Household Food Insecurity, Coping Strategies and Adolescent Girls' Dietary Diversity Status in Hossana Town, Ethiopia.

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Abstract

Background Globally there are 1.8 billion adolescents, comprised of 10-19 years old, represent approximately 20% of the world's population. In Ethiopia this group represents 20-26% of general population. Despite the fact that this period is a window of opportunity to break intergenerational cycle of malnutrition, macro and micronutrient deficiencies are among leading health problems in this vulnerable age groups. Moreover, there is scarcity of data on the status of dietary diversity in this segments of the population.

Methods a community based cross sectional study design was employed from May 21-June 20, 2019. Pre-tested structured questionnaire was used for data collection using cluster sampling technique to approach 451 households with adolescent girls. Data was entered in to Epi-Data version 3.1 then exported to SPSS version 23 for analysis. Descriptive and logistic regression analysis were performed. Adjusted Odd Ratios (AOR), along with corresponding 95% confidence interval (CI) were used and the level of statistical significance was declared at a p-value of <0.05.

Results a total of 434 households with adolescent girls were involved in the study. We found that 41.7% of households were food insecure, only 57.8%, (C.I.53.5-62.2) of adolescent girls consumed diversified diet, with the mean DDS of 5.38 (SD=1.75). After adjusting for potential confounders, occupational status of the adolescents' father, (AOR= 0.56, 95% C.I. 0.32-0.99 and AOR=0.26, 95% C.I. 0.17-0.47), exposure to televised media (AOR=3.36, 95% C.I. =1.55-7. 3) and household food security status (AOR=5.09, 95% C.I. =3.2-8.08) were significant predictors of dietary diversity among adolescent girls.

Conclusion Significant portion of households were food insecure; practicing ranges of coping strategies which further compromised dietary diversity of adolescent girls. Poor dietary diversity adversely affects micronutrient reserves of to-be a-mother girls; the vicious cycles of malnutrition continues its far fetching effect. Given that adolescence is the second period in life with rapid growth and development, improving dietary status of this sensitive segments of the population are to be an agenda of all concerned bodies.

Background

Globally there are 1.8 billion adolescents, comprised of 10–19 years old, represent approximately 20 % of the world's population. Of which 90% live in low and middle-income countries (LMICs). In Ethiopia, these group represents 20–26 % of the population (1–3). Adolescence is the period of most rapid growth second to childhood (4); characterized by rapid transition to adulthood marked by physical and biological growth and development. For instance 50, 20 and 50% of adult weight, height, and skeletal mass are gained in this period; hence optimal nutrition is critical during this period (5–8). Additionally, it is a period of critical window of opportunity to intervene an intergenerational cycle of malnutrition (3). Addressing the nutrition needs of adolescents girls could be an important step in breaking the vicious cycle of intergenerational malnutrition, chronic diseases, and poverty (9,10). However; adolescents from developing countries are susceptible to nutritional deficiencies due to early childhood nutritional insults

(11) and adverse environmental conditions including food insecurity which could impact on their development and wellbeing (5).

Dietary diversity score (DDS), a proxy for adequate micronutrient density of foods (12), defined as a number of individual food groups consumed over a given period of time. Along with food variety and consumption of animal source foods, dietary diversity is an indicator commonly used to assess intake and quality of diet at the household or individual level. In addition, DDS is a measure of food security, nutrition information, early warning system and target of intervention at global or national level (6,13). It has been propagated as a health-beneficial component of dietary behavior, and complements the concept of exploratory dietary patterns. In LMICs, dietary diversification has been examined, primarily concerning malnutrition-related health outcomes (14).

The overall nutritional quality of the diet is improved with diverse diet. Therefore, diversity in the diet is important to meet the requirements for energy and other essential micronutrients especially for those who are in the risk of nutrition deficiencies (15). Dietary diversity is a predictors of the observed under-nutrition (16).

Despite considerable efforts to decrease its prevalence, the health and nutritional status of adolescents has seen limited improvement over the past 50 years (8,17).

It is estimated that micronutrient deficiency is a global public health problem affecting two billion people worldwide (10,18), of which 500 million are women in their reproductive age (19). Although diet related health problem affects both sexes and all age groups, it is a major public health problem among women (20) especially among adolescent girls (21). It can result in diminished physical growth, cognitive and motor development, poor performance in school and productivity, and affect reproduction (21,22). Considering the burden of sub-optimal dietary intake, promotion of adequate dietary diversity becomes one of the global concerns (6).

In recognition of its health consequences, in 2012, the 65th World Health Assembly endorsed a 50% reduction in the burden of micronutrient deficiency in women of reproductive age by 2025, from 2011 levels. Ethiopia has also been striving to curve the high burden of micronutrient deficiencies through implementing national nutritional programs and strategies. However, the initiatives have been targeting only pregnant women and children aged 6–59 months; under-representing adolescent girls. Additionally, status of dietary diversity is not investigated in this vulnerable age segments of the population.

Methods

Study setting, design and sampling

A community based cross sectional study design was employed in Hosanna Town, Hadiya Ethiopia. Sample size was computed with the assumptions of single population proportion formula considering to

detect at least 26.8% dietary diversity (23), 95% significance level, 5% margin of error, 10% non-response rate and design effect of 1.5 the final sample size was $(301 \times 1.5) = 451$.

[Due to technical limitations, the formula could not be displayed here. Please see the supplementary files section to access the formula.]

Where

- n = sample size
- $z_{\alpha/2}$ = 95% CI with two tailed test
- p = population proportion
- d = margin of error

A cluster sampling method was used; after random selection of three Kebele (the least administrative structure), we have obtained total number of predefined distinct clusters (Mender) (smallest cluster within an administrative Kebele) with size of the adolescent girls for each “Mender”. Afterwards; required numbers of clusters (Mender) were assigned to kebeles by ENA software using probability proportional to population size (PPS) method. In this method, larger settlements have a higher chance of being selected as clusters compared to smaller settlements because the probability of selection is proportional to population size of the settlement. Once again using computer generated random number specific clusters corresponding to each kebeles were assigned. Finally, all households (HHs) from identified clusters with adolescent girls were selected for data collection.

Data collection tools and procedures

Questionnaire was adapted from the Ethiopian Demographic and Health Survey 2016 (EDHS,2016) and WHO/FAO guideline (24). Structured Amharic version questionnaire was administered to assess socio-economic and demographic factors. Household food security status was determined using the household food insecurity access scale (HFIAS) developed by Food and Nutrition Technical Assistance (FANTA) (25). We have used 24-H dietary recall in the preceding day to assess dietary diversity score among adolescents. Groups of foods were prepared from FANTA/FAO and further categorized into ten food groups. Dietary diversity score was created as a summary measure using consumption of 5 or more food groups as adequate (6) otherwise it is inadequate so that to apply logistic regression model.

Data quality management

To assure the quality of data, data collectors supervisors were trained for two days on the clarity of tools and overall data collection procedures. Structured questionnaire was prepared in English, then translated to Amharic and back translated to English by bilingual experts in order to check consistency. Pre-test was done on 5% of sample size and this was not included in actual data. Cronbach’s alpha was computed to

assess the internal consistency; hence possible modification to the tool was considered based on pre-test result. Data collection was carried out by trained diploma nurses under supervision. All collected data were returned to PIs and checked and cleaned for consistency and completeness; discussion was made on daily bases.

Data analysis

Data were entered in to Epi- Data version 3.1 and then exported to Statistical Package for Social science (SPSS) version 23 for analysis. Before analysis missing value, new categories and normality for continues variables was checked. HHs wealth index was computed by principal component analysis (PCA) based on household assets and housing quality variables which were adapted from EDHS2016 (26). Descriptive statistics was performed for each variable including the outcome variables. DDS status was dichotomized using five food groups as cut off so that to fit for logistic regression model. First, bivariate analysis was done to identify candidate variables for multivariable logistic regression. Variables with p-value of <0.25 in bivariate analysis were regarded as candidates for multivariate analysis. Finally, multivariable logistic regression was fitted to the data in identifying predictors of DDS among study participants Adjusted Odd Ratios (AOR), along with corresponding 95% confidence interval (CI) was used in writing results. Level of statistical significance was declared at a p-value of <0.05 .

Results

Socio-demographic characteristics

A total of 434 HHs were included in the analysis yielding a response rate of 96.2%. Of the total adolescent girls, 130 (30%), 151 (34.8%) and 133 (35.3%) are in their early, middle and late adolescence age respectively. We found that from the total participants, 61.1% are protestant by religion and 78.8% are Hadiya by Ethnicity. Occupational and educational status of parents, household's family size and wealth index were assessed (Table 1)

Table 1: Here

Concerning access to information, more than a quarter (26.5%) and around 40% of adolescent girls listen to radio and watch television at least once a week respectively.

Household food security status

From the total HHs under the study, 253 (58.3%) were food secure whereas the remaining 181(41.7 %) were food insecure. Food insecure HHs were further categorized in to different degrees of food insecurity; mildly food insecure 48 (11.1%), moderately food insecure 59 (13.6%) and severely food insecure 74 (17%).

When food insecurity exists at HH level, shifting to less expensive and poor quality food (73.5%), reducing on non-food expenditures (53%), reducing the amount of consumed meal (41%) and cutting the number of meals (40%) were among the major coping strategies used by the household.

[Figure 1]

Dietary Diversity Status of Adolescent Girls

From a total adolescents involved in the study, 251 (57.8%, C.I.53.5-62.2) consumed diversified diet with mean DDS of 5.38 (1.75) 24-hours preceding the survey date. Almost all of the participants (97.5%) consumed grains, white roots and tubers, and plantains followed by pulses (87.6%) and dark green leafy vegetables (77.2%). The least consumed diets were nuts (22%) and meat, poultry and fish (22.4%) (Table 2).

Table 2:Here

Bivariate analysis to identify candidate variables

In bivariate analysis ten potential covariates were identified for multivariable logistic regression model; age of adolescent girls, living with both parents, educational status of mother, educational status of father, maternal occupation, paternal occupation, adolescents listening to radio, adolescents watching television, HHs wealth index and HHs food security status identified at a p-value <0.25.

Predictors of dietary diversity status

Potential covariates identified in bivariate analyses were entered into multivariable logistic regression model using backward removal method to adjust for potential confounders in predicting the outcome.

After adjusting for the others occupational status of adolescent's father, adolescent's exposure to televised information and household food security status showed statistically significant association with dietary diversity status of population under the study.

Estimates obtained through multivariable logistic regression showed that odds of consuming diversified diet is lower by 44% and 74% when occupation of adolescent girls' father is merchant and other respectively compared to their counterparts from the employee father (AOR= 0.56, 95% C.I. 0.32-0.99 and AOR=0.26, 95% C.I. 0.17-0.47).

The likelihood of consuming diversified diet among adolescent girls with exposure to television media is about 3.4 times more likely than their counterparts, (AOR=3.36, 95% C.I. =1.55-7. 3). Furthermore, there is five times increased odds of consuming diversified diet among adolescent girls living in food secure HHs (AOR=5.09, 95% C.I. =3.2-8.08) (Table 3)

Discussion

The Sustainable Development Goals (SDGs) call for efforts to eliminate world hunger and malnutrition in its all forms by 2030, and ensure the access of all people to nutritious and abundant food. But there is a problem of access to it making close to 800 million chronically hungry despite sufficient food production in the world (27,28).

In spite of global initiatives and sufficient food production, our study reported that around 42% of HHs were food insecure. This is in line with reported 37.2–44.4% HHs food insecurity in the country (29,30); however the status of food insecurity is much higher than reported 14% (3), and lower when compared to 75% of Birhane *et al* (31) and 80.5% of Kenya (32). These inconsistencies could be explained by the socioeconomic and methodological differences. In the context of food insecurity, we found that HHs use different coping strategies to deal with difficulties. This is supported by findings from qualitative and quantitative studies (28,31–33).

Our study witnessed that substantially less than two third of adolescent girls consumed diversified diet. This intake is lower than reports from some parts of the country which documented 63.3–75.5% of adolescent had adequate dietary diversity (6,29,34), but it is higher than studies in Gurage Zone (23). The possible explanation for this variation could be due to use of different cut-off to declare consumption of diversified diet in the population.

After controlling the confounding effects of others, occupational status of adolescent's father, adolescent's exposure to televised information, and household food security status predicted dietary diversity status among adolescent girls. This study identified that adolescent girls whose father are merchant and of other occupation are less likely to consume diversified diet in comparison to their counterparts from employed father. This could be explained by the fact that lack of time to stay at home due to busy working schedules (35); as a result, minimal care is expected. In other way, men can contribute towards improving household nutrition security by reducing consumption of food away from the home (36). Moreover, male involvement in affaires of family care including nutrition is found to be determinant (37).

In this study it was found that adolescent girls who watch television at least once a week are more likely to consume diversified diet. This may be best explained as television media have more favorable associations with recommended levels of lifestyle behaviors (38). Adherence to a healthy dietary recommendation is increased with greater exposure to the information delivered by different mass media (39). As a result, individuals with access to health promoting information are supposed to have better nutritional knowledge that could be translated to practice.

The current study identified that HHs food security status determines dietary diversity of adolescent girls in the study setup. This is in line with other studies which reported that likelihood of having adequate

dietary diversity were higher among adolescents from food secured HHs; food insecurity predisposes people to relay on an undiversified diet (13,40), ranges of coping strategies as evident in this study.

In contrary to the hypothesis, surprisingly parental education (23) was not associated with dietary diversity of adolescents after controlling the confounding effects of others. This may signal that nutritional knowledge lacks in the curricula of formal education. Household wealth status may be associated to both HHs food security and dietary diversity but not in the causal pathway; hence it is not a true predictor of dietary diversity in this study.

Conclusion

Significant portion of HHs are food insecure practicing ranges of coping strategies which further compromised dietary diversity of adolescent girls in the household. The role of media, paternal occupation, household food security had statistically significant correlation with dietary diversity of adolescent girls. Poor dietary diversity adversely affects micronutrient reserves of to-be a-mother girls; the vicious intergenerational cycles of malnutrition continues its far fetching effect. Due to the fact that adolescence is the second period in life during which rapid growth and development occurs, improving dietary status of this sensitive segments of the population is to be an agenda of all concerned bodies. Based on the finding we have the following recommendations.

In the era of information revolution media should take leading role in transmitting health promoting messages including dietary recommendations. Scientific communities should be able to influence the media in favors of the healthy dietary recommendations with an aim to break the intergenerational cycle of malnutrition. Given the parental monitoring of dietary intake is significant, parents spending much time out of home should give due attentions in watching the dietary intake of the adolescent girls. Governmental and non-governmental organizations working in nutrition sensitive and nutrition specific program should perform their tasks in averting unacceptably high prevalence of household food insecurity. We recommend nutrition in the educational curricula as we have observed that educational status lacks statistical relation to dietary diversity. Despite significant contribution in filling the gap, we recognize the following limitations; qualitative dietary information may not correlate to the nutrient adequacy, it didn't assess intra-household dietary diversity which could reveal gender differences in the context.

List Of Abbreviations

AOR = adjusted odds ratio; CI = 95% confidence interval; COR = crude odds ratio; DDS = dietary diversity score; EDHS = Ethiopian demographic and health survey; HHs = households; LMICs = low and middle income countries; PCA = principal component analysis.

Declarations

Ethics approval and consent to participate

The study was approved by ethical Review Board of Hossana college of health science. All the study participants were informed about the purpose of the study and oral consent was obtained before interview. For age less than 18 years, ascent was prepared. Respondents were informed that they have the right to refuse or terminate the interview and the information provided by each respondent was kept confidential.

Consent for publication

Not applicable for this section.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

BB involved in design, conduct, analysis, interpretation and drafting the manuscript; LP involved in the in design, analysis, interpretation and revise the manuscript. BBF, AE and RD involved in design, analysis and interpretation. ML revised and edited the manuscript for the final submission. All authors read and approved the final manuscript.

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Annex

Table 1: Household and /adolescents socio-demographic characteristics in Hossana town, 2019 (n=434)

Variables		Frequency	Percent
Adolescent girls age category	Early adolescent	130	30
	Middle Adolescent	151	34.8
	Late adolescent	153	35.2
Ever attended school	Yes	429	98.8
	No	5	1.2
Religion	Protestant	265	61.1
	Orthodox	99	22.8
	Muslim	37	8.5
	others	33	7.6
Ethnicity	Hadiya	342	78.8
	Kembata	53	12.2
	Siltie	28	6.5
	other	11	2.5
Educational status of adolescent's mother	No formal education	75	17.7
	Primary (1-8 grade)	227	48.8
	9-12 grade'	74	17.5
	Graduate	68	16
Educational status of Adolescent's father (n=423) a*	No formal education	36	8.5
	Primary (1-8 grade)	104	24.7
	9-12 grade'	132	31.3
	Graduate	150	35.5
Occupation of mother (n=421)	Gov't employee	78	18.5
	NGO	17	4
	Hired in private sector	24	5.7
	Merchant	104	24.7
	Housewife	182	43.2
	Daily labourer	8	1.9
	Other	8	1.9

Occupation of father (n=423) a*	Gov't employee	158	37.4
	NGO	24	5.7
	Hired in private sector	19	4.5
	Merchant	88	20.8
	Farmer	49	11.6
	Daily labourer	18	4.3
	Others	67	15.8
House hold family size	≤5	185	42.6
	>5	249	57.4
HH wealth index category	highest	146	33.6
	middle	153	35.3
	lowest	135	31.1

Table 2: consumption of food groups by adolescent girls using 24-h recall method, in Hossana Town, 2019

Types of Diet	Frequency	%
Grains, white roots and tubers, and plantains	423	97.5
Pulses (beans, peas and lentils)	380	87.6
Nuts and seeds	95	21.9
Dairy	230	53.0
Meat, poultry and fish	97	22.4
Eggs	166	38.2
Dark green leafy vegetables	335	77.2
Other Vitamin A-rich fruits and vegetables	248	57.1
Other vegetables	195	44.9
Other fruits	160	36.9

Table 3: Factors associated with dietary diversity score among adolescents in Hossana Town, 2019

	Variable category	Dietary diversity status		COR (95% CI)	P-value	AOR (95% CI)	P-value
		Adequate	Inadequate				
Occupation of Father (n=423)	Employee(ref)	144	57	1		1	
	Merchant	49	39	0.5(0.3- 0.84)	0.009	0.56(0.315- 0.99)	0.048
	Others	52	82	0.25(0.16- 0.40)	<0.001	0.26(0.17- 0.43)	<0.001
Watching TV	Not at all (ref)	15	39	1		1	
	< once a week	118	95	3.23(1.68- 6.2)	<0.001	1.52(0.71- 3.23)	0.281
	At least once a week	118	49	6.26(3.17- 12.39)	<0.001	3.36(1.55- 7.3)	0.002
Food security status	Food secure	187	66	5.18(3.423- 7.84)	<0.001	5.09(3.2- 8.08)	<0.001
	Food insecure (ref)	64	117	1		1	

Figures

Figure 1

Household coping strategies in response to food insecurity in Hossana Town, 2019.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Formulas.docx](#)