

Nutritional status and associated factors among school adolescent in Chiro Town, West Hararge, Ethiopia

Chiro bölgesi, Batı Hararge, Etyopya'da Okul Çağındaki Adolesanlarda Beslenme Durumu ve İlgili Faktörler

Tolessa Dekeba Damie¹, Mektie Wondafrash², Aderajew Nigussie Teklehaymanot²

¹Chiro Zonal Health Office, Ethiopia

²Department of Population and Family Health, College of Public Health and Medical Sciences, University of Jimma, Ethiopia

Abstract

Adolescence is the 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. The aim of this study was to assess nutritional status and associated factors among school adolescents in chiro town. Cross-sectional study was employed from November 04- 13, 2013. Trained nurses took anthropometric measurement weight and height. Data was entered to Epi data and was analyzed using SPSS. Multivariate logistic regression analysis was used to identify predictors of nutritional status of adolescents by controlling the effect of possible confounders. Of 319 selected samples, 291(91.2%) were participated in the study. 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], chewingkhat [AOR=2.45 CI=1.07, 5.64], having fathers with no formal education [AOR=8.52 CI=2.055, 35.36] were associated with being underweight. While sometimes hand washing after toilet [AOR= 3.24 CI= 1.01, 10.37] was found to be predictor of stunting. Prevalence of underweight was high among adolescents but the prevalence of stunting was low. Nutrition education, adolescents' body change awareness, education and risk of khat chewing and further research on stunting of adolescents should be done to improve adolescents' nutrition.

Keywords: School adolescent, stunting, dietary diversity, anthropometry

Özet

Adolesan dönem, yoğun fiziksel, psikososyal ve bilinçsel gelişimin olduğu ve bebeklik döneminden sonra en yüksek hızda fiziksel gelişimin olduğu dönemdir. Bu nedenle adolesanlar hızlı büyüme ve diğer artan sağlık riskleri nedeni ile artmış beslenme gereksinimlerini karşılayacak iyi kalite ve miktarda besine gereksinim gösterir. Çalışmamızın amacı Chiro bölgesinde okul çağındaki adolesanlarda beslenme durumunun ve ilgili faktörlerin değerlendirmesini yapmaktır. Kesitsel çalışma 04-13 Kasım 2013 tarihinde yapılmıştır. Eğitimli hemşireler tarafından antropometrik boy ve ağırlık ölçümleri alınmıştır. Veriler Epi dataya işlenmiş, SPSS ile analizleri yapılmıştır. Multivariate logistik regresyon analizi, muhtemel etkiyeci faktörlerin analizini yapmak için kullanılmıştır. 391 kişiden çalışmaya 291'i (%91.2) dahil edilmiştir. Sosyo demografik faktörlerden erken adolesan olunması (10-14 yıl) [AOR=2.06, CI= 1.02, 4.16], erkek cinsiyet [AOR= 3.91 CI=1.7, 8.98], gat bitkisi çiğnemek [AOR=2.45 CI=1.07, 5.64], eğitimi olmayan babaya sahip olmak [AOR=8.52 CI=2.055, 35.36] düşük kilolu olmak ile ilgiliydi. Tuvalet sonrası el yıkamak büyümenin artması ile ilgili bulundu [AOR= 3.24 CI= 1.01, 10.37]. Düşük kilo sıklığı yüksek bulunurken gelişme geriliği düşük bulundu. Beslenme eğitimi, adolesan vücut değişikliği farkındalığı eğitimi, gat çiğnemenin riskleri ve adolesanların gelişimin artırılması ile ilgili ileri çalışmalar adolesanların beslenmesini düzenlemek için yapılmalıdır.

Anahtar kelimeler: Okul çağı adolesanları, gelişimin ilerlemesi, diet farklılıkları, antropometri

Introduction

UN and WHO define adolescence as a segment of population group age from 10-19 years old; this a transition from childhood to adulthood period has 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 (3-5). Up to 45% of skeletal growth takes place and 15 to 25% of adult height is achieved during adolescence. Regarding body composition change girls begin to store fat around breast, hips and upper arm but boys start losing fat and develop muscle (6).

Currently adolescents make up roughly 20% of the global population (2,3,7). In developing countries,

Correspondence: Aderajew N. Teklehaymanot, MD, Department of Population and Health Sciences, University of Jimma, Ethiopia
Tel:+90 251 912914777 aderajewnu@gmail.com

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adolescents have an even higher 85% demographic weight, for instance, roughly 26% in Salvador, compared to 14% in USA (8). Similarly, in the Ethiopia, it is estimated that adolescents represent more than quarter (25.9%) of the total population (9). This significant number of adolescent worldwide and especially developing country where huge number of adolescent resides; deserve to reach and maintain the highest level of health. But this is impossible in presence of malnutrition, especially for adolescent girls (10, 11).

Adolescent nutritional problems are common throughout the world. Some young people lack adequate food and others make poor food choices (11). Especially Under-nutrition among adolescents is a serious public health problem internationally, particularly in developing countries (12). 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 (13, 14). Few studies in Africa have used the WHO recommended references to assess under nutrition among adolescents. Of those that have, the prevalence of under nutrition among adolescents is in the range of 4-30%, substantially lower than South Asia (15).

Ethiopia, as the developing country, nutritional problems is one of the major health problems for all stage of human life (16). Ethiopia like as other developing country has one of the world's highest incidences of Children under nutrition 44% stunted, 29% underweight and 10% wasted under five children (17). Regarding adolescent nutritional status some studies done before in different part of the country has been demonstrate to be high nutritional problem. west Harare is one of the chronically food insecure area because of long term drought in the area, almost 80% of the area is food insecure district (18). So malnutrition among adolescent need to be intervened.

Materials and Methods

The study was conducted in chiro town of West Hararge Zone found in Oromia regional state; Eastern part of the Ethiopia. Chiro town is being the capital city of west Hararge zone which located 326km away from Addis Ababa on the main road to Harar & Diredaw. According to 2007 Ethiopian census report the estimated total population of Chiro town in 2013 is about 43,220 of which 7088 is under five and Approximately 29% of total population is age between 10-19 years old There is one university, one Government college and three private college. Chiro town has seven Government schools and five private schools. The study was conducted from November 04-13, 2013. School based cross-sectional study was conducted among in school adolescent in chiro town of west Hararge zone. 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.

The sample size was determined using single population proportion formula taking the proportion of adolescents who have been under weight (27.2%) from study in school of Ambo town (16). With assumption of 95 % confidence interval, a marginal error of 5 % By adding 10% of the non-response rate the final sample size was $290 + 10\%$ of calculated sample = $290 + 29 = 319$.

Data was collected using structured questionnaire and anthropometry measurement of the study subjects. The questionnaire was adopted from previous study done in Ambo town (16,17). The diet diversity questionnaire was adopted from national baseline survey. For height measurement SECCA height measuring board with a precision of 0.1cm was used. Digital bath balance (SECCA-scale) with precision of 0.1kg was used for measuring weight. All measurements were taken twice, if the two measurements differ by one unit the measurement was repeated by direct communication.

Data collectors and supervisors was trained for two days, then pre-test was done in the similar setting (Barkume High school and Kuni elementary schools of gemechis woreda) on 5% of the total sampled population who were not included in the main study. Necessary correction was done based on pre-test findings.

After data entry, data was exported to SPSS. Anthropometric indice was calculated by using WHO anthropolus. Then data exploration was done to identify data such as outliers, abnormal distribution and was treated accordingly.

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 multivariate logistic regression was applied to determine predictors for stunting and underweight of adolescents at a 95% confidence interval, and significance was declared at $p < 0.05$. 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 hararge 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. Informed written consent was sent to parent/guardian of adolescents after the written consent obtained from parents of study participants with standard assurances of confidentiality and Verbal consent was taken from study participants.

Results

Socio demographic Characteristics respondent and their Family

A total of 291 study participants were involved in this study, which made response 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. Above ninety nine percent of 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 there 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). 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%).

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
Living with	Catholic	3 1
	Parent	191 65.6
Absence from school in a month	Without parent*	100 34.4
	≥ 2 days	56 19.2
Work other than being student	<2 days	235 80.8
	Yes	34 11.7
	No	257 88.3

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).

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).

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 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
Educational status of father	Diploma and above	21 7.2
	no education	96 33
	1-8	108 37.1
Ethnicity of HH Head*	9-12	37 12.7
	Diploma and above	50 17.2
	Oromo	228 78.4
Occupational status of Father	Amahara	45 15.5
	Gurage	11 3.2
	Others	7 2.4
Occupational status of Mother	Civil servant	59 20.3
	Merchant	44 15.1
	Farmer	144 49.5
Main source of income	Daily laborer	19 6.5
	other	25 8.6
	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
	Farming	139 47.8
	Merchant	71 24.4
	Civil servant	58 19.9
	Daily laborer	15 5.2
	other	8 2.7

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 them were 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 girls and 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.

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%)
Mainly used food staples in the area	others	3(1.6%)	1(0.9%)	4(1.4%)
	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%)
Number of meal per day	other	11(5.9%)	2(1.9%)	13(4.5%)
	Two and less than two	43(23.2%)	13(12.3%)	56(19.2%)
	Three	124(67.1%)	65(61.3%)	189(64.9%)
Number of hunger episode in last month	Four and above	18(9.7%)	28(26.4%)	46(15.8%)
	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%)
Diet diversity	Four and above episode	12(6.5%)	4(3.8%)	16(5.5%)
	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%)

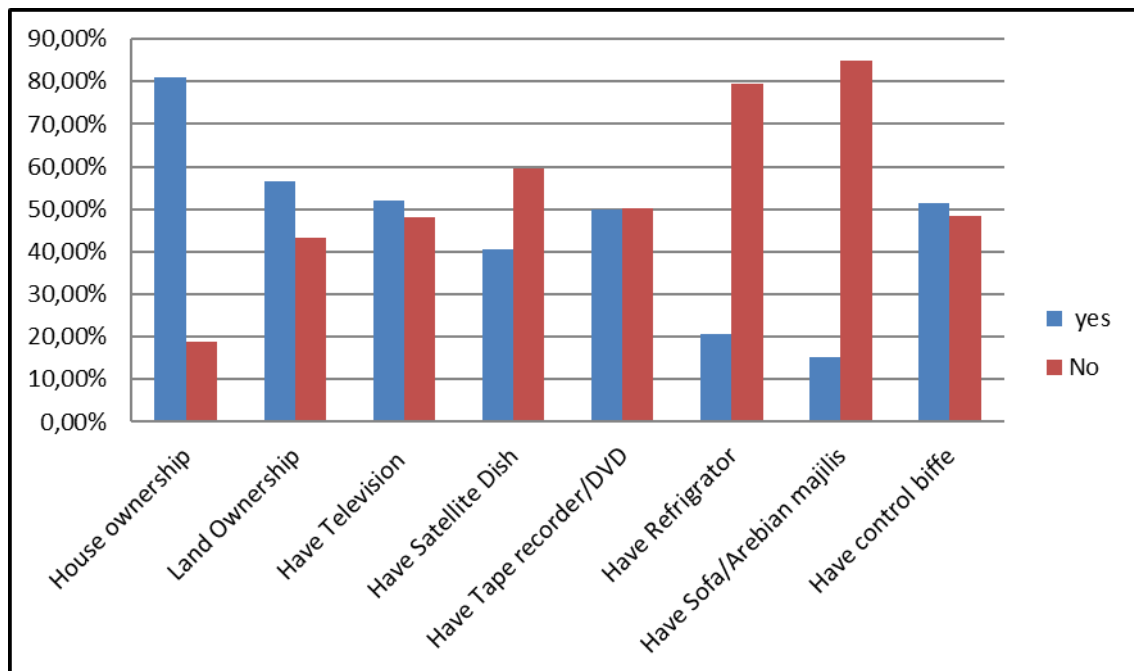


Figure 1. Study participants' families' household asset possession, chiro Town, November 2013

Study participants' sanitation and hygiene
All schoolshad latrine but none of them had

hand washing facilities. Majority of study participants house hold 272(93.5%) had latrine of

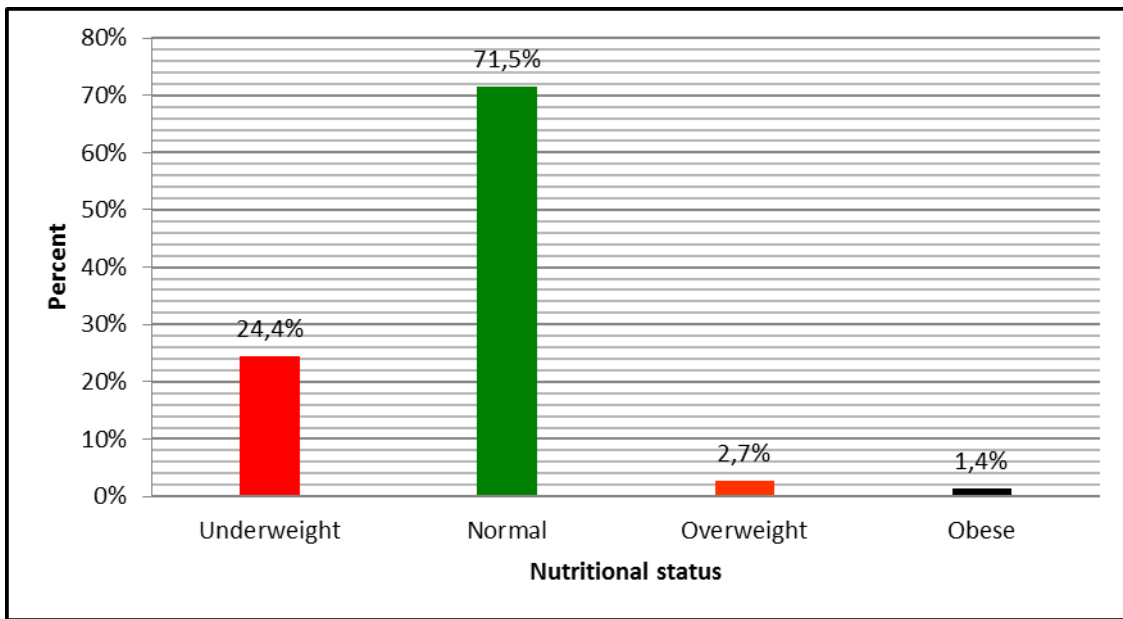


Figure 2. Study participants' Nutritional status, Chiro Town, November 2013

which only 104(38.2%) has hand washing facilities. The most common type of latrine were 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.

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

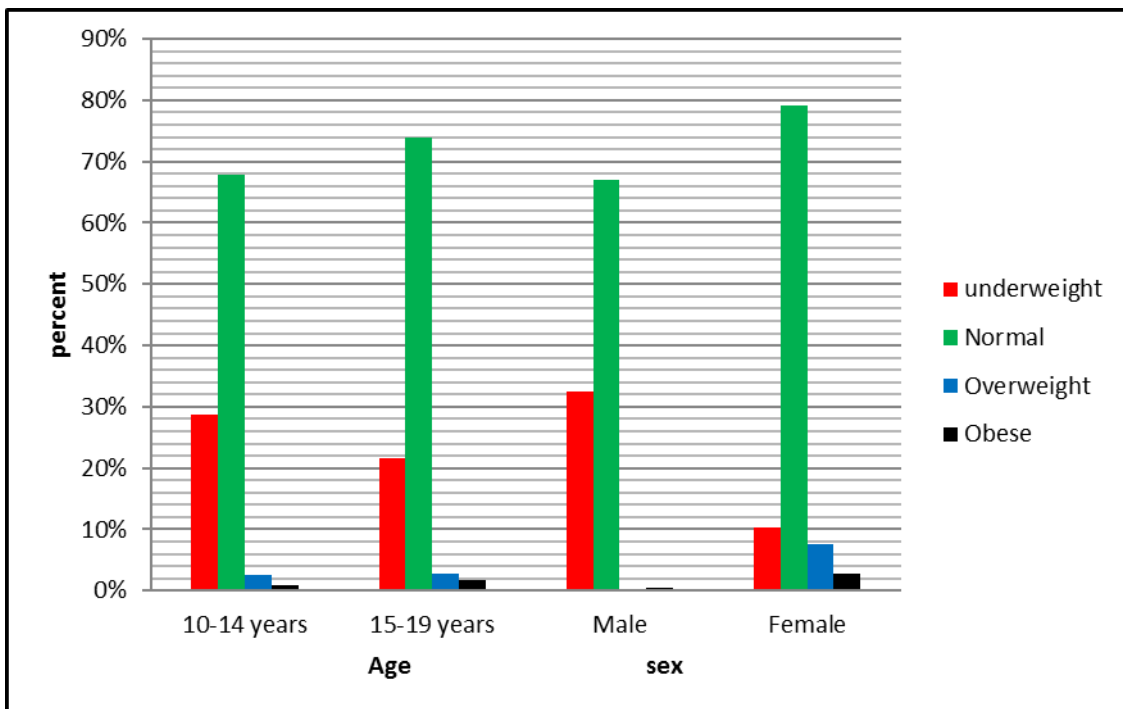


Figure 3. Study participants' nutritional status by sex and age, Chiro Town, November 2013

respondents about 8(5.4%) of them had previous history of utilization of family planning methods.

age of study participants were 16.60 and 29.30 respectively.

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

Underweight

This study revealed that 71(24.4%) of participants were underweight, 209(71.5%) of them were normal, 8(2.7%) of them were overweight and

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

Variables		Nutritional status			
		Underweight N (%)	NormalN (%)	Overweight N (%)	ObeseN(%)
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%)
Educational status of Father	9-12	7(17.1%)	28(80.5%)	1(2.4%)	0%
	Diploma and above	7(33.3%)	41(66.7%)	0%	0%
	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%)
Occupation of father	9-12	8(21.6%)	28(75.7%)	0%	1(2.7%)
	Diploma and above	7(14%)	41(82%)	2(4%)	0%
	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%)
Occupation of mother	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
	Housewife	25(21.4%)	88(75.2%)	4(3.4%)	0%
Occupation of mother	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%

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

Variables		Nutrition status			
		UnderweightN(%)	NormalN(%)	OverweightN(%)	ObeseN(%)
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%
Diet Diversity	Others	6(46.2%)	7(53.8%)	0%	0%
	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

4(1.4%) were obese. 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

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%)

And obese were 33(28.7%), 78(67.8%), 3(2.6%), 1(0.9%) respectively [fig.3].

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%).Similarly the prevalence of underweight among study participants from male headed and female head household were (28.9% vs 14.6%). About 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).

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 more 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% vs 23%) (Table 5).

Stunting

The proportions of stunted among late adolescence 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 (table 6).

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. 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 claimed 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%).

Factors associated with underweight

Primarily 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 candidates for the final model. Age, sex, birth order, with whom they live, their source of food, main staple they eat, khat chewing of study participants and their family residence, household head, educational and occupational status of family were found as candidate with P-value less than 0.25. Other variables like: meal frequency, family size and diet diversity were not significant at p value 0.25.

Table 7. Factors associated with Underweight of study participants, Chiro Town, November 2013

Variable	Underweight		Crude OR (95%CI)	Adjusted OR (95%)	
	YesN(%)	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)*
Father occupation	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
	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

Table 8. 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

To identify the important of 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, 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 that 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 under weight than study participants who came from female head household [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]. 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.

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 8].

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 vulnerables like infant, pregnant and lactating women and limited on adolescent girls.

The prevalence of underweight was found to be 24.4% which is almost comparable with the study done in Ambo which was 27.5% (12). This might be due to almost similar in demographic conditions. In addition the reason might be how they access their food to eat; the majority of adolescents' families purchases their food in both Ambo and Chiro town (66.9% vs 52.2%). Similarly this study was in line with the International 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%) (13). But prevalence of underweight in this study was found to be lower than a study done in West Bengali, India which was 42.2 % (13,14). The prevalence of underweight was in line with the study

done in Tanzania Kilosa district (24.4 % vs 21%)(14). This accounts for their similarity as 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%)(15). 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 (16). Similarly study done in India show more boys were underweight than girls (52.1% vs 32%) (17). 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 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 (18). 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%](19). The stunting prevalence among schoolgirls were found to be comparable with the prevalence of stunting among Kenyan school girls (10.4% vs 12.1%) (30). 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 (20). 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 (21). 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 (20,21). 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.

Adolescent 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 predictor for underweight of study participants, this might be due to that educational status affect income and knowledge about nutrition.

Adolescent from male headed household were more stunted than female headed household. This might be due traditional burden of women caretaking for both young and old family member (21).The current study revealed that adolescents who wash their hand after toilet was predictor of stunting, This might be explained by hand washing after toilet decrease the occurrence of communicable disease.

Conclusion

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. Participants who came from family headed of male; their father with no formal education as well as civil servant father, Regular hand washing after toilet use and being female headed house hold decreases the probability of stunting.

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References

1. United Nation Population Fund. The Promise of Equality Gender Equity, Reproductive Health and the Millennium Development Goals. State of world population 2005, UNFPA, 220 East 42nd Street, 23rd Fl. New York, NY 10017 U.S.A.
2. WHO, Nutrition. Adolescent nutrition a neglected dimension. <https://apps.who.int/nut/ado.htm>. (Accessed 21 June, 2013).
3. Stang J, Story M. eds. Guidelines for adolescent nutrition services. Minneapolis, MN: Center for Leadership, Education and Training in Maternal and Child Nutrition, Division of Epidemiology and Community Health, School of Public Health, University of Minnesota; 2005.
4. Chaubey Namrata, Chakravarthy Archana. A Comparative Study of Nutritional intake in adolescent girls. [Homepage on the Internet]. 2013; http://www.onlineijra.com/catogery/english%20research%20paper/A_Comparative_Study_of_Nutrient_Intake_in_Adolescent_Girls.pdf [Accessed 15 may, 2013].
5. Khan MR, Ahmed F. Physical Status, nutrient intake and dietary pattern of adolescent female factory workers in Urban Bangladesh. *Asia Pac J Nutr*. 2005; 14(1):19-26.].
6. SALLY S. California state. 4-H Center for Youth Development, the Biology of Adolescence. <http://www.ca4h.org/files/1333.pdfhtml> (accessed 21 June, 2013).
7. Judith E. Brown, J. Stang. Nutrition through life the cycle. 4th edition. 20 Davis Drive Belmont, CA 94002-3098 USA Wadsworth Cengage learning, 2011.
8. Federal Democratic Republic of Ethiopia. National Guidelines for HIV/AIDS and Nutrition .Addis Ababa: Ministry of Health, 2008
9. Johannes Kettunen .Examination of Genetic Components Affecting Human Obesity-Related Quantitative Traits (Dissertation). Helsinki: University of Helsinki. 2010.
10. UNICEF. Adolescence an Age of opportunity the state of the world's children 2011, United Nations Press: New York, 2011.
11. WHO, Discussion paper on Adolescence, Nutrition in adolescence -Issues and Challenges for the Health Sector, WHO publication press, Geneva, 2005.
12. California Department of Public health, California Nutrition and physical activity guideline for adolescent, Child and Adolescent health division, center for family health march 2012
13. UNICEF. State of the World's Children. United Nations Press: New York, 2005.
14. Burt MR. Why should we invest in adolescents? Paper prepared for the Conference on Comprehensive Health of Adolescents and Youth in Latin America and the Caribbean, July 9-12, 1996. Washington DC: PAHO, Kellogg Foundation (www.paho.org/english/hpp/adol_burt.htm) (accessed 13, March/2013).
15. Central Statistical Agency [Ethiopia]. 2007 population and housing census of Ethiopia result for country level statistical report. Addis Ababa, Ethiopia: Central Statistical Agency; 2010.
16. Alderman, H., et.al. Long-Term Consequences of Early Childhood Malnutrition. Food Consumption and Nutrition Division Discussion Paper 168, International Food Policy Research Institute, Washington, DC, 2003.
17. Elder L. Kennedy. Interactive Learning Exchange. Exploring Strategies to Reach and Work with Adolescents. Health, Nutrition and Population (HNP) Discussion Paper, World bank, Washington, DC, March, 2004.
18. Mondal N, Sen J. Prevalence of stunting and thinness among rural adolescents of Darjeeling district, West Bengal, India. *Italian journal of public health* 2010; 7(1): 54-61.
19. Sawaya, A.L., et.al. Long term effects of early malnutrition on body weight regulation. *Nutr. Rev.* 2004, 62: S127-133.
20. Nandy, S., et.al. Poverty, child undernutrition and which is similar to the pattern morbidity: new evidence from Indian. *Bull. World in this study. Health Organ* 2005, 83: 210-216
21. Delisle, H el ene, V. et.al. Should Adolescents Be Specifically Targeted for Nutrition in Developing Countries: To Address Which Problems, and How?" World Health Organization/International Nutrition Foundation for Developing Countries, 2000. (accessed march 23, 2013) Available at http://www.who.int/childadolescent-health/New_Publications/NUTRITION/Adolescent_nutrition_paper.pdf.

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