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Level of Diversified Feeding Among School-Age Children in Northwest Ethiopia: A Cross Sectional Study

Tewabe T*, Belachew A and Miskir Y

Bahir Dar University, College of Medicine and Health science, Bahir Dar, Ethiopia

***Corresponding author:** Tewabe T✉ bezatewabe01@gmail.com

Bahir Dar University, College of Medicine and Health science, Bahir Dar, Ethiopia.

Tel: 61474173615

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Abstract

Background: In Ethiopia, a country of diverse agro climatic conditions, children consume a monotonous diet. This unvaried feeding culture has consequences on their nutritional status. But the reason why they are monotonous is not clearly known. Thus, the purposes of this study were to determine the level of dietary diversity among school age children.

Methods: A community based cross sectional study was conducted among 422 randomly selected school age children from 16 April to 15 June 2018 in Mecha woreda, Amhara regional state. The data were collected using structured questionnaire. Both descriptive and inferential statistics were used to present the data. Variables at $p < 0.05$ were taken as determinants for diet variety.

Results: The prevalence of dietary diversity; 86.4% had good dietary diversity. Most households (89.4%) were secured for food. The determinant factors of good dietary diversity were irrigation user [AOR= 2.49 (1.11, 5.60)] and access to information [AOR = 2.29 (1.15, 4.59)].

Conclusion: Prevalence of dietary diversity was generally good in the study area. Children from households that used irrigation and access to information had better dietary diversity. Increasing maternal and child awareness through medias and increasing household agricultural production of variety through irrigation were recommended.

Keywords: Dietary diversity; Household food security; Northwest Ethiopia

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Introduction

They say whoever the father of a disease, the mother is poor nutrition. Poor nutrition is always present behind the death of children due to pneumonia, diarrhea and other infectious diseases, either as a causative or aggravating factor for these illnesses [1]. Direct malnutrition is also responsible to 2.4 million child deaths annually. Considering these scenarios together, malnutrition with its constituents is responsible for a significant number of deaths of children worldwide [2]. The problem becomes a leading public health problem worldwide with its severity much worse in developing countries particularly sub-Saharan African countries [3]. Ethiopia, one of the sub-Saharan African countries, is suffering mainly from a burden of under nutrition (macro and micro nutrients deficiency) [4]. In fact, the country has achieved a significant progress in improving nutrition

over the past 3 decades [5]. However, the issue of diet diversity is still an area of concern.

Studies show that feeding children variety of food meant keeping their health and upgrading their cognitive ability. Good diet diversity increases level of micronutrients [6] and children with good diet diversity are healthier, have normal body weight [7] and are not stunted [8]. Most importantly, appropriate feeding has an impact on academic achievements of a child [9]. For these and other unmentioned importance of diet variety, contemporary nutrition guidelines recommend children to consume a wide variety of food at least four kind from the major food group each day [10].

Looking level of dietary diversity in Ethiopia, previous studies showed consistently low result across different study areas. The proportion of children who consumed minimum acceptable

dietary diversity was 43.2% in Wolayita Sodo region [11], 16.2% South Gonder [12], 13.6% in Dejen [13], 13% in Sinan woreda [14], 34.3% in Mirab Abaya, Southern Ethiopia [15]. To turn this trend, the government of Ethiopia in concert with stakeholders and in collaboration with local and international partners has implemented different interventions. Mainly the school feed program and but these interventions are not sufficient to achieve the required level of diet diversity

Different factors are claimed as determinants of poor diet diversity. Age, sex, birth interval, birth size, breastfeeding, pre-lacteal feeding, educational status of parent, place of delivery, immunization, maternal health seeking behavior, food availability, media access, inadequate feeding, late initiation of complementary feeding is some of the factors mentioned in previous studies. Notably, socio-economic status of a society is found to be negatively associated with diet diversity. In china positive predictors of dietary diversity included residing in an urban environment. High dietary diversity was associated with a decreased risk of anemia [16]. It revealed dietary diversity varied with age and place of residence; the older ones and the ones living in rural areas tend to have poorer dietary diversity [17]. On the other hand, variety agriculture production culture of a household and having food security is shown to have positive impact on the children diet variety [18] access to irrigation infrastructure strengthened food security [19]. However, in most countries, including Ethiopia, with diverse agro climatic conditions, children consume a monotonous diet [1]. Studies indicate that household decisions about the adoption of agricultural technology and their food security situations were strongly and positivity interdependent. In Ethiopia food security is mostly depend on rain based agriculture and proportion of food insecurity in different parts of the country varies widely, with almost half of the households in Amhara region are unsecured [17].

Identifying factors associated with diet variety is detrimental for intervention. In this regard, published studies are scarce in Ethiopia in general and absent in the current study area in particular. Thus, the purpose of this study was to determine the level of dietary diversity and household food security among school age children in Mecha woreda, Ethiopia.

Materials and Methods

Study settings and participants

A community based cross-sectional study was conducted among school age children from 16 April to 15 June 2018. The study was conducted in Mecha woreda which is in Amhara regional state, Ethiopia. The woreda is bordered on the south by Sekela, on the southwest by the Agew Awi Zone, on the west by the Lesser Abay River, on the northeast by Bahir Dar, and on the east by Yilmana Densa. It has a total population of 80,780 of whom 20,000 (7000 in urban and 13000 in rural area) were school age children in Mecha woreda. A total of 66,107 households are there in the woreda, resulting in an average of 4.42 persons per a household. The majority (98.91%) of the inhabitants practiced Ethiopian Orthodox Christianity. The district has 10 kebeles (part of the

town divided for administrative purposes). There is one hospital, one health center and 10 health posts in the district.

The sample size was calculated using single population proportion formula by considering the following assumptions: proportion (P) 50% which is the proportion of dietary diversity among school age children (6-13 years old), margin error (d) 5%, confidence level (CL) 95% and after considering 10% non-response rate the final sample size became 422. To select study participants, 3 rural Kebeles (43%) were taken and sample size was allocated proportionally to each selected kebeles. Finally, Simple random sampling technique was used to select households with school age children from a community health folder. Based on the information from the folder, houses were accessed and data from mothers (when mothers were not alive or not present during data collection time with their children, primary care givers were taken as mothers) and their children were interviewed together. Students who were seriously ill or who could not give interview were excluded. In houses where more than one school age children were present, interview was made to the youngest one [20].

Inclusion and exclusion criteria

Inclusion criteria: Children between 6 to 12 years (school ages) and living in Mecha woreda were included in this study.

Exclusion criteria: Those children who were seriously ill and with parents who had a mental problem were not included.

Data collection tools and procedure

The data was collected by trained nurses using a pre-tested structured interviewer administered questionnaire adopted and modified from previous similar studies [21-23] and Based on the Food and Agriculture Organization of the United Nations (FAO)/ Food and Nutrition Technical Assistance (FANTA) Guidelines for measuring Household and Individual Dietary Diversity [20]. Data collectors were trained about collection techniques and procedures before the actual time of collection. The data was collected by face to face interview of mothers with their children on socio demographic variables, environmental characteristics, maternal and child related behaviors.

Variables of the study

Dependent variables: Dietary diversity.

Independent variables: Social and economic: Age, sex, birth interval, birth size, breastfeeding, pre-lacteal feeding, educational status, place of delivery, immunization, maternal health seeking behavior, food availability, media access, inadequate feeding, late initiation of complementary feeding, access to iodized salts, family planning, number of children, unsanitary living conditions, agricultural patterns, drought etc.

Operational definition

A child is considered having good diet diversity: When he/she eats at least four types of food groups per day (within 24 hours).

A child is considered food secured when: He/she is secured for all nine components food security questionnaires (within the last month).

Data quality assurance

All activities were done with the agreement of the principal investigator to get qualified data. Training was given in each module of the questionnaire on how to ask questions and code answers. To ensure data quality, completeness, accuracy, and consistency, all collected data were checked every day by the investigators and supervisors during the entire data collection period. Any quest related to clarity, ambiguity, incompleteness, misunderstanding, was solved on the following day before beginning of the next day activity.

Data analysis

Data were entered and cleaned using Epi data version 3.1 and exported to SPSS software version 21 for analysis. Both descriptive and inferential statistics were used to present the data. Binary (unadjusted) and adjusted logistic regression was performed to examine the effect of each independent variable on dietary diversity. Statistical significance was declared at P value < 0.05 by adjusted regression.

Results

Socio demographic characteristics

From total participants of the study, 392 mothers with their children were interviewed which made a response rate of 92.8%. About 206 (52.5%) children were males, 176 (44.4%) children were within the age group 6-8 years, 110 (27.8%) were first in birth order. Regarding mothers, most (93.2%) were between 18 - 45 years, majority (85.9%) were orthodox Christian, 45.2% had 3 - 4 children, 83 (21.0%) were educated, 251 (89.9%) were farmers and about 335 (84.6%) were married. Whereas nearly one third (31.8%) of husbands were educated and about 45 (13.1%) are employed. Above half (60.9%) of households had their own farming land of which 145 (36.6%) used irrigation farming. The average household income of the family was between 1001-2000 Ethiopian birr per month in about 34.6% households. Most (81.0%) families had access to information (**Table 1**).

Maternal and health related characteristics

Most (75.8%) mothers used family planning methods to space birth intervals. Majority (83.3%) of children were on school and from them above half (54.2%) were grade three and above. Nearly one third (29.3%) of school age children were engaged in work. Above three third (76.5%) of children had history of illness. Most (70.5%) children eat four and above per day and about 288 (72.7%) mothers got child nutrition education (**Table 2**).

Household food security and dietary diversity

When assessed for food security (using food security access scale), most of the households (89.4%) were secured for food. The prevalence of dietary diversity was 13.7%, 58.3%, 28% had low, good diversity and better diet diversity, respectively. Regarding the common consumed food groups: 28.3% vegetables, 23.0% fruits, 31.8% eggs, 46.5% milk and milk products (**Table 3**).

Factors associated with dietary diversity

First variables were tested using bivariate analysis to see their independent predictors of dietary diversity. The independent predictors of dietary diversity were irrigation user, family planning, maternal educational status, husband educational status, maternal occupation, household income, information access and household food security level. After adjusted logistic regression, irrigation and access to information were found to be independent predictors of dietary diversity children from an irrigation user households were almost 2.5 times higher to have good dietary diversity than those from non-irrigation user households [AOR= 2.494(1.111,5.600)] and children whose

Table 1: Socio-demographic distribution of school age children in Mecha Woreda, North West Ethiopia, 2018 (n=396).

Variables	Response	Frequency	Percent
Sex of the child	Male	190	47.5
	Female	206	52.5
Age of the child	6-8 years	176	44.4
	9-10 years	115	29.0
	11-12 years	105	26.5
Number of children	1-2	150	37.9
	3-4	179	45.2
	Five and above	67	16.9
Birth order of the child	First	110	27.8
	Second and above	286	72.2
Age of the mother	18-45	369	93.2
	46-60	27	6.8
Religion	Orthodox christian	340	85.9
	Muslim	47	11.9
	Protestant	9	2.3
Ethnicity	Amhra	393	99.2
	Others	3	0.8
Maternal level of education	Educated	83	21
	Uneducated	313	79
Maternal occupation	Employed	44	11.1
	Farmer	73	18.4
	Unemployed	279	70.5
What is your marital status?	Married	335	84.6
	Unmarried	61	15.4
Husband level of education	Educated	109	31.8
	Uneducated	234	68.2
Husband occupation	Employed	45	13.1
	Unemployed	298	86.9
Farming land	Yes	241	60.9
	No	155	39.1
Irrigation user	Yes	145	36.6
	No	251	63.4
Average monthly income	< 1000	87	22.0
	1001- 2000	137	34.6
	> 2001	172	43.4
Access to information	Access to information	320	81.0
	No access information	75	19.0

Table 2: Maternal related characteristics distribution of school age children in Mecha Woreda, North West Ethiopia, 2018 (n=396).

Variables	Response	Frequency	Percent
Ever used of FP methods	Yes	300	75.8
	No	96	24.2
Is your child on school	Yes	330	83.3
	No	66	16.7
Level/ grade of education	1-2 grade	152	45.8
	Grade three above	180	54.2
Is your child engaged in work	Yes	116	29.3
	No	280	70.7
If engaged for how many hours	1-3 hours	53	45.7
	Above three hours	63	54.3
Do child get feeding on worksite	Yes	69	59.0
	No	48	41.0
History of illness	Yes	302	76.3
	No	94	23.7
Type of illness	Pneumonia	85	28.1
	Diarrhea	139	46.0
	Measles	17	5.6
	Malaria	22	7.3
	Others /specify	39	12.9
Type feeding during illnesses	Regular family dish	161	40.8
	Additional feeding	234	59.2
Frequency of eating per day	Four and above	279	70.5
	1-3	117	29.5
Access to child nutrition education	Yes	288	72.7
	No	108	27.3

Table 3: Household food security and dietary diversity distribution of school age children in Mecha Woreda, North West Ethiopia, 2018 (n=396).

Food security questions	Yes (Frequency and percent)	No (Frequency and percent)
In the past four weeks, did you worry that your household would not have enough food	36 (9.1%)	360 (90.9%)
In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources	30 (7.6%)	366 (92.4%)
In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources	29 (7.3%)	367 (92.7%)
In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food	24 (6.1%)	372 (93.9%)
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food	22 (5.6%)	374 (94.4%)
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food	16 (4.0%)	380 (96.0%)
In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food	12 (3.0%)	384 (97.0%)
In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food	9 (2.3%)	387 (97.7%)
In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food	8 (2.0%)	388 (98.0%)
Dietary diversity questions		
Any local foods, bread, rice noodles, biscuits, or any other foods made from millet, sorghum, maize, rice, wheat, or any other locally available grain	350 (88.4%)	46 (11.6%)
Any potatoes, yams, manioc, cassava, or any other foods made from roots or tubers	257 (64.9)	139 (35.1%)
Any vegetables	112 (28.3%)	284 (71.7%)
Any fruits	91 (23%)	305 (77.0%)
Any beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds, liver, kidney, heart, or other organ meats	112 (30.8%)	274 (69.2%)

Food security questions	Yes (Frequency and percent)	No (Frequency and percent)
Any eggs	126 (31.8%)	270 (68.2%)
Any fresh or dried fish or shellfish	31 (7.8%)	365 (92.2%)
Any foods made from beans, peas, lentils, or nuts	240 (60.6%)	156 (39.4%)
Any cheese, yogurt, milk, or other milk products	184 (46.5%)	212 (53.5%)
Any foods made with oil, fat, or butter	278 (70.2%)	118 (29.8%)
Any sugar or honey	173 (43.7%)	223 (56.3%)
Any other foods, such as condiments, coffee, tea	212 (53.5%)	184 (46.5%)

Table 4: Distribution of dietary diversity among school age children in Mecha Woreda, North West Ethiopia, 2018 (n=396).

Variables	Dietary diversity					
	Parameters	Yes (N %)	No (N %)	COR (95% CL)	AOR (95% CL)	p- value
Irrigation user	Yes	269	31	2.870 (1.397, 5.896)	2.494 (1.111,5.600)	0.027
	No	73	23	1	1	
Family planning	Yes	135	10	2.734 (1.503, 4.973)		
	No	207	44	1		
Educational status	Educated	78	5	2.895 (1.115, 7.518)		
	Uneducated	264	49	1		
Husband education	Educated	109	7	3.114 (1.360, 7.132)		
	Uneducated	225	45	1		
Occupation of mother	Employed	44	0	3.527 (.000,.000)		
	Farmer	69	4	3.766 (1.314,10.800)		
	Housewife/other	229	50	1		
Average household Income	<1000	70	17	0.309 (0.140, 0.681)		
	1001-2000	111	25	0.333 (0.161, 0.691)		
	>2000	160	12	1		
Access to information	Yes	289	31	4.123 (2.230,7.626)	2.295 (1.146,4.597)	0.019
	No	52	23	1	1	
Household food security	Insecure	31	11	0.390 (0.183, 0.832)		
	Secured	311	43	1		

1= Reference, AOR: Adjusted Odds Ratio, COR: Crude Odds Ratio, p<0.05 is considered significant.

mothers had better access to information were almost two times more likely to have good dietary diversity than their counter parts [AOR=2.295 (1.146,4.597)] (Table 4).

Discussion

In this study the level of dietary diversity was low in 13.7% households. The result of this study is comparable with studies conducted in other areas; 13% in Sinan woreda [14], 13.6% in Dejen [21], 16.2% in South Gonder [22]. But it is higher when compared to studies conducted in Mirab Abaya woreda- 34.3% [15] and Wolayita sodo- 43.2% [23]. An improved dietary diversity in the current study area may be due to the agricultural practice of households as most of them were irrigation users. Different studies show that when households improve their agricultural production variety and productivity, children deity variety will also improve. Again, improving agricultural production variety and productivity is achieved when households practiced irrigation other than being dependable solely on rain fall. At one hand irrigation will improve households' food security and on the other hand probability of planting fruit and vegetables increases. Overall irrigation improves socioeconomic status of a community

and a community with improved socioeconomic status is good at consuming varied diet.

This study revealed the prevalence of dietary diversity was affected by different factors. Among them access to irrigation was significantly associated with prevalence of dietary diversity. A child with access to irrigation in the family had higher dietary diversity than non-irrigation user families. This result is consistent with studies conducted in South Africa [24], Malawi [25], in school age children [26], Benin [27] and in other varied climatic zones [28]. This may be due to the fact that irrigation increases the income of the family, gives chance to cultivate variety of food. As the production of foods and customs increased it creates, access and availability for food choices this ultimately increased the prevalence of dietary diversity.

On the other hand, access to information was the determinant factors for dietary diversity. Children whose mothers had better access to information were two times more likely to have good dietary diversity than their counter parts [AOR=2.295 (1.146,4.597)]. This result is consistent with findings in Gonder [22] and Dejen [21], in America [29], and evidence from DHS

studies [30]. This could be due to mass media are means for giving health information and to change health habits. Mass media campaigns had a consistent outcome in improving the attitude of mother about diet diversity and practices. At country level using radio and television should be increased to create awareness about appropriate feeding practices.

As strength the study identified determinants of dietary diversity which could be an important aspect for decreasing the impact of malnutrition and as a limitation there may be recall bias to some variables like questions related to previous maternal and child health utilizations and seasonal variations was not determined since in one season i.e., spring.

Conclusion

Generally, the prevalence of dietary diversity in this study was good. Among different factors studied, only being irrigation users and having access to information were determinants of good dietary diversity. Increasing maternal and child awareness by any means and working with the community to increase productivity through irrigation were recommended to maintain or increase the current level of diet diversity in the current study area.

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Ethical Approval and Consent to Participate

Ethical clearance was obtained from the Amhara public health institute after approved by Bahir Dar university medicine and health sciences research and ethical committee and support letter was written for respective institutions. Respondents were informed about the objective of the study and a signed informed consent that assures participants willingness to participate was taken from each participant. Moreover, a personal identity was not included in questionnaire to assure confidentiality.

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