

NUTRITIONAL STATUS AND ASSOCIATED FACTORS
AMONG IN SCHOOL ADOLESCENTS IN CHIRO TOWN



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NUTRITIONAL STATUS AND ASSOCIATED FACTORS AMONG
IN SCHOOL ADOLESCENTS IN CHIRO TOWN, WEST HARARGE,
OROMIA, 2013

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Abstract

Background: Adolescence is a period of intense physical, psychosocial and cognitive development and the second to infancy at which highest rate of physical growth occur. So Adolescent need to have good quantity and quality nutrient to cope with this rapid growth and other health risk which increase nutritional demand. However there is limited study and attention for adolescent nutrition; especially in developing country where the demographic weight of adolescent is significant.

Objective: The Objective of this study is to assess nutritional status and associated factors among in school adolescents in chiro town.

Method and Material: Cross-sectional quantitative study design was employed from November 04- 13, 2013. Data were collected using structured questionnaires from 291 adolescent students. Anthropometric measurement (weight and height) was taken by trained nurses. Data were entered to Epidata Version 3.1 .Then the data was Analysed using SPSS version 16.0. Descriptive statistics was used to show the prevalence of nutritional status and other independent variable characteristic. Bivariate and multivariate binary logistic regression analysis was used to identify predictorsof nutritoinal status of adolecents by controlling the effect of possible confounders.

Results: Out of 319 selected sample 291(91.2%) were participated in the study. This study revealed that 24.4% and 7.2% of adolescents were found to be underweight and stunted respectively. Socio-demographic factors like being early adolescents (10-14 years) [AOR=2.06, CI= 1.02, 4.16], male [AOR= 3.91 CI=1.7, 8.98], chewing chat [AOR=2.45 CI=1.07, 5.64], having fathers with no formal education [AOR=8.52 CI=2.055, 35.36] were assocaited with being underweight. Hand washing “sometimes”after toilet [AOR= 3.24 CI= 1.01, 10.37] was found to be predictor of stunting.

Conclusion and Recommendation-The prevalence of underweight was high one out of three among adolescents but the prevalence of stunting was low one out of thirteen. Factors associated with underweight were sex, age and chat chewing of adolescents, educational status of father and sex of household head.

Key word: School Adolescent, Stunting, Deitary Diversity, Anthropometry

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Acronyms

AIDS	Acquired immunodeficiency syndrome
BMI	Body Mass Index
CSA	Central Statistics Agency
DHS	Demographic Health Survey
EDHS	Ethiopian Demographic and Health Survey
FAO	Food and Agricultural Organization
ICRW	International Center of Research on Women
HIV	Human Immunodeficiency Virus
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
SD	Standard Deviation
SPSS	Statistical Package for Social Science
USA	United States of America
UN	United Nation
WHO	World Health Organization.

Chapter One: Introduction

1.1 Background Information

Both United Nation and World Health Organization define adolescent as a segment of population group age from 10-19 years; this is a period of transition from childhood to adulthood accompanied with intense physical, psychosocial and cognitive development (1, 2). During this period, the final growth spurt occur; particularly early adolescence after the first year of life is the critical period of rapid physical growth and changes in body composition, physiology and endocrine (3,4, 5).Up to 45% of skeletal growth takes place and 15 to 25% of adult height is achieved during adolescence. During the growth spurt of adolescence, up to 37% of total bone mass may be accumulated (5). Regarding body composition change girls begin to store fat around breast, hips and upper arm but boys start losing fat and develop muscle (6).

All humans require the same set of essential nutrients, but the amount of nutrients needed varies based on: age, illness, body size, lifestyle habits (e.g., gender smoking, alcohol intake), genetic traits, medication use, growth, pregnancy and lactation (7).Adolescents are especially vulnerable for nutritional deficiency for the increase demand of additional energy to cope with faster growth, change in eating habit and other health risks (8,9).

Thus during this period the adolescents are requiring the highest quantity and quality nutrients. So if those requirement and quality of nutrients for adolescents are not met, malnutrition happens that influences growth, development and health of adolescents (7).

Additionally, malnutrition is also caused by others like disease condition and genetic factors (7). For example People who has Human Immuno deficiency Virus(HIV) infection require 10% more energy when asymptomatic and 20–30% more when symptomatic (10) and a large number of genes more than 300 involved in obesity have been identified, but they still explain only a fraction of the variance attributed to genetic factors identified by family and twin studies(11).

Adolescence period is a window of opportunity for human being because there is possibility of little catch-up growth (12, 13). And it is a time of changing lifestyles and food habit; changes that affect both nutrient needs and intake so it is an opportunity to shape this new behavior adoption (7, 14). Currently adolescents make up roughly 20% of the global population (2, 15). In developing countries, adolescents have an even higher 85% demographic weight, for instance, roughly 26% in Salvador, compared to 14% in USA (16). Similarly, in the Ethiopia, it is estimated that adolescents represent more than quarter (25.9%) of the total population (17). Those significant number of adolescents worldwide and especially developing country where huge number of adolescents resides deserve to reach and maintain the highest level of health. But this is impossible in presence of malnutrition, especially for adolescent girls (18, 19).

1.2 Statement of the problem

Malnutrition is a common health problem in the world; both over nutrition and under nutrition. Adolescent nutritional problems are common throughout the world as well. Some young people lack adequate food and others make poor food choices (20). Especially under-nutrition among adolescents is a serious public health problem internationally, particularly in developing countries (13). According to International Center of Research on Women (ICRW) report the prevalence of underweight was highest among countries like India, Nepal and Benin which ranges from 4-30% (21). Stunting is also widely prevalent among adolescents of the globe according to ICRW report, which ranges from 27-65%. The higher prevalence of both underweight and stunting was in South Asia (13). In Africa the prevalence of undernutrition among adolescents were found to be higher in eastern part of the continent (22-25). In Ethiopia the prevalence of undernutrition were found to be high (22, 26).

Those malnutrition has been continue to be a primary cause of poor health in those countries (27;28). Malnutrition during any of adolescence can have lasting consequences on an adolescent's cognitive development, resulting in decreased learning ability, poor concentration, and impaired school performance (14). The health consequence on adolescent girls have been identified to be high; obstetric risk particularly if they are short and

underweight and transmitting malnutrition to next generation because of competing growth of mother (29,21).

Ethiopia, as the developing country, nutritional problems is one of the major health problems for all stage of human life (30). Under nutrition is assumed to be affected by both health and food security status of the individual(31) .Ethiopia has more than 50 percent population remain food insecure, particularly in rural areas and about ten percent of the population is chronically food insecure and is further prone to acute food insecurity, primarily during times of drought, environmental degradation, and insufficient access to and availability of food (10, 32).And west Hararge is one of the chronically food in secured area because of long term drought in the area, almost 80% woreda is food insecure district (33).

Attaining health for all people at every stage of their life especially for the adolescent the so called next generation is impossible in the presence of malnutrition (14, 20, and 34).Unfortunately; information regarding the nutritional status of adolescents from the developing world is scanty. Limited studies conducted across a range of ecologic settings in the developing world demonstrate that children enter middle childhood having already accumulated significant deficits in nutritional status (35, 36). Similarly limited studies conducted in Ethiopia did not show the prevalence in chronically drought affected area and didn't assess factors like diet inaduaqacy.As long as malnutrition among adolescents need to be intervened.Adequate information is needed for effective intervention.

Chapter Two

2.1 Literature Review

Nutritional status of an adolescent is reflected by his/her body composition, which in turn demonstrates individual's lifetime nutrient and energy balance. Which can be studied at whole body level with accurate method to estimate the component at whole body level .The most common component at this level are body weight and height (37).

There are different indicators of height and weight status of adolescents to show chronic and/or acute nutritional problems, which determine nutritional status. The commonest are stunting, underweight, wasting, overweight and obesity (38).

2.1.1 Stunting

Short stature may reflect the long term health and nutritional status of population. Stunting can result from growth retardation because of chronic malnutrition, recurrent illness, or both (39).

Stunting is commonly observed among adolescents in populations with a high rate of children malnutrition. According to WHO review stunting has been found highly prevalent in 9 of the 11 ICRW studies, ranging from 27% to 65%. The highest (65%) has been found in Philippines (29).

The cross-sectional study done among adolescent age group 10-19 years in Gujarat, India demonstrates that the prevalence of stunting was 47.4%, in which the stunting was higher in Male (53.8%) than female (41.3%). But the associated factors were not studied in this study (40).Other cross sectional study done among rural school-going adolescents in Darjeeling District, West Bengal, India show that 46.6% of adolescents found to had stunting. A high prevalence of stunting was found among boys (43.1%) and girls (50.3%) this study reveal that, there was asignificant difference in the prevalence of stunting in terms of age and sex among the adolescents(34).

Stunting is also very common in sub-Saharan African countries. For example studies done on late adolescent in Umuahia town of South Eastern Nigeria demonstrate that 67.3% of boys and 57.8 of girls have been found stunted (41).

The cross-sectional study done among adolescent schoolgirls in western Kenya demonstrates that the prevalence of stunting was 12.1%. Of total 2% were severely stunted and the prevalence of stunting decrease with age(42).

Concerning Ethiopia cross-sectional study conducted among rural adolescent girls in Tigray demonstrated that 26.5% of them had stunting. This study didn't include boy adolescents which many other countries study boys are more affected (26). Other Community based Cross-sectional study done among adolescents in Jimma that prevalence of stunting among adolescents were 16%, which was lower when compared to other studies (43).

According to WHO discussion paper limited study has been demonstrate that Chronic under nutrition that result in stunting is responsible at adolescence for delayed growth and maturation, magnified obstetric risk especially where adolescent pregnancy is higher, and reduced work capacity . There is evidence that this consequence continues for adulthood lifetoo (29, 44).

Still there is debated question in the extent of catch-up growth that is achievable during adolescence. But delayed growth and maturation as a result of chronic malnutrition in children allows for some spontaneous catch-up growth in adolescence, since the growing period is extended (13, 29).

However, this catch-up is not complete, particularly for those remaining in the same (adverse) environment (13). Furthermore, nutritional improvement may increase the velocity of adolescence growth spurt, but at the same time, accelerate maturation and as a result reduce the period of fast growth, with little change in the final achieved height (29).

2.1.2 Underweight

Underweight is depletion of body fat or lean tissue stores or both. World Health Organization defines underweight as a BMI below the 5th percentile for age and gender. Its status may be related to genetics, acute or chronic under nutrition, or illness. And it is associated with high morbidity and mortality (45).

Underweight is common nutritional problem among adolescent in the world. The study done among high school student in Northern Province of Iran has been demonstrated high underweight 29.9% and 13.9% among boys and girls respectively (46). Similarly underweight is very common in developing countries For example study done in urban slum of south India has been show that 42.6% of adolescent as per NCHS are underweight (47).

Cross sectional study done among rural school-going adolescents in Darjeeling district, West Bengal, India show that 42.3% of adolescents found to had underweight. A high prevalence of underweight was found among boys (53.1%) than girls (32.0%). this study reveal that, there was asignificant difference in the prevalence of Underweight in terms of age and sex among the adolescents(34) Other cross-sectional study done among school adolescents age from 10-19 years to assess nutritional status and morbidity in Wardha, a Peri-Urban area of India demonstrate that the prevalence of underwieght was 51.7%. Early adolescent were found to be more underweight than late adolescents (48).

In sub-Sahara Africa limited study done demonstrate that underweight among adolescent is high too. Study done in Tanzania Kilosa district has been demonstrate that 21% of adolescent are underweight this prevalence varies with in age group where highest (26.2%) for age group from 13-15 years old and lowest (13.3%) for 16-19 years old adolescent(23).

Especially for adolescents the onset of puberty may be delayed in both male and female with a low BMI. For example study done among secondary school adolescent girl in Port Harcourt of Nigeria has been demonstrated that age at menarche is delayed in underweight adolescent girl (mean age 13.09 ± 1.14) than normal weight adolescent girl (12.09 ± 1.15). Abnormal menses has been demonstrated in underweight females. And Underweight

adolescents who become pregnant may be at increased risk for pregnancy complications and poor fetal outcomes (45, 49).

Concerning Ethiopia; National baseline survey demonstrates that 14% of adolescent girls had low BMI for age (50). Cross-sectional study done among rural adolescent girls in Tigray show that 58% of them were found to have underweight (26). Community based Cross-sectional study done among adolescents in Jimma show that prevalence of underweight among adolescents was 80.3%, which was higher when compared to other studies (43).

The other study done among school adolescent in central part of Ethiopia Ambo town show 27.2% of underweight that varies in age and sex (22). The other study done in primary schools of Addis Ababa demonstrate that the prevalence of underweight among adolescent were 13% which seems low (51).

2.1.3 Wasting

Wasting results from inadequate nutrition over a shorter period (7). It is acute malnutrition indicator. Wasting, based on low body mass index (BMI) is not widespread among adolescents, according to available data. However, the situation may be very different in emergency settings. Particularly when the crisis situation extends over long periods of time, adolescents may be seriously affected by malnutrition and yet, have little access to supplementary or therapeutic feeding programmes. Preliminary results of a recent survey among adolescent refugees from Bhutan (52) reveal a 34% rate of low BMI, much the same as in adults. And the study conducted among adolescent girl in rural Kolar district of India shows that only 26.5% of girls were normal as per BMI, 73.6% were found to be thin and out of these 69% were in severe degree of wasting. The prevalence of wasting decreases with the age but this was not significant. The prevalence of wasting was peak in 10 to 14yrs girls (53). Other study from Pakistani show the prevalence of thinness among males and females was 11% and 9% respectively (54). Cross sectional Study from northern part of Ethiopia show under nutrition was prevalent among adolescent girls the thinness was 58.3% which is the highest (26). According to Ethiopian DHS 2011 Despite prevalence of wasting for under five children in Ethiopia is about 10%; the prevalence of thinness for late adolescent (15-19 years) was 65.9% and 36.15 for boys and girls respectively (44).

2.1.4 Obesity

Obesity is a disorder of energy metabolism involving excessive adipose tissue stores (body fatness), which may be associated with medical or psychosocial morbidity. The prevalence, as well as the severity of obesity in adolescents is increasing at an alarming rate, making it one of the most serious health problems affecting adolescent (45).

Obesity has become a global pandemic and should be regarded as today's principal neglected public health problem (55). It is increasing in most high-income countries, in developing countries undergoing nutrition transition, and even in poor countries with current food insecurity and under nutrition problems. For instance in one of Nigeria semi urban study conducted among adolescents a total of 46.79% of the boys and 86.79% of the girls studied had no detectable nutritional impairment, while 37.28% of the studied population (irrespective of sex) suffer from malnutrition of which 20% is under nutrition and 17.28% over nutrition . The prevalence of underweight in this study was 19.36% and 13.12% were found to be overweight; which were nearly similar. From over nutrition 24.60% of boys and 4.78% of girlshave been obese (56). From study in South Africa overweight and obesity increase with age in adolescent and reach around 25% in late adolescence (57).

Environmental factors, or interactions between genetic and environmental factors, are the most likely causes of the dramatic rise in overweight and obesity (29).

These environmental factors increase the risk of developing overweight if an adolescent is genetically predisposed to obesity (58).

The persistence of overweight from childhood throughout adulthood has not been well quantified. However according to International association for study of obesity there is moderate evidence for persistence of child and adolescent overweight/obesity to adult. Moreover as many as 90% of overweight adolescents can be expected to remain overweight into adulthood (59).

A Cross-sectional study done among Semnan city adolescents in Iran show that the prevalence of at risk for and overweight was 11.7% and 4.7% respectively. The highest percentage of obesity (6.3%) was in the late age groups (60).

2.1.5 Factors related to nutritional status

Adolescent nutritional problems are common in the Ethiopia and throughout the world. Some young people lack adequate food and others make poor food choices (19, 36, and 30). Moreover nutritional status of adolescent is affected with socioeconomic, environmental/community and individual behavioral and biologic status affect adolescent nutritional status (45).

Demographic factors like age and sex of the adolescent affect nutritional status. study done in Central Ethiopia Ambo district demonstrate that the proportion of underweight in early adolescent (10-14 years) was significantly higher than late adolescent (15-19 years) 38.1% and 18.6% for early and late adolescent respectively (22).The prevalence of thinness in rural areas ranged from 24.5 to 31.5 per cent in males as compared to 14.6 to 15.8 per cent in females (61).

Socioeconomic factors like parent education especially mother educational level, source of food purchased /produced, food availability level of income associated with malnutrition (22, 61). Source of water for drinking and lack of latrine or safe waste disposal Facilities (83%) are factor those found to contribute for malnutrition of adolescent girls (26).

The place of residence like being rural and urban affect nutritional status of adolescents for example in 2011 Ethiopian DHS it has been demonstrated that rural men are slightly more likely to be thin 39% than urban men 32%.(44).

Nutritional factors like eating pattern (frequency of meal) and frequent consumption of foods high in fat and sugar affect nutritional status of adolescent (7). Adolescents who eat less frequent have been more underweight (22).

2.2 Conceptual frame work

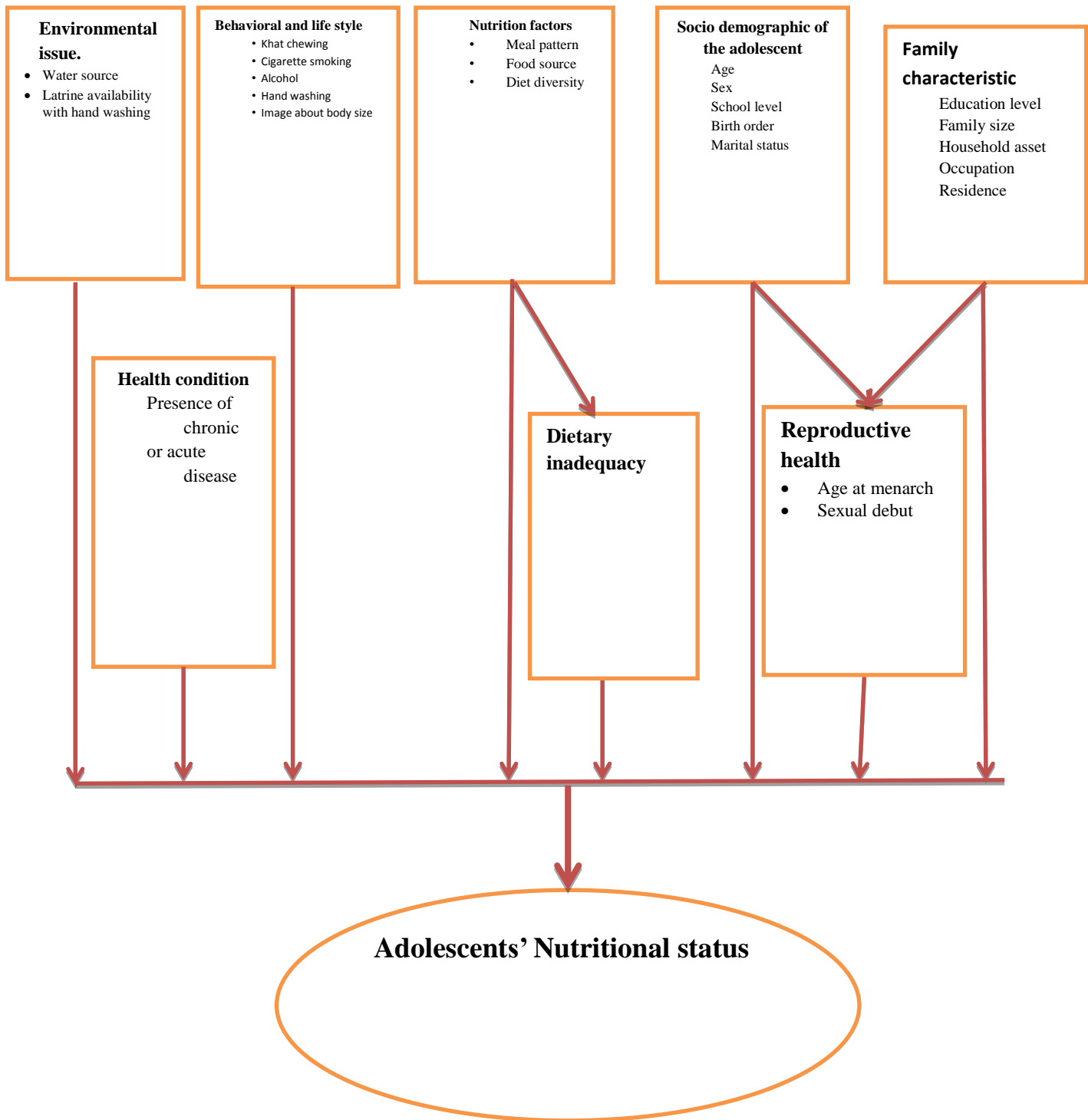


Figure 1 .conceptual framework of nutritional problems and causal factors in adolescence adapted from WHO (11)

2.3 Significance of the study

Adolescent nutritional status is an important aspect of life cycle nutritional intervention for better health, growth and development. However, programs as well as researcher have increasingly turned their attention to addressing nutritional problems earlier in the life cycle. But still adolescent should be targeted for nutritional intervention. So, to intervene successfully planners, decision makers and service providers need to know information on adolescent nutritional status.

So this study is aimed at filling the gap found in the above studies and assessing the level of adolescent nutritional status and identifying the factors contributing to adolescent malnutrition in chiro town, West Hararge, Oromia. Information gathered from this study will provide baseline data and will elicit support and promote cooperation among the different stakeholders towards the initiation of a sustainable nutrition and health promotion program for adolescents in study area and similar setting.

Chapter Three: Objective

3.1 General objective

- ❖ To assess nutritional status and associated factors among in school adolescents in Chiro town, West Hararge Zone, 2013.

3.2 Specific Objective

- To determine the prevalence of stunting among in school adolescents in Chiro town.
- To determine the prevalence of underweight among in school adolescents in Chiro town.
- To identify factors associated with nutritional status among in school adolescents in Chiro town.

Chapter Four: Method and Subjects

4.1 Study Area and period

The study was conducted in Chiro town of West Hararge Zone, Oromia regional state located Eastern part of the Ethiopia. Chiro town is located 326km away from Addis Ababa on the main road to Harar & Dire Dawa. According to 2007 Ethiopian census report the projected total population of Chiro town for the year 2013 was 43,220 of which 7088 was under five and approximately 29% of total population was age between 10-19 years old. There are four colleges, seven Government and five private schools. Regarding functional public health facilities are one hospital, one health center, seven private and NGO clinics and one other governmental clinic. As the town health office reported in 2012 Chiro town has 83% latrine coverage and 69% water supply coverage in 2005. The study was conducted from November 04-13, 2013 in all elementary and secondary schools of town.

4.2 The study design

School based cross-sectional study was conducted among in school adolescent in Chiro town of West Hararge zone.

4.3 population

4.3.1 Source population:

All adolescents found in schools of Chiro town.

4.3.2 Study population:

Adolescents who attend grade 5th to 12th and randomly selected from source population

4.4. Inclusion and exclusion criteria

4.4.1 Inclusion criteria for study subject

All adolescent students who are listed in the register of selected schools to be age group of 10 to 19 years old and selected as study participant.

4.4.2 Exclusion criteria

All in school adolescents with obvious physical deformities for anthropometric measurements and/or seriously ill to be interviewed.

4.5 Sample size determination and sampling technique /sampling procedures

4.5.1 Sample size determination

The sample size was determined using the formula of sample size determination for single population proportion taking the proportion of adolescents who have been underweight (27.2%) from study in school of Ambo town (22). With assumption of 95 % confidence interval, a marginal error of 5 % and 10% non-response rate was added to the total sample size

$$n = \frac{Z_{\alpha/2}^2 P(1-P)}{d^2}$$

$Z_{\alpha/2}$, confidence level

P, population proportion (prevalence of underweight)

d, Margin of error

$$n = \frac{1.96^2 \cdot 0.272(1-0.272)}{0.05^2} = 304$$

Since total population is less than 10, 000 which was 6,222 using the correction formula the final sample size was

$$n_f = \frac{n}{1 + \frac{n}{N}}$$

n, calculated sample size without correction

N, Total population (adolescent in schools)

N_f , final sample size

$$n_f = \frac{304}{1 + \frac{304}{6222}} = 290$$

By adding 10% of the non-response rate the final sample size was $290+10\%$ of calculated sample= $290+29=319$

4.5.2 Sampling technique /procedure.

All five second cycle elementary school (5-8th grade), one high school and one preparatory school were taken. Then sample size was proportionally allocated to all schools. Finally study participant was selected by simple random sampling from sampling frame; that was made from all school register/rosters independently.

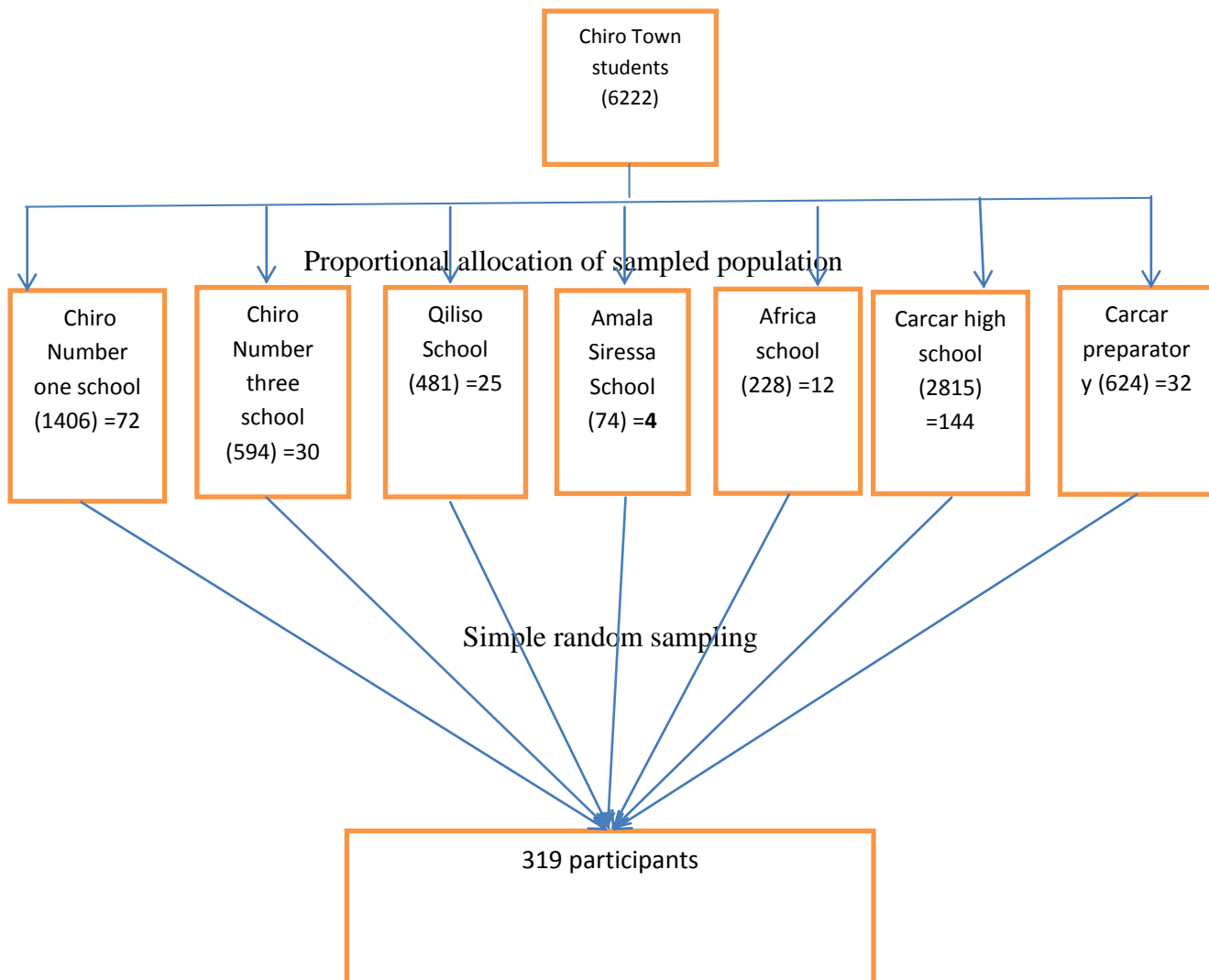


Figure 2 Schematic Representation of sampling procedure

4.6 Study variables

4.6.1 Dependent variable

Stunting

Underweight

4.6.2 Independent variable

Socio demographic variable of adolescent (age, sex, Grade level, number of sibling, birth order, religion,

Family related variable (occupation, marital status, educational level, family size, income, head of house hold, ethnicity)

Environmental and personal hygiene variable (Availability and utilization of latrine, Type of water source, hand washing)

Nutrition factors (meal frequency, food group, diet diversity, source of food)

Behavior and life style (physical activity, smoking, alcohol drinking, chat chewing etc)

Health condition (experience of chronic disease, diarrhea, TB and other infection)

Reproductive health variables (age at menarche, pregnancy, utilization of family planning)

4.7 Data collection procedure

4.7.1. Data collection instruments

Data were collected with structured questionnaire by interviewing and anthropometry measurement of the study subjects.

The questionnaire was adapted from previous study done in Ambo town (26). And the diet diversity questionnaire was adopted from national baseline survey and WHO (54). The questionnaire has seven components (personal factors, family characteristics, health information, nutrition and diet factors, behavioral and life style, personal hygiene and sanitation, reproductive health information).

The other tools for this study were anthropometric measurement equipments. For height measurement SECCA height measuring board with a precision of 0.1cm was used. SECCA-scale digital bath balance of model no. **8811021659** made in German with precision of 0.1kg was used for measuring weight. All measurements were taken twice and the average computed, if the two measurements differ by one unit the measurement was repeated.

4.7.1 Data collector (personnel)

Six experienced nurse data collectors and two experienced supervisors were recruited. And two teachers were recruited as facilitators from each school.

4.7.2. Data quality control issues

Before data collection, the questionnaire prepared in English version was translated in to Afaan Oromo and again back translated to English by third person to ensure consistence.

Data collectors and supervisors was trained for two days on objectives, in how to approach study subject (human), on how to utilize tools such as proper filling of questionnaire and the use of the weight and height scales...

Then pre-test was done in the similar setting (Barkume High school and Kuni elementary schools of gemechis woreda) on 17(5%) of the total sampled population who were not included in the main study. Necessary correction was done after the pre-test data was analyzed and anthropometric equipment especially weight scale was calibrated by using known 2kg material.

During data collection measuring instrument especially weight scale calibrated with known 2 kg weight material every day before starting measuring and appropriate measure was taken on time. The collected data was checked out for the completeness, consistence and clarity by the principal investigator and supervisors by supervision.

At least quality checking was done on about 5% of questionnaire daily after data collection and amendments was made before the next data collection measure.

After data collection each questionnaire was checked for the completeness, consistence and clarity by the principal investigator and manual data cleaning was done. Then the data was entered into Epi Data.

4.8. Data management and analysis

After data entry, data was exported to SPSS version 16.0. Anthropometric indice was calculated by using WHO anthroplus program V1.0.4. Then data exploration was done to identify data such as outliers, abnormal distribution and treat them accordingly.

Descriptive statistics was used to show the prevalence of nutritional status of adolescent and other socio demographic characteristics. Bivariate logistic regression analysis was used to see the associations of different variable with underweight and stunting. The factors that found to be significant at 0.25 level was used as candidate for multivariate analysis and then backward stepwise binary logistic regression was applied to determine predictors for stunting and underweight of adolescents at a 95% confidence interval and significance was declared at $p < 0.05$.

4.9. Ethical considerations

The study was carried out after obtaining ethical clearance from the ethical review committee of Jimma University, College of Medical Science and Public Health. Official letters was submitted to west hararghe education office then; the zonal education office was sent a formal letter to the town education office finally Chiro town education office sent letter schools. After permission was be obtained from each school administration. Informedwritten consent was sent to parent/guardian of adolescents after the written consent obtained from parents of study participants with standard assurances of confidentiality. Verbal consent was taken from study participants.

The study participants were informed that answering the anonymous questionnaire was voluntary. Moreover, the class teacher was not involved while administering the questionnaires to assure confidentiality, this consent was obtained following an explanation about the purpose of the interview and on what was expected of them.

Issues related to confidentiality and any potential risk and benefits from participation in the study was discussed. In addition participants were informed that participation is voluntary and that they can withdraw at any time without any precondition. Upon completion of the interview health education about importance Variety of nutrient for them and others too was given.

4.10. Operational definition and cut points of variables

- **School adolescent:** those boys and girls between the ages 10-19 years who were attending school at the time of data collection.
- **Nutritional status:** refers to stunting and underweight
- Nutritional status cutpoint (7,62)
 - **Stunting:** Adolescents whose height-for-age below the 3th percentile for gender of WHO 2007 reference.
 - **Underweight:** Adolescent with BMI for age below the 5th percentile for gender of WHO 2007 reference.
 - **Normal:** : Adolescent with BMI for age between the 5th to 85th percentile for gender of WHO 2007 reference.
 - **Oveweight:** Adolescent with BMI for age between the 85th to 95th percentiles for gender of WHO 2007 reference.
 - **Obese:** Adolescent with BMI for age more than the 95th percentile for gender of WHO 2007 reference.
- **Meal pattern:** Number of meal consumed by student per day.
- **Feel hunger:** Self report feeling hunger or weak because of not eating breakfast or lunch

- **Diet Diversity(63)**

- Low: Adolescent who consume less than or equal to three food groups.
- Medium: adolescent who consume 4-5 food groups.
- High: adolescent who consume greater than or equal to six food groups.

4.11. Dissemination Plan

The results of the study will be presented and submitted to Department of Population and family health, College of Medical Science and Public Health, Jimma University. And the study will be presented and submitted to local authorities Chiro town educational and health office, school administration and for students and their parent. Publishing on scientific journal will be considered.

Chapter Five: Result

5.1 Sociodemographic Characteristics of respondents and their Family

A total of 291 study participants were involved in this study, which made response the rate 91.2%. Male constitutes 185(63.6%) whereas female accounts for only 106(36.4%). One hundred forty (48.1%) of the participants were from high school while 122(41.9%) were from elementary school and others 29(10%) were attending preparatory school. Almost all 289(99.3%) the study participants never married. Regarding the religion of the participants, 166(57%), 106(36.4) and 16(5.5%) were Muslims, Orthodox Christians and protestants respectively. Study participants living with their families were 192(66%) and the rest were living with out family (alone, with friend or relatives etc) 99(34%). Regarding the work status 34(11.9%) of study participants had work in addition to being student of which 19(55.6%) were household workers, 9(26.5%) were daily laborer, 4(11.8%) were merchants (Table 1).

Table 1: Distribution of sociodemographic Characteristics of study participants, chiro town, 2013

Variable		Frequency (N=291)	
		Number	Percentage (%)
Sex	Male	185	63.6
	Female	106	36.4
Age	10-14	115	39.5
	15-19	176	60.5
Schooling level(grade)	5-8	122	41.9
	9-10	140	48.1
	11-12	29	10
Family size	<5	90	30.9
	≥5	201	69.1
Religious affiliation	Muslim	166	57.1
	Orthodox	106	36.4
	Protestant	16	5.5
	Catholic	3	1
Living with	Parent	191	65.6
	Without parent*	100	34.4
Absence from school in a month	≥ 2 days	56	19.2
	<2 days	235	80.8
Work other than being student	Yes	34	11.7
	No	257	88.3

NB: * study participants living alone, with friend, relative and orphange

The mean age, highest level of grade, birth order, number of sibling and family size was found to be 14.8 years (± 2.20), 8.54 (± 1.8), 3.03(± 2.0), 4.26(± 2.3) and 6.57(± 2.2) respectively. Nearly one third of the participant was the first child in the house 85(29.2%).

Regarding the family of study participants 117 (40.2%) of them were reside in rural. Study participants who came from male headed household were 188(64.6%). The occupational status of study participants family shows that 144 (50.9%) of their fathers and 117 (40.8%) their mothers were farmers and housewives respectively. Similarly the educational background of their parents revealed that 99(33%) of their fathers and 125 (43%) of their mothers had no education. The ethnicity of household heads were Oromo 228(78.4%) followed by Amhara 45(15.5%). The main source of families income for the majority of study participants were farming 139(47.8%) followed by trading 71(24.4%) (Table 2).

Table 2: Study participants' family sociodemographic characteristics, chiro town, November 2013.

Variables	Frequency		
	Number	Percentage (%)	
Residence	Urban	174	59.8
	Rural	117	40.2
Sex house hold head	Male	188	64.6
	Female	103	35.4
Educational status of mother	no education	125	43
	1-8	104	35.7
	9-12	41	14.1
	Diploma and above	21	7.2
Educational status of father	no education	96	33
	1-8	108	37.1
	9-12	37	12.7
	Diploma and above	50	17.2
Ethnicity of HH Head*	Oromo	228	78.4
	Amahara	45	15.5
	Gurage	11	3.2
	Others	7	2.4
Occupational status of Father	Civil servant	59	20.3
	Merchant	44	15.1
	Farmer	144	49.5
	Daily laborer	19	6.5
	other	25	8.6
Occupational status of Mother	Civil servant	25	8.6
	Housewife	117	40.2
	Merchant	87	29.9
	Farmer	34	11.7
	Daily laborer	15	5.2
	other	13	4.5
Main source of income	Farming	139	47.8
	Merchant	71	24.4
	Civil servant	58	19.9
	Daily laborer	15	5.2
	other	8	2.7

* HH mean household

Two hundred thirty six (81.1%) of the study participants family were living in their own house, while 55 (18.9%) didn't have their own house. Household assets possession of families show that 165(56.7%) of household had farm land and 151(51.9%) television fig 3.

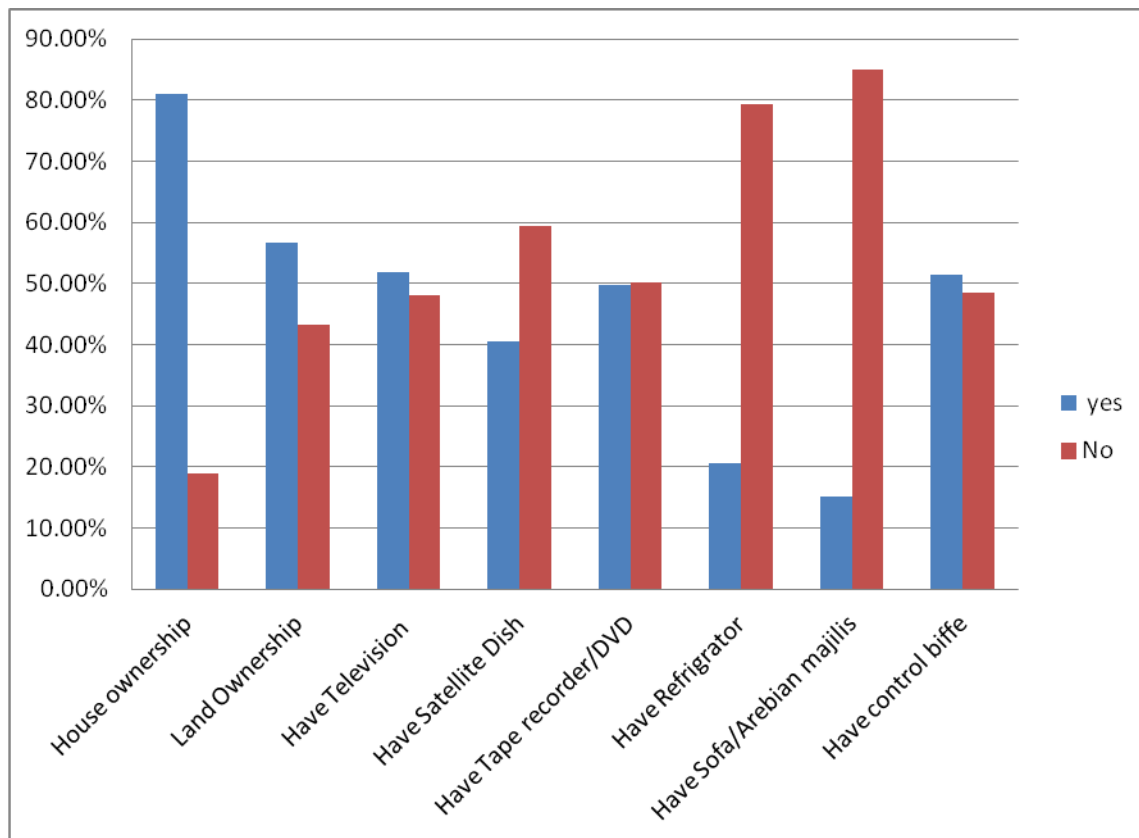


Figure 3. Study participants' families' household asset possession, chiro Town, November 2013.

5.2 Health information

Two hundred nine (71.8%) study participants had ever visited health facility before in their life time they can recognize and only 82 (28.2%) of them didn't ever visited health facility. Two hundred eighty (96.2%) of study participants had no history of known chronic disease whereas 4 (1.4%), 2(0.7%) and 1(0.3%) had history of cardiovascular disease, diabetics mellitus, and bronchial asthma respectively. Regarding current health facility visit only 21 (7.2%) visited health facility with common complaints like cough, fever and diarrhea within the last two weeks before this study was conducted.

5.3 Nutritional factors

The source of food staple for 152 (52.2%) study participants were purchasing followed by both own product and purchasing 77(26.5%). Mainly used food staple was teff 150 (51.5%) and the least used food staple was wheat 8(2.7%). The study participants who consumed two or less than two, three times and four and above times meals per day were 56(19.2%), 189(64.9%) and 46(15.8%) respectively (table 3).

Table 3. Distribution of Nutritional factors characteristic of study participants, Chiro Town, November 2013.

Variables		Male	Female	Total
Source of food	Own product	42(22.7%)	16(15.1%)	58(19.9%)
	Purchase	88(47.6%)	64(60.4%)	152(52.2%)
	Both own product and purchase	52(28.1%)	25(23.6%)	77(26.5%)
	Others	3(1.6%)	1(0.9%)	4(1.4%)
Mainly used food staples in the area	Teff	79(42.7%)	71(67%)	150(51.5%)
	Maize	11(5.9%)	2(1.9%)	13(4.5%)
	Sorghum	84(45.5%)	31(29.2%)	115(39.5%)
	Other	11(5.9%)	2(1.9%)	13(4.5%)
Number of meal per day	Two and less than two	43(23.2%)	13(12.3%)	56(19.2%)
	Three	124(67.1%)	65(61.3%)	189(64.9%)
	Four and above	18(9.7%)	28(26.4%)	46(15.8%)
Number of hunger episode in last month	No episode	116(62.7%)	80(75.5%)	196(67.4%)
	One episode	22(11.9%)	6(5.7%)	28(9.6%)
	Two episode	21(11.4%)	10(9.4%)	31(10.7%)
	Three episode	14(7.6%)	6(5.7%)	20(6.9%)
	Four and above episode	12(6.5%)	4(3.8%)	16(5.5%)
Diet diversity	Low	91(49.2%)	38(35.8%)	129(44.3%)
	Medium	66(35.7%)	35(33%)	101(37.7%)
	High	28(15.1%)	33(31.1%)	61(21%)

The study participants were also asked about solid or semisolids foods they consumed the previous day during 24 hours prior to the study. Accordingly, among all study participants (n=291) porridge, gruel, bread, 'Kita', and 'Injera' made from grains, pasta, 'Dabboo', food made from tuber 289(99.3%) and legume, nut and seeds 236(81.1%) were the commonly reported food types. At the same time 228(78.4%),222(76.3%),192(66%) and 178 (61.2%) of the respondents were reported foods made from egg, meat and fish, milk and milk products (cheese,yorgut) and organ meat respectively. However, other vitamin A rich fruit and vegetable (carrot, yellow sweet potatoes, mango, and papaya) 82 (28.2%) and dark green leafy vegetable (green pumpkin, cabbage,'qosxa') 60(20.6%) were the least consumed foods types per day in the study area.

According to study participants 24 hours recalled report, the number of foods group consumed by was range from 1-10 dietary group per day. Majority 162(55.7%) of study were fed with the recommended balanced diets (6or more food groups, while only 129(44.3%) of them were fed with 1-3 food groups) per day. Most frequently, the study participants were fed with three food groups per day. The mean of 1.8 (SD =0.8) food groups were consumed by study participants per day.

5.4 Life style and behavior of the study participants

One hundred ninty (65.3%) study participants claim that they had physical activities. The mean days spent on doing physical activities per week for study participants were 2.14 (SD=1.52). Khat chewing was common 84(28.9%), among study participants relative to cigarette smoking and alcohol consumption which were 5(1.7%) and 4(1.4%) respectively. Regarding the feeling study participants had about their body size show that 17(5.8%), 214(73.5%), 60(20.6%) of themwere very fat, medium and very thin respectively. In this study females feel very fat about themselves when compared with boys (12.3% vs 2.2%). One hundred fifty seven (54%) of the study participants were attempt nothing while 94(32.3%) of them attempted to gain weight and only 40(13.7%) of them attempted to lose their weight. Twenty five (23.6%) of girlsand 15(8.1%) of boys were attempt to lose their weight. But only 15(14.2%) of females and 79(42.7%) of males were attempt to gain weight.

5.5 Study participants' sanitation and hygiene

All schools had latrine but none of them had hand washing facilities. Majority of study participants household 272(93.5%) had latrine of which only 104(38.2%) have hand washing facilities. The most common type of latrine was pit latrine with slab 175(64.3%) and followed by pit latrine without slab 75(27.6%). The study participants obtain water from tap, protected spring, river and unprotected spring were 267(91.8%) 10(3.4%), 11(3.8%) and 3(1%) respectively. The study participants who claimed that they wash their hands always, sometime and not at all before eating were 149(51.2%), 129(44.3%) and 13 (4.5%) respectively. Of the study participants who reported that they wash their hands not at all, sometime and always after using toilet were 13(4.5%), 126(43.3%) and 152(52.2%) respectively.

5.6 Reproductive characteristics of the study participants

Among female respondents about 73 (69.5 %) of them claimed that they start menstruating whereas 32(30.5%) of them didn't start menstruating. Among menstruating girls 22 (30.1%) start menstruating at the age of 14 years. The median and mean age of menarche was 14 and 13.6 (SD=1.13) years respectively. Among female respondents 2 (0.7%) of them were married at age of 15 years. Of total female respondents about 8(5.4%) of them had previous history of utilization of family planning methods.

5.7 Anthropometric status of study participants

The mean of height and weight of study participant were 160.18(SD=10.67) cm, 46.98(SD=9.73) kg respectively. The median BMI for age and Height for age of study participants were 16.60 and 29.30 respectively.

5.8 Nutritional Status of the study participants

5.8.1 Underweight

This study revealed that 71(24.4%) of study participants were underweight, 209(71.5%) of them were normal, 8(2.7%) of them were overweight and 4(1.4%) were obese [figure.4].

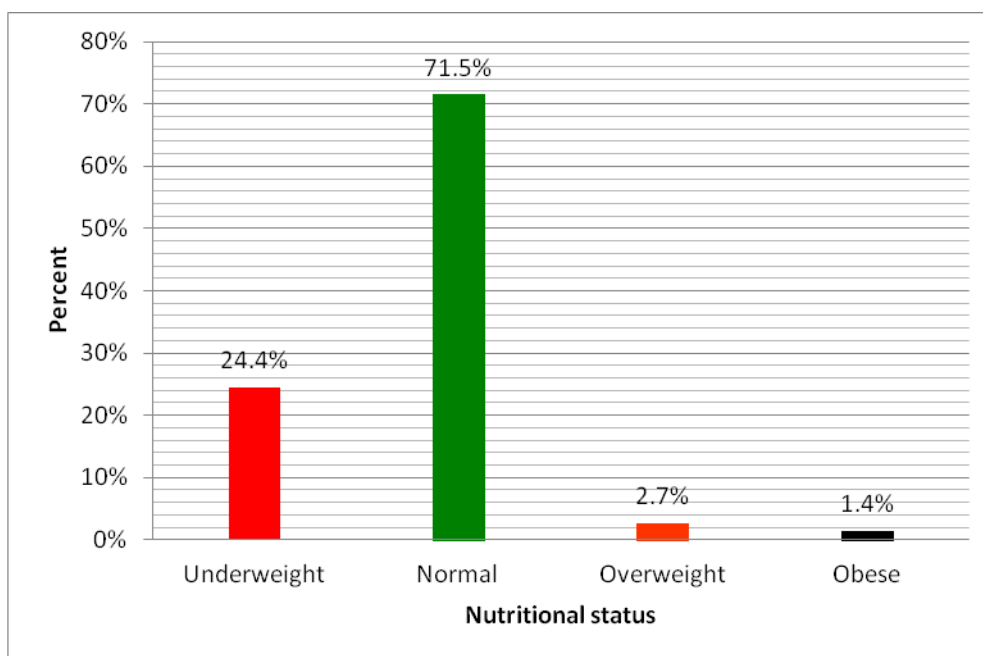


Figure 4. Study participants' Nutritional status, Chiro Town, November 2013.

Male study participants found to be underweight, Normal and obese were 60(32.4%), 124(67.1%), 1(0.5%) respectively. Regarding the age of participants the proportion of early age (10-14) years found to be underweight, Normal, overweight and obese were 33(28.7%), 78(67.8%), 3(2.6%), 1(0.9%) respectively [figure.5].

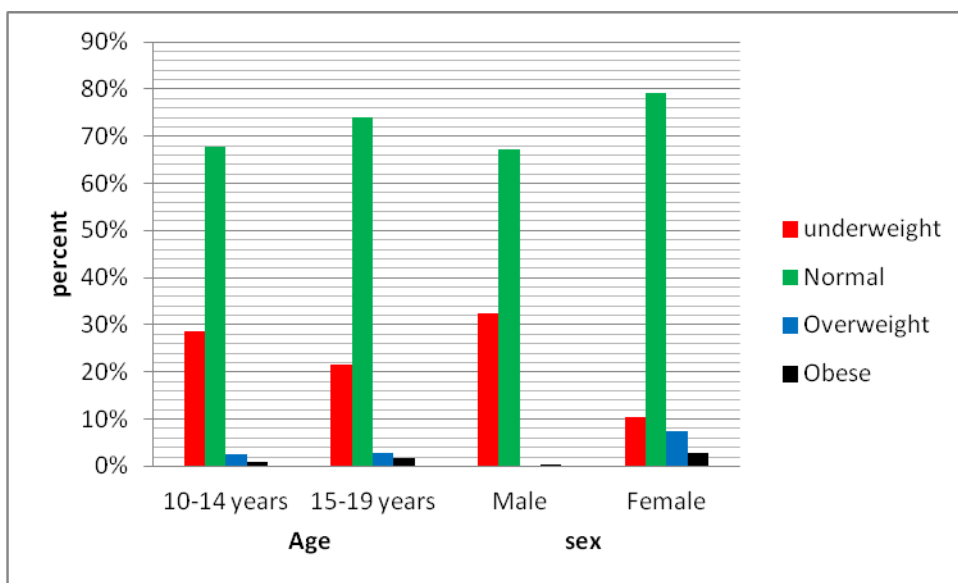


Figure 5. Study participants' nutritional status by sex and age, Chiro Town, November 2013.

The distribution of underweight among primary schools were 31(25.4%), secondary 33(23.6%), and Carcar preparatory 7(24.1%) which was almost similar. When we look at nutritional status of study participants within different schools underweight were found to be higher in Carcar high school 33(46.5%) followed by Number one primary school 15(21.1%).

The study participants who came from family members less than five and greater than five had similar underweight proportion (24.4% vs 24.4%) as well as nearly similar overweight proportion (2.5 % Vs 3%). Under weight was prevalent in study participants who born first in the family 26(30.6%) and who had seven sibling 9(33.3%).

The proportion underweight among study participants in rural and urban were (46.5% vs 53.5%). But 33(28%) of study participants whose family reside in rural found to be underweight while for those from urban were 38(21%). Regarding household heads study participants came from male headed household were more underweight than those who came from female headed household (78.9% vs 21.1%). Similarly male headed household study participants were more obese than those who female headed household (75% vs 25%). On other hand the prevalence of underweight among study participants from male headed and female head household were (28.9% vs 14.6%).

Nutritional status of study participants varies based on their family educational status. For example 36(28.8%) of study participants were underweight among whose mother had no education and 25(26.1%) of them were underweight among whose father had no education. Study participants who had merchant fathers and civil servant mothers observed proportion of underweight were 3(9.1%) and 4(16%) respectively [table 4].

Table 4. Study participants' nutritional status by sociodemographic characteristics of their families, Chiro Town, November 2013.

Variables		Nutritional status			
		Underweight N (%)	Normal N (%)	Overweight N (%)	Obese N(%)
Family Residence	Rural	33(28.2%)	79(67.5%)	3(2.6%)	2(1.7%)
	Urban	38(21.8%)	129(74.2%)	5(2.9%)	2(1.1%)
sex of house hold head	Male	56(28.9%)	125(66.4%)	4(2.1%)	3(1.6%)
	Female	15(14.6%)	83(80.5%)	4(3.9%)	1(1%)
Educational status of mother	no education	36(28.8%)	84(67.2%)	4(3.2%)	1(0.8%)
	1-8	21(20.2%)	77(74%)	3(2.9%)	3(2.9%)
	9-12	7(17.1%)	28(80.5%)	1(2.4%)	0%
	Diploma and above	7(33.3%)	41(66.7%)	0%	0%
Educational status of Father	no education	25(26.1%)	68(70.8%)	3(3.1%)	0%
	1-8	31(28.7%)	71(65.7%)	3(2.8%)	3(2.8%)
	9-12	8(21.6%)	28(75.7%)	0%	1(2.7%)
	Diploma and above	7(14%)	41(82%)	2(4%)	0%
Occupation of father	Civil servant	15(25.4%)	44(72.9%)	1(1.7%)	0
	Farmer	41(28.4%)	98(68.1%)	4(2.8%)	1(0.7%)
	Merchant	3(9.1%)	30(79.6%)	2(4.5%)	3(6.8%)
	Daily laborer	4(21.1%)	15(78.9%)	0	0
	Other	8(28%)	21(68%)	1(4%)	0
Occupation of mother	Housewife	25(21.4%)	88(75.2%)	4(3.4%)	0%
	Merchant	21(24.1%)	60(69.1%)	3(3.4%)	3(3.4%)
	Farmer	11(32.4%)	22(64.7%)	0%	1(2.9%)
	Civil servant	4(16%)	21(84%)	0%	0%
	Other	10(35.7%)	17(60.7%)	1(3.6%)	0%

Nutritional status of study participants varies with their nutritional factors. Study participants who get two or less meal per day 15(26.3%) were underweight and only 10(21.7%) were underweight among study participants who consume four or above meal per day. Regarding their diet diversity, study participants consume who consume low diet diversity found to be more underweight than high diet diversity consumer (27.9% vs23%) [Table 5].

Table 5. Distribution of nutritional status among study participants by nutrition factors, Chiro Town, November 2013.

Variables		Nutrition status			
		Underweight N (%)	Normal N (%)	Overweight N (%)	Obese N (%)
Main source of income	Farming	39(28.1%)	98(69.8%)	2(1.4%)	1(0.7%)
	Merchant	14(19.7%)	50(70.4%)	4(5.6%)	3(4.2%)
	Civil servant	16(27.6%)	41(70.7%)	1(1.7%)	0
	Others	2(8.7%)	20(87%)	1(4.3%)	0
Number of meal per day	Two and less than two	15(26.3%)	41(73.2%)	0	0
	Three	46(24.3%)	133(70.4%)	7(3.7%)	3(1.6%)
	Four and above	10(21.7%)	34(73.9%)	1(2.2%)	1(2.2%)
source of food staple	Own product	19(32.8%)	38(65.5%)	1(1.7%)	0
	Purchase	34(22.4%)	111(73%)	5(3.3%)	2(1.3%)
	Both own product and purchase	16(20.8%)	57(74%)	2(2.6%)	2(2.6%)
	Others	2(50%)	2(50%)	0	0
Main staple	Teff	30(20%)	112(74.6%)	4(2.7%)	4(2.7%)
	Maize	3(23.1%)	10(76.9%)	0%	0%
	Sorghum	32(27.8%)	79(68.7%)	4(3.5%)	0%
	Others	6(46.2%)	7(53.8%)	0%	0%
Diet Diversity	Low	36(27.9%)	86(66.7%)	4(3.1%)	3(2.3%)
	Medium	21(20.8%)	77(76.2%)	2(2%)	1(1.0%)
	High	14(23%)	45(73.8%)	2(3.3%)	0

Visiting and not visiting of health facility in last the two weeks before this study conducted had no difference in underweight proportion (23.8% vs 24.4%). Among study participants who chew khat 29(34.5%) of them were underweight and from those who didn't chew khat 42(20.3%) found to be underweight. Among study participants who had latrine at household 65(23.8%) of them were underweight and who didn't have latrine 6(31.6%) found to be underweight. Underweight also varies among study participants who had latrine with and without hand washing (20.2% vs 26.2%).

Among study participants those who wash their hands not at all, sometime and always before eating were 6(46.2%), 33(25.6%) and 32(21.5%) underweight respectively. On the other hand three quarter of overweight 6(75%) and obese 3(75%) were those who wash their hands always before eating. Of those study participants who wash their hands not at all, sometime and always after using toilet were 3(23.1%), 31(24.6%) and 37(24.6%) underweight respectively. While majority of overweight 6(75%) and obese 3(75%) were who wash their hands always after using toilet.

Underweight were more prevalent in adolescent girls who didn't start menses than who start menses (15.6% vs 8.1%). But overweight were higher in adolescent girls who start menses when compared to those who didn't start menses (62.5% vs 37.5%) while all obese girls were started menses.

5.8.2 Stunting

This study revealed that the prevalence of stunting among study participants were 21(7.2%)[Figure 6].

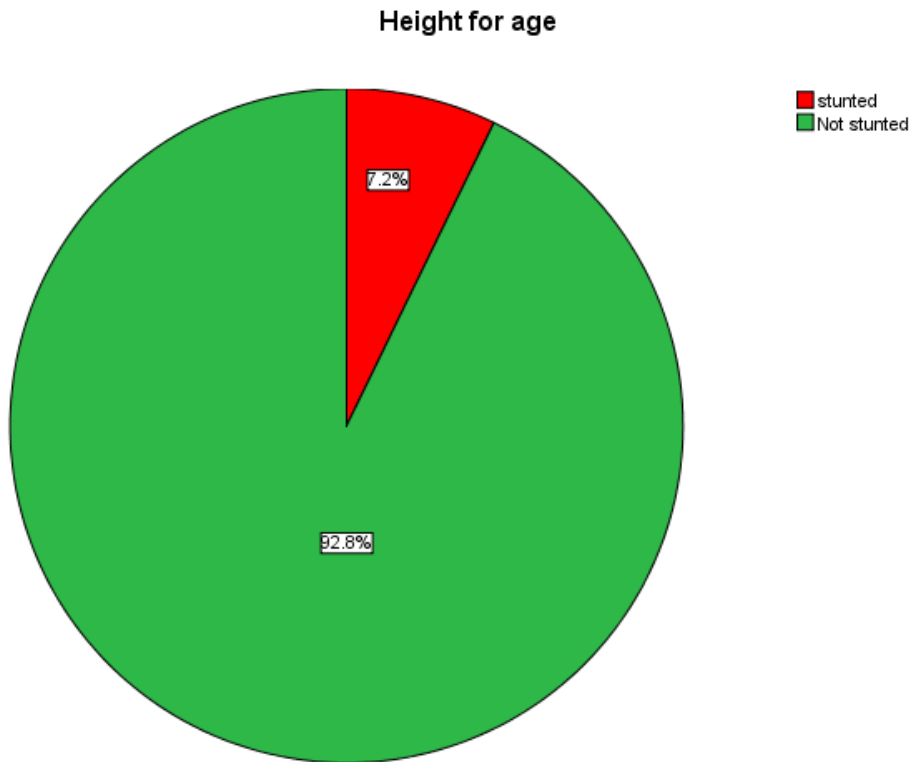


Figure6. Prevalence of stunting among study participants, Chiro town, November 2013.

Even though the proportions of stunted late adolescence study participants were higher than early adolescence (57.1 % vs 42.9%); the prevalence of stunting was higher in early adolescence (7.8% vs 6.8%) than late adolescence period of study participants[table 6].

Table 6. Stunting among study participants by sociodemographic characteristics, Chiro town, November, 2013.

Variables		Frquency (percentage)	
		Stunted N (%)	Not stunted N (%)
Age	10-14	9(7.8%)	106(92.2%)
	15-19	12(6.8%)	164(93.2%)
Sex	Male	10(5.4%)	175(94.6%)
	Female	11(10.4%)	95(89.6%)
Family Residence	Rural	11(9.4%)	106(90.6%)
	Urban	10(5.7%)	164(94.3%)
sex of household head	Male	9(4.8%)	179(95.2%)
	Female	12(11.7%)	91(88.3%)
Educational status of mother	no education	10(8%)	115(92%)
	1-8	8(7.7%)	96(92.7%)
	9-12	1(2.4%)	40(97.6%)
	Diploma and above	2(9.5%)	19(90.5%)
Educational status of Father	no education	7(7.3%)	89(92.3%)
	1-8	9(8.3%)	99(91.7%)
	9-12	1(2.7%)	36(97.3%)
	Diploma and above	4(8%)	46(92%)
Occupation of father	Farmer	12(57.1%)	132(48.9%)
	Merchant	1(4.8%)	37(13.7%)
	Civil servant	5(8.5%)	55(91.5%)
	Daily laborer	1(5.3%)	18(94.7%)
	other	2(9.5%)	28(10.3%)
occupation of mother	Housewife	9(7.7%)	108(92.3%)
	merchant	8(9.2%)	79(90.8%)
	Farmer	2(5.9%)	32(94.1%)
	Civil servant	2(5.9%)	23(92%)
	other	0.00%	28(100%)

Stunting prevalence of study participants varies with their nutritional factors. Study participants who get two or less meal per day 4(7.1%) were stunted and 2(4.3%) were stunted among study participants who consume four or above meal per day. Seven (12.1%) study participants who access food from their family own products were stunted. Study participants who consume sorgum as main staple were more stunted than other staple consumer. Regarding their diet diversity; the study participants had no that much difference in their stunting prevalence. Study participants who cliamed they had received any food supplements were less stunted than those who didn't receive any food supplement (28.6% vs 71.4%) but study participants who claim they know the importance of breast feeding were more stunted than those who claimed they didn't know (71.4% vs 28.6%). The higher the diet diversity the adolescents consume the lower the proportion of stunting [table 7].

Table 7. Distribution of stunting among study participants by nutrition factors, Chiro Town, 2013.

Variable		stunted	Not stunted
Number of meal per day	Two and less than two	4(7.1%)	52(92.9%)
	Three	15(7.9%)	174(92.1%)
	Four and above	2(4.3%)	44(95.7%)
source of food staple	own product	7(12.1%)	51(87.9%)
	Purchase	8(5.3%)	144(94.7%)
	Both own product and purchase	5(6.5%)	72(93.5%)
	others	1(25%)	3(75%)
Main staple	Teff	9(6%)	141(94%)
	Maize	0.00%	13(100%)
	Sorghum	12(10.4%)	103(89.6%)
	other	0.00%	13(100%)
Diet Diversity	Low	9(7%)	120(93%)
	medium	8(7.9%)	93(92.1%)
	High	4(6.6%)	57(93.4%)

Among study participants who chew khat 5(6%) of them were stunted and of those who didn't chew khat 16(7.7%) found to be stunted. Among study participants from household with latrine 20(7.4%) and from those who didn't have latrine only 1(5.3%) were found to be stunted. Stunting also varies among study participants those who have latrine with and without hand washing a (4.8% vs 8.9%).

The proportions of stunted adolescent girls who start menses were found to be more than those who didn't start menses (72.7% vs 27.3%). But the prevalence found in each groups were almost similar (10.8% vs 9.4%) respectively. Most of the stunted 5 (62.5%) adolescent girls' ages at menarche were early adolescence (10-14 years).

5.9 Factors associated with underweight and stunting

5.9.1 Factors associated with underweight

Primarily bivariate binary logistic regression analysis was done between the socio demographic, health and health issue, nutritional variables, behavioral and lifestyle, hygiene and sanitation and reproductive health and underweight to find factors which could have association. Age, sex, birth order, with whom they live, their source of food, main staple they eat, chat chewing of study participants and their family residence, household head, educational and occupational status of family were found to be significant with P-value less than 0.25 and the other variables their meal frequency, family size, diet diversity household latrine were not significant at p value 0.25.

To identify the important health and health issue, nutritional variables, Behavioral and lifestyle, hygiene and sanitation and reproductive health variables which are independently associated with underweight, the variables were included in multiple binary logistic regression analysis and some of the variables were found to be independently associated with underweight these are age and sex of the study participant, sex of household head, educational status of father, main source of family income and khat chewing .

Study participants with age group 10-14 years were two times more likely to be underweight than 15-19 years groups [AOR=2.06, CI= 1.02,4.16]. Male study participants were found four times more likely to be underweight when compared with female [AOR= 3.91 CI=1.7, 8.98].

Study participants from household headed by male were two times more likely to be underweight relative to study participants who came from female head house hold [AOR=2.32 CI=1.13,4.79]. The proportion of study participants whose father had no education were found to be eight times more likely higher than the proportion of study participants from father with diploma or above [AOR=8.52 CI=2.055, 35.36]. Study participants who chew khat were found to be two times more likely to become underweight than who don't chew khat [AOR=2.45 CI=1.07, 5.64] [table 8].

Table 8 Factors associated with Underweight of study participants, Chiro Town, November 2013.

Variable	Underweight		Crude OR (95% CI)	Adjusted OR (95% CI)	
	Yes N(%)	No N(%)			
Age					
	10-14	33(46.5%)	82(37.3%)	1.46(0.851-2.51)	2.06(1.02-4.16)*
	15-19	38(53.5%)	138(62.7%)	1	1
Sex					
	Male	60(84.5%)	125(56.8%)	4.14 (2.07-8.31)*	3.91(1.7-8.98)*
	Female	11(15.5%)	95(43.5%)	1	1
Sex of household head					
	Male	56(78.9%)	132(60%)	2.49(1.32-4.67)*	2.32(1.13-4.79)*
	Female	15(21.1%)	88(40%)	1	1
Educational Father					
	no education	25(35.2%)	71(32.3%)	2.16 (0.86-5.43)	8.52(2.055-35.36)*
	1-8	31(43.7%)	77(35%)	2.473(1.00-6.09)*	7.57(1.91-29.92)*
	9-12	8(11.3%)	29(13.2%)	1.69(0.55-5.19)	5.32(1.33-21.33)*
	Diploma and above	7(9.9%)	43(19.5%)	1	1
Father occupation					
	Civil servant	15(21.1%)	45(20.5%)	1	1
	Merchant	3(4.2%)	35(16%)	0.29(0.09-0.96)*	0.17(0.03-0.93)*
	Farmer	41(57.7%)	103(47%)	1.17(0.59-2.33)	0.83(0.17-4.12)
	Daily laborer	4(5.6%)	15(6.8%)	0.78 (0.22-2.73)	0.31(0.05-1.91)
	Other	8(11.3%)	22(10%)	1.14(0.40-3.27)	0.99(0.19-5.19)
Main source of income					
	Farming	39(54.9%)	100(45.5%)	1	1
	Merchant	14(19.7%)	57(25.9%)	4.09(0.92-18.29)	1.79(0.74-4.30)
	Civil servant	16(22.5%)	42(19.1%)	2.58(0.54-12.32)	8.70(2.50-30.30)*
	Other	2(2.8%)	21(9.5%)	4.00(0.84-19.05)	0.421(0.08-2.12)
Main staple					
	Teff	30(42.3%)	120(54.5%)	1	1
	Maize	3(4.2%)	10(4.5%)	1.2(0.31-4.63)	0.45(0.072-2.89)
	Sorghum	32(45.1%)	83(37.7%)	1.54(0.87-2.73)	1.29(0.44-3.73)
	Other	6(8.5%)	7(3.2%)	3.43(1.07-10.95)*	2.98(0.64-13.95)
khat Chewing					
	Yes	29(40.8%)	55(25%)	2.07(1.18-3.64)*	2.45(1.07-5.64)*
	No	42(59.2%)	165(75%)	1	1

* P-value less than 0.05

5.9.2 Factors Associated with Stunting

Binary logistic regression was done between the socio demographic, health and health issue, nutritional variables, behavioral and lifestyle, hygiene and sanitation and reproductive health and stunting to find factors which could have association. Only two factors were found to be significant in bivariate analysis.

To identify the important health and health issue, nutritional variables, behavioral and lifestyle, hygiene and sanitation and reproductive health variables which are independently associated with stunting, the variables were included in binary logistic regression analysis and some of the variables were found to be independently associated with stunting these were sex of household head and hand washing practice after toilet.

Study participants from household headed by male were three times more likely to be stunted when compared to study participants who came from female head household [AOR=2.95 CI=1.15,7.48]. In this study the adolescents who don't wash their hand after using toilet food were three times more likely to become stunting those who wash their hand at always [AOR= 3.24 CI=1.01,10.37][table 9].

Table9. Factors associated with stunting of school adolescents, Chiro Town, 2013

Variable	Frequency (percentage)		Crude OR (95%CI)	Adjusted OR(95%CI)	
	Stunted N (%)	Not stunted N (%)			
Age	10-14	9(42.9%)	106(39.3%)	1.16(0.47-2.85)	1.41(0.53-3.78)
	15-19	12(57.1%)	164(60.7%)	1	1
Sex	Male	10(47.6%)	175(64.8%)	2.03(0.83-4.94)	1.64(0.58-4.56)
	Female	11(52.4%)	95(35.2%)	1	1
Family residence	Urban	11(52.4%)	106(39.3%)	0.59(0.24-1.43)	0.46(0.17-1.31)
	Rural	10(47.6)	164(60.7%)	1	1
sex of household head	Male	9(42.9%)	179(66.3%)	2.62(1.06-6.45)*	2.95(1.15-7.48)*
	Female	12(57.1%)	91(33.7%)	1	1
Hand washing for HH latrine	yes	5(25%)	99(39.3%)	0.51 (0.18-1.46)	0.48 (0.17-1.41)
	No	15(75%)	153(60.7%)	1	1
Hand washing after toilet using	Not all	1(4.8%)	12(4.4%)	1.41(0.17-11.58)	1.47(0.17-12.93)
	Sometime	4(19%)	122(45.2%)	3.59(1.17-11.03)*	3.24(1.01-10.37)*
	always	16(76.2%)	136(50.4%)	1	1

* P-value less than 0.05

Chapter Six: Discussion

Adolescents are often thought of as healthy and strong, but many studies identified that many adolescent were underweight and stunted in height. Despite this, many studies in Ethiopia is still carried out focus on vulnerabes like infant, pregnant and lactating women and limited on adolescent girls.

In this study, the prevalence of underweight was found to be 24.4% which is almost comparable with the study done in Ambo which was 27.5% (22). This might be for that those two town were almost similar in demographic for example; the majority of Ambo study participants fathers were farmer and government employ (67%) and similarly (79.8%) of this study participants fathers were farmer and civilservent. In addition to those reason it might be how they access their food to eat; the majority of adolescents' families purchase their food in both Ambo and Chiro town (66.9% vs 52.2%). Similarly this study was in line with the Inernational Center of Research on Women (ICRW) reports, which states that the adolescent underweight was highly prevalent Benin. Benin take the third place in adolescent malnutrition specifically underweight, compared with our findings the situation was almost comparable (24.4% vs 23)(21). But prevalence of underweight in this study was found to be lower than cross-sectional study done in West Bengali, India which was 42.2 % (34).

Similarly, this study underweight prevalence was in line with the study done in Tanzania Kilosa district (24.4 % vs 21%)(23). This accounts for their similarity as the district existed in developing countries. But the prevalence of underweight were found to be higher than that of study done in Addis Ababa (24.4% vs 13%) (61). This might be due to the difference in socioeconomic situation of the Addis Ababa and chiro town, which enable the adolescent in Addis Ababa for better access for food, nutrition information and had more educated families.

Likewise when compared between boys and girls the prevalence of underweight was higher among boys than girls (32.4% vs 10.4%) this might be due to variation of maturation time in boys and girls ,for which girls reached maturation earlier than boys. The difference of

prevalence in underweight by sex was also demonstrated by study done in Northern Province of Iran i.e high underweight 29.9% and 13.9% among boys and girls respectively (50). Similarly study done in India show more boys were underweight than girls (52.1% vs 32%) (34).

It was also demonstrated that the prevalence of underweight was improved with age; this is possibly explained by body mass index for age tended to improve with age due to later maturation. For example the study showed that prevalence of underweight was higher in early age 10-14 years old 28.7% and lower at later age 15-19 years old 21.6%, this is in line with study done in Tanzania Kilosa district which demonstrate that 26.2% for age group from 13-15 years old and lowest 13.3% for 16-19 years old adolescent (23). There are also a number of studies reporting that BMI for age change with age (22, 34).

The prevalence of stunting (7.2%) in this study is lower than a study reported in ICRW which is ranging from 27% to 65%. This might be from the cut point they used to say stunting, which was less than the 5th percentile of height for age. Here ethnic differences might be and would have to be taken into account in adolescence than earlier life (13). Similarly other study done in Gujarat India show that stunting was about 47.4% which is still higher than our study. The prevalence of stunting in this study was found to be lower than that of Jimma (7.2% vs 16%) (43). Even though there is no apparent evidence from this study; study done in New Guinea and India show that consuming milk and milk product improve linear growth of adolescents. And in this study area milk and milk product consumption is common.

Similarly when compared between boys and girls the prevalence of stunting was higher among females than males (10.4% vs 5.4%). The stunting prevalence among schoolgirls were found to be comparable with the prevalence of stunting among Kenyan school girls (10.4% vs 12.1%) (42). This study demonstrated that stunting among early and late adolescent was almost similar (7.8% vs 6.8%).

The findings of this study showed that the dietary intake of adolescent was inadequate, a significant number of adolescents (19.2%) were consumed two and less than two meals per day which is higher than a study done in Singapore which is (9.6%). This may be due to economical difference among countries (64). In contrary, this finding was comparable to the

study done in Ambo, in which 18.2% of adolescents consume two or less than two meals per day (22). Moreover, nearly half of the adolescents (44.3%) consumed diet of low diversity and only 21% of the adolescent consumed high diet diversity.

This study revealed that median age of menarche among females was 14 years. This is in line with the study done in Ambo. Several factors are likely to be involved in this difference, and nutritional status is considered to be a major one (22,45).

This study revealed that being younger was found to be an important predictor of underweight. This might be due to as age increases adolescents might access food easily by themselves. On the other hand, as age increased, adolescents become more matured. Adolescents who come from male household head were more underweight. This might be due to the cultural in which more women take care for the family food. Family educational status, especially father educational status, were found to be important predictors for underweight of study participants. This might be due to that educational status affects income and knowledge about nutrition.

Adolescents from male headed households were more stunted than female headed households. This might be due to the traditional burden of women caretaking for both young and old family members (1). The current study revealed that adolescents who wash their hands after toilet were predictors of stunting. This might be explained by hand washing after toilet decreasing the occurrence of communicable disease.

Even though most adolescents were found in schools, data collected from school-based may not be representative of the community at large. And there was recall bias for age estimation but tried to triangulate different sources of adolescents' age: school roster, self-report by consulting their family. Other limitations to be considered to utilize this result report were seasonal variation in food consumption.

Conclusion

This study examined the nutritional status and factors associated with underweight and stunting. The findings of the study show that the extent of underweight was high among study participants. One out of four study participants were found to be underweight. But stunting were slightly lower than underweight in this study population. One stunted study participations found in thirteen. Boys were almost three times more underweight than girls. The prevalence of stunting was almost similar between boys and girls.

Underweight tended to decrease with age. And underweight become more prevalent among study participants who chew khat, who came from family headed by male; from father with no formal education as well as civil servant father.

Regular hand washing after toilet use and being female headed house hold decrease the probability of stunting.

Recommendation

For school community

- Adolescents need to learn about nutrition demand change during their adolescence period and on importance of balanced and adequate diet.
- Preparing handwashing facility for their latrine.

For local health authorities and health professionals

- Families as well as the whole community need to get awareness on nutrition of adolescents through health extension worker and including in routine facilities service.
- Adolescent need to aware about the effect of chat chewing on their nutritional status

For Researcher

- Eventhough currently most of adolescents were in school those who are in community need to be assessed.
- Further investigation should be done on stunting.

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Annex I Informed consent form (English version)

Good morning/afternoon.

My name is: _____

Thank you for taking the time to talk with me. I came from Jimma university college of Medical and Public Health, a higher institution providing Master of Public Health Program. I will ask and measure clients like you, and collecting data for the research purposes to assess the nutritional status of adolescent and contributing factors. This school has been chosen to be included in the study. If you agree to be interviewed and assessed, I will be asking you questions and assess about yourself and your family in various issues. We are interested in finding out nutritional status and contributing factors in adolescent. This information will be used to help develop better health services for adolescent and to create a baseline data for the country.

If you decide not to participate in the study, or at any time in the future, it will not affect the education you receive at the school now or in the future. While the results of this study may be published, your privacy will be protected and you will not be identified in any way. No one, including your teacher and school, will know your answers. Your opinion and experiences are important to us, so please be honest and truthful in answering our questions. Your answers will be confidential and secret. Do you want to participate in the study?

1. Yes 2. No

If the response is “Yes” proceeds to the next page.

If the response is “No” thank the respondent and stop here

Interviewer signature _____

Annex II Parent/GuardiaWritten consent form (English version)

Good morning/afternoon.

My name is: _____

Thank you for your time. I came from Jimma university college of Medical science and Public Health, a higher institution providing Master of Public Health Program. I am sending you this consent form to allow your child to participate to be questioned and assessed for the research purposes to assess the nutritional status of adolescent and contributing factors. Your child has been chosen to be included in the study. If you agree that your child to be interviewed and assessed, I will be asking him/her questions and assess about her/himself and your family in various issues. We are interested in finding out nutritional status and contributing factors in adolescent. This information will be used to help develop better health services for adolescent and to create a baseline data for the country.

If you decide that your child do not to participate in the study, now or at any time in the future, it will not affect the education of your child receive at the school now or in the future. While the results of this study may be published, you and your child privacy will be protected and you and your child will not be identified in any way. No one, including your child teacher and school, will know your child answers. You and your child opinion and experiences are important to us, so please be honest and truthful in giving consent. Your child answers will be confidential and secret. Are voluntary your child to participate in the study?

If your response is “Yes” Please write your name and put your signature.

Name of Guardian/mother/Father _____ signature _____

If your response is “No” thank you. Have a nice day

Annex III Questionnaires (English Version)

To assess the prevalence of malnutrition and associated factors among school adolescent in Chiro Town, west hararge, 2013.

001. Questionnaire ID _____
002. School name _____
003. School code _____
004. Visit 1 _____ 2 _____ 3 _____
005. Date of interview _____
006. Time Interveiw Started _____ Time Interveiw Completed _____
007. Date of Birth ____/____/____/ or Month and year of birth ____/____

Name of Interveiwer _____

I. Demographic and socioeconomic profile of Respondent/study subject			Jump to Question
101	How old are you?	Agein year _____	
102	In what grade are you?	Grade _____	
103	Sex	1.Male 2.Female	
104	What is your Birth Order in the family	Rank _____	
105	How Many Sibling do you have	Size in number _____	
106	Family size	Size in number _____	
107	Marital status	1. Never Married 2. Married 3. Divorce 4. Widow	If your answer is 1 jump to Q109
108	What was your age at first Marriage	_____year	

109	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Others specify_____	
110	Do you have work other than being student to live on?	1. yes 2. no	If your answer is no go to Q112
111	If yes what do you do?	1. Merchant 2. Daily laborer 3. Household work	
112	Where you live now(with whom) in last three month	1. Live with family 2. Rented alone 3. Rented with friends 4. Your Relative (specify_____) 5. Orphanage	
113	How many days of absenteeism do you have in last month	_____days	
114	Do you often attend classes regularly	1. Yes 2. No	
115	Do you often did your homework	1. Yes 2. No	
116	What was your rank last year?	Rank_____	
117	What is your average last year?	_____%	

118	How do you rate your performance	1.Excellent 2.Very good 3.Good 4.Fair 5.Poor	
II. Demographic and socioeconomic profile of Respondent/study subject parent			
201	Where do your family live	1. Rural 2. Urban	
202	What is the sex of your household head	1.Male 2.Female	
203	Age of father	Age (year) _____ I don't know	
204	Age of Mother	Age (year) _____ I don't know	
205	Occupation of father	1. Farmer 2. Merchant 3. Daily laborer 4. Government employee	
206	Occupation of mother	1. House wife 2. Merchants 3. Farmer 4. Daily laborer	

207	What is the ethnicity of household head	<ol style="list-style-type: none"> 1. Oromo 2. Amhara 3. Tigrie 4. Guro 	
208	What is your father educational level?	<ol style="list-style-type: none"> 1. No education 2. Elementary 1st cycle(1-4) 3. Elementary 2nd cycle(5-8) 4. High school 5. Diploma 6. Bachelor Degree and above 	
209	What is your mother educational level?	<ol style="list-style-type: none"> 1. No education 2. Elementary 1st cycle(1-4) 3. Elementary 2nd cycle(5-8) 4. High school 5. Diploma 6. Bachelor Degree and above 	
210	If your answer for Q.112 is choice four. What is educational level of your caretaker's?	<ol style="list-style-type: none"> 1. No education 2. Elementary 1st cycle(1-4) 3. Elementary 2nd cycle(5-8) 4. High school 5. Diploma 6. Bachelor Degree and above 	

211	If your answer for Q.112 is choice four What is Occupation of your caretaker's?	1. House wife 2. Merchants 3. Farmer 4. Daily laborer	
212	Does your family have their own house?	1. Yes 2. No	
213	How many cattle's does the family own for only farmers	1.None 2.One 3.Two 4.Three 5.Four and above four	
214	Do your family own farming land	1. Yes 2. No	
215	Do you have Television in your house?	1. Yes 2. No	
216	Do you have Dish in your house?	1. Yes 2. No	
217	Do you have tape recorder/DVD in your house?	1. Yes 2. No	
218	Do you have refrigerator in your house?	1. Yes 2. No	
219	Do you sofa/arebian mejils in living room?	1. Yes 2. No	
220	Do you have "Control Biffe" in living room?	1. Yes 2. No	

221	What is the main source of income for your family	<ol style="list-style-type: none"> 1. Farming 2. Merchant 3. Civil servant 4. Daily laborer 5. Relative support from abroad 6. I don't know 	
III. Health information			
301	Do you have any diagnosed chronic disease?	<ol style="list-style-type: none"> 1. None 2. Diabetic mellitus 3. Cardiovascular disease 4. Hypertension 5. Asthma 	
302	Did you ever visit Health facility?	<ol style="list-style-type: none"> 1. Yes 2. No 	
303	If yes for what purpose did you visit the health facility?	<ol style="list-style-type: none"> 1. For sickness 2. For follow up 3. Others 	
304	Did you visit health facility in the last two weeks?	<ol style="list-style-type: none"> 1. Yes 2. No 	If your answer is no go to Q401

305	If yes for Q.304 what reason did you visit?	<ol style="list-style-type: none"> 1. For acute current illness 2. For follow up 3. Others 	
306	If yes for Q.304 again state the type of illness		
IV. Nutrition and diet information			
401	What is the origin of the food currently being eaten?	<ol style="list-style-type: none"> 1. Own product 2. Market purchase 3. Both 1 and 2 4. Food aid 5. Gift 6. Loan 	
402	What is your area staple food?	<ol style="list-style-type: none"> 1. Teff 2. Maize 3. Sorghum 4. Wheat 5. Other specify 	
403	How many meals per day are you getting?	_____times	

For Question 404-422		
I would like to ask you about foods or liquids that you ate yesterday		
During the day or at night at home or outside.		
a. Think about when you first woke up yesterday. Did you eat anything at that time?		
404	Any porridge or gruel (made from grains other than teff)?	1. Yes 2. No 3. I don't know
405	Any Sugar containing food like Chocolate,Candy,Cake,Baqlaba,Halawa,Honey,Marmalata and other sweety	1. Yes 2. No 3. I don't know
406	Bread, pasta, rice, noodles, biscuits, cookies or any other food made from oats, maize, barley,wheat, sorghum, millet, or other Grain	1. Yes 2. No 3. I don't know
407	Any food made from teff, like injera, kita, or porridge?	1. Yes 2. No
408	Any white potatoes, white yams, bulla, kocho, cassava, or any other foods made from roots?	1. Yes 2. No
409	Any pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside?	1. Yes 2. No
410	Any dark green, leafy vegetables like kale, spinach or amaranth leaves?	1. Yes 2. No

411	Any ripe mangoes, ripe papayas	1. Yes 2. No	
412	Any other fruits or vegetables? Like banana,appel,abocado	1. Yes 2. No	
413	Any liver, kidney, heart or other organ meats?	1. Yes 2. No	
414	Any beef, pork, lamb, goat, rabbit [or wild game meat such as antelope or deer]?	1. Yes 2. No	
415	Any chicken, duck or other birds?	1. Yes 2. No	
416	Any eggs?	1. Yes 2. No	
417	Any fresh or dried fish or shellfish?	1. Yes 2. No	
418	Any foods made from beans, peas, lentils or pulses?	1. Yes 2. No	
419	Any nuts or seeds such as peanuts, sesame or sunflower seeds?	1. Yes 2. No	
420	Any cheese, yogurt, milk or other milk products	1. Yes 2. No	
421	Any foods made with oil, fat, or butter?	1. Yes 2. No	

422	Any other solid or semi-solid food?	1. Yes 2. No	
423	How many times per day did you usually eat vegetables	_____times	
424	How many times per day did you usually eat fruit such as orange ,banana, Mango	_____times	
425	How many times per week you eat meat	_____times	
426	During the past 30 days, how often did you go hungry because there was no enough food in your home?	_____times I don't know	
427	What do you do when your family faces shortage of food?	1. look for a loan 2. sell commodities 3. beg	
428	Are you eating unusual foods due to lack of the usual food?	1.Yes 2.No	
429	If your answer is yes for question number 428 describe the unusual food you eat	_____	
430	Do you know the importance of balanced diet?	1. Yes 2. No	
431	Please would you like to mention those balanced diet	_____	
432	Do you know the importance of breast feeding?	1. Yes 2. No	

433	Do you know the importance of child care in growth and development?	1. Yes 2. No	
434	Did you receive any food supplement?	1. Yes 2. No	
435	Is there a school feeding program in your school?	1. Yes 2. No	

V. Behavior and life style

501	Did you do body exercise(sport)	1. Yes 2. no	If the answer is "no" go to Q504
502	During the past 7 days how many days were you are physical hard work until you fill weak	_____days	
503	How long did it usually take for you to get to and from school each day	_____minute	
504	Do you smoke cigarette/shisha?	1.Yes 2.No	If the answer is "no" go to Q506
505	If yes for Q.504 how old were you when you first tried cigarette?	_____years	
506	Have you ever drink alcohol?	1.Yes 2.No	If the answer is "no" go to Q509
507	If yes for Q.506 how old were you when you first tried alcohol?	1.Yes 2.No	
508	During the past 30 days on how many days did you have at least one drinking containing	_____days	
509	Do you chew khat?	1.Yes 2.No	If the answer is "no" go to Q511
510	If yes for Q.509 how many time in last seven day	_____times	
511	What do you feel about your body size	1. Too fat 2. Average	
512	Did you ever try to lose/gain body weight?	1. Tried to gain weight 2. Tried to	

VI. personal hygiene and sanitation information			
601	Does your school have latrine?	1. Yes	
602	Do this latrine has hand washing	1. Yes	
603	Do your household have latrine	1. Yes 2. no	If the answer is "no" go to Q606
604	Do this latrine has hand washing	1. Yes	
605	If yes for Q. 603 which type of latrine	1. Ventilated improved pit latrine 2. Pit latrine with slab 3. Pit latrine with no slab/open pit	
606	Where do you defaecate	1. Toilet 2. Open flied	
607	What is your main source of water?	1. Tap water 2. Spring (protected) 3. Spring (unprotected) 4. Pond	If the answer is "1" go to Q609
608	How long does it take to collect water?	_____times	
609	How often did you wash your hands with before eating?	1. Not at all 2. Sometime	

610	How often did you wash your hands with soap after using the toilet or latrine?	1. Not at all 2. Sometime 3. always			
VII. Reproductive health information					
701	Have you ever seen mense?	1. Yes 2. No	If the answer is "no" go to Q703		
702	If yes for Q.701 how old were you at that time?	_____years			
703	Did you have any start sexual intercourse	1. Yes 2. No	If the answer is "no" go to Q707		
704	If yes for Q.703 at what age	_____years			
705	Did you have any pregnancy before?	1. Yes 2. No			
706	If yes for Q. 705 what was your age at first pregnancy	_____years			
707	Are you on any family planning services	1. Yes 2. No			
VIII. Anthropometry					
		Reading 1	Reading 2	Reading 3	Average
801	Heightg				
802	Weight				

Thank you

Annex IV Parent/Guardia Written consent form (Afaan Oromo version)

Akkam Olitan/Bultan

Ani Maqaan koo_____Jedhama.

Duraan dursee naa waalin hasaa'udhaaf yeroo naaf keennu keetiif guddisi Galaatoomi. Ani kanan dhufee Yuunivarsitii Jimmatti Koolleejjii saayinsi meedikaala fi fayyaa hawaasa kan sagantaa Masters of public health keennurrayyi. Eergaa kana kan isin ergu akka mucaan keessaan qo'anno sadarka soorata Dargagoota fi waantoota sadarka kanaf gumachan irratti hirmaatu hayyamitaniifidha. Mucaan keessan akka qo'nnoo kana irratti hirmaatu filaatamee jiraa, Yoo hayyamitan mucaan keessaan gaafii fi sakata'insa adda addaa kani isaa fi keessaan sadarka soorata fi wantoota gumacha godhan mul'isuu danda'ani ta'a. Kani nuuti barbaadinu sadarka soorata dargagoota fi waantoota sanafi gumacha godhaan qo'achuudha. Odeeffanno kun tajaajila fayyaa dargagoota foyyeessuuf fi raga ka'umsa kahuu biyyaaf tajaajilu kahuu ta'a.

Yoo qo'anno kan irratti hirmaachuuf amma ykn gara fuldura ille hin murteesine, Barnoota fi tajaajila mana barumsa kana irra argaturratti ammas ta'ee gara fulduraa dhibaa hin qabuu. Yeroo barreefamini kun maxxanfamu, eenyuuman mucaa keessaani ifaa hin bahuu gara fuldura ille kara kaminu ifaa hin bahuu. Deebii mucaa keessaan mana barumsa ta'ee barsisootni isaa illee hin beekan. Yaadni fi muxxannon mucaa keessaan nuuf baayy'ee barbachisaadha, kanaafuu waan nutti himitu hunduma dhugaa fi ammanama ta'u qaba. Deebiin mucaa hiccitidhan eegama. Qo'annaa kana irratti akka hirmaatu ni feetu?

Eyy ee Lakki Yoo eeyyee ta'ee

Maqaa keessaan _____ Mucaaf maal akka
Tatan _____ Mallattoo _____

Yoo deebiin lakki ta'ee garuu Gaalatooma.

Annex V Informed consent form (Afaan Oromo version)

Akkam Olitan/Bultan

Ani Maqaan koo _____ Jedhama.

Duraan dursee naa waalin hasaa'udhaaf yeroo naaf keenu keetiif guddisi Galaatoomi. Ani kanan dhufee Yuunivarsitii Jimmatti Koolleejjii saayinsi meedikaala fi fayyaa hawaasa kan sagantaa Masters of public health keennurrayyi. Dargagoota akka keetiin sakkata'uuf gaafii gaafadhe oddeeffannoo haala nyaata fi sirna nyaata waali qaabatee qo'achutti jiruuf fuunaanutti jira. Manni Barumsaa kun qo'anno kana keessaatti akka hirmatu filatamee jiraa. Yoo ati gaafi gaafatamuuf sakkata'amiif naaf hayyamitee ,Gaafi adda addaa waa'ee keetiif maatii keetii sii gafaadha. Kani nuuti barbaadinu sadarka soorata dargagoota fi waantoota sanafi gumacha godhaan qo'achuudha. Odeeffanno kun tajaajila fayyaa dargagoota foyyeessuuf fi raga ka'umsa kahuu biyyaaf tajaajilu kahuu ta'a.

Yoo qo'anno kan irratti hirmaachuuf amma ykn gara fuldura ille hin murteesine, Barnoota fi tajaajila mana barumsa kana irra argaturratti ammas ta'ee gara fulduraa dhibaa hin qabuu. Yeroo barreefamini kun maxxanfamu, eenyuuman kee ifaa hin bahuu gara fuldura ille kara kaminu ifaa hin bahuu. Deebii keetille mana barumsa keetis ta'ee barsisootni keetis hin beekan. Yaadni fi muxxannon kee nuuf baayy'ee barbachisaadha, kanaafuu waan nutti himitu hunduma dhugaa fi ammanama ta'u qaba. Deebiin kee hiccitidhan eegama. Qo'annaa kana irratti hirmaachu ni feeta?

yye ki

Yoo eeyyee ta'ee fuula itti anu itti fuufi

Yoo deebiin lakki ta'ee garuu Gaalateefadhuutti asuma irratti dhaabi.

Annex VI Questionnaire (Afaan Oromo Version)

Gaafilee "Dargaagoota" Manneen barnoota magaala ciroo Sadarka soorata isaan fi waantoota sadarkaa kaanaf gumaacha godhan Qorachuuf qophaa'ee Hararge lixa, Oromiyaa ,2013.

1. Lakkoofsa gaafii (Questionnier) _____
2. Eddo qoranoon itti gageefamuu : Mana Barumsaa _____
3. Kodii manaa barumsa _____
4. marsaa dawwii 1 _____ 2 _____ 3 _____
5. Guyyaa gaafiin itti gaafatamee _____
6. Sa'a itti jalqabamee _____ sa'aa itti xumuramee _____
7. Guyyaa dhaloota ____/____/____/ ykn Ji'a fi bara dhaloota ____/____

Maqaa gaafataa _____

lakk	Gaafii	Deebii	Gara gaafii darbi
I. Demographic and socioeconomic profile of Respondent/study subject			
101	Ummuriin kee meeqa?	Umurii waggaan _____	
102	Kutaa Meeqa Baratta?	Kutaa/Sadarkaa _____	
103	Saala	1.Dhiira 2.Dhalaa	
104	Matii kee keessatti tartiibni dhaloota kee meeqa/Marsaa itti dhalatte	Daa'imma _____ ffaa	
105	Obbolaa meeqa qabda?	Hanga lakkoofsaan _____	
106	Baay'na maatii keessan meeqa? Mana keessaa nama meeqatu iiraata	Hanga lakkoofsaan _____	
107	Haala fuudhaaa fi heeruma	<ol style="list-style-type: none"> 1. Tasa hin fuune/heerumne 2. Fuudheera/Heerumeera 3. Adda baanee jirra 4. Najalaa du'e/duute 5. Kan Bira (adda Baasi _____) 	Yoo deebiin kee 1 ta'ee gara gaafii 109 dhaqi

108	Yeroo Fuutu ykn Heerumtu sana ammata meeqa ni taata	Waggaa_____	
109	Amantii kee maali?	1. Ortodokisii 2. Musliima 3. Pirotestantii	
110	Barnoota malee hojii jirudhaaf hojjetu qabda?	1. Eeyyee 2. lakki	Yoo deebiin lakki ta'e gaafii 112 dhaqi
111	Yoo eeyyee ta'e maali?	1. Daldala 2. Hojjeetaa Guyyaa 3. Hojii manaan wal qabate	
112	Amma eenyu waalin jiraatta (eeynu waliin)? Baatii sadan darban jechuu dha	1. Maati waalin 2. Kophaa mana kireeffadhe 3. Hiriyoota koo waalin mana kireeffadhe 4. Miiltoo/fira waliin (adda baasi_____) 5. Gudistoota (orphanage)	
113	Baatii darbee keessaa baatii meeqa mana barumsa hafte	Guyyaa_____	
114	Barnoota kee yeroo hundaa seeraan hordoftaa?	1.Eeyyee 2.Lakki	
115	Hojii manaa kee yeroo hunda akkaata jedhamen ni hojjettaa?	1.Eeyyee 2.Lakki	
116	Bara darbee kutaa keessaa meeqaffa baate?	Sadarka_____	
117	Qabixin kee avereejin meeqa turee?	_____%	
118	Akka waligalatti Sochiibarnoota kee akkamiin madaalta?	1.Irra baay'ee gaarii 2.Baay'ee gaarii 3.Gaarii 4.Wayyaa 5.Gadi aanaa	

II. Demographic and socioeconomic profile of Respondent/study subject parent		
201	Maatiin kee eessaa jiraatu	1. Badiyaa 2. Magaalaa
202	Saalli dursaa maatii keeti maali?	1.Dhiira 2.Dhalaa
203	Umurii Abbaa	Umurii (Waggaa) _____ Hin beeku
204	Umurii Haadhaa	Umurii (Waggaa) _____ Hin beeku
205	Hojii Abbaa keeti maali?	1.Qotee Bulaa 2.Daldalaa 3.Hojjetaa Guyyaa 4.Hojjetaa Mootummaa 5. Hojii hin qabu 6.Kan biraa (adda baasi_____)
206	Hojiin Haadhaa keeti maali?	1. Haadha manaa 2. Daldaltuu 3. Qotee Bulaa 4. Hojjeettuu Guyyaa
207	Sabin /Sanyiin/Qomon dursaa maatii maali	1.Oromoo 2.Amaara 3.Tigiree 4.Gurage 5.Kan Bira(Adaan baasi_____)

208	Sadarkaa barumsaa Abbaa kee?	<ol style="list-style-type: none"> 1. Barumsaa hin qabu 2. Sadarkaa tokkoffaa m,arsa tokko(1-4) 3. Sadarkaa tokkoffaa m,arsa Lammaffa(5-8) 4. Sadarkaa lammaffaa(9-12) 5. Diploomaan 	
209	Sadarkaan barumsaa Haadha kee?	<ol style="list-style-type: none"> 1. Barumsaa hin qabu 2. Sadarkaa tokkoffaa m,arsa tokko(1-4) 3. Sadarkaa tokkoffaa m,arsa Lammaffa(5-8) 4. Sadarkaa lammaffaa(9-12) 5. Diploomaan 	
210	Yoo Abbaa fi Haadha malee jiraatta ta'e sadarkaan barumsa nama si gargaaruu hangami?	<ol style="list-style-type: none"> 1. Barumsaa hin qabu 2. Sadarkaa tokkoffaa m,arsa tokko(1-4) 3. Sadarkaa tokkoffaa m,arsa Lammaffa(5-8) 4. Sadarkaa lammaffaa(9-12) 5. Diploomaan 	
211	Yoo Abbaa fi Haadha malee jiraatta ta'e hojiin nama si gargaaruu maali?	<ol style="list-style-type: none"> 1. Haadha manaa 2. Daldalaa/tuu 3. Qotee bulaa/tuu 4. Hojjetaa/tuu guyyaa 5. Hojjetaa Motumma 	
212	Maatin Keessan Mana dhufaa isaan qaban?	3. Eyyee	
213	Maatiin kee Loon meeqa qabu? (qotee bulaa qofaaf)	_____	
214	Maatin Kee lafa Qonnaa Dhunfatti Qabu?	1. Eyyee	

215	Mana Keessa Teeleviziyona Qabdu?	1. Eyyee 2. Lakki	
216	Mana keessaa Sataliti dishi Qabdu?	1. Eyyee	
217	Mana Keessaa teepii ykn DVD qabdu?	1. Eyyee 2. Lakki	
218	Firija mana keessaa Qabdu?	1. Eyyee 2. Lakki	
219	Mana jireenya keessa Arabian maajilis ykn/sofaa jira?	1. Eyyee 2. Lakki	
220	Biffe mana keessaa Qabdu?	1. Eyyee 2. Lakki	
221	Maddi galii maati keessan irra guddan maali?	1. Qonna 2. Daldala 3. Hojii Motumma 4. Hojii Guyyaa 5. Fira Biyya ala jiru irra 6. Hin beekta	
III. Health information(Odeeffannoo Fayyaa)			
301	Dhibee ture/qancaraa ogeessaan adda bahe qabdaa?	1. Hin qabuu 2. Dhibee Shukkaaraa 3. Dhibee Onneen wal qabate 4. Dhiibbaa dhiigaa 5. Aasiinii (dhibee qimmaa silleessa)	
302	Jiruu kee keessatti gara mana yaalaa deemtee beektaa?	1. Eyyee 2. Lakki	Yoo deebin lakki ta'ee gaafii 304 dhaqi
303	Yoo deemte ta'e sababa maaliif?	1. Dhukkubaan 2. Hordoffiif	

304	Torban lamaan darban keessa mana yaalaa deemtee beektaa?	1. Eyyee 2. Lakki	Lakki yoo ta'ee gaafi 401 dhaqi
305	Deemte yoo ta'e maaliif?	1. Dhukkubaa hariifachiisaan 2. Hordoffiif	
306	Deemte yoo ta'e gosa dhukkubichaa mee adda baasi		

IV. Nutrition and diet information (Odeeffannoo Nyaataa)

401	Nyaata amma nyaataa jirtan eessaa fiddan?	1. Oomisha ofii 2. Bittaa magaalaa irraa 3. Oomisha ofii fi bittaa magaalaa 4. Gargaarsa nyaataa 5. Kenna 6. Liqii	
402	Gosti midhaanii nyaataaf fayyadamtu kami?	1. Xaafii 2. Boqqolloo 3. Mishingaa 4. Qamadii 5. Kan biraa (adda baasi	
403	Guyyaatti yeroo meeqa nyaata Nyaatta/ argatta?	Yeroo_____	

Gaafille arman Gadittif 404-422 ttif

Kaleessa guyyaas ta'ee galgala nyaata hunda manattis ta'ee manaan alati nyaatee ibsii.

- Yeroo kelessa hirbaa irraa kaatee irraeegalii yaadadhu. Yeroo sana nyaata nyaatee jiraa? Yoo nyaatee
- jiraate: nyaata yeroo san irraa eegalte nyaate/nyaatte hunda naaf himi.
- Nyaata walitti makameef** Maal of keessaa akka qabuu?

404	Marqaa ykn bulluqa(Daakuu xaafii aala ta'an) irraa qophaawan.	1. Eeyye 2. Lakkii 3. Hin beeku	
405	Soorata shukkara of keessaa qaban kamiyyu fkk chekoleetaa, karamellaa, keekii, baqlabaa, halawaa, dayma, marmaalaata, fii nyaatan biro mimi'aa	1. Eeyye 2. Lakkii 3. Hin beeku	
406	Daabboo, pasta, Ruuza, noodles, Buskuta, Kukis ykn Nyaata bira kan akka midhaan ajjaa, Boqollo, Garbuu,Qamaadii, Mishiniga, millet, Ykn Midhaan biro irraa Hojjeetaman.	1. Eeyye 2. Lakkii 3. Hin beeku	
407	Nyaata Kamiyyu xaafii irraa hojjetaman, Kan akka biddena, Qixxa, ykn Marqaa?	1. Eeyye 2. Lakkii 3. Hin beeku	
408	Nyaateen hiddi, nyaatamuu [Dinichaa adii, mixaaxis adii, godaree adii, kaasaavaa (cassava), inisata (bullaa, kocho) ykn nyaata biro kan hiddi isaanii nyaatamu	1. Eeyye 2. Lakkii 3. Hin beeku	
409	Wantoota hiddii, isaanii keelloo dukkana'aa ykn burtukaana fakaatu qaban [dubbaa, kaaroota, ykn mixaaxisa kan keessi isaa keelloo ykn burtukaana fakkaatu tahee]?	1. Eeyye 2. Lakkii 3. Hin beeku	
410	Mudraalee baallii isaanii magariisa dukkana'aa tahee (dubbaa magariisa, raafuu, qosxaa, kkf)?	1. Eeyye 2. Lakkii 3. Hin beeku	
411	Mangoo fi Paapayaa Bilchaata Kammiyyu?	1. Eeyye 2. Lakkii 3. Hin beeku	
412	Kudraafi mudraa biro kamiyyuu [fkn Kudraalee: muza, appilii, abokaadoo, akkasumas mudraa fkn: loomii, qircaa, suufii, raafuu, angudaay, timaatima, (diimaa, keelloo,	1. Eeyye 2. Lakkii 3. Hin beeku	
413	Tiruu, kalee, onnee, ykn foon qaamootaa (organ) kamiyyu?	1. Eeyye 2. Lakkii 3. Hin beeku	
414	Fooni Horii,,Gaala, boyyee,hoolaa,re'ee ykn kuruphee kammiyyuu?	1. Eeyye 2. Lakkii 3. Hin beeku	

415	Fooni lukkuu,gogori(duck) ykn sinbiroo biro nyaataman kamiyyuu?	1. Eeyye 2. Lakkii 3. Hin beeku	
416	Killeeyk buphaa kammiyyu?	1. Eeyye 2. Lakkii 3. Hin beeku	
417	Soorata garba keessa argaman fkk qurxummi (qurxummii xaasaan cufamanii qophaawan) kamiyyuu?	1. Eeyye 2. Lakkii 3. Hin beeku	
418	Nyaata kamiyyu kan akka baaqulaa, atara, misira, gaayyaa, kkf irra qophawwan kamiyyuu?	1. Eeyye 2. Lakkii 3. Hin beeku	
419	Nyaata kamiyyu kan akka loozii, suufii, kkf kamiyyu?	1. Eeyye 2. Lakkii 3. Hin beeku	
420	Nyaatan aannan irraa qophaawan [Ayibee, Itituu, isi kireemii fii hoomisha aannanii kan biro] kammiyyu?	1. Eeyye 2. Lakkii 3. Hin beeku	
421	Soorata zayyita qabu, chooma, margaarin ykn dhadhaa ykn nyaata kanneen irraa qophaa'ee kamiyyu?	1. Eeyye 2. Lakkii	
422	Nyaatan biro dangala'oo ykn cicimoo?	1. Eeyye 2. Lakkii 3. Hin beeku	
423	Guyyaatti yeroo meeqa kuduraa fi mudura nyaatta?	Yeroo_____	
424	Guyyaatti yeroo meeqa Muduraa kan akka Burtukaanaa, Muuzii, Maangoo,... nyaatta?	Yeroo_____	
425	Torbanitti yeroo meeqa Foon nyaatta?	Yeroo_____	
426	Sababa nyaanni mana keessaa dhibameen guyyoota sodomman (ji'a tokko) darban keessa bellofte beekta?	Yeroo_____	

427	Yeroo hanqinni waan nyaataamu maatii kee mudatu maal gootan?	1. Liqin barbaada 2. Meeshaaleen gurgura 3. Kadhaa	
428	Sababin waanti duraan nyaataamu mana keessaa dhabameef nyaata yeroo baay'ee hin nyaatamine nyaattee?	1. Eeyyee 2. Lakki 3. Hin beeku	
429	Yoo deebin Gaaafii 428 eeyyee ta'ee maali fadha ibsi	_____ _____	
430	Barbaachisummaa nyaata madalama/ gosa gosarra beektaa?	1. Eeyyee 2. Lakki	
431	Mee Nyaata Madalama sana ibsaa		
432	Barbaachisummaa harma hoosisuu beektaa?	1. Eeyyee 2. Lakki	
433	Gahee kunuunsi daa'immanii guddinaa fi Dagagina daa'imman irratti qabu beektaa?	1. Eeyyee 2. Lakki	
434	Nyaata dabalataa(food supplement) fudhattee beektaa?	1. Eeyyee 2. Lakki	
435	Mana barumsaa kee sagantaan nyaataa jiraa?	1. Eeyyee 2. Lakki	

V. Behavior and life style			
501	Sochii Qaama ni hojjeeta	1. Eeyyee 2. lakkii	Yoo lakki ta'ee gaafii 503 dhaqi

502	Guyyoota torban dabran keessaa guyyaa meeqa sochii qaamaa hanga dadhabbii sitti dhageebamutti bojiattee jirte?	Guyyaa_____	
503	Mana barumsaa geessee deebi'uuf hangam sitti fudhata?	Sa'ati_____ Daqiqaa_____	
504	Tambo/shisha xuuxxaa?	1. Eeyyee 2. Lakki	Yoo lakki ta'ee gaaffi 506 dhaqii
505	Yoo ni xuuxxa ta'e yeroo jalqabaaf kan xuuxuu yaalte yoomi(umurii waggaa	Waggaa_____	
506	Alkoolii dhugdee beektaa?	1. Eeyyee 2. Lakki	Yoo lakki ta'ee gaaffi 509 dhaqii
507	Yoo eeyyee ta'e ammata meeqa ni ta'a yeroo dhugdu sana	Waggaa_____	
508	Guyyoota soddoman darban keessaa guyyaa meeqa yoo xiqqaate dhugaati alkooliiqabu dhugde?	Yeroo_____ _____ Hin beeku	
509	Jimaa ni qamaataa?	1.Eeyyee 2.Lakki	Yoo lakki ta'ee gaaffi 511 dhaqii
510	Yoo ni qamaata ta'e torban dabrab keessaa guyyaa meeqa?	Guyyaa_____	
511	Hanga qaama keetti maaltu sitti dhagahama?	1. Haalaan furdaa dha 2. Giddu	
512	Ulfaatina qaama kee dabaluuuf/hir'isuuf yaaltee beektaa?	1. Dabaluuf yaaleen jira	

VI. personal hygiene and sanitation information (Odeeffannoo Qulqullina

Dhuunfaa fi Naannoo)

601	Mana barumsa keessa fincaanii qabduu	1. Eeyyee 2. Lakki	Lakki yoo ta'ee gaafi 603 dhaqqii
602	Mani fincaani kun iddo harka dhiqana qabaa	1. Eeyyee	
603	Mani amma keessa jiraatu mana fincaani qaba	1. Eeyyee 2. lakkii	Lakki yoo taa'ee gaafii 606 dhaqqii
604	Mani fincaani mana keessani kun iddoo harka dhiqanna qabaa	1. eeyyee 2. lakki	
605	Yoo jiraate isa kam?	1. Bolla Fincaani hamaya'a 2. Boolla Fincaani Simintoon shufame 3. Bolla fincaani simintoon hin cufamine/ kan mukaan cufamee tahu	
606	Boolli yeroo Baayy'ee eessatti baata	1. Mana fincaani bira 2. Dirree irratti 3. Kan biroo yoo iiratee	
607	Maddi Bishaan irraa argattan maali?	1. Bishaan hujummoo 2. Burqaa (Kan to'atame) 3. Burqaa (Kan hin to'atamiin) 4. Haroo 5. Laga 6. Boolla Biirii	
608	Bishaan waraabuuf hangam isinitti fudhata?	Sa'ati _____ Dessaa _____	
609	Nyaata dura hangam tokko harka samunadhan dhiqatta?	1. Tasumaa hin dhiqadhu 2. Yeroo tokko tokko	

610	Mana fincaanii booda hangam tokko harka kee samunadha dhiqatta?	1. Tasumaa hin dhiqadhu 2. Yeroo tokko tokko			
VII. Odeeffannoo sirna walhormaata dargagoota (dargagoota umurin isaani wagga 12-19) ta'a					
701	Wanta Aadaa/Laguu agartee beekta? (dubartootaaf)	1. Eeyyee	Lakki yoo ta'e Gaafii 703		
702	Umurii itti laguu/Waanta Aadda agarte	Umurii waggaan ____			
703	Wal Qunnamtii saalaa Gootee beekta?	1. Eeyyee 2. Lakki	Lakki yoo ta'e Gaafii 707 dhaqii		
704	Yoo jalqabdee ta'e umurii meeqatti?	Umurii waggaan ____			
705	Gaafii 703 eeyyee yoo ta'ee Ammaan dura Garaa goodhate/ ulfooftee beektaa?	1. Eeyyee			
706	Yoo Gara goodhate/ ulfooftee ta'e umurii meeqatti?	Umurii waggaan ____			
707	Karooora Maatii Kamiyyuu ni fayyadamta?	1. Eeyyee 2. lakki			
VIII. Anthropometry					
		Safara 1	Safara 2	Safara 3	Giddu Gala
801	Dheerina (centi meetiran)				
802	Ulfaatina (Kilo giraman)				

Hora Bulaa