Assessment of Nutritional Status and Dietary Diversity among in-school Adolescents of East wollega Zone, Ethiopia

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Abstract

Adolescence covers 10-19 years of human age. It is considered as a nutritionally critical period of life. Rapid growth and changes that occurs during adolescences demands both macro and micronutrients including iron. The pre-pregnancy nutritional status of young girls is important as it impacts on the course and the outcome of their pregnancy. Hence, addressing the nutritional needs of adolescents could be an important step towards breaking the vicious cycle of intergenerational malnutrition. This study aims to assess adolescent nutritional status and associated factors among school going adolescent girls in *wayu tuka* district, Oromia,Ethiopia,2016.A school based cross-sectional study was conducted among 448 in-school adolescents selected from all government schools of *Wayutuka* district, south west Ethiopia from February to March, 2016.A pre-tested questionnaire was used to collect data on socio-demographic information. Weight and height were measured using standard procedures and were and converted to BMI for age z-score based on WHO Anthro-plus software Version 1.0.4. Data were analyzed using STATA version12.Binary logistic regression with 95%CI was used to see the associations. A p-value ≤0.05 was considered statistically significant. The proportion of thinness and overweight girls based on the BMI for age z-score was 33% and 3.6%, respectively. The major determinants identified for underweight were place of residence (AOR=2.2; 95% CI=1.9to7) older age (AOR=3.6; 95%CI=2.7 to 8.5) and family size (AOR=3.4; 95% CI=1.3 to 11.6).One in three school going female adolescents are thin. Place of residence, older age and family size are factors which determine adolescent thinness. To improve the prevailing adolescent nutritional problem, policies need to address the aforementioned identified determinants.

Keywords: Determinants, Female adolescent, Nutritional Status,Thinness, , Rural Ethiopia

Introduction

The word "adolescence" is derived from the Greek word, "adolescere" which means "to grow into maturity. Adolescent is defined by World Health Organization (WHO) as the period of life from 10 to 19 years of age, while "adolescence period" is a period of transition from childhood to adulthood which, can be classified into early adolescence between 10 to 14 years and late adolescence between 15 to19 years of age(1, 2). Currently in the world, there are about 1.2 billon adolescents which is almost one fifth of world's population out of these 5million(4/5th) adolescents are living in developing countries. In Ethiopia, adolescent girls constitute about 24.8 % of total population which is almost one fourth (3).

Early adolescence after the first year of life is the second critical period of rapid changes both in physical and in body composition. These Rapid growth and changes increase their nutritional requirements and risks of under nutrition(4, 5). Nutritional deficiencies especially in adolescent girls have far reaching costs, if undernourished adolescent girl becomes pregnant, the risks increases since they are competing for nutrients between the mother (who is still growing) and the infant which raises the risk of low birth weight (birth weight of less than 2,500 grams) and early death(6).So parent needs to provide more nutrients and emotional support since this provide the last opportunity to overcome adverse effects of early childhood malnutrition and recover growth faltered in childhood and also support growth spurt and skeletal development to break the vicious cycle of intergenerational malnutrition(4 5).

Assessment of nutritional status of adolescent girls has been the latest reconnoitered area of research in the world [16, 17, 18, 19].A study conducted among Child and Adolescent in Addis Ababa showed that the prevalence of underweight, overweight and obesity among girls were:9.0%, 9.4% and 0.8%, respectively (7)while the prevalence of underweight and overweight was 24.6%, and 4.9% respectively from study conducted in elementary and secondary school of Ambo town(8).The objective of the study was to assess adolescent nutritional status and associated factors among school going adolescents in *Wayu Tuqa* district,East Wollega, Ethiopia.

Methods

Study Area and Period

The study was conducted, **in wayu tuqa district** which is one of the woredas in East Wollega Zone , Oromia Regional state of Ethiopia, which is located 331 km from capital Addis Ababa.

The study was conducted from February to May 2016.

Study Design

Institutional based cross-sectional study design was used. Source populations were all adolescent girls of governmental schools of Wayu Tuka district aged 10- 19 years. The study populations were all adolescent girls found in the randomly selected schools.

Sample Size Determination and Sampling Procedure.

Sample size was determined by using a single proportion formula. It was calculated with the assumption of 26 percent of thinness among adolescent, 95%CI, 5% margin of error and 1.5 design effect(9). Multistage systematic random sampling techniques were applied with high schools as the first-stage unit and school girls as the second-stage unit. Schools were ranked by geographical location to allow for equal distribution of the schools over the study area and then selected randomly. Information on the number and size of schools in the study area was obtained from the district education authority and then proportional allocation was done to allow for equal distribution for the schools and then over primary, secondary and preparatory schools. Finally study participants were selected by systematic random sampling technique.

Data Collection and Data Quality Control

Data were collected using an interviewer administered questionnaire. For obtaining information about food intake pattern, participants were asked to recall their food intake within twenty four hour in terms of dietary diversity score.

The principal components analysis was used to determine household asset quintile. Anthropometric data were collected by trained data collectors. The height measurement was taken by considering to the nearest of 0.1cm. Weight was measured to nearest of 100gms and was calibrated to zero and wearing heavy closes was avoided. All measurements were taken twice and the average was computed. Under nourished adolescent were classified on the basis of (WHO 2007) reference population on basis of BMA z-scores as being; underweight (<−2SD) and obese (>+2SD) BMI for age.

Data quality was insured by training data collectors as well by providing day to day supervision during the whole period of data collection. Pre-test and modified questionnaire was used. Every day, all collected data was checked for their completeness, clarity and consistency by s and principal investigator.

Data Analysis and Statistical Test

Data were entered into Epi-data version 3.1 and then cleaned, coded and analyzed by using stata version12.Anthropometric data were entered and analyzed using WHO Anthro-plus version 1.0.4.software.Descriptive summary (Frequency distribution, proportion, mean & standard deviation) was used to summarize the variable. Bivariate & multivariate logistic regression was done to assess the association of factors with outcome variable , by calculating odds ratios, their 95% confidence limits and P-value less than or equal to 5% was taken as statistically significant.

Ethical Considerations

The study protocol was approved at all level which initially was cleared by the Ethical Committee of Addis Ababa University, College of Health Sciences, School of public health. In addition, the principal investigator requested and received permission from the parents of the students through the schools headmasters to undertake the study. After the nature of the study was fully explained to the participants in their local languages, informed verbal assent was also obtained. The right to withdraw from the study at any time was also communicated and respected. Respondents were informed that the individual study results will be treated confidentially and anonymous tools was used to collect the data.

Result

A total of 448 adolescents were enrolled with response rate of 91.0%. Three quarters (75.0%) were from rural, and over half (53.8%) were from midland topography and 249 (55.6%) were aged between 15 and 19, and the mean age was 14(±2) years. Three quarter (75%) of them was from rural and the vast majorities (96.2%) were single. Protestants constituted 341 (76.1%) and nearly all (97.1%) were from Oromo ethnicity. About two-thirds (65.6%) were from grade nine and 331(73%) from family members of five and above. Over half (54.2%) of respondent's father and 207(46.2%) of respondent's mother had no formal education. The proportion of poorest, poor, middle, rich and richest wealth quintile category across the respondents was almost uniform (Table1).

Table 1: Demographic and socio-economic characteristics of respondents in *Wayutuka* district Ethiopia, 2016 **(n=448)**

Characteristics	Levels	Frequency (n)	Percents
Residence	Urban	112	25
	Rural	336	75
Agro ecology	Highland	72	16
	Midland	241	53.8
	Lowland	135	30
Age	10-14	199	44.4
	15-19	249	55.6
Marital status	Single	431	96.2
	Ever married	17	3.8
Religion	Orthodox	81	18.08
	Protestant	341	76.1
	Muslim	3	0.9
	Catholic	22	4.9
Ethnicity	Oromo	435	97.1
	Amhara	3	0.7
	Tigre	3	0.7
	Gurage	7	1.6
Grade	Primary	294	65.6
	Secondary	83	18.5
	Preparatory	71	15.9
Family size	1-5	117	26.1
	>5	331	73.9
Fathers education	None	243	54.2
	Primary	100	22.3
	Secondary	105	23.4
Mothers education	None	207	46.2
	Primary	131	29.2

Anthropometric measurements among respondents

Figure 1 illustrates respondent's nutritional status as determined by BMI for age z-core (BAZ). Nearly two-thirds (62.0%) had normal BAZ status. Adolescents with thin BAZ status constituted 151.4(33.8%) while overweigh (+ 1 SD and + 2 SD) and obese (> + 2SD) were 19.7(4.4%) and 8 (1.8%), respectively.
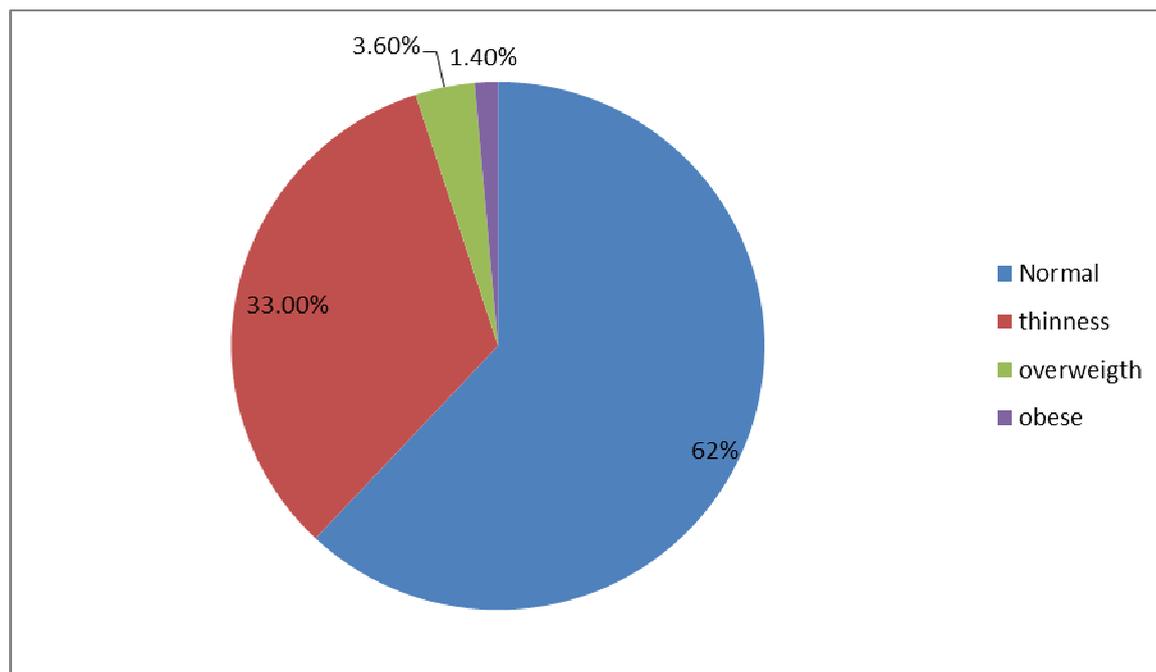
Figure1. BMI for- age z-score of participants in comparison to WHO 2007 growth standards (n=448) in *wayutuqa* district, Ethiopia, 2016

Dietary Diversity Score (DDS)

Nearly all (99.3%) participants consumed starch staples. The proportion of respondents who consumed vegetables, fruits, tuber, meat, eggs, legumes and milk within 24 hours prior to the study were 19.2%, 23.2%, 53.8%, 16.7%, 12.9%, 54.5% and 50.5%, respectively indicating consumption of meat, which is good sources of bio-available iron, was low. The mean DDS was 3.3($\pm$1.24). Over half (56%) of the adolescent girls had low DDS and the rest 183(41%) and 12(3%), had medium and high DDS, respectively (Table 3).

Table 2: Food groups consumed by participant (n=448) 24hr prior to the survey in *Wayutuqa* district, Ethiopia, 2016.

Types of food consumed	Food group	N	%
	Starchy staples*	445	99
	Vegetable	86	19.2
	Fruit	104	23.2
	Tuber	241	53.8
	Meat	75	16.7
	Fish	0	0.0
	Eggs	58	12.9
	Legume, nuts and seeds **	244	54.5
	Milk and milk products	226	50.5
Dietary Diversity Score	Low	253	56
	Medium	183	41
	High	12	3
	Mean	3.3	

Factors Associated with Underweight in Bivarate and Multivariate Analysis

The major determinants identified for anemia were place of residence (AOR=2.2; 95% CI=1.9 to 7) older age (AOR=3.6; 95%CI=2.7 to 8.5) and family size (AOR=3.4; 95% CI=1.3 to 11.6). The odds of underweight were significantly higher among adolescent from rural residents, late adolescent, and those from large family size than their counterparts (Table 3).

Table 3.Bivariate and Multivariate Logistic regression analyses showing the impact of selected variables on Anemia in *wayu tuqa* distrit, Ethiopia, 2016 (n=448)

Characteristics	Underweight		Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes (%)	NO n (%)		
Age				
15-19	118(26)	131(29)	3.3(1.66 13.45)	**3.6(2.7 8.5) ***
10-14	42(9)	157(35)	1	
Residence				
Rural	189(42.2)	147(32.8)	2.7(1.78 9.2)	**2.2 (1.9 7.0)***
Urban	36 (8)	76(17)	1	1
Family size				
>5	197(44)	134(30)	3.7	3.4(1.3 11.6)
1-5	33 (7)	84(18.8)	1	
Mothers educational status				
No education	61(13.6)	146(32.6)	1.34(0.79 7.4)	-
Primary	37(8)	94(21)	1.27(.62 5.8)	
Secondary and above	26(5.8)	84(18.8)	1	
Dietary Diversity Score				
low	106 (23.7)	147(32.8)	1.44(0.47 2.55)	**-**
Medium	73(16.3)	110(24.6)	1.33(0.36 13.45)	-
High	4(0.89)	8 (1.7)	1	1

Discussion
The present study was undertaken to assess nutritional status of in-school adolescent girls by using body mass index for age z-score (BAZ). The overall prevalence of underweight was 33% which is concurrent with the Indian study findings which reported 28 percent of adolescent's underweight (1)

In this study, about one third (33%) of adolescents were thin. When compared with the recent report, from the same Oromia regional state, for instance, for Adama city (33% vs. 21%), and Chiro town (33% vs. 24.4) it was higher (25-27). Nevertheless, compared with Mekele city, from the North Ethiopia, it is slightly lower (33% vs. 37.8%) (28).The observed differences could be due to variation in the socio demographic and economic of the communities(10-12) On the other hand, the proportion of overweight and obesity which was 3.6% and 1.4%, respectively were not different from previous study reports documented in *Adama* for overweight (3.6% vs. 3.3%) and obesity (1.4% vs. 1.0%).

In this study, the prevalence of underweight was significantly higher among younger adolescent aged groups than older adolescent and this finding is in line with the findings of a study in Northern Ethiopia and Ambo town and this could be attributed to their increased demand for achieving growth. This finding is similar with study conducted in Caste Community of Punjab, in which a positive correlation was found with age and Anemia(8, 13)

In terms of dietary diversity score (DDS), more than half of them had low diversity score while high DDS was observed in 3% of them only. Compared with some previous study reports for the same regional states, the present finding was higher than what has been reported for *Chiro* (56.0% vs. 44.3%) and *Adama* (56.0% vs. 41.2%) cities. This difference need to be explained cautiously since the cities are from the same Oromia regional states with similar culture though one may expect some socio-economical difference and warrants more studies (10, 11).

Strength and Limitations
We used large samples with an appropriate BMI cut off point recommended for adolescents and has shed light on the magnitude of thinness among in-school adolescents.Absence of quantitative dietary intakes due to logistic issues however were among some of the limitations in this study.

Conclusion and Recommendation
One in three school going female adolescents are thin and place of residence, age and family size were predictors of under nutrition. To improve the prevailing adolescent nutritional problem, Intervention strategies should focus the aforementioned identified determinants.

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