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Factors Associated with Dietary Diversity among Children of Agro Pastoral Households in Afar Regional State, Northeastern Ethiopia

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Abstract
Introduction: Dietary diversity has been consistently associated with child nutritional status and growth in developing countries. Therefore, this study was aimed to identify the factors affecting dietary diversity among children of agro pastoral households in northeastern Ethiopia.**Methods:** A community-based cross sectional study was employed in Afambo district on 370 mother-child pairs. Binary and multivariable logistic regression analyses were used to identify the factors associated with dietary diversity. Variables with a p-value < 0.05 were identified as statistically significant.**Results**: Overall 30.8% (95% CI: 26.1, 35.5%) of children aged 6-59 months achieved the minimum dietary diversity score (DDS) with mean score of 2.73. Mothers who got counseling on proper child feeding practices at postnatal checkup [AOR=3.7(1.45, 9.28)] and mothers who fed colostrum to their children were independent positive predictors of meeting minimum dietary diversity. The factor associated with decreased odds of meeting minimum dietary diversity was moderate to severe household hunger scale [AOR=0.24(0.10, 0.57)]. **Conclusion:** This study showed that nearly three children in every ten achieved the minimum DDS. Therefore, sound and culturally appropriate child feeding counseling during postnatal care should be given to mothers of young children so that they can make the possible use of locally available foods. In addition, expansion of social programs that might contribute to the earning capacity of poor households is also vital to ensure the dietary diversity.
Keywords: Children, dietary diversity, Afambo, Afar, Northeastern Ethiopia

INTRODUCTION

Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods. It provides a more rapid, user-friendly and cost-effective approach to measure changes in dietary quality at individual level [1, 2]. Dietary diversity is essential to ensure access to local foods that will adequately meet the energy and nutrient needs of a growing child [3, 4].

Dietary diversity has been consistently associated with child nutritional status and growth in a variety of studies in the developing countries. It was associated with lower prevalence of childhood stunting [5-9], underweight [10] and wasting [10, 11]. Moreover, appropriate complementary feeding is important to tackle child mortality. In developing countries, about six percent of all deaths among children aged less than five years can be prevented by recommended dietary diversity and meal frequency practices [12-14].

Despite this fact, limited studies are conducted on dietary diversity among agro pastorals in Afar Regional State. Therefore, this study was aimed to identify the factors affecting dietary diversity among children of agro pastoral households in northeastern Ethiopia. The findings may help policy makers and program managers to design intervention strategies that possibly might improve child dietary diversity.

METHODS

Study design

A community based cross sectional study was conducted on 370 mother-child pairs in Afambo district from January 21 to February 05/2015. Based on the 2007 census population projection, the district has a total population of 29,399, of which 2,639 are estimated to be children aged 6-59 months. There are seven kebeles (the smallest administrative units next to district in Ethiopia) in the district.

Sampling procedure

Firstly, Afambo district was selected purposively. Secondly, of the seven kebeles in the district, four were randomly selected by lottery. To give equal chance in the selection of mother-child pairs, proportional allocation technique was employed across each selected kebeles. Finally, systematic random sampling technique was applied to select the study participants. If there was more than one mother-child pair in one household unit, one mother with the youngest child was selected. The detailed sampling procedure is found elsewhere [15].

Data collection process and instrument

Data were collected using a pretested-interviewer administered structured questionnaire. The questionnaire was prepared first in English and translated in to Afar'af (the local language), then back to English to check for

consistency. The Afar'af version of the questionnaire was used to collect the data. Eight high school graduates who can speak the local language were recruited as data collectors. The questionnaire was pretested on two kebeles which were not included in the study. Then, the pretest amendments on the questionnaire were made accordingly.

Study variables

Dietary diversity score (DDS), the outcome variable in this study, was defined as the total count of different food groups irrespective of the amount consumed by children in the 24 hour period preceding the survey. It was created based on the mother's recall of the child's consumption of food groups in the 24 hours preceding the survey. The mother reported whether or not the child consumed the following food groups: 1) Grains, roots and tubers; 2) Legumes and nuts; 3) Dairy products (milk, yogurt, cheese); 4) Flesh foods (meat, fish, poultry and liver/organ meats); 5) Eggs; 6) Vitamin-A rich fruits and vegetables; 7) Other fruits and vegetables. The response options were 'yes, consumed' (score 1) and 'no, not consumed' (score 0). These were summed up to create the child DDS, which ranged from 0 to7.

Then, as recommended by World Health Organization [16] child DDS was categorized into two; children with four or more dietary diversity score were classified as "meeting the minimum dietary diversity (MDD)" while those with less than four as "not meeting the MDD". Finally, those children who meet the minimum dietary diversity score were coded as "1" and those who did not meet the minimum dietary diversity score were coded as "0" for regression analysis.

The independent variables were maternal characteristics (age, occupation, educational status, marital status, ethnicity, religion), household characteristics (family size, income, household head, household hanger scale), paternal education status, maternal health services (history of antenatal care (ANC), place of delivery, history of postnatal care (PNC), mode of delivery, child feeding counseling at ANC and PNC checkups), child characteristics (sex and age) and child feeding practices (bottle feeding in the 24 hours preceding the survey, complementary feeding initiation time, prelacteal feeding and colostrum feeding). In this study household hanger scale was categorized into three levels based on the FANTA recommendation [17].

Data processing and analysis

Data were checked for completeness and consistencies. It was also cleaned, coded and entered into Epi Data version 3.02, then exported to SPSS version 20 for analysis. In binary logistic regression analysis, the crude odds ratio (COR) with 95% confidence interval was estimated to assess the association between each independent variables and the outcome variable. Then, variables with p-value <0.3 in the binary analysis were considered in the multivariable logistic regression analysis. The Hosmer-Lemeshow goodness-of-fit with enter procedure was used to test for model fitness. Adjusted odds ratio (AOR) with 95% confidence interval was estimated to assess the strength of the association. Variables with p-value <0.05 in the multivariable logistic regression analysis were considered as significant and independent predictors of dietary diversity score**.**

Ethical consideration

The study was approved by Ethical Review Committee (ERC) of Samara University. An official letter was written from Samara University to Afambo district administration office. Then, permission and support letter was written to each selected kebeles. The participants enrolled in the study were informed about the study objectives, expected outcomes, benefits and the risks associated with it. A written consent was taken from the participants before the interview. Confidentiality of responses was maintained throughout the study.

RESULTS

Dietary diversity score (DDS) of the study children

About 65% of the study children consumed dairy products and 18.6% consumed egg in the 24 hour recall period. Overall 30.8% (95% CI: 26.1, 35.5%) of children aged 6-59 months achieved the minimum dietary diversity score (**Table 1**). The mean dietary diversity score of the study participants was 2.73.

Table 1: Consumption of specific food groups and minimum dietary diversity score among children aged 6-59 months (n=370) in Afambo district, Northeast Ethiopia, 2015.

Variable	Frequency	Percent
Food groups		
Grains, roots and tubers	209	56.5
Legumes and nuts	140	37.8
Dairy products (milk, yogurt, cheese)	242	65.4
Flesh foods (meat, fish, poultry and liver/organ meats)	105	28.4
Eggs	69	18.6
Vitamin-A rich fruits and vegetables	98	26.5
Other fruits and vegetables	143	38.6
DDS ≥4 in the previous 24 hour		
Yes	114	30.8
No	256	69.2

DDS: dietary diversity score.

Factors affecting dietary diversity

Binary logistic regression analysis showed that religion, child age, antennal care attendance, child feeding counseling at postnatal care, complementary feeding initiation at 6 months and household hunger scale were significantly associated with minimum dietary diversity score at $p < 0.05$. In the multivariable logistic regression analysis child feeding counseling at postnatal care, colostrum feeding and household hunger scale remained statistically significant at $p < 0.05$.

Mothers who got counseling on proper child feeding practices at postnatal checkup were [AOR=3.7(1.45, 9.28)] 3.7 times more likely to fed their children with diversified food compared to mothers who lack counseling. Compared to children who deprived of colostrum, children who fed on colostrum were [AOR=2.7(1.18, 6.42)] more likely to get diversified food. Children from households with moderate to severe hunger were [AOR=0.24(0.10, 0.57)] less likely to receive diversified food compared to children from households of little to no hunger (**Table 2**).

Table 2: Binary and multivariable logistic regression analysis showing factors associated with meeting minimum dietary diversity score among children aged 6-59 months in Afambo district, Northeast Ethiopia, 2015.

	MDDS			
Variables	Yes	No	**COR (95% CI)**	**AOR (95% CI)**
Religion				
Muslim	89	225	1	1
Orthodox	25	31	2.0(1.14, 3.65)*	1.25(0.47, 3.35)
Maternal occupation				
Housewife	74	150	1.3(0.83, 2.07)	0.73(0.34, 1.58)
Other[†]	40	106	1	1
Child age (month)				
6-23	58	159	1	1
24-59	56	97	1.6(1.01, 2.47)*	1.78(0.77, 4.09)
Antenatal care visit[§]				
No	41	134	0.5(0.33, 0.81)*	0.77(0.29, 2.03)
Yes	73	122	1	1
Child feeding counseling at PNC				
No	9	30	1	1
Yes	57	72	2.6(1.16, 6.00)*	3.7(1.45, 9.28)*
Initiate complementary feeding at 6 months				
No	81	220	0.4(0.24, 0.69)*	0.53(0.22, 1.27)
Yes	33	36	1	1
Colostrum feeding				
No	34	95	1	1
Yes	80	161	1.39(0.86, 2.32)	2.7(1.18, 6.42)*
Bottle feeding in the previous 24 hours				
No	88	184	1	1
Yes	26	72	0.76(0.45, 1.26)	1.17(0.46, 2.96)
Household hunger scale				
Little to no hunger	79	147	1	1
Moderate to severe hunger	35	109	0.6(0.37, 0.96)*	0.24(0.10, 0.57)*

Hosmer and Lemeshow Test=0.445. MDDS: minimum dietary diversity score. COR= Crude odds ratio. AOR= Adjusted odds ratio. CI= confidence interval. PNC= postnatal care. [§]at least one visit. [†]government employee, trader, agro-pastoralist *Significant at p<0.05.

DISCUSSION

This study showed that 30.8% of mothers fed their child with the recommended dietary diversity score by World Health Organization. This is lower than the finding at Areka town of Wolaita Zone [5]. However, it is higher than the findings at Southern [18] and Eastern Ethiopia. This might be due to the reason that a significant proportion of children in the Ethiopia lowlands receive adequate dietary diversity compared to the midland agro-ecological zones [19].

Child feeding counseling during the postnatal checkups was the positive predictor for dietary diversity. Mothers who had given counseling on proper child feeding practices at postnatal checkup were 3.7 times more likely to feed their children with diversified food compared to mothers who lack counseling. In line with this study, in Nepal absence of postnatal care checkup was negatively associated with infant and child feeding index [20]. This might be due to the fact that mothers who got counseling at postnatal checkup may be encouraged by health professionals to practice optimal feeding practices.

Compared to the study children who deprived of colostrum, children who fed on colostrum were about three times more likely to get diversified food. In Raya Kobo district, mothers who fed their children with colostrum were more likely to practice proper infant and young child feeding as compared to those who discarded colostrum [21]. This could be explained in such a way that mothers who fed their children with colostrum might have positive attitude and knowledge on the advantage of optimal child feeding practices.

Children of households in moderate to severe hunger were 76% less likely to receive diversified food compared to children from households of little to no hunger. Likewise, in Ghana [22], Ethiopia [23], and rural Bangladesh [24] households in the highest wealth quintiles have higher odds of achieving higher dietary diversity compared to those in the lowest wealth quintiles. Similar finding was reported in Kenya [9].

The study shares the limitation of cross sectional study design. However, due attention was given to the study procedures; including the process of training and close supervision throughout the study period.

CONCLUSION

Colostrum feeding and counseling on proper child feeding practices at postnatal checkups are independent positive predictors of minimum dietary diversity score. However, there is negative association between household hunger scale and minimum dietary diversity score. Therefore, sound and culturally appropriate child feeding counseling during postnatal care should be strengthen to mothers of young children so that they can make the possible use of locally available foods. In addition, expansion of social programs that might contribute to the earning capacity of poor households is also vital to ensure the dietary diversity.

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