

Prevalence and Associated Factors of Thinness among Adolescent Students in Finoteselam Town, Amhara Region, Ethiopia

Damitie Kebede Mengesha (✉ dakebede10@gmail.com)

Bahir Dar University <https://orcid.org/0000-0001-5494-9906>

Reddy P. C. J. Prasad

Bahir Dar University

Degnet Teferi Asres

Bahir Dar University

Research

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Abstract

Background 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, adolescents need to have good quantity and quality nutrient to cope with this rapid growth and other health risk which increase nutritional demand. This study aimed to assess the prevalence and associated factors of thinness among school adolescents in Finoteselam town, Amhara region, Ethiopia.

Methods A school-based cross-sectional study among adolescent students aged 10-19 in public primary and secondary schools was carried out in Finoteselam town from February 05 to March 27, 2018. A total of 397 adolescent students were included in the study. Stratified and simple random sampling techniques were employed to select study subjects. Pre tested structured questionnaires were used to collect the data. Data was entered using Epi info version 7 and analyzed using SPSS version 20 and WHO Anthro Plus soft ware. A multivariate logistic regression analysis was employed to identify factors associated with stunting. Crude and adjusted odds ratios with 95% level significance were used to measure the strength of association and statistical significance was declared at p-value less than 0.05.

Results The prevalence of thinness among adolescents was 14.9%. Early Adolescent stage (AOR= 4.81; 95% CI: 1.23, 18.51), being Male adolescent students (AOR = 2.33; 95% CI: 1.60, 3.40), and using well water (AOR= 3.82; 95% CI: 1.46, 10.04) were significantly associated with thinness at P-value <0.05.

Conclusion The study revealed that prevalence of thinness was high in the study area. Age, Sex and sources of drinking water were found to be important factors associated with thinness among the respondents.

Background

Both UN and WHO define adolescence as a segment of population group age from 10–19 years old; it is a transition from childhood to adulthood period has intense physical, psychosocial and cognitive development [1]. During this period, the final growth spurt occurs; 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 [2]. 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 [3]. Regarding body composition change girls begin to store fat around breast, hips and upper arm but boy start losing fat and develop muscle [4].

Adolescence period is a window of opportunity for human being because there is possibility of little catch-up growth [5]; 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 [6].

Currently adolescents make up roughly 20% of the global population. In developing countries, adolescents have an even higher 85% demographic weight, for instance, roughly 26% in Salvador,

compared to 14% in USA [7]. Similarly, in Ethiopia, children and adolescent constitutes about 48% of Ethiopian population and about 25% of the Ethiopian populations are adolescents but studies among this age group were insufficient [8].

West gojam zone has a high potential in agriculture production like irrigation, particularly fruits and vegetables in addition to livestock and crop production [9, 10]. Finote selam is the center of the market and there is a surplus availability of fruits and vegetables. So, this study helps to assess the impact of agriculture products on the school adolescent students of thinness status in addition to other factors. The main aim of this study was to assess the prevalence and associated factors of thinness among school adolescents in Finoteselam Town, Ethiopia.

Methods

Study design and area

The study design was a school-based, cross-sectional study among adolescent students aged 10-19 in public primary and secondary schools. The study was carried out from February 05 to March 27, 2018. This study was conducted in Finote selam town which is located 389 km north-west of Addis Ababa, and 176 Km SE from Bahir Dar, the city of Amhara Region. Finote Selam town administration has been established to be the main town of West Gojjam zone since 2004 E.C. The total population size of the town according to 2012 census report was 42,062 (21,286 males and 20,776 females). The town is situated at an altitude ranging from 1500-2300 meters above sea level and has area coverage of 116,954 ha. The area receives an average annual rainfall is 1250mm. The minimum and maximum daily temperatures of the area are 14 and 32°C, respectively. It is bordered on North Sekela and Quarit, on South Dega Damot and Burie, on east, Deg damot and Dembecha, and on west Burie. There are six primary schools, one high school, one preparatory school and five colleges in Finote selam Town. The total number of students from grade 5-12 was 12,289 [11].

The source and Study Population

All adolescent students (10-19) in Finoteselam town schools were the source population. Randomly selected adolescent students (10-19) in Finoteselam town schools were study population.

Sample size and sampling procedure

The minimum sample size required was calculated using single proportion formula. The proportion of thinness among school going adolescents of Mekelle City, Northern Ethiopia was 37.8% [12] at a 95% confidence level, 5% margin of error adding 10 % as contingency for non-response rate.

[Due to technical limitations, the formula could not be displayed here. Please see the supplementary files to access the formula.]

By adding 10% non response rate the minimum sample size required to estimate the prevalence of stunting and its associated factors among Adolescent Students was $361 + 10\%$, $(361 + 36) = \underline{397}$.

To obtain the sample, stratified random sampling technique was used. The schools were stratified into primary schools, junior schools, high school and preparatory school. Three primary schools, namely Bata, Bakel and Efrata; and three junior schools, namely Edgetber, Bata and Bakel were selected using simple random sampling from six primary schools and six junior schools respectively, whereas a high school namely Finoteselam secondary school and a preparatory school namely Damot preparatory school were selected purposively since one high school and one preparatory school were present in Finoteselam Town. The total sample size was distributed proportionally to the schools. The sampling frame was students' identification number in their respective school. Numbers of students to be included in the study were determined by systematic random sampling method.

Data collection

To generate the data set used in this study, pre-tested structured questionnaires were used to collect data by trained data collectors. This standardized interview questionnaires were adopted and modified from related articles to collect data on the socio-demographic, Nutritional and health related variables [13, 14, 15, 16]. The questionnaires were translated into the local language (Amharic) for easy understanding by the respondents. Each student was interviewed to obtain information on socio demographic, nutritional and health related characteristics of the adolescents' family.

Anthropometric data was collected by trained data collectors who were health extension workers. And the overall activity was coordinated by the investigator. The age of the adolescents were derived from the school register. Height and weight were measured using stadiometer and Seca digital scale (Seca Germany) respectively. The weight was recorded to the nearest 0.1kg. It was calibrated against known weight regularly. Before the real anthropometric data collection, a standardization exercise was performed during the training to capture technical error of measurement. During the procedure the subjects wore light clothes and took off their shoes. Height was measured in cm using portable stadiometer. All adolescents were measured against the wall without foot wear and with heels together and their heads position and eyes looking straight ahead (Frankfurt plane) so that the line of sight was perpendicular to the body. The height was recorded to the nearest 0.1cm. The same measurer was employed for a given anthropometric measurement to avoid variability.

Data quality control and management

To ensure the reliability and validity of the study, training was given for the data collectors, the data collection was done by two health extension workers, and close follow up was done by the investigator during data collection. The Amharic version of the questionnaire was tested on 5% of the samples at Selamamba primary school, who have similar characteristics with the study participant but not participate in the study. The data collectors and investigator were participated on pre testing and standardization of the questionnaires. Problems highlighted during the preliminary study were corrected before the start of the actual survey. Each question was properly coded; Continuous supervision was done during pre-test and data collection period by the investigator. Completeness and consistency of recording on the questionnaire sheets were evaluated by investigator at the end of each working day so that correction measures were taken for the next times.

Data analyses

Socio-demographic, anthropometric, nutrition and health related data were entered into EPI info version7 and checked for completeness and consistency, followed by data cleaning and editing on EPI info. Then the data was analyzed by using SPSS (Statistical Package for Social Sciences), Version 20 software's and WHO Anthro Plus software was used for assessing growth of the adolescents [17]. Descriptive statistics using frequencies and proportions was used to present the study results. Anthropometric analysis determined the proportion of adolescents who was thin ($BAZ < -2$ SD). Odds ratio with 95% confidence interval was used for checking the strength of associations between the outcome variable (i.e. thinness) and independent variables. Bivariate and multivariable binary logistic regression was used to measure the association between the dependent variable and independent variables with 95% confidence interval. Covariates having p-value <0.25 were retained and entered to the multivariable logistic regression analysis [18]. A p-value <0.05 was considered as a cut-off point for an independent variable to be significantly associated with the outcome.

Results

Socio-demographic characteristics of study participants and their Family

From a total of 397 adolescent students who were selected as a sample, with 100% response rate 365 study participants were involved in this study. Among these 47(11.8 %) were early adolescents, 151(38.0 %) were mid adolescents and 199 (50.1 %) were late adolescents. Males constituted 249(62.7%) whereas females constituted 148(37.3%). From the participants, 108 (27.2%) were primary schools, 132 (32.2%) were from junior schools, while 116(29.2%) were from high school and others 41(10.3%) were attending preparatory school. Of the total participants, 195(49.1%) were from urban whereas 202(50.9%) were from rural. Regarding the family size, 173 (43.6%) and 224(56.4%) were <5 family members and ≥ 5 family members respectively. From the total participants, 257(64.7%) had functional latrine whereas 140(35.3%) did not have functional latrine (Table 1).

Table 1: Socio demographic related characteristics of adolescent students at Finote selam town, Amhara region, Ethiopia, 2018.

Variables	Frequency	Percentage
Age Group		
Early adolescent (10-13)	47	11.8
Mid adolescent (14-16)	151	38.0
Late adolescent (17-19)	199	50.1
Sex		
Female	148	37.3
Male	249	62.7
Grade		
Grade 5-6	108	27.2
Grade 7-8	132	33.2
Grade 9-10	116	29.2
Grade 11-12	41	10.3
Religion		
Muslim	22	5.5
Orthodox	375	94.5
Place of residence		
Urban	195	49.1
Rural	202	50.9
Father`s education		
Illiterate	95	23.8
Read and write	101	25.4
Primary school (1-8)	41	10.3
Secondary school (9-12)	92	23.2
College and above	68	17.1
Mother`s education		
Illiterate	102	25.7
Read and write	109	27.5
Primary school (1-8)	34	8.6
Secondary school (9-12)	89	22.4
College and above	63	15.9
Father`s occupation		
Daily laborer	57	14.4
Farmer	119	30.0
Merchant	85	21.4
Government/non-government-Employee	136	34.3
Mother`s occupation		
Daily laborer	5	1.3
House wife	86	21.7
Merchant	119	30.0
Farmer	107	27.0
Government/non-government-Employee	80	20.2
Family size		
<5	173	43.6
≥5	224	56.4
Source of drinking water		
Spring water	82	20.7
Well water	106	26.7
Public tap water	26	6.5
Tap water	183	46.1
Presence of functional latrine		
Yes	257	64.7
No	140	35.3

Nutrition and health related characteristics of school adolescents

Most of adolescents 278 (70.0%) were consuming meals three and above times per day whereas 1019 (30.0 %) of adolescents were consuming meals two times per day. Among the respondents, 33.0% were illness reported in the last one month. Among the respondents, 288 (72.5%) had home garden. Vegetables (46.1%) and fruits (51.4 %) were consumed daily. Among the respondents, 115 (29.0 %) ate farm animal products at least once per week (Table 2).

Table 2: Nutrition and health related characteristics of school adolescents at Finote selam town, Amhara region, Ethiopia, 2018.

Variables	Frequency	Percentage
Number of meals eaten per day		
Two times	119	30.0
Three times and above	278	70.0
Illness reported in the last one month		
Yes	131	33.0
No	266	67.0
Availability of home garden		
Yes	288	72.5
No	109	27.5
Eat vegetables at least once per day		
Yes	183	46.1
No	214	53.9
Eat fruits at least once per day		
Yes	204	51.4
No	193	48.6
Eat farm animal products at least once per week		
Yes	115	29.0
No	282	71.0
Nutrition and health information		
Yes	47	11.8
No	350	88.2

Anthropometric results

The minimum and maximum heights of study subjects were 127.50 cm and 186.70cm respectively. The mean \pm SD overall height of the participants was 158 ± 10.67 cm. Similarly, the minimum and maximum weights of study participants were 20.5kg and 80kg respectively. The mean \pm SD overall weight of the participants was 45.99 ± 10.09 kg. The mean heights of boys and girls were 158.99 ± 12.24 cm and 156.31 ± 6.94 cm respectively. Similarly, the mean weights of boy and girl adolescents were 45.1 ± 10.97 Kg and 47.53 ± 8.17 Kg respectively. The mean age of the study participants was 15.54 years (15.54 ± 2.41 SD).

Prevalence of stunting and thinness: the overall prevalence of thinness among adolescent students at Finoteselam town was 14.9%.

The mean Z-score of BMI-for-age of all adolescents was -1.13 which revealed the distribution of BAZ (Figure 1).

The mean Z-scores of BMI-for-age among boys and girls were -1.29 and -0.51 that showed the distribution of BAZ respectively (Figure 2).

Factors Associated with Thinness

The odds of thinness were 4.81 times higher among adolescent students in the early Adolescent stage as compared to adolescent students in the late Adolescent stage [AOR= 4.81; 95% CI: 1.23, 18.51]. Male adolescent students had 2.13 times higher odds of thinness (AOR = 2.13; 95 % CI: 1.60, 3.40) compared to female adolescent students. Students from households that used well water supply as main source of water supply were 3.82 times more likely to be at risk of being thin than students from households that used tap water supply for human consumption [AOR= 3.82; 95% CI: 1.46, 10.04]. Adolescents who had less than four dietary diversity were 2.24 times more likely to develop thinness than those having greater than four dietary diversity [AOR = 2.24, 95 % CI: 1.32, 8.13] (Table 3).

Table 3: Bivariate and multivariate logistic regression of factors associated with thinness among adolescent school students, Finoteselam town, Amhara region, Ethiopia, 2018.

Variables	Thinness		(COR,95% C I)	AOR,95% C I
	yes	no		
Age Group				
Early adolescent (10-13)	17 (36.2%)	30 (63.8%)	5.14 (2.39, 11.08)*	4.81 (1.23, 18.51)*
Mid adolescent (14-16)	24 (15.9%)	127 (84.1%)	1.90 (0.99, 3.64)	1.68 (0.57, 4.93)
Late adolescent (17-19)	18 (9.0%)	181 (91.0%)	1	1
Sex				
Female	4 (2.7%)	144 (97.3%)	1	1
Male	55 (22.1%)	194 (77.9%)	2.68 (1.88, 3.84)	2.13 (1.60, 3.40)*
Grade				
Grade 5-6	23 (21.3%)	85 (78.7%)	2.57 (0.91, 7.24)	1.77 (0.40, 7.87)
Grade 7-8	22 (16.7%)	110 (83.3%)	2.08 (0.74, 5.86)	1.33 (0.22, 8.19)
Grade 9-10	10 (8.6%)	106 (91.4%)	1.01 (0.32, 3.15)	1.06 (0.20, 5.58)
Grade 11-12	4 (9.8%)	37 (90.2%)	1	1
Religion				
Muslim	1 (4.5%)	21 (95.5%)	1	1
Orthodox	58 (15.5%)	317 (84.5%)	3.82 (0.50, 29.18)	3.90 (0.19, 81.94)
Place of residence				
Urban	18 (9.2%)	177 (90.8%)	1	1
Rural	41 (20.3%)	161 (79.7%)	2.44 (1.35, 4.40)*	2.16 (0.96, 4.87)
Father`s education				
Illiterate	15 (15.8%)	80 (84.2%)	2.79 (0.92, 8.45)	4.06 (0.23, 71.76)
Read and write	17 (16.8%)	84 (83.2%)	1.97 (0.71, 5.43)	2.73 (0.31, 24, 29)
Primary school (1-8)	10 (24.4%)	31 (75.6%)	1.96 (0.73, 5.32)	2.36 (0.26, 21.41)
Secondary school (9-12)	11 (12.0%)	81 (88.0%)	1.44 (0.51, 4.10)	0.80 (0.5, 12.90)
College and above	6 (8.8%)	62 (91.2%)	1	1
Mother`s education				
Illiterate	17 (16.7%)	85 (83.3%)	2.38 (0.77, 7.39)	1.78 (0.86, 3.65)
Read and write	16 (14.7%)	93 (85.3%)	1.86 (0.68, 5.07)	1.40 (0.83, 2.34)
Primary school (1-8)	9 (26.5%)	25 (73.5%)	1.50 (0.55, 4.09)	1.29 (0.61, 2.71)
Secondary school (9-12)	11	78 (87.6%)	1.33(0.47,	1.15 (0.66,

College and above	(12.4%) 6 (9.5%)	57 (90.5%)	3.81) 1	1.97) 1
Father`s occupation				
Daily laborer	8 (14.0%)	49 (86.0%)	1.20 (0.47, 3.07)	1.1 (0.55, 21)
Farmer	26 (21.8%)	93 (78.2%)	2.27 (1.12, 4.61)*	1.55 (0.45, 5.29)
Merchant	11(12.9%)	74 (87.1%)	1.18 (0.50, 2.75%)	1.52 (0.55, 4.26)
Government/non- government- Employee	14 (10.3%)	122 (89.7%)	1	1
Mother`s occupation				
Daily laborer	1 (20.0%)	4 (80.0%)	1.86 (0.19, 18.55)	2.10 (0.11, 38.74)
Farmer	21 (24.4%)	65 (75.6%)	2.74 (1.16, 6.46)*	2.16 (0.62, 7.51)
House wife	15 (12.6%)	104 (87.4%)	1.33 (0.55, 3.23)	2.46 (0.58, 10.47)
Merchant	13 (12.1%)	94 (87.9%)	1.24 (0.51, 3.04)	1.52 (0.43, 5.36)
Government/non- government- Employee	9 (11.2%)	71 (88.8%)	1	1
Family size				
<5	17 (9.8%)	156 (90.2%)	1	1
≥5	42 (18.8%)	182 (81.2%)	2.43 (1.32, 4.45)*	1.9 (0.80, 4.51)
Source of drinking water				
Well water	39 (21.3%)	144 (78.7%)	4.53 (1.71, 11.98)	3.82 (1.46, 10.04)*
Spring water	13 (12.3%)	93 (87.7%)	3.37 (0.88, 12.89)	2.56 (0.87, 7.56)
Public tap water	2 (7.7%)	24 (92.3%)	1.88 (0.23, 15.49)	1.46 (0.26, 8.09)
Tap water	5 (6.1%)	77 (93.9%)	1	1
Presence of functional latrine				
Yes	38 (14.8%)	219 (85.2%)	1	1
No	21 (15.0%)	119 (85.5%)	1.08 (0.49, 2.38)	1.05 (0.59, 1.87)
Number of meals eaten per day				
Two times	19 (16.0%)	100 (84.0%)	1.17 (0.64, 2.13)	1.01 (0.53, 1.91)
Three times and above	40 (14.4%)	238 (85.6%)	1	1
Illness reported in the last one month				
Yes	19 (14.5%)	112 (85.5%)	1.06 (0.57, 1.96)	1.03 (0.57, 1.87)
No	40 (15.0%)	226 (85.0%)	1	1
Availability of home garden				

Yes	50 (17.4%)	238 (82.6%)	1	1
No	9 (8.3%)	100(91.7%)	1.60 (1.01, 2.54)	1.15 (0.66, 1.99)
Eat vegetables at least once per day				
Yes	23 (12.6%)	160 (87.4%)	1	1
No	36 (16.8%)	178 (83.2%)	1.35 (0.76, 2.60)	1.30 (0.72, 2.36)
Eat fruits at least once per day				
Yes	26 (12.7%)	178 (87.3%)	1	1
No	33 (17.1%)	160 (82.9%)	1.33 (0.76, 2.31)	1.23 (0.69, 2.18)
Eat farm animal products at least once per week				
Yes	14 (12.2%)	101 (87.8%)	1	1
No	45 (16.0%)	237 (84.0%)	1.20 (0.62, 2.29)	1.19 (0.61, 2.34)
Nutrition and health information				
Yes	6 (12.8%)	41 (87.2%)	1	1
No	53 (15.1%)	297 (84.9%)	1.15 (0.49, 2.71)	1.08 (0.43, 2.69)

Discussion

In this study, the prevalence of thinness was 14.9% and this finding was lower than the studies in Mekele city (37.8%) [12], Ambo city (27.5%) [19], Wukro district (26.1%) [13] and Seychelles (27.7%) [20]. Another study in Ethiopia, in Jimma zone, has reported a much higher level (80.8%) of thinness prevalence among adolescents [21]). The prevalence of thinness of this study was higher than studies done in Addis Ababa (6.2%) (13%) [22]. The difference is mainly might be due to socioeconomic back ground and sample size differences. Findings in other African countries including Burkina Faso (13.7% [23], Asembo and Mumias, Kenya (15.6%) [24], Tunisia (13%) [25], and Tamale Metropolis, Ghana (10%) [26]. The variation might be due to socioeconomic, geographical characteristics of study area, cultural difference in dietary habit and care practices.

The odds of thinness were 4.81 times higher among adolescent students in the early Adolescent stage as compared to adolescent students in the late Adolescent stage. This finding was in line with findings from Adwa Town, Northern Ethiopia [14] and in CBN implementing woredas, Amhara region, Ethiopia [27]. Male adolescent students had 2.13 times higher odds of stunting compared to female adolescent students. This study was in line with the studies conducted in Mekelle City, Northern Ethiopia [12], Jimma Zone, South West Ethiopia [21] and Wukro, northern Ethiopia [13] which confirmed that, males were more affected in thinness than girls. Students from households that used well water supply as main source of water supply were 3.82 times more likely to be at risk of being stunted than students from households

that used tap water supply for human consumption. This finding was in line with findings from Adwa Town, Northern Ethiopia [14]. Adolescents who had less than four dietary diversities were 2.24 times more likely to develop thinness than those having greater than four dietary diversities. This finding was supported with finding from CBN implementing woredas, Amhara region, Ethiopia [27].

Conclusions

The prevalence of thinness was high in the study area. Consistent with this result, the mean Z-scores of height-for-age and BMI-for-age were higher in boys than girls. Age, Sex, and sources of drinking water were found to be important factors associated with stunting among the respondents. Based on the finding; there must be collaboration among health sectors and education sectors of the town to address school adolescents under nutrition problems of the town.

Abbreviations

AOR:Adjusted Odd Ratio; CM:Centimeter; COR:Crude Odd Ratio; CSA:Central Statistics Agency; CV:Confidence Interval; EDHS:Ethiopian Demography and Health Survey; SD:Standard Deviation; SPSS:Statistical Package for Social Sciences. UN:United Nations; WHO:World Health Organization

Declarations

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Fund was not obtained for this study.

Availability of data and materials

Data will be available upon request from the corresponding authors.

Authors' contributions

Damitie Kebede Mengesha has designed the study and involved in data collection, supervision and data processing. Damitie Kebede Mengesha has cleaned and analyzed the data; as well as interpreted the results and drafts the manuscript. Reddy P. C. J. Prasad and Degnet Teferi Asres participated in cleaned, analyzing and interpreting the data. Damitie Kebede Mengesha, Reddy P. C. J. Prasad and Degnet Teferi Asres have critically reviewed the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The study was approved by the University Ethical Committee of Faculty of Chemical and Food Engineering, Bahir Dar University (Protocol no. 12/2010). Supportive letters were obtained from Amhara public Health institute wrote a letter to West Gojjam zone health office, and then West Gojjam zone health office wrote a letter to Finote Selam Town Administration Health Office. Finally, Finote Selam Town Administration Health Office wrote a letter to target schools. Written informed consent was obtained from the adolescents` parents or legal guardians, after clearly explaining the research objectives.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

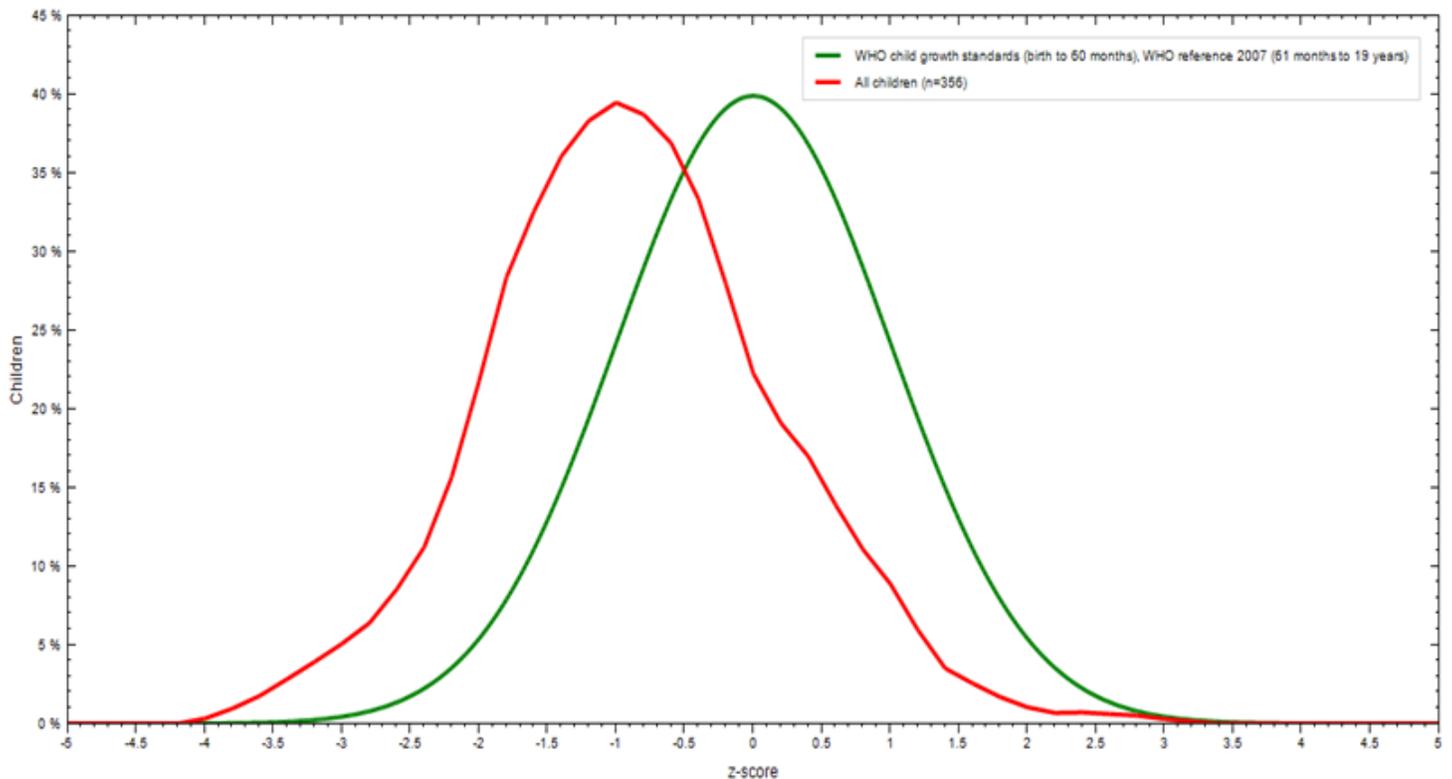


Figure 1

Height for age z- score of adolescent students in Finote Selam town, Northwest Ethiopia

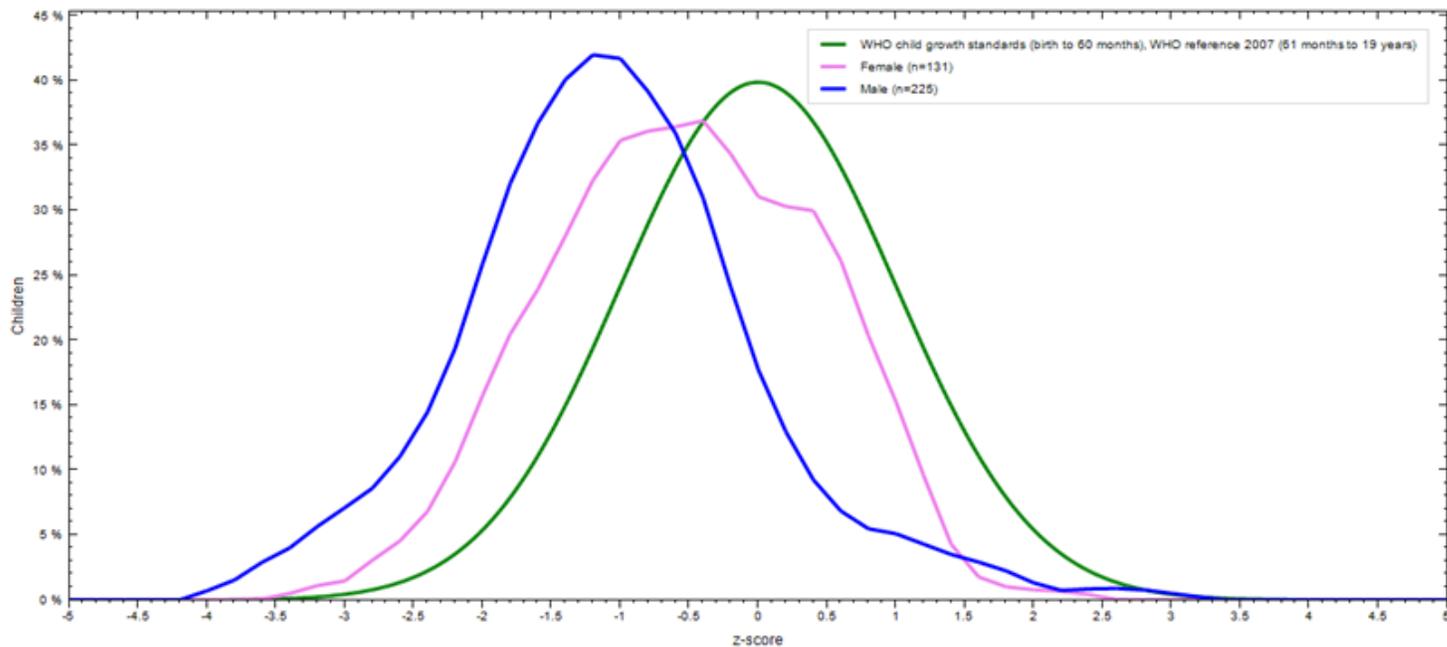


Figure 2

Height for age z- score of adolescent students by sex in Finote Selam town, Northwest Ethiopia

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