0.14, 1.64]	0.242
	Rich	16(16)	68(22)	1.27[0.53, 3.02]	0.99[0.33, 2.93]	0.981
	Richest	10(10)	54(17.5)	1	1	
Meal frequency per day	≤ Twice times	47(47)	64(20.7)	3.39[2.10, 5.48]	2.56[0.94, 6.96]	0.066
	≥ Three times	53(53)	245(79.3)	1	1	
Skipping regular meals	Yes	46(46)	62(20.1)	3.39[2.09, 5.49]	1.01[0.37, 2.75]	0.983
	No	54(54)	247(79.9)	1	1	
Drinking coffee/tea with meal	Yes	69(69)	140(45.3)	2.69[1.66, 4.34]	2.19[1.22, 3.95]	0.01*
	No	31(31)	169(54.7)	1	1	
Nutritional counsel in school	Yes	43(43)	208(67.3)	1	1	
	No	57(57)	101(32.7)	2.73[1.72, 4.33]	2.07[1.17, 3.66]	0.01*
Using mass media	Yes	42(42)	243(75.7)	1	1	
	No	58(58)	75(24.3)	4.3[2.68, 6.93]	1.85[0.98, 3.49]	0.058
Dietary diversity score	≤ 4	66(66)	108(35)	3.6[2.25, 5.81]	1.99[1.06, 3.73]	0.03*
	>4	34(34)	201(65)	1	1	
Food security status	Insecure	49(49)	66(21.4)	3.5[2.19, 5.70]	2.13[1.15, 3.93]	0.02*
	Secure	51(51)	243(78.6)	1	1	
Drinking water source	Unimproved	36(36)	49(15.9)	2.98[1.79, 4.97]	1.09[0.54, 2.19]	0.813
	Improved	64(64)	260(84.1)	1	1	
Hand washing after toilet	Yes	87(87)	289(93.5)	1	1	
	No	13(13)	20(6.5)	2.16[1.03, 4.52]	2.29[0.88, 6]	0.091
Using soap for hand washing	Yes	55(55)	229(74.1)	1	1	
	No	45(45)	80(25.9)	2.34[1.46, 3.74]	1.16[0.63, 2.13]	0.626
Receiving deworming	Yes	40(40)	169(45.3)	1	1	
	No	60(60)	140(54.7)	1.81[1.14, 2.86]	0.74[0.41, 1.35]	0.324
Chronic illness	Yes	8(8)	13(4.2)	1.98[0.79, 4.93]	3.78[1.16, 12.3]	0.03*
	No	92(92)	296(95.8)	1	1	
HEW visit at home	Yes	36(36)	188(60.8)	1	1	
	No	64(64)	121(39.2)	2.76[1.73, 4.41]	1.85[1.03, 3.31]	0.04*

Note; AOR- Adjusted odds Ratio, COR- Crude Odds Ratio, CI- confidence interval

6. DISCUSSION

The aim of this study was to assess the determinants of stunting. As a result, this study found that food insecurity is an independent risk factor for stunting among school adolescent girls, which indicates being living in a food insecure household was 2.13 times more likely to be stunted. This finding was consistent with previous studies conducted in Debark(40), Legehida district(46), Afar region and Northeast Ethiopia(45). The possible explanation might be the fact that food insecurity is the cause of undernutrition in the community. That means those individuals living in food insecure households are at risk of stunting and poor health outcomes, which can affect the coming generations(52). And also, it might be due to food insecurity, individuals are not able to consume sufficient amounts of safe and nutritious food for an active and healthy life, which results in chronic complications of undernutrition(53).

Likewise, eating a low diversified diet (low dietary diversity score) was identified as one of the independent risk factors contributing to stunting. The odds of adolescent girls eating a low diversified diet in the cases group was 1.99 times higher than in the counter controls. This finding is in agreement with studies conducted in Dessie Town(43), Awash Town(10), Gonder and Dembia districts, Northwest Ethiopia (41, 42). The association of low dietary diversity score and stunting might be due to the fact that low variety foods do not fulfill micronutrient requirements, such as iron, vitamin B12, folate, and other essential requirements for growth resulting in linear growth retardation (stunting)(54). Furthermore, another possible reason might be that an adequate supply of all essential nutrients has a fundamental importance in satisfying the nutritional requirements for the maintenance of a body's growth, strength, physical work, immunity, and good health.

Drinking coffee/tea immediately while eating a meal is one of the significant determinants of stunting among school adolescent girls. The odds of drinking coffee/tea immediately with meal rather than not drinking were about 2.19 times higher among cases than controls. This finding is inconsistent with a study conducted in Gonder town(44). The reason for the disagreement might be the difference in the study design, characteristics of the study population, and sample size. Even if this is not clearly reported by previous scholastic articles, the association between drinking coffee/tea immediately while eating a meal and stunting might be due to the caffeine content of coffee and tea slightly reducing calcium and iron absorption, which may inhibit bone growth and

linear development in children and adolescents. In addition, taking coffee/tea with meals initiates hiccupping and gastrointestinal disturbance, which in turn decreases adequate meal consumption in adolescent. Drinking coffee/tea also results in sleep disturbance (causes lack of sleep), especially those drank within six hours before sleep time, which results in reduced growth hormone production since it is more produced during sleep(55). This indicates that sleeping for a shorter period of time than usual causes growth retardation or stunting.

Did not receive nutritional counseling in school was also identified as a significant independent determinant of stunting among adolescent girls. The odds that the cases did not get nutritional counseling in school was nearly twofold (2.07) higher than that of the controls. This finding is supported by studies conducted in Adwa town, urban Northwest Ethiopia(41, 42) and the low land area of Southern Ethiopia(37). The possible justification might be nutritional counseling helps adolescent girls to know and understand important information about their healthy eating practice as well as it could reduce risky behavior (like skipping meals for physical posture)(56).

Based on this study finding, having a known chronic illness was a significant determinant of stunting in adolescent girls. The odds of having a chronic illness were 3.78 times higher among the case group than controls. The possible reason for this association of chronic illness with stunting might be due to the fact that adolescents with chronic illness are at greater risk for eating disorders than adolescents without chronic illness. This further causes chronic malnutrition and developmental delay(57). According to WHO report, delayed growth and puberty are common to most adolescents with chronic illnesses. Chronic illness can affect the growth and maturation of adolescents.

This study also revealed that not being visited by health extension workers in the home was independently associated with stunting. The odds of not being visited by a health extension worker in their home among cases was about 1.85 times higher than that of controls. This finding was supported by study conducted in Wolaita and Hadiya zones of Southern Ethiopia(37). The possible reasons for this association of not being visited by health extension workers and stunting might be the fact that health extension workers provide services on health packages like food hygiene and safety measures, healthy home environment, as well as family nutrition and adolescent reproductive health services. These may be used for the prevention of undernutrition in the community either directly or indirectly (58). In addition, they could probably give nutritional

counseling that could result in the improvement of nutritional knowledge and behavioral change to improve nutrition among members of the household (59). Furthermore, health extension workers are playing a pivotal role in supporting improvements in adolescent health services in rural and urban areas. For instance, they work with Productive Safety Net Program (PSNP), which helps to mitigate household-level food insecurity and increase school feeding programs through providing meals for school children(60).

7. LIMITATION OF THE STUDY

This study might have the following limitations: Since the data was collected through an interviewer administered questionnaire, there may be social desirability and recall bias, especially for dietary diversity scores and food security assessments. This study excludes those participants who had spinal curvature because of a lack of an anthropometric measurement scale for such a group of individuals. There might also be misclassification of genetically short-statured adolescent girls as undernourished or stunted (cases) since the study used height and age measurement to identify cases and controls.

8. CONCLUSION

The present study indicates that a low dietary diversity score, living in a food insecure household, drinking coffee/tea immediately while eating a meal, not receiving nutritional counseling in school, having a chronic illness, and not being visited by health extension workers at home were significant determinants of stunting.

9. RECOMMENDATION

For health extension workers

The health extension workers better to visit the household of school adolescent girls. And then, provide information about the purpose of consuming a diversified diet for adolescent girls. It is also better to identify food insecure households and join those with Productive Safety Net programs to reduce food insecurity.

For school community

The school directors and unit leaders better to give adolescent nutritional counseling on a regular schedule for the students.

For school adolescent girls

It is better to reduce drinking coffee/tea immediately while eating a meal since it is better to wait at least 30-60 minutes after eating a meal. It is better to practice eating a diversified diet per 24 hours.

For researchers

It is better to undertake prospective studies that are able to include those individuals with spinal curvature and variables such as institutional factors, amount of coffee and tea consumed per day.

REFERENCE

1. Organization WH. Physical status: The use of and interpretation of anthropometry, Report of a WHO Expert Committee: World Health Organization; 1995.
2. Samadi M, Moradi S, Azadbakht L, Rezaei M, Hojati N. Adherence to healthy diet is related to better linear growth with open growth plate in adolescent girls. Nutrition Research. 2020;76:29-36.
3. Christian P, Smith ER. Adolescent undernutrition: global burden, physiology, and nutritional risks. Annals of Nutrition and Metabolism. 2018;72(4):316-28.
4. Luo H, Zyba SJ, Webb P. Measuring malnutrition in all its forms: An update of the net state of nutrition index to track the global burden of malnutrition at country level. Global Food Security. 2020;26:100453.
5. Hawkes C, Demaio AR, Branca F. Double-duty actions for ending malnutrition within a decade. The Lancet Global Health. 2017;5(8):e745-e6.
6. UNICEF. Investing in a safe, healthy and productive transition from childhood to adulthood is critical. Adolescents overview; 2018. 2020.
7. Organization WH. Guideline: implementing effective actions for improving adolescent nutrition. 2018.
8. Bowler N, Phillips C, Rees P. The association between imported factors and prisoners' mental health: Implications for adaptation and intervention. International journal of law and psychiatry. 2018;57:61-6.
9. Shrimpton R, du Plessis LM, Delisle H, Blaney S, Atwood SJ, Sanders D, et al. Public health nutrition capacity: assuring the quality of workforce preparation for scaling up nutrition programmes. Public health nutrition. 2016;19(11):2090-100.
10. Kahssay M, Mohamed L, Gebre A. Nutritional status of school going adolescent girls in Awash Town, Afar Region, Ethiopia. Journal of Environmental and Public Health. 2020;2020.
11. Wolde T, Belachew T. Chronic undernutrition (stunting) is detrimental to academic performance among primary schools of adolescent children: a randomized cross sectional survey in Southern Ethiopia. BMC Research Notes. 2019;12(1):1-6.
12. Wertheim EH, Paxton SJ. Body image development in adolescent girls. 2017.
13. https://www.unicef.org/nutrition/middle-childhood-and-adolescence. February, 2022.
14. Aguayo VM, Paintal K. Nutrition in adolescent girls in South Asia. bmj. 2017;357.
15. Akseer N, Al-Gashm S, Mehta S, Mokdad A, Bhutta ZA. Global and regional trends in the nutritional status of young people: a critical and neglected age group. Annals of the New York Academy of Sciences. 2017;1393(1):3-20.
16. babu Kodali P, Kopparty S, Vallabhuni R, Kalapala GR. Mid-day Meal Programme and Adolescent Undernutrition-an Epidemiological Study in Hyderabad, India. Journal of Pharmacy Practice and Community Medicine. 2016;2(1):16-20.
17. Organization WH. World health statistics 2018: monitoring health for the SDGs, sustainable development goals: World Health Organization; 2018.

18. Mosites E, Dawson-Hahn E, Walson J, Rowhani-Rahbar A, Neuhouser ML. Piecing together the stunting puzzle: a framework for attributable factors of child stunting. Paediatrics and International Child Health. 2017;37(3):158-65.
19. Karim A, Qaisar R. A Comparison of International and National References to the Prevalence of Stunting in Pakistani School-age Girls. 2020.
20. Sasongko EPS, Ariyanto EF, Indraswari N, Rachmi CN, Alisjahbana A. Determinants of adolescent shortness in Tanjungsari, West Java, Indonesia. Asia Pacific journal of clinical nutrition. 2019;28(Supplement 1).
21. Pal A, Pari AK, Sinha A, Dhara PC. Prevalence of undernutrition and associated factors: A cross-sectional study among rural adolescents in West Bengal, India. International Journal of Pediatrics and Adolescent Medicine. 2017;4(1):9-18.
22. Kassa GM, Arowojolu AO, Odukogbe A-TA, Yalew AW. Trends and determinants of teenage childbearing in Ethiopia: evidence from the 2000 to 2016 demographic and health surveys. Italian journal of pediatrics. 2019;45(1):1-13.
23. Bekele H, Jima GH, Regesu AH. Undernutrition and associated factors among lactating women: Community-based cross-sectional study in Moyale District, Borena Zone, Southern Ethiopia. Advances in Public Health. 2020;2020.
24. Melaku Y, Dirar A, Feyissa GT, Tamiru D. Optimal dietary practices and nutritional knowledge of school adolescent girls in Jimma Town, South West Ethiopia. International Journal of Adolescence and Youth. 2018;23(3):299-307.
25. Mengesha HG, Vatanparast H, Feng C, Petrucka P. Modeling the predictors of stunting in Ethiopia: analysis of 2016 Ethiopian demographic health survey data (EDHS). BMC nutrition. 2020;6(1):1-11.
26. Choudhury N, Raihan MJ, Ahmed ST, Islam KE, Self V, Rahman S, et al. The evaluation of Suchana, a large-scale development program to prevent chronic undernutrition in north-eastern Bangladesh. BMC Public Health. 2020;20(1):1-9.
27. Berhe K, Gebremariam G. Magnitude and associated factors of undernutrition (underweight and stunting) among school adolescent girls in Hawzen Woreda (District), Tigray regional state, Northern Ethiopia: cross-sectional study. BMC Research Notes. 2020;13(1):1-6.
28. Leroy JL, Frongillo E. What does stunting really mean. A critical review of the evidence Adv Nutr. 2019;10:196-204.
29. Gonete AT, Kassahun B, Mekonnen EG, Takele WW. Stunting at birth and associated factors among newborns delivered at the University of Gondar Comprehensive Specialized Referral Hospital. PLoS One. 2021;16(1):e0245528.
30. Kennedy E, Tessema M, Hailu T, Zerfu D, Belay A, Ayana G, et al. Multisector nutrition program governance and implementation in Ethiopia: opportunities and challenges. Food and nutrition bulletin. 2016;36(4):534-48.
31. Brief AE-IP. Reducing Stunting in Ethiopia:"From Promise to Impact". 2019.

32. Ismail A, Darling AM, Mosha D, Fawzi W, Sudfeld C, Sando MM, et al. Prevalence and risk factors associated with malnutrition among adolescents in rural Tanzania. Tropical Medicine & International Health. 2020;25(1):89-100.
33. Rengma MS, Bose K, Mondal N. Socio-economic and demographic correlates of stunting among adolescents of Assam, North-east India. AnthropologicAl review. 2016;79(4):409-25.
34. Keino S, Plasqui G, Ettyang G, van den Borne B. Determinants of stunting and overweight among young children and adolescents in sub-Saharan Africa. Food and nutrition bulletin. 2014;35(2):167-78.
35. Feskens EJ, Bailey R, Bhutta Z, Biesalski H-K, Eicher-Miller H, Krämer K, et al. Women's health: optimal nutrition throughout the lifecycle. European Journal of Nutrition. 2022:1-23.
36. Gagebo DD, Kerbo AA, Thangavel T. Undernutrition and associated factors among adolescent girls in Damot Sore District, Southern Ethiopia. Journal of nutrition and metabolism. 2020;2020.
37. Handiso YH, Belachew T, Abuye C, Workicho A, Baye K. Undernutrition and its determinants among adolescent girls in low land area of Southern Ethiopia. PloS one. 2021;16(1):e0240677.
38. Tariku A, Belew AK, Gonete KA, Hunegnaw MT, Muhammad EA, Demissie GD, et al. Stunting and its determinants among adolescent girls: findings from the nutrition surveillance project, northwest Ethiopia. Ecology of food and nutrition. 2019;58(5):481-94.
39. Kebede D, Prasad RP, Asres DT, Aragaw H, Worku E. Prevalence and associated factors of stunting and thinness among adolescent students in Finote Selam Town, Northwest Ethiopia. Journal of Health, Population and Nutrition. 2021;40(1):1-12.
40. Alemu TG, Muhye AB, Ayele AD. Under nutrition and associated factors among adolescent girls attending school in the rural and urban districts of Debark, Northwest Ethiopia: A community-based comparative cross-sectional study. PloS one. 2021;16(8):e0254166.
41. Birru SM, Belew AK, Tariku A. One in three adolescent schoolgirls in urban northwest Ethiopia is stunted. Italian journal of pediatrics. 2018;44(1):1-8.
42. Gebregyorgis T, Tadesse T, Atenafu A. Prevalence of thinness and stunting and associated factors among adolescent school girls in Adwa town, North Ethiopia. International journal of food science. 2016;2016.
43. Mulu Birru G, Eshete Tadesse S, Hassen Abate K, Mekonnen TC, Genetu Chane M. Malnutrition in School-Going Adolescents in Dessie Town, South Wollo, Ethiopia. Journal of Nutrition and Metabolism. 2021;2021.
44. Getaneh Z, Melku M, Geta M, Melak T, Hunegnaw MT. Prevalence and determinants of stunting and wasting among public primary school children in Gondar town, northwest, Ethiopia. BMC pediatrics. 2019;19(1):1-11.
45. Hadush G, Seid O, Wuneh AG. Assessment of nutritional status and associated factors among adolescent girls in Afar, Northeastern Ethiopia: a cross-sectional study. Journal of Health, Population and Nutrition. 2021;40(1):1-14.

46. Ashebir Kebede W, Yimer Ayele B. Magnitude of Stunting and Associated Factors among Adolescent Students in Legehida District, Northeast Ethiopia. Journal of Nutrition and Metabolism. 2021;2021.
47. Abate BB, Kassie AM, Kassaw MW, Zemariam AB, Alamaw AW. Prevalence and determinants of stunting among adolescent girls in Ethiopia. Journal of pediatric nursing. 2020;52:e1-e6.
48. Engidaw MT, Gebremariam AD. Prevalence and associated factors of stunting and thinness among adolescent Somalian refugee girls living in eastern Somali refugee camps, Somali regional state, Southeast Ethiopia. Conflict and health. 2019;13(1):1-8.
49. Bibugn Wereda Education office report, January, 2022 (Unpublished data). 2022.
50. Cole MB, Augustin MA, Robertson MJ, Manners JM. The science of food security. npj Science of Food. 2018;2(1):1-8.
51. Gebreyesus SH, Lunde T, Mariam DH, Woldehanna T, Lindtjørn B. Is the adapted Household Food Insecurity Access Scale (HFIAS) developed internationally to measure food insecurity valid in urban and rural households of Ethiopia? BMC nutrition. 2015;1(1):1-10.
52. Organization WH. The state of food security and nutrition in the world 2018: building climate resilience for food security and nutrition: Food & Agriculture Org.; 2018.
53. Endale W, Mengesha ZB, Atinafu A, Adane AA. Food Insecurity in Farta District, Northwest Ethiopia: a community based cross–sectional study. BMC research notes. 2014;7(1):1-6.
54. Halala Handiso Y, Belachew T, Abuye C, Workicho A. Low dietary diversity and its determinants among adolescent girls in Southern Ethiopia. Cogent Food & Agriculture. 2020;6(1):1832824.
55. Nehlig A. Effects of coffee/caffeine on brain health and disease: What should I tell my patients? Practical neurology. 2016;16(2):89-95.
56. Rogers PC, Schoeman J. Nutritional assessment and intervention. Pediatric Hematology-Oncology in Countries with Limited Resources: Springer; 2014. p. 91-112.
57. Neumark-Sztainer D, Story M, Falkner NH, Beuhring T, Resnick MD. Disordered eating among adolescents with chronic illness and disability: the role of family and other social factors. Archives of pediatrics & adolescent medicine. 1998;152(9):871-8.
58. Bilal NK, Herbst CH, Zhao F, Soucat A, Lemiere C. Health extension workers in Ethiopia: improved access and coverage for the rural poor. Yes Africa Can: Success Stiroes from a Dynamic Continent. 2011;2011:433-43.
59. Ababa A. Essential Health Services Package of Ethiopia. 2019.
60. Yitayal M, Berhane Y, Worku A, Kebede Y. Health extension program factors, frequency of household visits and being model households, improved utilization of basic health services in Ethiopia. BMC health services research. 2017;14(1):1-9.

ANNEX

1. Information sheet

Introduction: My name is _____ and I am working as a data collector for MSc student Ambaw Abebaw. He is a student of pediatrics and child health nursing at Bahir Dar University. He is conducting a study on the determinants of stunting among adolescent girls in the schools of Digo Tsion Town, Northwest Ethiopia.

Procedures: This information will help to plan interventions that improve nutrition service seeking behavior among adolescent girls. The questionnaire may take about 10- 15 minutes to complete. The information will allow us to determine chronic nutritional status of adolescents in the study area.

Risks: There are no risks to adolescent girls from participating in this study. The adolescent girls should not experience any discomfort because of their participation.

Benefits: Taking part in this research study may not benefit participants personally, but it may help to improve future nutritional interventions to improve the nutritional and health status of adolescent girls in the study areas.

Confidentiality: We will keep participants' answers confidential to the best of our ability. We will not share any answers with any of your neighbors or family. We will use a number instead of a name on study forms. Name and other facts that might help people recognize an individual will not appear when he presents this study to others or publishes its results. Any information that might identify a participant will be kept separate from the answers, and the answers will be kept in a secure place for analysis by the researchers only. The data must be stored on password-protected computers.

Contact Person: If you have any questions, I will be happy to answer them. In addition, if you want to contact a person from, I work for, I can write down the telephone number for the principal investigator from Bahir Dar University.

Ambaw Abebaw = +251918100749

Email: ambabebaw@gmail.com

Consent Form

I have been informed about the study entitled "Determinants of stunting among adolescent girls in schools of Digo Tsion Town, Northwest Ethiopia." It will be conducted by Mr. Ambaw Abebaw (BSc, MSc candidate). I understand the purpose and procedures of the study. I declare that my participation in this study is voluntary and I can withdraw at any time. I have been informed about any available compensation if injury occurs to me because of study-related procedures. I hope that you participate since your opinion is important. If you are willing to participate, please put your signature in the space provided below.

Participant's signature: _____ Date: _____

Interviewer's signature: _____ Date: _____

Thank you for your cooperation.

Assent form

I am _____ and a data collector for Ambaw Abebaw. He is a Pediatrics and Child Health Nursing master's student at Bahir Dar University. Now, he is conducting a study to identify determinants of stunting among adolescent girls in the schools of Digo Tsion town. So, I am asking you to take part in the research study because you have been chosen by chance to participate in the study and your participation is very helpful in designing a better stunting or chronic undernutrition prevention strategy for adolescent girls in the town. For this research, I will take a measurement of the height of the adolescent. I want to assure you that all of your answers will be kept strictly confidential. You have the right to participate or not, to stop the interview at any time, or to skip any questions that you don't want to answer. Your participation is completely voluntary. The interview may take approximately 10–15 minutes to complete. Sign this form only if you understand what you will do for this study, have discussed it with your parent(s) or legal guardian, and agree to participate in this research.

Your Signature _____ Date _____

Signature of Parent/Legal Guardian(s) _____

Researcher/explaining study Signature _____ Name _____Date_____

2. English Version Questioners

Name of interviewer_____ Signature_____ Date_____

Code of respondent_____ School name_____

Part 1. 1 Socio-demographic information			
101	How old are you?	_____ age in years	
102	Where you come from? (residence)	1. Rural 2. Urban	
103	With whom you are living?	1. Parents (Father and mother) 2. Mother only 3. Father only 4. Other (specify) _____	
104	What is your marital status?	1. Single 2. Married 3. Divorced 4. Other	
105	Family size residing in your home	_____ (write number)	
106	The educational status of your father	1. Unable to read and write 2. Read and write only 3. Primary school 4. Secondary school 5. College/University	
107	Occupation of your father?	1. Farmer/ Agricultural worker 2. Daily laborer 3. Merchant 4. Government employ 5. Unemployed 6. Other (Specify) _____	
108	The educational status of your mother	1. Unable to read and write 2. Read and write only 3. Primary school 4. Secondary school 5. College/University	
109	Occupation of your mother	1. Farmer/ Agricultural worker 2. Merchant 3. Government employ 4. Housewife 5. Others specify ----------	

Part 1.2 Wealth index assessment tools

S No	Questions	Response	Skip
1	What is the main source of drinking water for members of your household?	1. Tape water 2. Dug well water(protected) 3. Spring water (protected) 4. Dug well water(unprotected) 5. Spring water (unprotected) 6. Surface water/river	
2	Does your household have toilet facility?	1. Yes 2. No	If no go to Q6
3	What kind of toilet facility do members of your household usually use?	1. Pit latrine with slab 2. Pour flash latrine 3. Ventilated improved pit latrine 4. Pit latrine without slab 5. Other specify_ __	
4	Do you share this toilet facility with other households?	1.Yes 2. No	If no go to Q6
5	Including your own household, how many households use this toilet facility?	---------- in number	
6	What type of fuel does your household mainly use for cooking?	1. Electricity 2. Electricity and charcoal 3. Charcoal and wood 4. Natural gas (biogas) 5. Wood only 6. Other, specify----------	
7	Does this household own any livestock, herds, other farm animals, or poultry?	1. Yes 2. No	If no go to Q9
8	How many animals do this household own?	---------- in number	
9	Does this household own any agricultural land?	1.Yes 2. No	If no go to Q11
10	How many hectares of agricultural land do members of this household own?	---------- hectares	
11	Does your household have; (1), Electricity, (2), radio (3), television (4), computer (5), refrigerator (6), table	Incircle the response (Multiple answers are possible)	

	chair (7), bed with cotton mattress (8) electric mitad		
12	Does any member of this household own? (1), Watch (2), mobile phone (3), bicycle (4), motorcycle (5), baggaj (6), car	Incircle the response (Multiple answers are possible)	
13	Does any member of this household have a bank account?	1. Yes 2. No	
14	What is the material of the floor of the dwelling?	1. Bamboo 2. Flower plastic sheet 3. Cement/ceramic 4. Dung 5. Earth/sand 6. Other, specify ----------	
15	What is the material of the roof of the house?	1. Corrugated iron 2. Galvanized iron 3. Thatch/leaf 4. Plastic sheet 5. Other, specify ---------	
16	What is the material of the roof of the house?	1.Wood with mud 2. Stone with mud 3. Cement/building 4. Wood only 5. Other, specify	

Part 2. Dietary and nutritional service factor questionnaire

I.	**Food type and frequency related information of adolescent girls**		
201	What is your usual staple (usual) food? (More than one answer is possible)	1. Teff only 2. Teff, Maize, & Wheat 3. Teff, Maize, Barley & Wheat 4. Teff, Maize, Barley, Wheat and potato 5. Maize, Barley, Wheat and potato 6. Other (specify)_____	
202	Who is decision-maker in your family for you to get food service?	1. Father 2. Mother 3. Jointly (both mother & father) 4. Other ----------	

203	Where do your family get food for daily use or personal consumption?	1. Own product 2. Market purchase 3. Own product and market purchase 4. Others ----------	
204	How many times you have eaten meal per day?	1. Once per day 2. Twice per day 3. Three times and more	
205	Have you use snack?	1. Yes 2. No	
206	Have you ever skipped your regular meal?	1. Yes 2. No	If no skip to Q208
207	Which meal do you skip usually?	1. Breakfast 2. Lunch 3. Dinner	
208	Have you ever drunk coffee/tea immediately while eating meal?	1. Not at all 2. Sometimes 3. Always	
209	Have you ever got nutritional counseling?	1. Yes 2. No	
210	Have you ever used mass media?	1. Yes 2. No	

II. Dietary diversity score assessment tool with 24-hour dietary recall

Ask the participants weather the following groups of food were consumed within 24 hours

	Food categories	**Examples**	**Yes =1 No = 0**
1	Any food which is made from Grains, white roots and tubers, and plantains	Breads, rice, stiff porridges of maize, sorghum/millet, pasta, potatoes, Teff, wheat, rice, barley, maize, and oats.	1 0
2	Any food which is made from Pulses (beans, peas and lentils)	bean, pea, lentil	1 0
3	Any food which is made from Nuts and seeds	sesame, flax, sunflower, and nuts, nigger	1 0
4	Any food which is made from Dairy and dairy products	Milk, soft and hard cheeses and yoghurt	1 0
5	Any food which is made from Meat, poultry and fish	Meats, organ meats, poultry, fish beef	1 0

6	Any food which is made from Eggs	Eggs from any type of bird	1 0
7	Any food which is made from Dark green leafy vegetables	Chili, cabbage, spinach salad,	1 0
8	Any food which is made from other vitamin A-rich fruits and vegetables	Potato, carrot, pumpkin, pepper, and deep yellow- or orange	1 0
9	Any food which is made from other vegetables	Onion, Tomato, and mushroom	1 0
10	Any food which is made from other fruits	Orange, Banana, Avocado, watermelon, Apple, and Lemon	1 0

III. **Food Security assessment tools**

Ask the adolescent girl/her parents to consider what has happened in the past 30 days

1	In the past 30 days did you worry that your household would not have enough food?	1. Yes 2. No	If No skip to Q2
1.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	
2	In the past 30 days were you or any household members not able to eat the kinds of foods you preferred because of a lack of resources?	1. Yes 2. No	If "No" skip to Q3
2.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	
3	In the past 30 days did you or any household member eat just a few kinds of food day after day because of a lack of resources?	1. Yes 2. No	If "No" skip to Q4
3.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	

4	In the past 30 days did you or any household member eat food that you did not want to eat because of a lack of resources to obtain other types of food?	1. Yes 2. No	If "No" skip to Q5
4.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	
5	In the past 30 days did you or any household member eat a smaller meal than you felt you needed because there was not enough food?	1. Yes 2. No	If "No" skip to Q6
5.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	
6	In the past 30 days did you or any household member eat fewer meals in a day because there was not enough food?	1. Yes 2. No	If "No" skip to Q7
6.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	
7	In the past 30 days was there ever no food at all in your household because there were no resources to get more?	1. Yes 2. No	If "No" skip to Q8
7.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	
8	In the past 30 days did you or any household member go to sleep at night hungry because there was no enough food?	1. Yes 2. No	If "No" skip to Q9
8.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	
9	In the past 30 days did you or any household member go a whole day without eating anything	1. Yes 2. No	

	because there was no enough food?		
9.a	How often did this happen?	1. Rarely 2. Sometimes 3. Often	

Part 3: Personal hygiene, household and environmental-sanitation information			
301	Does your family have home latrine?	1. Yes 2. No	
302	What is the main source of drinking water for your household?	1. Tape water 2. Dug well water(protected) 3. Spring water (protected) 4. Dug well water(unprotected) 5. Spring water (unprotected) 6. Surface water/river	
303	Does your family use water purification methods?	1. Yes 2. No	If no, skip to Q305
304	What type of method is used?	1. Boiling 2. Wuha Agar 3. Strain through a cloth 4. Using sand 5. Others (specify)_____	
305	How often did you wash your hands before eating?	1. Not at all 2. Sometimes 3. Always	
306	Do you wash your hands after using toilet?	1. Yes 2. No	If no skip to Q308
307	Do you use soap/detergents for washing your hands?	1. Yes 2. No	
308	Does your family house have a separate waste disposal garbage?	1. Yes 2. No	

Part 4: Health related and health service questions

401	Have you received deworming tablet every six month?	1. Yes 2. No	
402	Have you been diagnosed as you had anemia before this time?	1. Yes 2. No	

403	Have you been ill with malaria?	1. Yes 2. No	
404	Have you ever had known chronic illness? (E.g., DM, CHD, epilepsy)	1. Yes 2. No	
405	Have you ever been visited by a HEW at your home?	1. Yes 2. No	If no, skip to Q407
406	Did they teach you about adolescent nutrition during the visits?	_____ in year	
407	Have you begun menstruation?	1. Yes 2. No	If no, skip to the end
408	At what age did you see your first menstruation?	1. Yes 2. No	

Thank you very much for giving your precious time and your collaboration!!

3. የአማርኛ ትርጉም ጠያቂዎች

መግቢያ

<u>መግቢያ/ዓላማ</u>: ስሜ _____ እባላለሁ እና ለተማሪ አምባው አበባው መረጃ ሰብሳቢ ሆኜ እየሰራሁ ነው። አምባው አበባው በባህርዳር ዩኒቨርሲቲ የሁልተኛ ድግሪ (ማስተርስ) የጎፃናትና ልጆች ጤና ነርስ ተማሪ ነኝ። በአሁኑ ሰዓት በዲጎ ጽዮን ከተማ ትምህርት ቤቶች ዉሰጥ በሚማሩ ታዳጊ ልጃገረዶች መካከል የመቀንጨር ችግርን በሚያሳዩ (በሚወስኑ) ነገሮች ላይ ጥናት እያካሄደ ነው።

<u>ሂደቶች፡</u> ይህ መረጃ በጉርምስና ዕድሜ ላይ ባሉ ልጃገረዶች መካከል የአመጋገብ አገልግሎትን የመፈለግ ባህሪን የሚያሻሽሉ ተግባራትን ለማቀድ ይረዳል። መጠይቁን ለማጠናቀቅ ከ10-15 ደቂቃዎች ሊወስድ ይችላል። ይህ መረጃ በጥናት አካባቢ ያሉ በጉርምስና ዕድሜ ላይ ያሉ ልጃገረዶች የአመጋገብ ሁኔታን ለመወሰን ያስችለናል።

ስጋቶች፡ በጉርምስና ዕድሜ ላይ የምትገኝ ልጃገረድ በዚህ ጥናት ውስጥ ብትሳተፍ ምንም አይነት የጎንዮሽ ጉዳት አስከትልም። ምንም ዓይነት ምቾት ማጣትም ሊገጥማቸው አይችልም።

ጥቅማ ጥቅሞች፡ በዚህ የምርምር ጥናት ውስጥ መሳተፍ ለተሳታፊዎች በግል አይጠቅምም ነገር ግን በጥናት ቦታዎች ያሉ በጉርምስና ዕድሜ ላይ የሚገኙ ልጃገረዶችን የአመጋገብ እና የጤና ሁኔታ ለማሻሻልና የወደፊት የአመጋገብ ተግባራቶችን ለማሻሻል ይረዳል።

ምስጢራዊነት፡ የተሳታፊዎችን መልስ በተቻለን መጠን በሚስጥር እንይዛለን። ለማንኛውም ጎረቤቶችዎ ወይም ቤተሰብዎ ምንም አይነት መልሶችን አናጋራም። በጥናቱ ቅጾች ላይ ከስም ይልቅ ቁጥር እንጠቀማለን። ይህን ጥናት ለሌሎች ሲያቀርብ ወይም ውጤቶቹን ሲያሳትም ሰዎች ግለሰብን እንዲያውቁ የሚያግዙት ስም እና ሌሎች እውነታዎች አይታዩም። ተሳታፊውን የሚለይ ማንኛውም መረጃ ከመልሶቹ ተለይቶ ይቀመጣል እና መልሶቹ በተመራማሪዎቹ ብቻ ለመተንተን ደህንነቱ በተጠበቀ ቦታ ይቀመጣሉ። ዋናው የወረቀት መጠይቆች በተቆለፉ ካቢኔቶች ውስጥ ይቀመጣሉ እና መረጃውም የይለፍ ቃል በሚጠይቁ ኮምፒውተሮች ላይ ይቀመጣል።

ለተጨማሪ መረጃ፡ ማንኛውም ጥያቄ ካልዎት መልስ ለመስጠት ደስተኛ ነኝ። በተጨማሪም የምንሰራለትን ሰው ማነጋገር ከፈለጋችሁ የአምባው አበባውን ስልክ ቁጥር መጠቀም ይችላለሁ።

ስልክ ቁጥር: +251918100749

ኢሜል፡ <u>ambabebaw@gmail.com</u>

የፍቃድ/ስምምነት ቅፅ

እኔ (----------) ስለ ጥናቱ መረጃ ተነግሮኛል የጥናቱ ርዕስም በዲጎ ጽዮን ከተማ ትምህርት ቤቶች ዉሰጥ በሚማሩ ታዳጊ ልጃገረዶች መካከል የመቀንጨር ሁኔታን የሚያሳዩ (የሚወስኑ) ነገሮች ምን ምን ናችዉ የሚል ነው። የጥናቱን ዓላማ እና ሂደት ተረድቻለሁ። በጥናቱ ላይ ለሚነሱ ጥያቄዎች መልስ እንድሰጥ እድል ተሰጥቶኝ እርካታ አግኝበታለሁ። በዚህ ጥናት ውስጥ ያለኝ ተሳትፎ ሙሉ በሙሉ በፈቃደኝነት እንደሆነ እና በማንኛውም ጊዜ ማቋረጥ እንደምችል ግንዛቤ አግኝቻለሁ። ከጥናቱ ጋር በተያያዙ ሂደቶች ምክንያት ጉዳት ቢደርስብኝ ስለሚገኝ ማንኛውም ማካካሻ ተነግሮኛል። በዚህ ጥናት ውስጥ ስለሚያደረጉት ተሳትፎ እናመሰግናለን። መልስዎ ጠቃሚ ስለሆነ እንደሚሳተፍ ተስፋ አደርጋለሁ። ለመሳተፍ ፍቃደኛ ከሆኑ እባኮትን ፊርማዎን ከታች ባለው ክፍት ቦታ ላይ ያስቀምጡ።

የተሳታፊ ፊርማ፡ _____ ቀን፡ _____

የጠያቂው ፊርማ፡ _____ ቀን፡ _____

ለትብብርዎ እናመሰግናለን!!!

የድጋፍ/ስምምነት ቅጽ

እኔ ---------- እባላለሁና የአምባው አበባው መረጃ ሰብሳቢ ነኝ። አምባው አበባው በባህርዳር ዩኒቨርሲቲ የሁልተኛ ድግሪ የጎፃናትና ልጆች ጤና ነርስ ተማሪ ነው። በአሁኑ ሰዓት በዲጎ ጽዮን ከተማ ትምህርት ቤቶች ዉሰጥ በሚማሩ ታዳጊ ልጃገረዶች መካከል የመቀንጨር ሁኔታን በሚያሳዩ ነገሮች ላይ ጥናት እያካሄደ ነው። በመሆኑም እርስዎ በምርምር ጥናቱ ላይ እንድትሳተፉ እጠይቃለሁ ምክንያቱም በጥናቱ ላይ ለመሳተፍ በአጋጣሚ ስለተመረጡ እና ተሳትፎዎ በከተማው ውስጥ ላሉ ታዳጊ ልጃገረዶች ሥር የሰደደ የተመጣጠነ ምግብ እጥረት መከላከል ስትራቴጂን ለመንደፍ በጣም ጠቃሚ ነው። ስለዚህ ለምርምሩ ጠቃሚ የሆኑ መጠይቆችን ትጠየቃላችሁ። የእርስዎን መልስ ለሌሎች እንደማናሳይና ምስጥራዊነታቸው በጥብቅ እንደሚጠበቁ ላረጋግጥልዎ እፈልጋለሁ። እንዲሁም በማንኛውም ጊዜ ቃለ መጠይቁን የማቆም ወይም መመለስ የማትፈልጉትን ማንኛውንም ጥያቄ የመዝለል፣ የመሳተፍም ያለመሳተፍ መብት አልዎት። እናም የእርስዎ ተሳትፎ ሙሉ በሙሉ በፈቃደኝነት ነው። ቃለ መጠይቁን ለመጨረስ ከ10-15 ደቂቃ ያህል ሊወስድ ይችላል። ለዚህ ጥናት ምን እንደምታደርጉ ከተረዱ፣ ሁሉንም ጥያቄዎችዎ መልስ ካገኙ፣ ስለዚህ ጠናቱ አላማ ከወላጆችዎ/ህጋዊ አሳዳጊዎ ጋር ከተነጋገሩ እና በዚህ ጥናት ላይ ለመሳተፍ ከተስማሙ ብቻ ይህንን ቅጽ ይፈርሙ።

የእርስዎ ፊርማ _____ ቀን _____

የወላጅ/ህጋዊ አሳዳጊ(ዎች) ፊርማ _____ ቀን _____

የሰብሳቢው ስም---------- ፊርማ _____ ቀን _____

የጠያቂው ሙሉ ስም----------ፊርማ----------ቀን---------

የመጠይቁ ኮድ ----------የት/ቤት ስም ----------

ተ. ቁ	ጥያቄዎች	አማራጭ መልሶች (መልሱን ያክቡ)	ወደ ተራ ቁጥር-ይዝለሉ
ክፍል 1.1 ማህበራዊ እና ስነ-ህዝባዊ መረጃን በተመለከተ ዳሰሳ			
101	ዕድሜ	……በአመት	
102	ከየት ነው የመጡት?	1.ገጠር 2. ከተማ	
103	ከማን ጋር ነው የሚኖሩት?	1. ከወላጆች (አባት እና እናት) 2. ከእናት ብቻ 3. ከአባት ብቻ 4. ከሌላ (ይግለጹ)_____	
104	የጋብቻ ሁኔታ	1. ያላገባች 2. ያገባች 3. የፈታች	
105	የቤተሰብ ብዛት	.....በቁጥር	
106	የአባት የትምህርት ደረጃ	1. ማንበብና መጻፍ የማይችል 2. ማንበብና መጻፍ የሚችል 3. የመጀመሪያ ደረጃ የጨረሰ(1-8) 4. ሁለተኛ ደረጃ የጨረሰ(9-12) 5. ኮሌጅና ከዚያ በላይ	
107	የአባት የስራ ሁኔታ	1. አርሶ አደር 2. የቀን ሰራተኛ 3. ነጋዴ 4. የመንግሰት ሰራተኛ 5. ሰራ የለውም 6. ሌላ ካለ ይገለጥ_____	
108	የእናት የትምህርት ደረጃ	1. ማንበብና መጻፍ የማትችል 2. ማንበብና መጻፍ ብቻ የምትችል 3. የመጀመሪያ ደረጃ የጨረሰች(1-8) 4. ሁለተኛ ደረጃ የጨረሰች(9-12) 5. ኮሌጅና ከዚያ በላይ	
109	የእናት የስራ ሁኔታ	1. አርሶ አደር 2. ነጋዴ 3. የመንግሰት ሰራተኛ 4. የቤት እመቤት 5. ሌላ ካለ ይገለጥ...	
1.2 የቤተሰብ አባላት ምጣኔ ሀብት መረጃ ሁኔታ መጠይቅ			
ተ.ቁ	ጥያቄ	መልስ	ዝለል

1	ለቤተሰብዎ አባላት ዋናው የመጠጥ ውሃ ምንጭ ምንድነው?	1. መኖሪያ ቤት ውስጥ ያለ ቧንቧ ውሃ 2. ንጽጎናው የተጠበቀ የጉድጓድ ውኃ 3. ንጽጎናው የተጠበቀ የምንጭ ውሃ 4. ንጽጎናው ያልተጠበቀ የጉድጓድ ውኃ 5. ንጽጎናው ያልተጠበቀ የምንጭ ውሃ 6. የወንዝ/መስኖ ውሃ	
2	የእርስዎ ቤተሰብ መኖሪያ ቤት መጸዳጃ ቤት አለውን?	ነ. አዎ 2. የለውም	የለም ካሉ ወደ ጥያቄ 6
3	የቤተሰብዎ አባላት ብዙውን ጊዜ የሚጠቀሙት ምን ዓይነት የመጸዳጃ ቤት ነው?	ነ. ጉድጓድ መጸዳጃ ቤት ንጣፉ ያለው 2. ፍሳሽ ወደ ቱቦ ማስወገጃ ስርዓት ያለው (ዉሀ ያለዉ) 3. የተሻሻለ አየር ማናፈሻ ያለው ጉድጓድ 4. ጉድጓድ መጸዳጃ ቤቶች ያለንጣፍ የተሰራ 5. የጋራ መፀዳጃ ቤት	
4	ይህንን የመጸዳጃ ቤት መገልገያ ከሌሎች ቤተሰቦች ጋር ይጋራሉ?	ነ. አዎ 2. የለውም	
5	የራስዎን ቤተሰብ ጨምሮ፣ ስንት አባወራዎች ይህንን የመጸዳጃ ቤት ይጠቀማሉ?	……. በቁጥር	
6	ቤተሰብዎ በዋናነት ለምግብ ማብሰያ የሚጠቀሙት ምን ዓይነት ነዳጅ ነው?	ነ. ኤሌክትሪክ ብቻ 2. ከሰልና ኤሌክትሪክ 3. እንጨትና ከሰል 4. የተፈጥሮ ጋዝ 5. እንጨት ብቻ	
7	ይህ ቤተሰብ የእንስሳት፣ የከብት መንጋ፣ የሌሎች የእርሻ እንስሳት ወይም የዶሮ እርባታ አለው ወይ?	ነ. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 9
8	ይህ ቤተሰብ ስንት እንስሳት አሉት?	…….በቁጥር	
9	ይህ ቤተሰብ የእርሻ መሬት አለው?	ነ. አዎ 2. የለውም	የለም ካሉ ወደ ጥያቄ 11
10	ስንት ሄክታር የእርሻ መሬት አላቸው?	…….በሄክታር	
11	የእርስዎ ቤተሰብ የኤሌክትሪክ መብራት አለውን?	ነ. አዎ 2. የለውም	
12	ከዚህ የቤተሰብ ውስጥ አባል ሬዲዮ ያለው አለ?	ነ. አዎ 2. የለም	
13	ከዚህ የቤተሰብ አባል ውስጥ ቴሌቪዥን ያለው አለ?	ነ. አዎ 2. የለም	
14	ከዚህ የቤተሰብ አባል ውስጥ ኮምፒተር ያለው አለ?	1. አዎ 2. የለም	
15	ከዚህ የቤተሰብ አባል ውስጥ ሞባይል ያለው አለ?	1. አዎ 2. የለም	

16	ከዚህ የቤተሰብ አባል ውስጥ የእጅ ሰዓት ያለው አለ?	1. አዎ 2. የለም	
17	ከዚህ የቤተሰብ አባል ውስጥሞባይል ያለው አለ?	1. አዎ 2. የለም	
18	ከዚህ የቤተሰብ አባል ውስጥ ብስክሌት ያለው አለ?	1. አዎ 2. የለም	
19	ከዚህ የቤተሰብ አባል ውስጥ ሞተር ሳይክል ያለው አለ?	1. አዎ 2. የለም	
20	ከዚህ የቤተሰብ አባል ውስጥ ባጃጅ ያለው አለ?	1. አዎ 2. የለም	
21	ከዚህ የቤተሰብ አባል ውስጥ መኪና ያለው አለ?	1. አዎ 2. የለም	
22	የዚህ የቤተሰብ አባል ማቀዝቀዣ አለው?	ነ. አዎ 2. የለም	
23	የዚህ ቤተሰብ አባል የኤሌትሪክ ምጣድ አለው?	ነ. አዎ 2. የለም	
24	የዚህ ቤተሰብ አባል ጠረጴዛ አለውን?	ነ. አዎ 2. የለም	
25	የዚህ ቤተሰብ አባል ወንበር አለውን?	ነ. አዎ 2. የለም	
26	የእርስዎ ቤተሰብ ጥጥ/ስፖንጅ/ ስፕሪንግ ፍራሽ ያለው አልጋ አለውን?	1. አዎ 2. የለም	
27	ከዚህ የቤተሰብ አባል ውስጥ የባንክ ሂሳብ ቁጥር ያለው አለ?	1. አዎ 2. የለም	
28	የመኖሪያ ቤቱ ወለል ቁሳቁስ ምንድን ነው?	1. የእንጨት ጣውላዎች 2. ምንጣፍ 3. ሲሚንቶ/ሴራሚክ 4. እበት 5. ምድር (አፈር; አሸዋ) 6. ሌላ፣ ይግለጹ ---------	
29	የቤትዎ የውጭ ግድግዳ ዋናው ቁሳቁስ ምንድን ነው?	ነ. እንጨት ከጭቃ ጋር 2. ከብከት 3. እንጨት 4. ሌላ ካለ ይግለጹ (_____)	
30	የቤትዎ የጣሪያው ዋና ቁሳቁስ ምንድ ነው?	1. የብረት ቆርቆሮ ቆርቆሮ 2. የሳር ክዳን 3. ሌሎች (ይግለጹ)____	

ክፍል 2፡ የአመጋገብ አገልግሎት እና ከአመጋገብ የተያያዙ ጥያቄዎች

2.1 በጉርምስና ዕድሜ ላይ ያሉ ልጃገረዶች የአመጋገብ አገልግሎት እና የምግብ ድግግሞሽ መረጃ			
201	የእርስዎ ሁልጊዜ የሚጠቀሙት ዋና ምግብ ምንድን ነው? (ካንድ በላይ መልስ መስጠት ይቻላል)	1. ጤፍ 2. በቆሎ 3. ማሽላ 4. ገብስ 5. ስንዴ 6. ድንች 7. ሌላ (ይግለጹ)___	

202	የሚበላ ምግብ ለማግኘት በቤተሰብዎ ውስጥ ውሳኔ ሰጪ ማን ነው?	1.አባት 2. እናት 3. በጋራ (ሁለቱም እናትና አባት 4. ሌላ(ይግለጹ).....	
203	ለቤተሰብዎ ፍጆታ የሚሆን ምግብ ከየት ያገኛሉ?	1.የራስ ምርት 2. የገበያ ግዢ 3. የራስ ምርትና የገበያ ግዢ 4. ሌላ _____	
204	በቀን ስንት ጊዜ መደበኛ ምግብ ትመገባላችሁ?	1.በቀን አንድ ጊዜ 2. ሁለት ጊዜ 3. ሶስት ጊዜ እና ከዚያ በላይ	
205	መክሰስ ትጠቀማላችሁ?	1. አዎ 2. የለም	
206	መደበኛ ምግብዎን ያሳልፋሉ?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 208
207	ብዙውን ጊዜ የትኛውን ምግብ ነው የሚዘለሉት?	1. ቁርስ 2. ምሳ 3. እራት	
208	ከምግብ ጋር ወይም በኋላ ቡና ወይም ሻይ ትጠጫለሽ?	1. አዎ 2. የለም	
209	የአመጋገብ ምክር/የትምህርት አገልግሎት ወስደሽ ታውቃለሽ?	1. አዎ 2. የለም	
210	የጤና እና የስነ-ምግብ መረጃ ምንጮችን ይመለከታሉ/ትጠቀማላችሁ?	1. አዎ 2. የለም	

2.2 በምግብ ጊዜ የምግብ ስብጥር ሁኔታ የሚዳስስ

ትናንትና ጠዋት ከተመገቡት ምግብ በመነሳት በትናንትናው ዕለት ቀንም ሆነ ማታ(ፀሐይከወጣችጀመወሮለ24 ሰዓት) በተናጠል ወይም በጥምር የወሰዷቸውን የምግብ/የመጠጥ አይነቶች ምን ምን እንደሆኑ(ከተዘረዘሩት ውስጥ አንዱን እና ከዚያ በላይ ከተጠቀሙ 1ን ምንም ካልተጠቀሙ 0) ይግለጹ።።

ተ.ቁ	ጥያቄዎች	ምሳሌዎች	አዎ = 1 የለም = 0
1.	ባለፈው 24 ሰአት ውስጥ ቀንም ሆነ ማታ የእህል ዘር እና ስር ያላቸው ተመግበዋል?	እንጀራ፣ዳቦ፣ቂጣ፣ገንፎ፣ማሽላ፣በቆሎ፣ሩዝ፣ፓስታ፣ስንዴ፣ገብስ፣ዳጉሳ፣፣ድንች፣ቆጮ፣ካዛባ፣ቀይ.ስር፣አጃ	1 0
2	ባለፈው 24 ሰአት ውስጥ ከጥራጥሬ ዘር ተመግበዋል?	ባቄላ፣ አተር፣ ምስር፣ ጋያ፣ ምስር	1 0
3	ከቅባት እህል ዘር ተመግበዋል?	አቮሎኒ፣ ኑግ፣ ተልባ፣ ለውዝ፣ ሰሊጥናሱፍ እና ሌሎች. ከቅባት እህል ዘሮች	1 0
4.	ባለፈው 24 ሰአት ውስጥ ወተትና የወተት ተዋጽኦ ተመግበዋል?	ወተት፣ አይብ፣ እርጎ፣ ሌሎች የወተት ተዋጽኦ	1 0
5	ባለፈው 24 ሰአት ውስጥ ስጋ፣ የአካል ክፍል ስጋዎች እና የባህር ውስጥ ምግቦችን ተመግበዋ?	የበሬ፣ የበግ፣ የፍየል፣ የዶሮ፣ ጉበት፣ ኩላሊት፣ ልብ፣ ወይም የሆድ ዕቃ ጨምሮ አካል ክፍል ስጋዎች፣ አሣ	1 0
6	ባለፈው 24 ሰአት ውስጥ እቁላል ተመግበዋል?	የዶሮ፣ የዝግራ፣ ሌላ...	1 0

7.	ባለፈው 24 ሰአት ውስጥ ደማቅ አረንጋዴ ቅጠል ያላቸው አትክልቶች ተመግበዋል?	ሰላጣ፣ ቆስጣ፣ ጥቅልጎመን፣ ጎመን	1 0
8	ባለፈው 24 ሰአት ውስጥ በቫይታሚን ኤ የበለጸጉ ፍራፍሬዎችና አትክልቶች ተመግበዋል?	ዱባ፣ ካሮት፣ ስካርድንች፣ ድንች፣ በርበሬ፣ ደማቅ ቢጫ ብረቱካን፤ ፓፓያ፤	1 0
9	ባለፈው 24 ሰአት ውስጥ ሌሎች ከላይ ያልተጠቀሱ አተክልቶች ተመግበዋል?	ቀይ ሽንኩርት፣ ነጭ ሽንኩርት፣ ቲማቲም፣ እንጉዳይ	1 0
10	ሌሎች ፍራፍዎች	ሙዝ፣አቮካዶ፣ አናናስ፣ አፕል፣ ብርቱካን፣ ሎሚ፣ ሐብሐብ፣	1 0

2.3 የምግብ ዋስትና በተመለከተ የተዘጋጀ			
ከጥያቄ 1- 18 ድረስ ያሉት ጥያቄዎች **ባለፉት 4 ሳምንታት** ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን በችግር ምክንያት ሊያጋጥማቸው ስለሚችል የምግብ አቅርቦት እና የአመጋገብ ሁኔታን የሚጠይቁ ጥያቄዎች ናቸው፡፡			
1	ቤተሰቡ በቂ ምግብ አያገኝ ይሆናል ብለው ተጨንቀው ያውቃሉ?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 3 ይቀጥሉ
2	ቤተሰቡ በቂ ምግብ አያገኝ ይሆናል ብለው ተጨንቀው ከሆነ ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
3	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን መመገብ የሚፈልገውን ምግብ ማግኘት ያልቻለበት ሁኔታ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 5 ይቀጥሉ
4	የሚፈለገው አይነት ምግብ ያልተገኘው ስንት ጊዜ ነበር**?**	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
5	የቤተሰቡ አባላት የተወሰነ ምግብ አይነት ብቻ ለመብላት የተገደዱበት ሁኔታ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 7 ይቀጥሉ
6	የቤተሰቡ አባላት የተወሰነ ምግብ አይነት ብቻ ለመብላት የተገደዱት ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
7	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን መመገብ የማይፈልገውን ምግብ እንዲበላ የተገደደበት ሁኔታ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 9 ይቀጥሉ
8	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል የማይፈልገውን አይነት ምግብ እንዲበላ የተገደደው ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
9	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን ከወትሮው በመጠኑ ያነስ ምግብ እንዲበላ የተገደደበት ሁኔታ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 11 ይቀጥሉ

10	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን ከወትሮው በመጠኑ ያነስ ምግብ እንዲበላ የተገደደው ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
11	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን ምግብ ከወትሮው በቀን ከሚበላው ያነስ ጊዜ እንዲበላ የተገደደበት ሁኔታ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 13 ይቀጥሉ
12	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን ምግብ ከወትሮው በቀን ከሚበላው ያነስ ጊዜ እንዲበላ የተገደደው ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
13	በቤት ውስጥ በችግር ምክንያት ምንም አይነት ምግብ የጠፋበት ሁኔታ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 15 ይቀጥሉ
14	በቤት ውስጥ ምንም አይነት ምግብ የጠፋው ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
15	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን ምግብ ሳይበላ ተርቦ ያደረበት ጊዜ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 17 ይቀጥሉ
16	የምግብ እጥረት በመኖሩ ምክንያት ምግብ ሳይበላ ተርቦ ያደረው ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	
17	ቤተሰቡ ወይም ከቤተሰብ አባላት መካከል አንዱም ቢሆን ምንም ምግብ ሳይበላ ውሎ ያደረበት ጊዜ ነበር?	1. አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 301 ይቀጥሉ
18	ምግብ ሳይበላ ውሎ ያደረው ስንት ጊዜ ነበር?	1. በጣም ትንሽ ጊዜ 2. አንዳንድ ጊዜ 3. ብዙ ጊዜ	

ክፍል 3: የግል ንፅህና፣ የቤተሰብ እና የአካባቢ ንፅህና መረጃ			
301	የእርስዎ ቤተሰብ መፀዳጃ ቤት አለ?	1.አለ 2. የለም	
302	የቤተሰቡ ዋና የመጠጥ ውኃ መገኛ ምንድን ነው?	1.መኖሪያ ቤት ውስጥ ያለ ቧንቧ ውሃ 2. ንጽኅናው የተጠበቀ የጉድጓድ ውኃ 3. ንጽኅናው ያልተጠበቀ የጉድጓድ ውኃ 4. ንጽኅናው የተጠበቀ የምንጭ ውሃ 5. ንጽኅናው ያልተጠበቀ የምንጭ ውሃ 6. የወንዝ/መስኖ ውሃ	

303	ቤተሰብዎ የውሐ ማጣሪያ ዜዴዎችን ይጠቀማሉ?	1. አዎ 2. የለም	
304	የውሃውን ንፅህና ለመጠበቅ የሚጠቀሙት ዘዴ ምንድ ነው? (ከአንድ በላይ መልስ መስጠት ይቻላል)	1.ውሃውን ማፍላት 2. ክሎሪን በመጨመር 3. ውሃ ማጥለያ በመጠቀም(ሽክላ፤አሸዋ) 4. ቆሻሻው እንዲዘቅጥ በማድረግ 5.ሌላ.....	
305	ምግብ ከመብላት በፊት እጅዎን ይታጠቡታል?	1. በፍፁም 2. አንዳንድ ጊዜ 3. ሁልጊዜ	
306	ሽንት ቤት ከተጠቀሙ በኋላ እጅዎን ይታጠቡታል?	1. አዎ 2. የለም	
307	እጅዎን ለመታጠብ ሳሙና/ማጽጃ ይጠቀማሉ?	1. አዎ 2. የለም	
308	የእርስዎ ቤተሰብ ቤት የፈሳሽ ቆሻሻ የተለየ ማስወገጃ ቦታ አለው?	1. አዎ 2. የለም	

ክፍል 4: የጤናና ጤና ነክ አገልግሎት መጠየቆች

401	በስድስት ወራት የሆድ ትላትል ማጥፊያ መድሐኒት ወስደሽ ነበር?	1.አዎ 2. የለም	
402	ከዚህ ጊዜ በፊት የደም ማነስ ኢጋጥሞሽ ያውቃል?	1.አዎ 2. የለም	
403	ከዚህ በፊት በወባ ታምመሽ ታውቂያለሽ?	1.አዎ 2. የለም	
404	የቆየ (ቶሎ ሊድን የማይችል) የታወቀ ሕመም አለብሽ?	1.አዎ 2. የለም	
405	የወር አበባ ማየት ጀምረሻል?	1.አዎ 2. የለም	የለም ካሉ ወደ ጥያቄ 407 ይቀጥሉ
406	የወር አበባ ማየት የጀመርሽው በስንት አመትሽ ነው?	.....አመት	
407	የጤና ኤክስቴንሽን ሰራተኛ በቤትዎ ጉብኝት አድርገውልሽ ነበር?	1.አዎ 2. የለም	የለም ካሉ ይዝለሉት
408	የጤና ኤክስቴንሽን ሰራተኛው ስለ ታዳጊ ልጃገረድ አመጋገብ የነገረዎት ነበር?	1.አዎ 2. የለም	

ውድ ጊዜዎን እና ትብብርዎን ስለሰጠን በጣም እናመሰግናለን!!