

## Nutritional Status and its Associated Factors among Adolescents (10 - 19 Years) in Abaarso Village Western Part of Hargiesa Town Somaliland 2019

Hamse Khalif<sup>1\*</sup>, Melese Sinaga Teshome<sup>2</sup> and Tefera Belachew<sup>3</sup>

<sup>1</sup>Department of Nutrition and Dietetics, Addis Ababa Medical University College, Hargiesa, Somaliland

<sup>2</sup>Institute of Health, Nutrition and Dietetics Department, Public Health Faculty, Jimma Universities, Ethiopia

<sup>3</sup>Institute of Health, Jimma University Director School of Graduate Studied, Jima University, Ethiopia

**\*Corresponding Author:** Hamse Khalif, Department of Nutrition and Dietetics, Addis Ababa Medical University College, Hargiesa, Somaliland.

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### Abstract

**Background:** In worldwide nutritional status with their health complications are increasing suddenly, and it has reported as a higher health problem in developing countries related to poor socio-economic situation. Adolescence is a time of increased growth and maturation in human development that needs extra nutrients and energy for the development and growth. Focusing on adolescents' nutrition, nutritional status provides a good Chance to reduce the intergenerational cycles of malnutrition also, an opportunity to correct existing nutritional problems starting from childhood; since there is no adequate information about nutritional status of adolescents aged 10 - 19 years in Somaliland.

**Objective:** To determine nutritional status and its associated factors among adolescents in Abaarso village western part Hargeisa Town, Somaliland, 2019.

**Methods:** A community based cross-sectional study was employed and using systematic random sampling technique was used and K interval was calculated then every k<sup>th</sup> Household were included into the study. Face to face administered questionnaire was used to collect data from 218 adolescents. Data were entered to Statistical package for social science version 23 for data analysis. World health organization Athroplus was used to identify the nutritional status of adolescents. Multivariable logistic regression analysis were used to identify factors associated with the nutritional status of adolescents at  $P < 0.05$  and 95%CI.

**Result:** Findings of this study showed the prevalence of stunting and thinness were 16.7% and 22.5% respectively. Being male adolescent were significantly associated with stunting (AOR: 0.46 (3.971 AOR = 5.712) and thinness (AOR = 3.631, 95% 1.946, 6.776  $P < 0.0001$ ).

**Conclusion:** This study revealed stunting and thinness were highly prevalent among adolescents. Recognizing the high prevalence of under-nutrition in Abaarso village western part of Hargeisa city, there is a clear need for immediate designing interventions to reduces the risks of malnutrition among adolescent in Abaarso Village by both government and non-government organization.

**Keywords:** Nutritional Status; Adolescents; Hargeisa; Somaliland

## Abbreviations

WHO: World Health Organization; TEM: Technical Error Measurement; UNICEF: United Nations Children's Fund; ENA: Emergency Nutrition Assessment; HAZ: Height for Age Z-score; BAZ: Body Mass Index for Age Z-Score; WAZ: Weight for Age Z-Score; BMI: Body Mass Index; MUAC: Mid Upper Arm Circumference; DD: Dietary Diversity; DDS: Dietary Diversity Score; IDDS: Individual Dietary Diversity Score; LNGO: Local and International Organization; FANTA: Food and Nutrition Technical Assistance

## Introduction

Malnutrition in adolescent is a one of the major public health problem in the global, especially in third world countries, which is affects their ability to learn and work at maximum productivity.

The nutritional status of adolescents provides Justification to the health status of the societies in which they constitute and its one of the most global health challenges faced by developing countries today is under nutrition. Underweight is defined as low body mass index (BMI) for age, which graded into mild-I, moderate-II, and severe-III can be an identifying of under nutrition although underweight Adolescents are not necessarily undernourished.

According to WHO Adolescents are defined from 10 - 19 years and they contribute about 18% of the global population. They are poor physiological, cognitive, and psychosocial development but remain neglected from many health and nutrition services [8]. Since malnutrition passes from generation to generation, because adolescent girls that became pregnancy with poor nutrition status has higher risk to have birth to low birth weight or intrauterine growth restricted infants that is highly vulnerable to develop metabolic disorders in life time [1].

However, changes that occur in dietary intake and in physical activity contribute are highly prevalent to failure, often seen side by side in communities with poor nutrition. There are also some justifications that low birth weight may predispose individuals to obesity and associated chronic disease in their life time. In school age children 12% are obese, 17% of older adolescent girls were the prevalence of overweight and obesity (BMI > 25%) in young adolescents has increased from 10% to 15% for urban areas and from 6% to 8% in rural areas in 10 years period [9].

In a similar research conducted in Gobu Seyo District, East Wollega Zone, Oromia regional state of West Ethiopia, shows that adolescents aged from 10 to 19 years in study area were 18.8% (95% CI; 15.6%, 21.9%) of which 2.8% (95% CI; 1.5%, 4.2%) were severely underweight (< - 3SD) [15]. The higher prevalence of underweight were common in male 23.3% (95% CI; 18.6%, 28.1%) rather than females 14.0% (95% CI; 10.0%, 18.0%). Respectively age distribution of underweight among the study participants, was more prevalent in early adolescence (10 to 14 years) compared to late adolescence (15 to 19 years) with prevalence of 20.2% (95% CI; 16.6%, 23.9%) and 13.9% (95% CI; 8.1%, 19.8%) respectively [14,16].

Nutritional deficiencies in adolescent females have higher consequences and they are likely to give birth to undernourished infants and a child resulting in the vicious cycle of intergenerational malnutrition and if it's not to predictor to develop poor health have a higher risk of mortality associated with the direct or indirect consequences of malnutrition [10].

The burden of both in macronutrients and micronutrient deficiencies is highly prevalent in adolescents of developing countries and the subsequent social, economic, health, and development impact of under nutrition in adolescents is expected to be highly incident in third world countries [8].

The finding of the study will also contribute as source of information for concerned offices and authorities including planners, policy makers, governmental and nongovernmental organizations that require to get about nutritional status and associated factors among adolescents in the study area and also used as a secondary information for future researchers who will be interested in to carry out a such study also it will support the Ministry of Health (MOH), international and local NGOs for better planning and implementing their interventions and activities towards improving nutritional status of adolescents in the republic of Somaliland.

**Materials and Methods**

**Study design, area and setting**

Study setting was Abaarso village which is located 20 km western part of the capital city of Somaliland Hargeisa Abaarso is a farming land which produce up to 65% of Somaliland’s food supplies and is where most of Somaliland’s crops are produced. Abaarso village is considered one of the most fertile areas in Somaliland and the entire northern regions of Somaliland most common Crops grown in the Abaarso village include oranges, corn, pears, maize, wheat, barley, beans, lemon, peas, groundnut, potatoes, tomatoes, onions, garlic, salad and cabbages, watermelon, papaya and many other types of fruits and vegetables.

A community based cross sectional study design was conducted. Were the source population was all adolescents aged from 10 to 19 years in in Hargeisa city and study population was all adolescents aged from (10 - 19 years) living in the Abaarso village western part of Hargeisa town and randomly selected sample of adolescents living in the Abaarso village western part of Hargeisa town.

**Inclusion criteria**

Adolescents between of 10 - 19 years and living in the Abaarso village, western part of Hargeisa town in the last twelve months.

**Exclusion criteria**

- The adolescents who had chronic illness were excluded.
- Adolescents who had disability or deformed anthropometric appearances were be excluded.

**Sample size determination**

The sample size were calculated using two sample population proportion formula with the following parameters expected prevalence (P1) of underweight among the adolescent girls (10 - 19 years) was (13.68%) from a previous study done in Agarfa High School, Bale Zone, Oromia Region, South East Ethiopia 2015 [22] and the prevalence of under nutrition (p2) was (28%) from a study conducted in South western part of Ethiopia [15] and standard normal variable at 95% Confident level (1.96) and margin of error of 5% with a design effect of 1.5 with addition of 5% of non-response rate.

<p>Assumption 1.                  P1 = prevalence of underweight among the adolescent girls (10-19 years) was (13.68%) d = 5% (0.005)<sup>2</sup>                  Za/2 = (1.96)<sup>2</sup>                  DE = 1.5                  Non response rate = 5% (0.005)  <math display="block">n = \frac{(Z_{\alpha/2})^2 p(1 - p)}{w^2}</math>                 n = <math>\frac{(1.96)^2 * 0.13.68 (1-0. 13.68)}{(0.05)^2} = 260</math></p>	<p>Assumption 2.                  P2 = prevalence of under nutrition (p2) was (28%) from a study conducted in South western part of Ethiopia d = 5% (0.005)<sup>2</sup>                  Za/2 = (1.96)<sup>2</sup>                  DE = 1.5                  Non response rate = 5% (0.005)  <math display="block">n = \frac{(Z_{\alpha/2})^2 p(1 - p)}{w^2}</math>                 n = <math>\frac{(1.96)^2 * 0.28 (1-0. 28)}{(0.05)^2} = 309.78</math></p>
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### **Sampling procedure**

A systematic random sampling technique was employed with the following procedures firstly calculate K interval then every 2<sup>nd</sup> house hold were included and randomly selected by lottery method for the first household using by randomizer and if one of the selected households were became ineligible it will be jump to the next household an interview were continuing until required sample size was reached.

### **Data collection tools and procedure**

Data were collected using a self-administered questionnaire in a face-to-face manner from the head of households with adolescents aged from 10 - 19 years with a continuous supervision of supervisors and the overall quality were carryout by the first investigator:

The questionnaires were developed according to the relevant literature reviews and a pretested in similar setting out of Abaarso village were comments and suggestion gained from pretest were modified and added in the final version. The questionnaire developed in English and translated into local language Af-somali then back to English by another person to ensure the quality of Data.

Data collection equipment was developed in logical sequenced and it wasn't using scientific terms and non-leading. The pre-test were carryout on 5% of the sample population.

Questionnaires were reviewing every day by first investigator for any errors and/or missing data and feedback were given to data collectors before starting the next day's activities.

### **Anthropometric data**

Nutritional status of study participants were assessed using the anthropometric measurements of adolescents aged from 10 - 19 years and the height were measured using with a portable height scale to the nearest 0.1 cm and the body weight were measured using the platform (digital scale) weighing scale (SECA) to the nearest 0.1 kg that has the capacity to measure 0 - 150 kg. Weight and height were measured by different measurers and with any variation the final validations were done by supervisors and immediately on site also it was assigned one person to recorder and he will be recorded immediate after the measurement the subjects were weighed with minimum of wearing cloths. Body mass for age z-score were assuming to identify level of nutritional status in the study participants and those below -2 z-score are categorized as under-weight, >-2 to +2 as normal nutritional status and Z >+2 as overweight and obese based on WHO classification of malnutrition (WHO, 2007) and also height for age z-score were used to identify nutritional status in the study participants and those below -2 z-score were categorized as having chronic malnutrition (stunted).

### **Data analysis procedures**

Data were used to enter Epi-Data version 3.1, and exported to SPSS, version 23.0 windows for further analysis. Dietary diversity score (DDS) was computed from seven food groups. Reliability of the equipment was checking using Cornbrash's Alpha. The data was presented in descriptive statistics using tables and figures by computing the frequencies and percentages of nutritional status (Under nutrition and over nutrition) minimum dietary diversity, meal frequency bivariate logistic regression analyses was done to identify candidate variables for adjusted regression at p-values of < 0.25 and multivariable logistic regression were presented as p-value < 0.05 with adjusted odds ratios (AOR) with 95% confidence intervals. All tests were two sided to determine statistical significance.

### **Data quality management**

To ensure Reliability and validity were checked using pilot testing, Cronbach's alpha. The contents of this study were based on objectives and data was double entry validated through Epi-data software and data collectors were trained and oriented how to avoid errors during data collection.

**Results**

A total of 281 adolescents from Abaarso Village, Western part of Hargeisa were involved in this study with a response rate of 90%. Regarding paternal occupation and education, 115 (40.9%) were self-employed and 94 (33.5%) of them attended primary school respectively.

Socio-demographic characteristics	Category	Frequency	Percentage
Sex	Female	221	78.6
	Male	60	21.4
Relationship of household head to family	Father	51	18.1
	Mother	205	73.0
	Relative	17	6.0
	Son/Daughter	4	1.4
Marital status of the household head	Divorced	52	18.5
	Married	196	69.8
	Separated/Widowed	23	8.2
	Single	10	3.6
Highest Educational level of Household head	Never went to school	64	22.8
	Only can read and write	85	30.2
	Primary level	94	33.5
	Secondary level	31	11.0
	Above secondary level	7	2.5
Occupation of Household head	Farmer	48	17.1
	Government employee	45	16.0
	Merchant	73	26.0
	Self-employee	115	40.9
Source of drinking water	Protected	113	40.2
	Unprotected	168	59.8

**Table 1:** Distribution of socio-economic and demographic characteristics among adolescents in Abaarso Village Western Part of Hargeisa Somaliland 2019.

**Characteristics dietary practice and related factors**

The mean of individual dietary diversity of adolescents were 1.46. More than half (54.4%) of participants consumed low dietary diversity and 125 (44.5%) of participants had habit of eating outside home. Two hundred one (71.5%) of the adolescents were consuming animal source of food once per week and 115 (40.9%) were skipping meal specially breakfast. More than half (55.5%) of the adolescents were from food insecure households.

Variable	Category	Frequency	Percent
Eating out of home	No	156	55.5
	Yes	125	44.5
Meal Frequency	1 - 2 times per day	70	24.9
	2 - 3 times per day	46	16.4
	> 3 times per day	165	58.7
Snacks	1 - 2 times per day	101	35.9
	2 - 3 times per day	116	41.3
	3 - 4 times per day	45	16.0
	> More than 4 times per day	19	6.8

Micronutrient supplement	No	126	44.8
	Yes	155	55.2
Animal Source of food	Once per week	201	71.5
	Twice per week	33	11.7
	More than twice per week	47	16.7
Meal Skipping	No	166	59.1
	Yes	115	40.9
Dietary Diversity score	Low	75	26.7
	Medium	109	38.8
	High	97	34.5

**Table 2:** Dietary distribution of adolescents in Abaarso Village, Western Part of Hargeisa, Somaliland 2019.

### Factors associated with stunting

In bivariate logistic regression non-relative household head, meal frequency, having snack and meal frequency and dietary diversity score were selected as candidate variables for multivariable logistic regression analysis. However, findings from multivariable logistic regression analysis were present that no variables were significantly associated with stunting.

Candidate Variable	Category	Stunting		COR with 95% C.I.	AOR with 95% C.I.
		Normal	Stunting		
Relationship of house hold head	Father	44 (86.3%)	7 (13.7%)	.47 (.043, 5.259)*	.84 (.068, 10.559)
	Mother	177 (86.3%)	28 (13.7%)	.47 (.048, 4.724)	.76 (.070, 8.487)
	Daughter/Son	2 (50.0%)	2 (50.0%)	3.0(.150, 59.890)	4.1(.184, 94.569)
	Relative	8 (47.1%)	9 (52.9%)	3.3 (.290, 39.322)	5.4 (.425, 71.004)
	Other Relative Member	3 (75.0%)	1 (25.0%)	1	1
Meal Frequency	1 - 2 times per day	55 (78.6%)	15 (21.4%)	1.3 (.662, 2.689)*	.91 (.350, 2.370)
	2 - 3 times per day	42 (91.3%)	4 (8.7%)	.46(.155, 1.404)*	.44 (.132, 1.519)
	> 3 times per day	137 (83.0%)	28 (17.0%)	1	1
Having Snack foods	1 - 2 times per day	77 (76.2%)	24 (23.8%)	2.6 (.571, 12.298)*	3.2 (.585, 17.680)
	2 - 3 times per day	99 (85.3%)	17 (14.7%)	1.4 (.309, 6.897)	1.8 (.329, 10.615)
	3-4 times per day	41 (91.1%)	4 (8.9%)	.82 (.139, 4.962)	.96 (.134, 6.946)
	> 4 times per day	17 (7.3%)	2 (4.3%)	1	1
DDS	Low	65 (86.7%)	10 (13.3%)	.49 (.219, 1.117)*	.69 (.277, 1.731)
	Medium	95 (87.2%)	14 (12.8%)	.47 (.228, .984)	.53 (.240, 1.212)
	High	74 (76.3%)	23 (23.7%)	1	1

**Table 3:** \*Indicates P-value less than 0.25%, and \*\* suggests P-value < 0.05%.

### Factors associated with thinness among adolescents

In bivariate logistic regression meal frequency, dietary diversity score watching TV and DVDS more than 2 hours per day and watching TV with family during meals were selected as candidate variables for multivariable logistic regression analysis. However, findings from multivariable logistic regression analysis indicated that no variables were significantly associated with thinness.

Variable	Category	Thinness		COR with 95% C.I.	AOR with 95% C.I.
		Normal	Thinness		
Meal Frequency	1 - 2 times per day	47(67.1%)	23 (35.9%)	1.8 (.975, 3.389)*	1.6 (.856, 3.064)
	2 - 3 times per day	40 (18.4%)	6 (9.4%)	.55 (.219, 1.420)*	.56 (.218, 1.448)
	> 3 times per day	130 (59.9%)	35 (54.7%)	1	1
Watching TV and DVD more than 2 hours per day	No	81 (84.4%)	15 (15.6%)	.51 (.271, .975)*	.59 (.275, 1.267)
	Yes	136 (73.5%)	49(26.5%)	1	1
Watching TV with family during meals	No	103 (80.5%)	25 (19.5%)	1.4 (.798, 2.488)*	1.0 (.540, 2.212)
	Yes	114 (74.5%)	39 (25.5%)	1	1
DDS	Low	63 (84.0%)	12 (16.0%)	.52 (.242, 1.116)*	.61 (.271, 1.410)
	Medium	83 (76.1%)	26 (23.9%)	.85(.456, 1.605)	.86 (.446, 1.670)
	High	71 (73.2%)	26 (26.8%)	1	1

**Table 4:** \*Indicates P-value less than 0.25%, and \*\* suggests P-value < 0.05%.

## Discussion

The finding of this study showed that low dietary diversity, adolescences food insecure and other relative member were significant predictors of stunting were only source of drinking is significant predictor of thinness.

In this study adolescents from low dietary diversity family were more likely to occur stunting than adolescents from high dietary diversity family.

Mean (SD) weights and heights of adolescents were 42.79 kg and 156.02 cm respectively and adolescent’s mean BAZ (BMI-for-Age Z-score) was -1.206797 and HAZ (Height-for-Age Score) was -1.001530.

The overall prevalence of stunting among adolescents in Abaarso Village Western part of Hargeisa was 16.7% sex of the respectively. Sex of the adolescents was significantly associated with stunting (P = 0.036 95% CI 1.046, 3.971 and AOR = 0.712) there is significant difference between boys and girls (21.5% and 11.7%) which is indicates that there low prevalence of stunting compared to other studies conducted in Ethiopia which is 17.0% and 28.5% (boys = 37.7%; girls = 21.2%; P = 0.001, Adwa Town, North Ethiopia 12.2% [16,23,24].

Stunting is an indicator of chronic malnutrition among adolescents aged from 10 - 19 years of age, it may reflect malnutrition during the first years of their life time and also a short stature results from nutritional deficit at the different stages of growth although childhood stunting is highly occurrence in Somaliland and the last chance for determining the consequences of malnutrition among adolescence period. And also there is a chance that children with childhood stunting can achieve catch-up growth during adolescence although it is usually incomplete [16,23,24].

The prevalence of thinness among the study participants was 22.5% with a significance difference between boys and girls (32.6% and 12.4% with p < 0.0001). This finding is higher than the findings of studies done in Gobu Seyo District, East Wollega Zone, Ekiti state, Nigeria, Owerri, Imo State, Nigeria, Adama City and Addis Ababa by which (18.8%) (11.7%) (18.6%) and (21.3%) of the adolescents were stunted, respectively [12,16,24,25]. On the other hand, our study indicate higher incidence of thinness among boys compared to other

studies conducted in Seychelles (14%) Iran (10.1%) Turkey (11.1%) [26-28]. This difference might be due to the difference in the study participants by which included urban and rural adolescent and the above studies was conducted only in rural areas which environmental factors are more likely to be common malnutrition and its impact was increasing day after day.

### **Conclusion**

This study was indicated that stunting and thinness are highly prevalent among adolescents aged from 10 - 19 years and recognizing high prevalence of under-nutrition in the city, and it should be carefully developed and planning interventions that minimize the risks of malnutrition among adolescent aged from 10 - 19 years in Abaarso village.

Many children, especially in third world countries are faced adolescence nutritionally unstable with a lot unfavorable environmental conditions, socioeconomic status, lifestyle and eating habits that make them vulnerable to diseases; and if they survive death, they are plagued in adulthood with chronic diseases, disabilities, poor quality of life and subsequently, early death. So, it is important to focus integrated nutritional strategies not only on children but also on adolescents. This will involve improving knowledge through effective communication and counseling that is accessible to the adolescents at multiple care points. Similarly, it will also involve promoting.

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### **Conflict of Interest**

The authors declare that they have no conflict of interest.

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