International Journal of Community Medicine and Public Health
Ali AM et al. Int J Community Med Public Health. 2022 Mar;9(3):1242-1249
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20220681

Original Research Article

Under nutrition and associated factors among adolescent girls in Fik district, Erar zone, Somali region, Ethiopia, 2019

Abdisalan Muktar Ali[1]*, Abdirahman Abdisamed Abdi[2]

[1]EPI and Surveillance Officer, World Health Organization, Jigjiga, Somali region, Ethiopia, WHO, Ethiopia
[2]Health and Nutrition project Coordinator, Organization welfare for Development and action, Jigjiga, Somali region, Ethiopia

Received: 10 January 2022
Accepted: 14 February 2022

***Correspondence:**
Mr. Abdisalan Muktar Ali,
E-mail: Aflax571@gmail.com

ABSTRACT

Background: Malnutrition in adolescent is a major public health problem in the world, especially in developing countries, which is responsible for bone mass disability and affects their ability to learn and work at maximum productivity. Despite this, there is a shortage of information on the nutritional status of adolescent girls in Somali region, Ethiopia. This study was therefore performed to help redress this lack of data and to provide information for future improvements by health planners and policy makers.
Method: Data were collected from 538 adolescent girls aged 10-19 years by community cross sectional study design. WHO Anthro-plus software was used to analyze nutritional statuses of adolescent girls and magnitudes were determined using WHO 2007 references point. Data were entered into Epi data and transferred to SPSS (version 20) for analysis. Multivariable logistic regression was used to measure the association between the dependent variable and independent variables with 95% confidence interval
Results: The result of the study revealed that prevalence of thinness and stunting are 32.7% and 2.8% respectively. Factors independently associated with thinness were age of adolescent girl (AOR=0.50, 95% CI=0.27-0.92), mother education status (AOR=2.30, 95% CI=0.72-7.36), father occupation (AOR=0.44, 95% CI0.22-0.87), dietary diversity score (AOR= 0.61, 95% CI=0.38-0.97) and less than two daily meal frequencies (AOR= 2.17, 95% CI=1.00-4.69).
Conclusions: The prevalence of thinness was high in the study area. Thus, focus should be given adolescent girls nutrition and provide a unique opportunity to break the intergenerational cycle of malnutrition. The government, school teacher and parents should give more attention to adolescent girls as they are crucial segment of the population and develop strategies on improvement of dietary diversity intake.

Keywords: Adolescent girl, Thinness, Stunting, Dietary diversity score, Somali region, Ethiopia

INTRODUCTION

World health organization (WHO) defines adolescents as persons aged 10-19 years. These age groups make up roughly 20% of the total world population and are transitioning from dependent childhood to independent adulthood. Physical growth at adolescent occurs earlier and is more rapid than during pre-adolescence.[1] Remarkably, 84% of the adolescents are in developing countries.[2,3] Adolescent constitutes about 25% of Ethiopian population and about 48% of this age group is girls.[3]

WHO, confirmed that, adolescent girl remain largely neglected, difficult to measure, hard to reach population in which the need of adolescent girls in particular often ignored.[2] Nutritional awareness during adolescence plays an important role in the human life cycle.[4] The diet of children and adolescent must be adequate to support normal and sometimes very rapid growth and development.[5] Nutrition in general influences the growth and development throughout infancy, childhood and

adolescence; it is, however, during the period of adolescence that nutrient needs are the greatest.[6]

Malnutrition in adolescent is a major public health problem in the world, especially in developing countries, which is responsible for bone mass disability and affects their ability to learn and work at maximum productivity, today, almost one in three people on the earth handle with a lack of adequate nutrition, making this one of the most devastating problems to face the global community.[7] The health and nutritional status of adolescents aged 10-19 years has seen limited improvement over the past 50 years.[8,9] As commonly observed a healthy stage of life, the period of adolescence is characterized by profound physical growth and development, which is heavily influenced by an individual's social, economic, and cultural environment.[9]

Nutritional status during adolescence plays an important role in the human lifecycle that influences growth and development and during this period nutrient needs are the greatest.[10] Adolescence is a period of most rapid growth second to childhood. Physical and physiological changes that occur in adolescence plays a great demand in their nutritional requirements and make them more vulnerable to malnutrition, worm infestation as well as the social norm of early marriage and adolescent pregnancy adds to the problem of under nutrition in adolescence.[11]

Nutritional status of adolescent girl in order to guide the formulation of policies and program there is a shortage of data on adolescent girl nutritional status in developing countries and up to recently, little was known about nutrition of adolescents, particularly in low-and middle-income countries.[12]

Nutritional needs during adolescence are influenced mainly by the onset of puberty with its associated increased growth rate and changes in body composition and organ systems.[13] During adolescence, 20% of final adult height and 50% of adult weight are attained and bone mass also increases by 45%.[14] Nutritional deficiencies and poor eating habits established during adolescence can have long-term consequences, including delayed sexual maturation and lower final adult height.[15] Adolescent have typically been considered as low risk for poor health and often receive few health care resource and attention.[12]

There has been a worldwide significant change in the nutritional status of adolescents during the past 2 decades because of global economic development and urbanization. Adolescents from developing countries are susceptible to nutritional deficiencies due to early childhood nutritional insults, which include underweight, stunting and low dietary intakes.[16] WHO estimates that 60% of deaths globally are due to non-communicable diseases associated with unhealthy diet and physical in activity, while 79% of these deaths occurring in developing countries.[12]

Adolescent girl malnutrition is currently one of the most common and intractable problems globally. During the period of adolescence, iron requirements increase dramatically in both boys and girls resulting in a higher probability of malnutrition. Studies from Asia and few studies from African countries have reported variances in prevalence of under nutrition that all of them signify adolescent malnutrition is a prevalent problem among the study population.[17-19] Few studies in Ethiopia found that, under nutrition was common problem among adolescent girls.[20]

Adolescence is a vulnerable period in the human life cycle for the development of nutritional status. malnutrition in adolescent girls contributes to maternal and fetal mortality and morbidity in future.[21] In 2014, study performed in Bhopal district revealed that majority 87.20% of adolescent girls belonging to the age group of 10-14 years were undernourished.[22]

Adolescent have typically been considered as low risk for poor health and often receive few health care resource and attention. However, their approach ignores the fact that many health problems later in life can be improved by adopting health life style habits in adolescents.[12] Another study conducted in Belagavi showed that the prevalence of thinness in adolescent girls was 62% and prevalence of overweight was 2% and another, study conducted in Dharwad district, India showed that the nutritional status of adolescent girl residing in rural area was BMI, 25.2% of girls were under-nourished and 3.7% were over nourished.[23,24] In addition, study done in arar city, kingdom of Saudi Arabia on adolescent girl nutritional status shown that 19.2% were underweight.[25]

The rational of this study is to know adolescence girl under nutrition and associated factors in the study area. Information gained from this study will be beneficial for the community awareness. Also, the findings of the study will be useful for Ethiopian Somali regional health bureau (ESRHB) and woreda health office (WoHO) for planning, and intervention measures of adolescents' nutrition by improving nutritional status of the adolescent girls in the community, and also to guide for encouragement effort.

METHOD

Study area and period

The study was conducted in Ethiopia, Somali region, Erar zone, Fik district which 685 km away from capital city Addis Ababa and 205 km away from Jigjiga on south west part of Somali region. The district has 21 kebeles which is four of them urban kebeles while the rest rural kebeles. A total of about 198,083 populations found in the district according to 2007 CSA. The main source of livelihood is dependent on pastoralist. Health services in the district are provided by one primary hospital, four health centers and 11 health posts. At the kebele level, health care is delivered by health extension workers who

are assigned to provide health care at the local level. (Fik district health office, 2018). The study has been conducted during the period August-September 2019.

Study design

Community based cross sectional study was carried out. The source population was adolescents' girls aged 10-19 years old residing Fik district. All adolescent girls aged 10-19 years old living in the selected kebeles in Fik district during data collection.

Sample size

The sample size was determined based on single population proportion formula and total of 545 adolescents were participated the study.

Sampling technique

Out of 21 kebeles, the study was conducted among one urban and four kebeles from rural by simple random sampling. Considering the list of the households in the selected kebeles as sampling frame the sample was allocated proportionally.

Finally, the systematic sample method was used to select household from each kebeles with every K interval value. The households with at least one adolescent girl were eligible for the study and if the select household has eligible adolescent girl was absent at the time of data collection, we were revisiting two times. In addition, if one household have two or more adolescent girls, one of the adolescent girls was selected by a lottery method.

Data collection and procedure

Questionnaire adapted from different literatures were used.[10,12,29] The data was collected by interviewing adolescent girl using a structured questionnaire which was developed based on conceptual framework. The questionnaire has been prepared first in English and then translated to Somali language (local language). Then, back translation to English was done to verify its consistency and contents by language experts. Selected five high qualified female health extension workers (HEWs) who are working on health facilities and have knowledge about criteria to diagnosis nutrition were selected and the data collectors were supervised on daily by two health officers. The data collectors were used nutrition guidlnie which is using to measure to assess signs of malnutrition of the adolescent in the community settings also considering the risk of household factors.

Data quality assurance

To ensure data quality, data collection tools were pre-tested with 5% of the outside study area. Questionnaire was checked for completeness, consistency and accuracy on a daily basis by immediate supervisors. Selected supervisors and data collectors were given two days training on nutrition to diagnoses nutritional status of adolescent girls, how to approach respondents, techniques of face-to-face interview, principal investigators and supervisors were regularly monitored and supervised the data collection process. Also, we were randomly rechecked 5% of the completed questionnaires daily. Data cleans up and cross-checking was conducted before analysis.

Data processing and analysis

The data were entered to EPI data 3.1 version and was checked for completeness and consistency, followed by data cleaning and editing. Then the data was analyzed by using statistical package for social sciences (SPSS) software's Version 20.0 and WHO Anthro plus software for assessing growth of the adolescent girls was used. Descriptive statistics using frequencies and proportions were used to present the study results. Odds ratio with 95% confidence interval was used for checking the strength of associations between dependent and independent variables. Bivariate analysis was used to identify candidate variables for multivariable logistic regression in determining factors associated with under nutrition and only variables with $p<0.05$ was used to determine significant associations for last model.

Ethical considerations

Ethical clearance and permission were obtained from Jigjiga university research committee and regional health bureau and respondents. The nature of the study has been fully explained to the study participants to obtain their oral informed consent prior to participation in the study and data was kept confidential (the respondents were not asked their name) and were used for research purposes only.

RESULTS

For the dietary consumption frequencies of adolescent girl, majorities of food item adolescent girls consume once/week. The frequencies consumption of fruit, vegetable and animal source foods was relatively low, 24.0% respondents have adequate dietary diversity score (Table 1).

The adolescents 297 (55.2%) had a frequency of meal three times per day while about 241 (44.8%) had only two times per day. About 131 (24.3%) of the students were skipped their breakfast on regular meals and 110 (20.4%) skipped their lunch on regular meals in the last two weeks during the data collection. Regarding latrine availabilities, 299 (55.6%) of adolescent girl had a functional latrine in their homes while 239 (44.4%) of the adolescent girl had no functional latrine in their homes. A total respondent 286 (53.2%) had reported that they wash their hands in three times (before meal, after toilet and before preparing food), while 61 (11.3%) of the respondents reported that

they wash their hands two times (before meal and after toilet) and 191 (35.5%) of the respondents had reported that they wash their hands fourth times and above. A total of 190 (35.3%) have information on nutrition and 348 (64.7%) have no information on nutrition. From those who have information on nutrition, 91 (16.9%) have got information from teachers, 85 (15.8%) were from peers, 10 (1.9%) were from media and (0.7%) were from their parents. Among the adolescent girls about 165 (30.7%) experienced disease in the last two weeks (Table 2).

Bivariate analyses have been used for under nutrition among adolescent girls and associated factors, hence the following factors had significant association ($p<0.25$), age of adolescent girls, mother education, father's occupation, family income, place of residents, dietary

diversity score (DDS), daily meal frequency and disease experience of last two week. Therefore, these variables were taken to the multivariate logistic regression in to a further analysis (Table 3).

Table 1: Consumption frequency food items of adolescent girls in Fik district, Erar zone, Somali region, 2019.

Variables	Categories	Number, (n=538)	Percent (%)
Fruit	Once	117	21.7
	2 times/week	46	8.6
	3 times and above/week	4	0.7
Vegetable	Once	145	27.0
	2 times/week	84	15.6
Meat	Once	349	64.9
	2times/week	17	3.2
Egg	Once	91	16.9
Past and rice	Once	49	9.1
	2 times/week	355	66.0
	3 times and above/week	91	16.9
Milk and milk product	Once	221	41.1
	2 times/week	118	21.9
	3 times and above/week	11	2.0
Sweets	One	46	8.6
	2 times/week	59	11.0
	3 times and above /week	2	0.4
Legume	One	180	33.5
	2 times/week	102	19.0
	3 times and above /week	18	3.3
Wheat	Once	141	26.2
	2 times/week	296	55.0
	3 time and above	50	9.3
Dietary diversity score	Low	389	72.3
	adequate	149	27.7

Table 2: Behavioral related characteristics of adolescent girls in Fik district, Erar zone, Somali region, 2019.

Variables	Categories	Number, (n=538)	Percent (%)
Daily meal frequency	Two times or below	241	44.8
	Three times or above	297	55.2
Regular meal skipped last two weeks	Breakfast	131	24.3
	Lunch	110	20.4
Availability of latrine	Yes	299	55.6
	No	239	44.4
Frequency of hand washing with soap	2 times	61	11.3
	3 times	286	53.2
	4 times and above	191	35.5
Nutritional information	Yes	190	35.3
	No	348	64.7
Source of nutritional information	Teacher	91	16.9
	Peers	85	15.8
	Media	10	1.9
	Parents	4	0.7

Continued.

Variables	Categories	Number, (n=538)	Percent (%)
Disease experience for the last 2 weeks	Yes	165	30.7
	No	373	69.3

Table 3: Bivariate regression analysis for under nutrition (thinness) among adolescent girls in Fik district, Erar zone, Somali region, 2019, (n=538).

Variables	Categories	Under nutrition (%)		COR	95% CI	P value
		Thinness	Normal			
Age of adolescent girl (Years)	10-13	31 (41.9)	43 (58.1)	0.39	0.22-0.67	0.13
	14-15	78 (32.5)	162 (67.5)	0.73	0.49-1.09	
	16-19	63 (28.1)	161 (71.9)	1.00	1.00	
Mother education level	Illiterate	162 (31.1)	359 (68.9)	3.06	1.14-8.17	0.03
	Primary	10 (58.8)	7 (41.2)	1.00	1.00	
Father occupation	Daily labor	76 (29.8)	179 (70.2)	1.00	1.00	
	Merchant	25 (43.1)	33 (56.9)	0.46	0.26-0.81	0.01
	Employee	15 (36.6)	26 (63.4)	0.74	0.37-1.48	0.38
	Farmer	9 (30.0)	21 (70.0)	0.991	0.43-2.26	0.98
	Unemployed	47 (30.5)	107 (69.5)	0.94	0.61 -1.45	0.77
Family monthly income (ETB)	>2600 ETB	47 (36.7)	81 (63.3)	1.00	1.00	
	1,000-2,500	86 (34.8)	161 (65.2)	1.07	0.68-1.68	0.76
	<1,000	5 (33.3)	10 (66.7)	1.08	0.35-3.37	0.89
	None	42 (28.4)	106 (71.6)	1.84	0.80-2.20	0.17
Place of resident	Urban	94 (34.7)	177 (65.3)	1.00	1.00	
	Rural	78 (29.2)	189 (70.8)	1.33	0.92-1.91	0.13
Dietary diversity score	Low	136 (34.6)	257 (65.4)	0.52	0.34 -0.81	0.003
	Adequate	36 (24.8)	109 (75.2)	1.00	1.00	
Daily meal frequency	2 times or below	68 (28.2)	173 (71.8)	1.40	0.97-2.03	0.07
	3 times or above	104 (35.0)	193 (65.0)	1.00	1.00	
Availability of functional latrine in your home	Yes	104 (34.8)	195 (65.2)	1.00	1.00	
	No	68 (28.5)	171 (71.5)	1.47	1.02-2.13	0.04
Disease experience for the last 2 weeks	Yes	59 (40.1)	88 (59.9)	1.41	0.94-2.12	0.09
	No	127 (32.5)	264 (67.5)	1.00	1.00	

The prevalence of under nutrition among adolescent girls was 41 (7.6%) severe thinness, 135 (25.1%) mild thinness and 15 (2.8%) stunting (Figure 1).

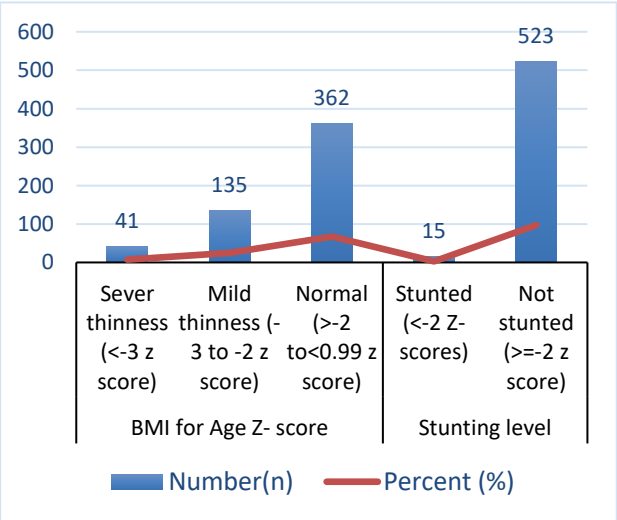

Figure 1: Under nutrition of adolescent girls in Fik district, Erar Zone, Somali region, 2019, (n=538).

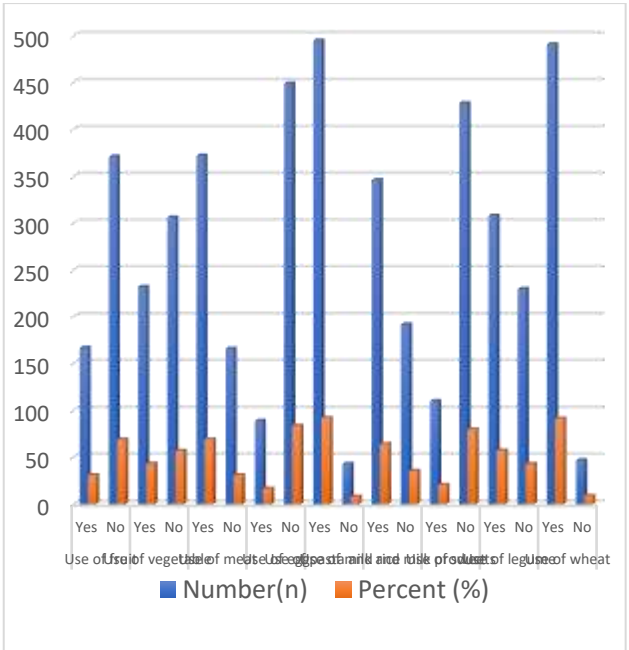

Figure 2: Dietary habits of adolescent girls Fik district, Erar zone, Somali region, 2019, (n=538).

Based on dietary habits of adolescent girl, the proportion use of fruit, vegetable, and sweets for adolescent girls are 38.9%. Among the participants, almost (80%) of them consumed pasta, rice, and cereals (legume and wheat), Consumption of animal source foods like, meat, milk and milk product and egg were relatively low (Figure 2).

DISCUSSION

We found that 32.7% and 2.8% adolescent girls were thinness and stunting respectively. The factors associated with thinness among adolescent girls were: age of adolescent girls, mother education status, father's occupation, low Dietary diversity scores (DDS) and less than two daily meal frequencies were uneventful.

The prevalence of thinness in these adolescent girls was 32.9%. This poor nutritional status of the adolescent girl's leftovers continuous throughout their adolescent life as thinness, is considered as long-term duration of under nutrition, was observed during the entire period of adolescence. The prevalence of under nutrition in eastern Sudan and Saudi Arabia was (38.3%) and 19.2% respectively which is lower than this finding and besides, study conducted in India indicated that 69% of adolescent girls were under nutrition in Bhopal district which is higher than my finding.[22,24,26] This might be due to the difference in socioeconomic background between the areas. The of this study is higher than the studies in Babile (21.6%), in Adama city (21.3%), in Agarfa, Bale Zone (13.68%), in Adwa town 21.4% and in Mekele city 37.8%.[10,12,28,29] These findings indicated that under-nutrition is a major public health problem in majority of Somali region communities including urban and rural adolescent girls. The discrepancy in prevalence could be the socio demographic and economic characteristics of the household and this area is highly affected by persistent drought for last five years. So, under nutrition is the most common problem for study area. The other reason may be due to the poor dietary diversity, pastoralist communities in difference between the study area and other part of the world.

In this study, factors that are significantly associated with under nutrition in adolescent girls were, age of adolescent girls which have significant association with under nutrition; Adolescent girls with young age group between 10-13 years had less odds (AOR=0.50, 95% CI=0.27-0.92) of thinness compared with old age adolescent girls between 16-19 years. Similarly, studies conducted in Babile, Goba town, southeast Ethiopia and in Tigray region.[10,14,30] Moreover, other studies performed in Bhopal district, India revealed that Majority of under nutrition adolescent girls 87.20% belongs to the age group of 10-14 years.[22,31] This difference could be due to geographical, socio democratic and socioeconomic of the households. Regarding Adolescent girls whose mothers were illiterate had 2 times higher odds (AOR=2.30, 95% CI=0.72-7.36) of thinness compared with adolescent girls whose mothers were literate (Primary). This result is similar with study conducted in Adwa Town, North Ethiopia.

About Adolescent girls whose fathers were merchants has less odds (AOR=0.44, 95% CI= 0.22-0.87) of thinness compared with those adolescent girls whose fathers were daily laborer. This result is similar with study conducted in Babile and disagree with study conducted in Adama city.[10,27] The possible reason for this difference may be geographical, socio-economic and sample size

This study revealed that Adolescent girls who have had low DDS were (AOR=0.61, 95% CI=0.38-0.97) have high odds of thinness compared with those adolescent's girls who have high DDS. This result is similar with study conducted in Adama city, central Ethiopia.[27] This is because when the DDS is high, adolescents will get adequate energy and other important nutrients having role in growth and development. Even though the magnitude of adequate dietary diversity is varied across the regions, the proportion of adolescents with low dietary diversity is common in Ethiopia. This needs great attention to curb its long-lasting consequences.

Adolescent girls who have had two or less daily meal frequency were 2 times higher odds (AOR=2.17, 95% CI=1.00-4.69) of thinness compared with those adolescent girls who have had three or more daily meal frequencies. This finding is in line with study conducted in Adwa Town, North Ethiopia. This might be due to skipping of meals leading to inadequate dietary intake. Adolescence period has the fastest growth and the nutritional requirements are increased to promote this growth. So, in addition to the increased nutritional demand during adolescent period, skipping of meals leads to being thin.

This study revealed that the prevalence of thinness and stunting were 32.9 and 2.8% respectively. Factors independently associated with thinness were age of adolescent girl, mother education status, father occupation, law dietary diversity and less than two daily meal frequencies.

This indicates that appropriate intervention and focus should be given to the se populations. As a nutritional status of adolescent girls contributes to the nutritional status of the community, there is a need to initiate intervention measures to improve the nutritional status of adolescent girls who are the future 'mothers-to-be'.

In general, there is a need to create awareness of intergenerational effect of malnutrition in the adolescent girls, adolescent girls should be advised to enhance their nutritional status during early adolescent, parents should develop the practices of maximum daily meal frequency and focus on well balance diets in each meal and parents should develop the habit of serving well diversified foods to their adolescent girls. The government should give more attention to adolescent girls as they are crucial

segment of the population and develop Strategies on improvement of dietary intake, school teachers and health workers should teach adolescent girls to eat healthy and well diversified foods and education bureau should be strengthening the adult education such; this may improve the educational status of mother about adolescent girl's nutritional status.

CONCLUSION

The prevalence of thinness was high in the study area. Thus, focus should be given adolescent girls nutrition and provide a unique opportunity to break the intergenerational cycle of malnutrition. The government, school teacher and parents should give more attention to adolescent girls as they are crucial segment of the population and develop strategies on improvement of dietary diversity intake.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Rees JMCM. Nutritional influences on physical growth and behaviour in adolescence. In: Adams G, ed. Biology of. Adolescent Behaviour and Development. California Sage Publications. 1989;139-162.
2. WHO. Nutrition in adolescence-Issues and Challenges for the Health Sector WHO discussion paper on adolescent, 2005. Available at: https://apps.who.int/iris/handle/10665/433. Accessed on 01 January 2022.
3. CSA. Centeral statistics agency of Ethiopia, Addis Ababa. Google Scholar. 2007.
4. Doustmohammadian A, Dorostymotlagh AR, Keshavarz A, Sadrzadehyeganeh H, Mohammadpour-Ahrangani B. Sociodemographic factors associated with Body Mass Index of female Adolescent students in Semnan City, Iran. Mal J Nutr. 2009;15(1):29-35.
5. Spear BA. Adolescent growth and development. JAmDietassoc PubMed| Google Scholar 2002;102(3):23-9.
6. Lifshitz F, Tarim O, Smith MM. Nutrition in adolescence. Endocr Metab Clin North Amer. 1993;22(3).
7. International Food Policy Research Institute. Global nutrition report 2015: actions and accountability to advance nutrition and sustainable development. Washington,DC. International Food PolicyResearch Institute. 2015. Available at: http:// wwwifpriorg/publication/global-nutrition-report. Accessed on 10 Jan, 2020.
8. Patton GC, Sawyer SM, Santelli JS. Our future: a Lancet commission on adolescent health and wellbeing. Lancet. 2016;387:2423-78.
9. Mokdad AH, Forouzanfar MH, Daoud F. Global burden of diseases, injuries, and risk factors for young people's health during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2016;387.
10. Teji K, Dessie Y, Assebe T, Abdo M. Anaemia and nutritional status of adolescent girls in Babile District, Eastern Ethiopia. Panafrican Med J. 2016; 24:62.
11. WHO S-C-02. Prevention of iron deficiency anaemia in adolescents role of weekly iron and folic acid supplementation, 2017. Available at: https://apps.who.int/iris/handle/10665/2. Accessed on 01 January 2022.
12. Mohammed AY, Tefera TB. Nutritional Status and Associated Risk Factors Among Adolescent Girls in Agarfa High School, Bale Zone, Oromia Region, South East Ethiopia. Int J Nutr Food Sci. 2015;4(4):445-52.
13. Stang J, Story M. Guidelines for Adolescent Nutrition Services. University of Minnesota. 2005;21.
14. Mulugeta A, Hagos F, Stoecker. Nutritional Status of Adolescent Girl from Rural Communities of Tigray, Northern Ethiopia. Ethiop J Health Development. 2009;23(1):7.
15. Funke OM. Prevalence of Underweight: A Matter of Concern among Adolescents in Osun State, Nigeria. Pak J Nutr. 2008;7(3):503-8.
16. Zahid MA, Tasnim S, Parvin R, Paul DK, Shuvo SD. Assessment of nutritional status, dietary patterns and knowledge perceptions of adolescent girls in Jessore, Bangladesh. Discovery J. 2017;53(256):224-34.
17. Choudhary S, Mishra CP. Correlates of nutritional Status of adolescent girls in thhe rural area of Varanasi. Internet J Nutrition Wellness. 2009;7(2):132-7.
18. Friedman JF, Phillips-Howard PA, Mirel LB TD, Okello N, Vulule JM, Hawley WA et al. Progression of stunting and its predictors among school-aged children in western Kenya. Euro J Clin Nutr. 2005;59(8):14-22.
19. Ayoola O, Ebersole K, Omotabe O. Relative height a weight among children and Adolescents of Rural South western Nigeria. Ann Hu Biol. 2009;36(4):388-99.
20. Alebachew Z. Prevalence of childhood and adolescent overweight and obesity among elementary school students. Addis Ababa University. 2010.
21. Kulkarni MV, Durge PM, Kasturwar NB. Prevalence of anemia among adolescent girls in an urban slum. National J Community Med. 2012;3(1).
22. Joshi SM, Likhar S, Agarwal SS, Mishra MK, Shukla U. A study of nutritional status of adolescent girls in rural area of bhopal district. National J Community Med. 2014;5(2):191-4.
23. Baliga SS, Naik VA, Mallapur MD. Assessment of nutritional status of adolescent girls residing in rural area of Belagavi. Int J Med Sci Public Health. 2017;6(2):323-6.

24. Pavithran S, Bant DD. Nutritional status of adolescent school girls residing in rural areas of Dharwad district, India: a cross sectional study. Int J Community Med Public Health. 2018;7(5):2761-5.
25. Fatima W, Alqhatani NSM, Ahmad LM. Assessment of Nutritional Status and its Related Factors among Female Adolescent Girls: A School based Study in Arar city, Kingdom of Saudi Arabia. IJMRHS. 2019;8(2):133-44.
26. Mahgoub HM, Fadlelseed OE, Khamis AH, Bilal JA, Adam I. Nutritional and micronutrient status of adolescent schoolgirls in eastern Sudan: A cross-sectional study. Research Gate. 2017;6:1831.
27. Roba KT, Abdo M, Wakayo T. Nutritional Status and Its Associated Factors among School Adolescent Girls in Adama City, Central Ethiopia. J Nutri Food Sci. 2016;6(3).
28. Gebregyorgis T, Tadesse T, Atenafu A. Prevalence of Thinness and Stunting and Associated Factors among Adolescent School Girls in Adwa Town, North Ethiopia. Int J Food Sci. 2016:8.
29. Gebremariam H, Seid O, Assefa H. Assessment of Nutritional Status and Associated Factors among School Going Adolescents of Mekelle City, Northern Ethiopia. Int J Nutri Food Sci. 2015;4(1):118-24.
30. Tegegne M, Sileshi S, Assefa T, Kalu A. Nutritional Status and Associated Factors of Adolescent School Girls, Goba Town, Southeast Ethiopia. Global J Med Res. 2016;16(1).
31. Radhika MS, Swetha B, Kumar BN, Krishna NB, Laxmaiah A. Dietary and nondietary determinants of nutritional status among adolescent girls and adult women in India. New York Academy of Sciences. 2018:5-17.

Cite this article as: Ali AM, Abdi AA. Under nutrition and associated factors among adolescent girls in Fik district, Erar zone, Somali region, Ethiopia, 2019. Int J Community Med Public Health 2022;9:1242-9.