Volume Issue I Version I

Mekonnen Tegegne[1], Semere Sileshi[2], Tesfaye Assefa[3] and Abdurrahman Kalu[4]

[1] Madda Walabu University

Abstract

Background: Despite the fact that, Having adequate information on the nutritional status of adolescent girls do have paramount importance to foster a healthy transition from childhood to adulthood and to broken the intergenerational cycle of malnutrition, in Ethiopia particularly in the study area information regarding the nutritional status of adolescents is lacking.Methods and procedure: An institution based cross sectional study design was employed. A total of 598 adolescent school girls were selected using simple random sampling methods. Data were collected using interviewer administered questionnaire and anthropometric measurements. Anthropo-metric measurements were converted to height-for age z-scores and BMI-for-age zscores using WHO Anthroplus software. The nutritional status of the study subjects were classified as stunted (HAZ < =2SD) and thin (BAZ < ?2 SDD). Data were Analyzed using SPSS version 20.0. Descriptive statistics was done. Binary logistic regression was used to identify factors associated with stunting and thinness.

Index terms— adolescents girls, nutritional status, stunting, thinness.

1 I. Background

orld Health Organization (WHO) defined adolescent as the period of life from 10 to 19 years. Adolescents constitute 20% of the world population and about 25% of the populations of Ethiopia are adolescent.

This period is very crucial since it is the formative years in the life of an individual when major physical, psychological and behavioral changes take place ??1, 2, and 3). During this period, adolescents gain up to 50% of their adult weight, 20% or more than that of their adult height and 50% of their adult skeletal mass. Owing to these, nutritional requirements at this period are maximal, combined with poor eating habits and other considerations, e.g. menstruation, contribute to accentuating the potential risk for adolescents under nutrition (4,5).

Malnutrition is associated with significant morbidity, mortality, and affects the reproductive outcome in adolescent girls. Moreover, undernourished adolescents tend to be ultimately malnourished adults, give birth to small babies, and transmitting under nutrition to future generation (6).

In general adolescent girls are the worst sufferers of the ravages of various forms of malnutrition because of their increased nutritional needs and low social power (7).

Like other developing countries of the world, under nutrition remains a major public health problem in Ethiopia. Among the women, 17 % had chronic energy deficiency (BMI < 18.5), 6 % had experiencing nightblindness in their most recent pregnancy, 27 % had anemia. This clearly reflects that rate of malnutrition in Ethiopia is high (8).

Despite the fact that, Having adequate evidences and information on the prevalence of stunting and thinness and associated factors among adolescent girls do have paramount important for planning, initiating and implementing of intervention programs to broken the intergenerational cycle of malnutrition and to to foster a healthy transition from childhood to adulthood, information regarding the nutritional status of adolescents in the study area is lacking.

Therefore, the study sets out to address the issues related to prevalence rat of underweight and stunting and its associated factors among adolescent girls in Goba town, south East Ethiopia.

2 II. Methods

3 b) Study Area

This study was conducted in Goba town, South East Ethiopia. Goba town is situated at 445km south east from the capital Addis Ababa. In the town, currently there are 21 schools of which 11 are governmental and 10 are privates. In the town there are One Referral Hospital and two health centres.

4 c) Sample size determination and sampling Methods

The sample size was calculated using single population proportion formula by considering the following assumptions. Proportion of adolescents with thinness (p= 58.3%) from previous study done among rural adolescent girls in Tigray, Margin of error as 5%, confidence level at 95 %, non response rate of 10 % and design effect 1.5. The final sample size for this study was 617.

A total of 617 adolescent girls were selected from both governmental and private schools. Subjects were selected by stratifying the total schools into governmental and nongovernmental schools. Then, two primary and one high school from governmental schools and two primary school from private schools were selected using lottery method. Then the study subjects were stratified per study classes and determined sample size was allocated proportionally. Finally, Simple Random Sampling was used to selected study subjects from respective classes using the registrar record as the sampling frame. Thinness: BMI-for-age below the 5 th percentile of the 2007 WHO reference population (18).

Stunting: Height-for-age below -2Z scores of the 2007 WHO Reference population (18).

Adequate Dietary Diversity: Proportion of adolescent girls who received mean values or above of foods from nine food groups (20).

Inadequate Dietary Diversity: Proportion of adolescent girls who received less than mean values of foods from nine food groups (20). f) Data collection methods and Measurement Data were collected using a questionnaire adopted from Ethiopian Demographic Health Survey, different literatures and FAO food grouping method, which were designed to assess Demographic and Socio -Economic Characteristics, Health and Household Environment related characteristics and Meal pattern and Dietary diversity score related characteristics. Weight was measured to the nearest 0.1kg using calibrated digital weight scales in standing position with light cloths and bare foot. Height was measured to the nearest 0.1cm using height measuring Stadiometer in standing position. Data were collected by six diploma nurses working in the study area.

5 g) Data Quality Control

Training was given for data collectors on aim of the study, sampling methods and Anthropometric Measurements. Questionnaires were pretested on adolescent school girls found outside the sampled schools. Scales were carefully handled and periodically calibrated by placing standard calibration weights of 2 kg iron bars on the scale to ascertain accuracy. h) Data analysis Data were Analysis using SPSS version 20.0. Descriptive statistics was used to describe the study population in relation to relevant variables. Anthropometric measurements were converted to height-for age z-scores and BMI-for-age z-scores using WHO Anthroplus software. The nutritional status of the study subjects were classified as stunted (HAZ < =SD) and thin (BAZ < ?2 SD) (9).

Binary logistic regression was used to identify factors associated with stunting and thinness. Then the variables found significantly associated with the study outcomes were included in multiple logistic regressions to identify the independent predictors of thinness and stunting. Finally, P value of less than 0.05 was used to declare significance.

6 i) Ethical considerations

Letter of Ethical approval was received from Madda Walabu University ethical clearance committee. Official letter of co-operation was also obtained from Goba town education office and from each school directors. Individual assent and parental consent for those participants <18 years and consent (> 18 years) was secured after a brief explanation about the procedure. The participants were also assured about the Confidentiality data.

7 a) Demographic and Socio -Economic Characteristics

A total of 598 adolescent girls aged 10-19 years were included in the final analysis among 617 which make a response rate 97.2 %. The mean ($\pm$ SD) age of study subjects were 13.5 ($\pm$1.9) years.

Three Hundred sixty four (60.9%) of the respondent were orthodox Christians. Majority of the respondent were from Grade four 133 (22.2 %.). Majority of the respondents were urban dwellers 573 (95.8%).

Regarding the Educational level of mothers of the respondents, 200 (33.4%) were attended secondary school, 73 (12.2%) were illiterate, 188 (31.4%) can only read and write and only 49 (8.2%) were attended college and university.

Governmental employment and House wife were the predominant occupation of the father and mothers, 204 (44.1) and 347 (58%) respectively (Table 1).

8 b) Health and Household Environment related characteristics of Adolescent girls

The common sources of drinking water for most adolescent girls were Private Water pipe 506 (84.5%). Almost all of the adolescent girls, 589 (98.5 %) reported that they have home latrine. Nearly half the respondent reported that home gardening was available in their home. 0f the respondents 283 (47.3 %) had begins their menstruation (Table 2).

9 c) Meal pattern and Dietary diversity score related characteristics

Five hundred seventy four (96 %) of the study subjects reported that they were consumed the three regular meal in the preceding day. About 115 (19.2 %) skips their regular meals in the previous week.

Two Hundred seventh one (45.3%) of the respondents practiced adequate dietary diversity (Table 3).

10 d) Prevalence of thinness and stunting among adolescent girls

The overall prevalence of thinness, low body mass index-for-age Z score less than < ?2SD among school adolescent girls found were 125 (20.9 %) while the prevalence of stunting, height-for-age Z Scores less than ?2 SD were 71 (11.9 %) (Table 4). e) Factors associated with thinness and stunting among school adolescent girls i. Factors associated with Thinness Thinness, low body mass index-for-age Z score less than < ?2SD was significantly associated with Age of the respondent and educational status of mother.

Early adolescent girls (age <=14) were 1.7 (AOR =1.7, 95% CI: 2.2 -19.1) times more likely to become thinner as compared to late adolescent girls (age >=14).

Adolescent girls whose mothers had no formal education were 9.6 (AOR=9.6 CI: 2.6 -23.3), mothers who can read and write were 7.6 (AOR =7.6, 95% CI: 2.2 -19.1) and mothers who had primary education were 5.2 (AOR= 5.2, 95%CI: 1.4 -17.4) times more likely to be thin as compared to those mothers who are above college and education level (Table 5).

ii. Factors associated with stunting Stunting, height-for-age Z Scores less than ?2 SD was significantly associated with dietary diversity practice and Menstruation status of adolescent girls.

Adolescent girls with inadequate dietary diversity were 2.7 (AOR =2.7, 95% CI: 1.5-5.04) times more likely to be stunted as compared their counterpart. Adolescent girls who begin menstruation were 8 (AOR =.20, 95% CI: 0.03 -0.401) times less likely to be stunted as compared to those who didn't begin their menstruation yet (5). In recent year, Ethiopia has made progress in reducing maternal mortality, while these achievements are encouraging, sustainable results are not expected if the nutritional status of adolescent girls is neglected.

11 IV. Discussion

12 Global Journal of

Medical Research

As can be noted multivirate logistic regression the likelihood of being thin was found to be significant among early adolescent (age <=14) compared to late (age >=14) adolescent girls. The finding of this study is This study found that the prevalence of thinness was 11.9%. This finding is relatively similar with the national nutrition baseline survey report for the NNP of Ethiopia (14%) (8), studies done in Agarfa Ethiopia (13.6) (10) and Hyryana, India 13.7%) (11). However this prevalence is higher than the finding of previous study done in Addis Ababa Ethiopia (6.2 %) (12). Moreover, this prevalence is lower than a previous study done in Kenya (15.6 %) (13), Bangladesh (26%) (14) and Tigray region in northern Ethiopia (58.3%) (7). This difference may be due to the differences in socioeconomic, culture, feeding habits, environmental factors, and public service utilization of the community in the study area.

The current study found that prevalence of stunting, height-for-age Z Scores less than ?2 SD was 20.9%. It was lower than the findings of previous study done in Tigray region, Northern Ethiopia (7). This may be due to time gap and set up differences. In this study majority of the respondents were urban dwellers but in the previous study the respondents were from rural community. Similarly it also lower than the prevalence reported from Bangladesh and Nigeria (32% and 57.8%) (11,15). The possible reasons for the difference could be due to cultural difference and dietary intake. But the finding of this study is higher than the finding of previous study done in ??enya (12.1%). This may be due to time gap and socio-economical differences.

comparable with the study done in Amhara Regional State, north western part of Ethiopia (17). This could be because of the early growth spurt seen in the girls with sudden increase in height in early age group.

In the present study Educational status of mother was important socio-demographic factor which showed significant association with thinness. Adolescent girls whose mothers had no formal education were 9.6 (AOR 9.6 (95% CI 2.6 -23.3), mothers who can read and write were 7.6 (AOR 7.6 (95% 2.2 -19.1) and mothers who had primary education were 5.2 (AOR 5.2 **??**1.4 -17.4) times more likely to be thin as compared to those mothers who are college and above education level. This finding is supported by previous study conducted in Bangladesh (11). This can be explained as educated mother adopt better caring practices for better allocate family resources for nutrition and have health decision-making power which ultimately affect the nutritional status of the children This study reveals that Adolescent girls who begun menstruation early were 8 times less likely to be stunted than their counterpart. This finding is in line with the finding of study done in Kenya (**??**3). This may be explained by the fact that delay in bagging of menstruation of respondents may be a sign of malnutrition, as nutritional status of adolescent girls deteriorate, they start menstruation late.

Adolescent girls who practice adequate dietary diversity were 2.7 times more likely to be stunted as compared their counterpart in the past 24 hours. This may be explained by the fact that intake of divers diet increase likelihood of meeting the nutritional requirement of adolescent

The major limitation of this study was, it relay only on anthropometric measurements to determine the nutritional status of adolescent girls. .

13   V. Conclusion

The overall prevalence of thinness and stunting in the study area is high. The risk of thinness and stunting is high among early adolescent girls, adolescent girls with less educated mothers and adolescent girls who had inadequate dietary diversity practice.

School-based nutrition program that focus on diversified diet consumption and promote education of women is highly recommended. The authors' responsibilities were as follows. MT conceived and designed the study, performed analysis and interpretation of data and drafted the manuscript. SS Participated in the design of the study and performed the statistical analysis. TA Participated in the design of the study, writing of results and discussion and has been involved in drafting the manuscript. All authors read and approved the final manuscript. AK wrote the paper.

14   Lists of Tables

Figure 1:

[1]

---

[1]© 2016 Global Journals Inc. (US)

1

	Category	Frequency	percent
Age	10-14	417	69.7
	15-19	181	30.3
Religion	orthodox	364	60.9
	Muslim	167	27.9
	catholic	17	2.8
	Protestant	50	8.4
Place of residence	Urban	573	95.8
	Rural	25	4.2
Type of school	Governmental school	380	63.5
	Private school	218	36.5
Educational status of father	Illiterate	36	6
	Read and write	14	24.9
	Primary school	98	16.6
	Secondary school	170	28.4
	Collage and above	144	24.1
Occupation of father	Governmental employee	204	44.1
	Farmer	126	21.1
	Daily labourer	84	14.0
	Merchant	121	20.2
	Other	3	0.5
Educational status of mother	Illiterate	73	12.2
	Read and write	188	31.4
	Primary school	88	14.7
	Secondary school	200	33.4
	Collage and above	49	8.2
Occupation of mother	House wife	347	58
	Governmental employee	101	16.9
	Daily labourer	39	6.5
	Merchant	111	18.6
Family size	1-3 Family	33	5.5
	4-6 Family	430	71.9
	$>$ =7Family	135	22.6

Figure 2: Table 1 :

2

	East Ethiopia, June 2015		
Variables	Category	Frequency	Percent
Source of drinking water	Private Water pipe	506	84.8
	Public tap water	87	14.6
	Protected well	5	0.8
Availability of latrine facility	Yes	589	98.5
	No	9	1.5
Availability of home gardening	Yes	386	64.5
	No	212	35.5
Use of home gardening	For home consumption	346	57.9
	For sale	5	.8
	For sale and home consumption	37	6.2
What do you grow	fruit	7	1.2
	vegetable	243	40.6
	fruit and vegetable	137	22.9
Menstruation status	yes	283	47.3

Figure 3: Table 2 :

3

East Ethiopia, June 2015			
Variables	Category	Frequency	Percent
The three regular meal during the previous day	Yes	574	96.0
	No	24	4.0
skip any regular meals during the previous week	Yes	115	19.2
	No	483	80.8
Reason for skipping meals	Shortage of food	6	1.0
	Lack of appetite	85	14.2
	sickness	19	3.2
	Others	1	.2
From the children who is served first	female	38	6.4
	male	69	11.5
	together	491	82.1
Dietary diversity score	Adequate	271	45.3
	Inadequate	327	54.7

Figure 4: Table 3 :

6

Factors		Thinness		COR 95 % CI	AOR 95 % CI
		Yes	No		
Age	<=14	112	305	0.211 (0.115-0.386)	1.7 (1.5 -2.6)
	>=14	13	168		
Educational status	Illiterate	30	43	0.093(0.027 -3.25)	9.6 (2.6 -23.3)
of mother	Can read and write	62	1'26	0.13 (0.04 -0.44)	7.6 (2.2 -19.1)
	Primary school	22	66	0.19 (0.05 -0.69)	5.2 (1.4 -17.4)
	Secondary school	8	195	1.5 (0.40 -6.1)	0.63 (0.15 -2.5)
	Collage and above	3	46	1	1
Age at first	11	1	21	10.9 (5.4 -28.15)	3.18 (0.26-18.5)
menstruation	12	3	75	12.9 (4.0 -24.1)	2.1 (0.23-17.6)

Figure 5: Table 6 :

4

Figure 6: Table 4 :

5

	Frequency	Percent
Thinness	71	11.9
No thinness	527	88.1
Total	598	100
	Frequency	Percent
Stunted	125	20.9
Not stunted	473	79.1
Total	598	100

Figure 7: Table 5 :

7

	Factors	Stunting Yes	No	COR 95 % CI	AOR 95 % CI
	Can t read and write	24	33	0.56 (0.012 -0.254)	13 (2.7 -18.08)
Educational status	Can read and write	22	180	0.334(.076-1.46)	2.4 (0.5-11.01)
of mother	Primary education	10	79	0.322(.068-1.53)	2.2 (0.45 -11.29)
	Secondary education	13	186	0.58(0.128-2.67)	1.4 (0.30-6.78)
	Above secondary	2	199	1	
Menstruation	Yes	23	260		
	No	48	267	0.49 (0.29 -0.83)	.201 (0.03 -0.40)
Individual dietary diversity score	Adequately diversified	54	17		
	Not adequately diversified	273	254	2.9 (1.6-5.2)	2.7 (1.5-5.04)

Figure 8: Table 7 :

.1 Competing interests

The authors declare that they have no competing interests.

.2 Authors' contributions

.3 VI. Acknowledgements

[European Journal of Clinical Nutrition] , *European Journal of Clinical Nutrition* 59 p. .

[Kurz ()] 'Adolescent nutritional status in developing countries'. K M Kurz . *Proc Nutr Soc* 1996. 55 p. .

[Anthroplus for personal computers manual: Software for assessing growth of the world's children and adolescents. Department of *Anthroplus for personal computers manual: Software for assessing growth of the world's children and adolescents. Department of Nutrition for Health and Development*, 2009. Geneva.

[Central Statistical Agency (Ethiopia) and ICF International. Ethiopia Demographic and Health Survey Central Statistical Agency 'Central Statistical Agency (Ethiopia) and ICF International. Ethiopia Demographic and Health Survey'. *Central Statistical Agency and ICF International*, (Addis Ababa, Ethiopia and Calverton, Maryland, USA) 2011. 2012.

[Choudhary et al. ()] 'Correlates of nutritional status of adolescent girls in the rural area of Varanasi'. S Choudhary , C P Mishra , K P Shukla . *The Internet J of Nutr and Wellness* 2009. 7 (2) .

[Federal minstry of Health. Program Implementation Manual of National Nutrition Program ()] *Federal minstry of Health. Program Implementation Manual of National Nutrition Program*, 2008. Addis Ababa, Ethiopia.

[Khagrachhari district in Chittagong hill tracts American Journal of Life Sciences ()] 'Khagrachhari district in Chittagong hill tracts'. *American Journal of Life Sciences* 2013. 1 (6) p. .

[Mosarrof et al. ()] G M Mosarrof , M Hossain Tanvir Sarwar , Hafizur Rahman1 , M A Shakh , Rouf . *A study on nutritional status of the adolescent girls at*, 2013. (Salim Raza1, Asad Ud-Daula1, Sabir Hossain)

[Nutrition and Consumer Protection Division with support from the EC/FAO Food Security Information for Action Programme a *Nutrition and Consumer Protection Division with support from the EC/FAO Food Security Information for Action Programme and the Food and Nutrition Technical Assistance (FANTA) Project. Guidelines for measuring household and individual dietary diversity*, 2007. Rome, Italy. (Food Agriculture Organization (FAO))

[Ahmed Yasin and Benti Tefera ()] 'Nutritional Status and Associated Risk Factors Among Adolescents Girls in Agarfa High School'. Mohammed Ahmed Yasin , Tomas Benti Tefera . *International Journal of Nutrition and Food Sciences* 2015. 4 (4) p. .

[Ogechi et al. ()] 'Nutritional Status and Energy Intake of Adolescents in Umuahia Urban'. Ogechi , E R Buskirk , Jel Carter , E F Johnston , E Francis . *Nigeria. Pakistan Journal of Nutrition* 2007.

[Saxena and Saxsena (2011)] 'Nutritional Status in Rural Adolescent Girls Residing at Hills of Garhwal in India'. Yogesh Saxena , Vartika Saxsena . *Internet Journal of Medical Update* 2011 July. 6 (2) p. 3.

[Mulugeta et al. ()] 'Nutritional status of adolescent girls from rural communities of Tigray, Northern Ethiopia'. A Mulugeta , F Hagos , B Stoecker , G Kruseman , V Linderhof , Z Abraha . *Ethiop J Health Dev* 2009. 23 p. .

[Akhter et al. ()] 'Nutritional status of adolescents in Bangladesh: Comparison of severe thinness status of a low-income family's adolescents between urban and rural Bangladesh'. Neyamul Akhter , Yasmin Farida , Sondhya . *J Edu Health Promot* 2013. 2 p. 27.

[Yoseph et al. ()] 'Nutritional status of adolescents in selected government and private secondary schools of Addis Ababa, Ethiopia'. G Yoseph , S Solomon , Balem Demtsu , BG . *Int J Nutr Food Sci* 2014. 3 p. .

[Wassie ()] 'Predictors of nutritional status of Ethiopian adolescent girls: a community based cross sectional study'. Wassie . *BMC Nutrition* 2015. 1 p. 20.

[Leenstra ()] *Prevalence and severity of malnutrition and age at menarche; cross-sectional studies in adolescent schoolgirls in western Kenya*, T Leenstra . 2003.

[Undo/Unfpa/Who/World and Bank ()] *Special program of Research, Development and Research Training in Human Reproductive Health (HRP), Progress in Reproductive Health Research. WHO production services*, Undo/Unfpa/Who/World , Bank . 2003. Geneva, Switzerland. p. 144. (ISBN 92 4 159191 9)

236 [Vashist Joyti and Goel ()] B M Vashist Joyti , M K Goel . *nutritional status of adolescents in rural and urban*
237   *rohtak*, 2009.

238 [World Health Organisation: Physical Status. The use and interpretation of Anthropometry ()] *World   Health*
239   *Organisation: Physical Status. The use and interpretation of Anthropometry*, Series No. 854. 1995. Geneva.
240   (Technical Report)

241 [World Health Organization WHO Child Growth Standards: length /heightfor-age, weight-for-age, weight-for-length, weight-for h
242   'World Health Organization WHO Child Growth Standards: length /heightfor-age, weight-for-age, weight-
243   for-length, weight-for height and body mass index-for-age'. *Methods and development* p. 2006.