



## **Assessment of Prevalence and Associated Factors of under Nutrition among School Adolescents in Hawzen Woreda, Eastern Tigray, Northern Ethiopia**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/IJTDH/2018/45282

Editor(s):

(1) Dr. Giuseppe Murdaca, Clinical Immunology Unit, Department of Internal Medicine, University of Genoa, Italy.

Reviewers:

(1) Piero Valentini, Università Cattolica del Sacro Cuore, Italia.

(2) C. Sunil Pal Singh, Kamineni Academy of Medical Sciences and Research Centre, India.

Complete Peer review History: <http://www.scientedomain.org/review-history/27677>

**Original Research Article**

**Received 18 September 2018**

**Accepted 20 November 2018**

**Published 08 December 2018**

### **ABSTRACT**

**Introduction:** Adolescence is a period of rapid growth and maturation in human development that demands extra nutrients and energy to support growth. Due to increased nutritional requirement, poor dietary diversity and dietary inadequacies during the adolescent period, they are more vulnerable to under-nutrition. Focusing on adolescents' nutrition, especially girls, provides a unique opportunity to break the intergenerational cycles of malnutrition

**Methods:** Institutional based cross-sectional study was conducted on 398 school adolescents in Hawzen Woreda, Eastern Tigray northern Ethiopia. Study participants were selected by using systematic random sampling method from five schools. Data was collected using self-administered questionnaire. Beam balance and tap meter were used for anthropometric data. Entry and analysis of data were done by SPSS (version 20). WHO Anthro plus software was used to calculate body mass index for age and height for age. Multivariate logistic regression was used to predict the factors associated with under-nutrition.

**Results:** The result of this study showed that 32.2% of school adolescents were underweight, 0.3% and 33.2% were overweight and stunted respectively. The rate being underweight was higher in those adolescents born to illiterate fathers (AOR =1.94(1.19, 1.99)) family income less than 500 birr

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(AOR=1.37(1.23 - 7.32)) and large family size (> 4) (AOR=1.49(1.42 - 5.19)) . Adolescent born to illiterate mothers had 1.78 times chance of being underweight. The same variables had shown significant association with stunting. Adolescents who did not eat meat and other animal products had 2.3 times more chance of being stunted

**Conclusion:** The result of this study have shown strong relationship of both underweight and stunting with father's & mother's educational status, family income and size.

*Keywords: Underweight; stunting; malnutrition; under nutrition.*

## 1. INTRODUCTION

Adolescents are tomorrow's adult population and is a period of transition when an individual physically, mentally and physiologically transformed from a child to an adult .The term "adolescents", as defined by the World Health Organization (WHO), includes persons aged 10–19 years. In 1995 WHO/ United nation international children's emergency fund (UNICE) further classify adolescent into three main developmental stages based on physical, psychological and social changes as early, mid and late adolescent for those aged 10- 13 years,14-16 years and 17-19 years respectively [1].

Adolescents gain fifty percent of adult weight and more than twenty percent of their adult height during this period. They are generally expected to enjoy good health and being less vulnerable to infection compared with under five children and of chronic diseases compared with aging people, and hence they have generally being given little health and nutritional attention except for reproductive health concern [2]. However malnutrition which generally refers to under-nutrition and over nutrition is a major public health problem among adolescents all over the world. Despite the economic growth observed in developing countries, malnutrition and particularly under nutrition is still highly prevalent. In developing countries including Ethiopia, half of all children and adolescent fail to achieve their full genetic growth potential. It is due to inadequate nutrition and frequent illness and lack of health care access [2-4]. The nutritional status of adolescent women is particularly important, because it is through women and their off-spring that the pernicious effects of malnutrition are propagated to future generations. Moreover, nutrition also has an important bearing on age at menarche. Menarche is attained earlier by well-nourished adolescents. A minimal amount of body fat is essential for the initiation of menarche. So, adolescent period is a unique opportunity to break a range of vicious cycle of

structural problem that are passed from generation to next [5-7].

To eradicate malnutrition due to hunger and poverty different countries set a policy and strategies, giving an example, before 2015 in India, problem of malnutrition among adolescent was received recognition by the academicians and policy makers and numbers of national nutrition programs were introduced by central government to combat the adolescent malnutrition [8]. Globally eight of sustainable development goals are directly related to nutrition [9]. Ethiopia has made progress in reducing hunger and to an extent, under-nutrition. This is a testament to the country's commitment and priority action plans to address food insecurity and under nutrition. However, despite improvements in productivity of staple food production, hunger and under nutrition remain big challenges that Ethiopia must address in order to achieve food security and nutrition for all. over the past 20 years poverty has been steadily decreasing and incomes and agricultural production has been rising yet, the prevalence of under nourishment and child stunting are still high [10].

The aim of this study was to assess the prevalence of under nutrition and its associated factors among school adolescents.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

This study was conducted in Hawzien Woreda, Eastern Tigray, Northern Ethiopia. The Woreda has a total population of 117,954.

### 2.2 Study Design and Period

An institution based cross-sectional study design was used to assess prevalence and associated factors of under nutrition among school boy and girl adolescents. The study was conducted from December 2017 to end of June 2018.

## 2.3 Population

### 2.3.1 Source population

All adolescent students in Hawzien Woreda.

### 2.3.2 Study population

Adolescent students attending their education in selected primary and secondary schools in the woreda

### 2.3.3 Study unit

Systematically selected students from selected schools and classes.

## 2.4 Eligibility

### 2.4.1 Inclusion criteria

Adolescents who are permanent residents of the woreda.

### 2.4.2 Exclusion criteria

Adolescent students who have physical deformity were excluded from the study.

## 2.5 Sample Size and Sampling Techniques/Procedure

### 2.5.1 Sample size

The required sample size for this study was calculated using formula for single population proportion based on the prevalence rate of underweight which is 37.8 % [10] reported from the previous study conducted among school going adolescents in Mekele city and using the 95% level of confidence and 5% marginal error.

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

The sample size we have got from the formula was 362. However, with the addition of 10% contingency, the final total sample size was 398.

### 2.5.2 Sampling technique/procedures

Five schools in the woreda and classes from selected schools were selected by lottery methods. study participants have been selected by using systematic random sampling methods. Sampling fraction had been estimated from the total number of students in each classes.

## 2.6 Data Collection Procedures (Instruments, Data Collection Procedures)

### 2.6.1 Data collection instruments

Data was collected by using pretested questionnaire with both closed and open ended questions. The questionnaire had been developed in English and then translated in to Tigrigna. Questions were developed based upon literature review with the aim to find important information that could characterise nutrition. Tape meter and digital weight beam balance were used to measure height and weight respectively.

### 2.6.2 Data collection procedures

Self administered questionnaires have been distributed to the study participants. Height and weight have been measured by trained personnel.

## 2.7 Data Quality Management

Training had been given to the data collectors. Research ethics and administrative issues were part of the training. Supervisors have been assigned during the data collection period. Questionnaires have been checked for completeness and consistency of information by the supervisors.

Questionnaire was prepared in English and then translated in to Tigrigna language and pre-tested on 5% of sample a week before actual data collection period.

## 2.8 Data Analysis

Data entry, Cleaning and analysis were done by using SPSS version 20. Multiple logistic regression analysis was used to predict factors which affect the dependent variables. Odds ratios and their corresponding 95% CI had been calculated.

## 3. RESULTS

### 3.1 Socio Demographic Characteristics

Total of 398 informed and consented adolescents from five schools were enrolled in this study with 100% respondent rate. The mean age of the study participants was 15.2 years old.

More than half of study participants were female and more than two third of the study participants live in rural areas. About 250 (62.8%) and 340(85.4%) of study participant's fathers and mothers respectively did not attend formal education (Table 1).

### 3.2 Anthropometric Assessments of the Study Participants

The prevalence of underweight and stunting among the study participants were 32.2 % and 33.4% respectively. About 69.6% of underweight adolescents were rural residents. 66.4% of

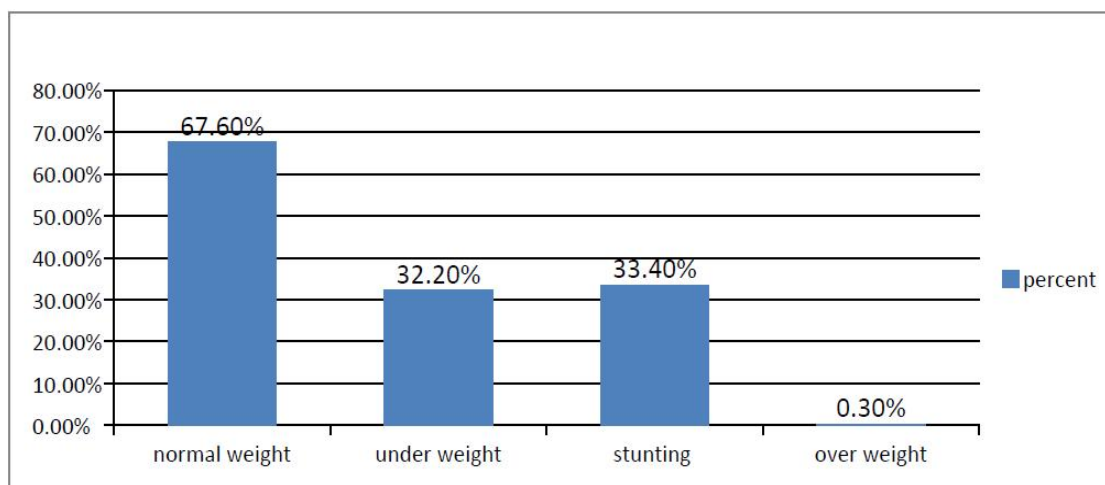
underweight and 45.9% of stunted adolescents were males (Fig. 1).

### 3.3 Assessment of Nutritional or Dietary Factors

Majority of the study participants (94%) eat their meal at a frequency of three or more per day. For most of the study participants ( 97.7%) their routine diet is Injera which is having poor nutritional value. Large proportion of the study participants eat meat, fruit, vegetables and other animal products less frequently. The reason reported was the low family income (Table 2).

**Table 1. Socio demographic characteristics of school adolescents in Hawzen Woreda, Eastern Tigray, Northern Ethiopia, May 2018**

Variable		Frequency(n)	Percentage (%)
Place of residence	Urban	153	38.4
	Rural	245	61.6
Age	10-13	66	16.6
	14-19	332	83.4
Sex	Male	190	47.7
	Female	208	52.3
Religion	Orthodox Christian	388	97.5
	Muslim	7	1.8
	Protestant	2	0.5
	Others	1	0.3
Educational level	4-8 grade	154	38.7
	9-12 grade	244	61.3
Father's occupation	Government employee	39	9.8
	Farmer	250	62.8
	Merchant	50	12.6
	Daily laborer	35	8.8
	Others	24	6
Mother's occupation	Government employee	28	7
	House wife	280	70.4
	Farmer	60	15.1
	Merchant	27	6.8
Family income (per month)	Others	3	0.7
	< 500 birr(<\$ 20)	113	28.4
	500 - 1000 birr(\$20 - \$37)	113	28.4
Family size	> 1000 birr (> \$37)	172	43.2
	≤ 4	177	54.5
Order of the respondent in the family	> 4	221	55.5
	First	76	19.4
	Second	77	19.3
	Third	96	24.1
	Fourth	102	25.6
Father's educational status	≥ fifth	47	11.8
	No formal education	250	62.8
	1- 4 grade completed	109	27.4
	College degree/diploma	39	9.8
Mother's educational status	No formal education	340	85.4
	1- 4 grade completed	21	5.3
	5- 8 grade completed	9	2.3
	College degree/diploma	28	7



**Fig. 1. Prevalence of underweight, stunting and overweight among school adolescents in Hawzen Woreda**

*Eastern Tigray, Northern Ethiopia, May 2018*

**Table 2. Dietary habit of school adolescents in Hawzen Woreda, Eastern Tigray, Northern Ethiopia, May 2018**

Variable		Frequency (n)	Percent (%)
Frequently eaten diet	Injera	389	97.7
	Bread	2	0.5
	Rise/pasta	1	0.3
	Vegetables	6	1.5
How often do you eat meat and other animal products	Daily	20	5
	Once in a week	54	13.7
	Once in a month	235	59
	Once in a year	67	16.8
How often do eat fruits and vegetables	Do not eat at all	22	5.5
	often	37	9.3
	seldom	361	90.7

**Table 3. Environmental and medical factors of school adolescents in Hawzen Woreda, Eastern Tigray, Northern Ethiopia, May 2018**

Variable		Frequency (n)	Percentage (%)
Availability of latrine	Yes	369	92.7
	No	29	7.3
Presence of hand washing basin after toilet	yes	307	83.1
	No	91	16.9
Source of drinking water	Tap water	384	96.5
	Protected well	6	1.5
	Unprotected well	4	1
	Spring water	3	0.8
	River	1	0.2
Distance of water source from home	<10 minutes travel	198	49.7
	10 - 30 minutes travel	73	18.3
	> 30 minutes travel	127	32
Illness in the last two weeks	Yes	83	20.9
	No	315	79.1

### 3.4 Environmental and Medical Factors

Majority of the study participants 384 (96.5%) reported that they use tap water for drinking and most of the study participants 369(92.7%) also reported that they use latrine for defecation(they do not use open spaces). About 83 (20.9%) of study subjects encountered acute illnesses in the last two weeks before the actual data collection period (Table 3).

### 3.5 Socio-demographic Characteristics & under Weight

Family income, family size and educational status of fathers and mothers were significantly associated with under nutrition (Table 4).

### 3.6 Socio-demographic Characteristics & Stunting

Family income, family size and educational status of adolescents fathers and mothers were significantly associated with stunting (Table 5).

### 3.7 Dietary Factors and under Nutrition

Frequency of eating meat and other animal products are significantly associated with stunting. Adolescents who do not eat meat and other animal products had 2.3 times more chance of being stunted. However none of the dietary factors were significantly associated with underweight.

### 3.8 Environmental, Medical Factors and Malnutrition

In this study result, no significant association has been seen between environmental, medical factors and under nutrition.

## 4. DISCUSSION

Malnutrition is a global health problem affecting both developing and developed countries with major adverse effects on human health as well as social and economic development. Globally, hundreds of millions of people are estimated to be affected by emergency situations all over the world; therefore, a high number of adolescents may present an increased risk of being exposed to under-nutrition. Targeting adolescence can provide an opportunity to prevent the onset of nutrition related chronic diseases in adult's life, addressing adolescence specific nutrition issues

and possibly also correcting some nutritional problems originating in the past. Many adolescents are in school which provides an effective and efficient opportunity for reaching large portion of the population, beyond students themselves they can influence their peers, family and community members so that adolescents an ideal target for nutrition education [5, 8-9].

This study showed 32.2% prevalence of underweight. In contrast to this, similar studies conducted in Nigeria, Ambo and Arbaminch had shown prevalence of 18.6% , 27.8% and 19.7% respectively. This inconsistency may be attributable to difference in socio-economic status [11–13]. However, study conducted in eastern Tigray and Mekele showed high prevalence of under-weight (55% and 37.8% respectively) [10,14]. This difference may also be due to a difference in socio-economic status between the study populations and difference in time of the study.

The prevalence of stunting in this study was 33.4 %. This is more than two times higher than the study result from Adama which showed stunting prevalence of 15.6% [15]. Similar study conducted in eastern Tigray showed lower prevalence rate (25.7%) [10].

Malnutrition in adolescent is related to different socio-demographic factors and hence different studies from different part of the world state many factors as the cause or determinant for malnutrition [16]. In this study, the rate of being underweight was higher in those adolescents born to illiterate fathers (AOR =1.94). Adolescents born to family with income less than 500 birr had 1.37 times more chance of being stunted. Adolescent born to illiterate mothers had 1.78 times chance of being underweight. The same variables had shown significant association with stunting. A community based cross sectional study done in three villages of Bangladesh found parental illiteracy and low monthly income as a major factors that determine protein energy malnutrition (PEM) among the children aged five to nineteen [17].

Similar study done in Bangladesh and Mexico revealed that under-nutrition rate was two times higher among the poorest [18]. A study done among school adolescents in Addis Ababa showed the association between underweight with parents' education, nutritional habit of adolescents and family income [19]. Another study conducted in Arbaminch, Ambo and

**Table 4. Socio demographic characteristics and underweight among schools adolescents of Hawzen Woreda, Eastern Tigray, Northern Ethiopia, May 2018**

Variable		Frequency (n)	Under weight		AOR(95%CI)	P-value
			Yes	No		
Place of residence	Urban	153	39(30.4%)	114(42.%)	1	0.07
	Rural	245	89(69.6%)	156(57.8%)	1.2(0.3-4.6)	
Age	10-13	66	30(23.4%)	36(13.3%)	0.59(0.12-2.86)	0.62
	14-19	332	98(29.5%)	234(70.5%)	1	
Sex	Male	190	85(44.7%)	105(55.3%)	1	0.83
	Female	208	43(20.7%)	165(79.3%)	1.43(0.43-2.56)	
Religion	Orthodox Christian	388	126(32.5%)	262(67.5%)	2.56(0.98 - 8.43)	0.58
	Muslim	7	2(28.6%)	5(71.4%)	1	
	Protestant	2	0(0%)	2(100%)	0.34(0.67 -1.56)	
	Others	1	0(0%)	1(100%)	0.36(0.48-1.79)	
Educational level	4-8 grade	154	66(51.6%)	88(32.6%)	2.25(0.4-6.25)	0.05
	9-12 grade	244	62(38.3%)	235(87%)	8.1(0.5-123.5)	
Father's occupation	Government employee	39	4(3.2%)	35(13%)	1	0.67
	Farmer	250	90(36%)	200(64%)	0.97(0.59 -6.78)	
	Merchant	50(12.6%)	15(30%)	35(70%)	1.34(0.56 - 3.91)	
	Daily laborer	35(8.8%)	10(28.6%)	25(71.4%)	2.89(0.69 -7.13)	
	Others	24(6%)	9(37.5%)	15(62.5)	1.98(0.49 - 4.48)	
Mother's occupation	Government employee	28	4(3.2%)	24(8.9%)	1	0.87
	House wife	280	101(36.1%)	179(63.9%)	0.58(0.74 - 7.29)	
	Farmer	60	14(23.3%)	46(76.7%)	0.49(0.98 - 8.13)	
	Merchant	27	9(33.3%)	18(66.4%)	1.57(0.87 - 6.83)	
	Others	3	0(0%)	3(100%)	0.19(0.79- 7.65)	
Family income (per month)	< 500 birr	113	87(77%)	26(23%)	1.37(1.23 - 7.32)	0.044
	500 - 1000 birr	113	28(25%)	85(75%)	1.11(0.31 - 5.98)	
	> 1000 birr	172	13(7.6%)	159(92.4%)	1	
Family size	≤ 4	177	31(17.5%)	146(82.5%)	1	0.047
	> 4	221	97(43.9%)	124(56.1%)	1.49(1.42 - 5.19)	

Variable		Frequency (n)	Under weight		AOR(95%CI)	P-value
			Yes	No		
Order of the respondent in the family	First	76	10(13.2%)	66(86.8%)	1	
	Second	77	15(19.5%)	62(80.5%)	0.93(0.423, 2.04)	0.56
	Third	96	25(26%)	71(74%)	0.46(0.229, 0.93)	0.90
	Fourth	102	59(57.8%)	43(42.2%)	1.14(0.27, 4.81)	0.43
	≥ fifth	47	19(40.4%)	28(59.6%)	1.407(0.41, 4.89)	0.12
Father's educational status	Did not attend formal education	250	104(41.6%)	146(58.4%)	1.94(1.19, 1.99)	0.048
	1-4 grade completed	109	21(19.3%)	88(80.7%)	1.5(0.055, 40.63)	0.60
	College degree/diploma	39	1(2.6%)	38(97.4%)	1	
Mother's educational status	Did not attend formal education	340	118(34.7%)	222(65.3%)	1.796(1.050, 3.073)	0.049
	1- 4 grade completed	21	6(28.6%)	15(71.4%)	1.257(0.319, 4.956)	0.30
	5- 8 grade completed	9	1(11.1%)	8(88.9%)	0.929(0.423, 2.037)	0.56
	College degree/diploma	28	3(10.7%)	25(89.3%)	1	

**Table 5. Socio demographic characteristics and stunting among school adolescents in Hawzen Woreda, Eastern Tigray, Northern Ethiopia, May 2018**

Variable		Frequency (n)	Stunted		AOR(95%CI)	P-value
			Yes	No		
Place of residence	Urban	153	45(33.8%)	108(40.8%)	1	
	Rural	245	88(35.9%)	157(64.1%)	2.11(0.49 - 8.97)	0.47
Age	10-13	66	32(48.5%)	34(51.5%)	0.76(0.13-4.3)	0.62
	14-19	332	101(30.4%)	231(69.6%)	1	
Sex	Male	190	61(30.4%)	129(67.9%)	1	
	Female	208	72(34.6%)	136(65.4%)	2.19(0.31-6.56)	0.71
Religion	Orthodox Christian	388	132(34%)	256(66%)	1.56(1.34 - 7.43)	0.51
	Muslim	7	1(14.3%)	5(85.7%)	1	
	Protestant	2	0(0%)	2(100%)	0.97(0.67 -7.56)	0.13
	Others	1	0(0%)	1(100%)	0.81(0.48-6.79)	0.19
Educational level	4-8 grade	154	73(47.4%)	81(52.6%)	1.25(0.47 - 6.25)	0.51
	9-12 grade	244	60(24.6%)	184(87%)	4.1(0.5 - 123.5)	0.89



Variable		Frequency (n)	Stunted		AOR(95%CI)	P-value
			Yes	No		
Father's occupation	Government employee	39	3(7.7%)	36(92.3%)	1	
	Farmer	250	93(37.2%)	157(62.8%)	1.37(0.62 - 5.78)	0.61
	Merchant	50	16(32%)	34(68%)	1.17(0.49 - 4.97)	0.74
	Daily laborer	35	11(31.4%)	24(68.6%)	1.89(0.58 - 6.13)	0.60
	Others	24	10(41.7%)	14(59.3%)	1.01(0.51 - 4.14)	0.52
Mother's occupation	Government employee	28	3(10.7%)	25(89.3%)	1	
	House wife	280	103(36.8%)	177(63.2%)	0.62(0.59 - 7.29)	0.57
	Farmer	60	16(26.7%)	44(73.3%)	0.79(0.61 - 6.13)	0.39
	Merchant	27	11(40.7%)	16(59.3%)	1.14(0.94 - 11.83)	0.86
	Others	3	0(0%)	3(100%)	0.21(0.80- 12.65)	0.37
Family income (per month)	< 500 birr	113	91(80.5%)	22(19.5%)	2.27(1.29 - 8.32)	0.039
	500 - 1000 birr	113	30(22.6%)	83(77.4%)	1.47(0.63 - 9.1)	0.57
	> 1000 birr	172	12(7%)	160(93%)	1	
Family size	≤ 4	177	31(17.5%)	146(82.5%)	1	
	> 4	221	102(46.2%)	119(54.8%)	1.83(1.23 - 10.19)	0.047
Order of the respondent in the family	First	76	11(14.5%)	65(85.5%)	1	
	Second	77	15(19.5%)	62(80.5%)	0.82(0.96, 13.037)	0.11
	Third	96	27(28.1%)	69(71.9%)	0.37(0.229, 8.928)	0.38
	Fourth	102	59(57.8%)	43(42.2%)	1.143(0.31, 10.81)	0.18
	≥ fifth	47	21(44.7%)	26(55.3%)	1.65(0.321, 9.892)	0.14
Father's educational status	Did not attend formal education	250	108(43.2%)	142(56.8%)	2.14(1.193, 11.994)	0.038
	1-4 grade completed	109	22(20.2%)	87(79.8%)	1.1(0.055, 23.63)	0.63
	College degree/diploma	39	3(7.7%)	36(92.3%)	1	
Mother's educational status	Did not attend formal education	340	121(35.6%)	219(64.4%)	1.03(1.021, 14.073)	0.048
	1- 4 grade completed	21	7(33.3%)	14(76.7%)	1.257(0.219, 8.321)	0.053
	5- 8 grade completed	9	2(22.2%)	7(87.8%)	0.929(0.423, 2.037)	0.47
	College degree/diploma	28	3(10.7%)	25(89.3%)	1	

**Table 6. Dietary factors and under-nutrition among school adolescents in Hawzen Woreda, Eastern Tigray, Northern Ethiopia, May 2018**

Variable	Frequency (n)	Stunting		AOR(95% CI)	P value	
		Yes	No			
Frequently eaten diet	Injera	389	132(33.9%)	257(67.7%)	1.14(0.43 - 9.13)	0.11
	Bread	2	0(0%)	2(100%)	1	
	Rise/pasta	1	0(0%)	1(100%)	0.46(0.33 -2.19)	0.82
	Vegetables	6	1(20%)	5(80%)	0.79(0.75- 14.13)	0.21
How often do you eat meat and other animal products	Daily	20	1(5%)	19(95%)	1	
	Once in a week	54	4(7.4%)	50(92.6%)	1.39(0.96 - 17. 9)	0.09
	Once in a month	235	58(24.7%)	177(75.3%)	1.43(0.67 - 5.69)	0.07
	Do not eat at all	89	72(80.9%)	17(19.1%)	1.52(1.29 - 8.23)	0.032
How often do eat fruits and vegetables	often	37	16(43.2%)	21(55.8%)	1	
	seldom	361	117(32.4%)	244(67.6%)	0.91(0.29 -11.39)	0.74

**Table 7. Environmental, medical factors and under nutrition among school adolescents of Hawzen Woreda, Eastern Tigray ,Northern Ethiopia, May 2018**

Variable	Frequency (n)	Under weight		AOR(95% CI)	P. value	
		Yes	No			
Availability of latrine	Yes	369	124(33.6%)	245(66.4%)	1.02(0.39 -7.93)	0.48
	No	29	4(13.8%)	25(86.2%)	1	
Presence of hand washing basin after toilet	yes	307	108(35.2%)	199(64.8%)	1.47(0.94 -19.9)	0.51
	No	91	22(24.2%)	69(75.8%)	1	
Source of drinking water	Tap water	384	127(33.1%)	257(66.9%)	1.18(0.36 -13.89)	0.49
	Protected well	6	1(20%)	5(80%)	1.03(0.72 -11.11)	0.39
	Unprotected well	4	0(0%)	2(100%)	0.89(0.38 - 10.1)	0.78
	Spring water	3	0(0%)	2(100%)	0.97(0.62 -18.7)	0.84
	River	1	0(0%)	1(100%)	1	
Distance of water source from home	<10 minutes travel	198	83(41.9)	115(58.1%)	1	
	10 - 30 minutes travel	73	15(20.5%)	58(79.5%)	1.25(0.52 -13.12)	0.69
	> 30 minutes travel	127	30(23.6%)	97(76.4%)	1.47(0.61 - 6.19)	0.41
Illness in the last two weeks	Yes	83	38(45.8%)	45(54.2%)	1.89(0.51 -14.9)	0.29
	No	315	90(28.6%)	225(71.4%)	1	

Mekele showed significant association between under-weight and fathers being illiterate, size of the household, maternal education determinants of being under-weight [10,12-13]. Adolescence period has the fastest growth and the nutritional requirements are increased to promote this growth. Adolescents who are fed inadequate quantities of protein and energy and micronutrients for their growth and health are likely to suffer from malnutrition.

The energy requirements per kg body weight are higher during adolescent period [4]. This study showed significant association between stunting and not consuming meat and other animal products. Adolescents who do not eat meat and other animal products had 2.3 times more chance of being stunted. Similar study conducted Mekele showed the same result [10].

## 5. CONCLUSION

The result of this study had shown high prevalence of both underweight (32.2%) and stunting (33.4%) with educational status of father's & mother's, family income and size, showing significant association with underweight & stunting.

## CONSENT AND ETHICAL APPROVAL

Before the data collection, ethical clearance letter was obtained from ethical review board of Adigrat University. Permission letter was obtained from administrative bodies of the woreda and schools. The study participants were informed about the purpose of the study, and their oral consent have been obtained. The participant's right to refuse or withdraw from participating in the interview was fully maintained and the information provided by each respondent was kept confidential.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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