

Health Science

KEYWORDS: Dietary diversity, Infant and Young Children, Damot sore, Woliata Zone

DIETARY DIVERSITY AND ASSOCIATED FACTORS AMONG CHILDREN AGED 6-23 MONTHS IN RURAL AREA OF DAMOT SORE DISTRICT, SOUTH ETHIOPIA



Volume-4, Issue-4, April - 2019

ISSN (O): 2618-0774 | ISSN (P): 2618-0766

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Article History

Received: 03.01.2019

Accepted: 14.03.2019

Published: 10.04.2019



ABSTRACT

Background: Lack of dietary diversity is a problem at any age, but it is particularly critical for older infants and young children during the complementary feeding period. Meeting recommended minimum standards of dietary quality is a challenge in many developing countries including Ethiopia, the timely introduction and quality of complementary foods for children six months and older is poor. In Ethiopia, the dietary diversity and associated factors of children not yet studied well. This study aimed to examine dietary diversity and associated factors of children 6-23 months old living in rural part Ethiopia.

Methods: A community based cross sectional study was conducted in rural part of Damot sore District, South Ethiopia from January to February, 2017. A total of 603 randomly selected mothers having children 6-23 months of age were involved in the study. Data were collected and then entered into a computer using Epi Data version 3.1 and exported to SPSS version 20 for analysis. Descriptive statistics, bivariate and multiple logistic regression analyses were performed. Crude and adjusted odds ratio along with their 95% Confidence Interval (CI) were reported.

Results: The study indicated that only 29.4%, (95% CI: 25.7-33.1%) of the children satisfied minimum dietary diversity within 24 hrs. Educational status of mothers, able to read and write (AOR =1.97, 95% CI: 1.22-3.19), secondary completed and above (AOR =2.52, 95% CI: 1.49-4.27), occupation of mother, those who are merchant (AOR=1.68, 95% CI: 1.03-2.74), government employee (AOR=8.59, 95% CI: 3.36-19.4) and child age 18-23 months (AOR=1.71, 95% CI: 1.08-2.72) were significantly associated with dietary diversity.

Conclusion and recommendation: Even though the study showed better result when compared with national report, it is still low and does not meet WHO infant and young child feeding recommendations. Therefore, increasing mother's education, empowering women and timely introduction of complementary foods at age of six month and above are recommended.

Background

Globally in 2016, 155 million children under 5 were estimated to be stunted (too short for age), 52 million were estimated to be wasted (too thin for height), and 41 million were overweight or obese. Under nutrition is associated with 45% of child death(1).

Lack of dietary diversity is a problem at any age, but it is particularly

critical for older infants and young children during the complementary feeding period, who need food containing essential nutrients for normal physical and mental development which is important for the promotion of health, good growth, behavioral and cognitive development(2). Early nutritional deficits are also linked to long term impairment in growth and health. Malnutrition during the first two years of life causes stunting on young child(3). Increasing the variety of foods across food groups is recommended in most dietary guidelines internationally(4).

The nutrient density of the diet given to young children is often insufficient to meet their nutrient requirements, and increasing the diversity of foods provided to young children, particularly meat, poultry, fish, eggs, fruits and vegetables, is recommended to improve micronutrient intakes(5). Meeting minimum standards of dietary quality is a challenge in many developing country settings including Ethiopia, especially in areas where household food security is poor, and it has often not been given enough emphasis(6).

The timely introduction and quality of complementary foods for children six months and older is poor, and less than ten percent of children were reported to have a minimum acceptable diet in Amhara region Ethiopia(7).

Globally few children receive nutritionally adequate and safe complementary foods in many countries less than a fourth of infants 6-23 months of age meet the criteria of dietary diversity for their age (1). Inadequate dietary diversity is a particularly severe problem among poor populations from the developing world because their diets are predominantly based on starchy staples and often include little or no animal products and few fresh fruits and vegetables(4).

Those who eat foods from four or more food groups daily have the recommended minimum dietary diversity, under the assumption that they consume at least one animal source food and at least one fruit or vegetable, in addition to a staple food. However, for many children, this minimum dietary diversity is not achieved, particularly among poor households, where starchy staples are the mainstay(8). In most developing countries micronutrient malnutrition is still a major threat of public health attention. This problem has been attributed to the intake of monotonous cereal based diets that are lacking in diversity. Diets in these countries lack fruits, vegetables and animal source foods(9).

Even with optimum breastfeeding, children will become stunted if they do not receive diversified diet after six months of age. An estimated 6% of under five deaths can be prevented by ensuring

optimal complementary feeding among which dietary diversity is the most important one(10, 11).

According to EDHS 2016, dietary diversity is low in Ethiopia. For instance, less than 14% of the children in rural Ethiopia were fed with four or more food groups out of seven food groups and another study conducted in Ethiopia shows that the prevalence of appropriate complementary feeding practices among children aged 6-23 months was very low (4.8 %)(12). Previous studies conducted on factors that consistently affect dietary diversity are age of the child especially lower age and low level of the mother's education(13). However, there is yet not conducted in this study area. Therefore, this study aimed to determine the proportion of dietary diversity and associated factor among children 6-23 months old in Damot Sore District, South Ethiopia.

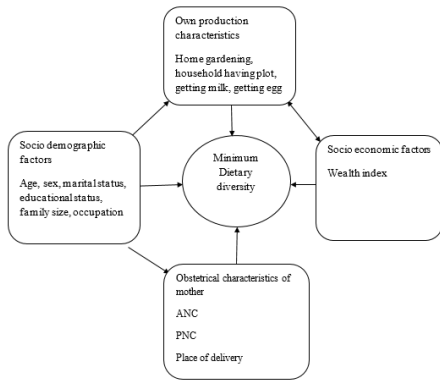


Figure 1: Conceptual framework of dietary diversity developed by reviewing different literatures

Methods

Study area

The study was carried out in Rural part of Damot Sore District, South Ethiopia which is located at 320 km from Addis Ababa and 17km far from the Wolaita sodo town toward south west. Estimated District's total population of 128, 184 from this male population is 62,810 and households are 26,160. Among total population of District the total number of children, 6-23 months of age were 4499. There are 20 kebeles in District and from these 17 are rural kebeles. The District has total area of 26,568 Hectare of which 13,336 is used/suitable for farm, the climate condition is Dega/high land, Woinadega/mid land and Kola/lowland and the main agricultural productions in the District are sweet potato, cassava, Maize, Enset and teff. There are 5 health centers and 20 health posts in study District.

Study design and period

A community based cross sectional study was conducted from January to February, 2017.

Sample size determination

Sample size was determined by using a single population proportion formula using prevalence of dietary diversity among children aged 6-23 months (23.3%) in study done in kemba District(14). 603 mothers with child pair included in the study.

Sampling method and procedures

A simple random sampling technique was employed to select kebeles in the study area. From 17 rural kebeles in District 6 kebeles were selected through a simple random sampling (SRS) technique to represent the District. Then households having children aged 6-23 months were selected using simple random sampling technique based on the sampling frame obtained from CHIS (community health information system) from health post of each kebele. Finally, the participant's (child-mother pairs) was selected by SRS using current list of 6-23 months children for each kebeles.

Operational Definitions

Dietary diversity: Number of individual food groups consumed over a 24-hour period.

Minimum dietary diversity: Proportion of children 6-23 months of age who received foods from four or more food groups of the seven food groups.

1. Grains, roots and tubers
2. Legumes and nuts
3. Dairy products
4. Flesh food
5. Eggs
6. Vitamin A rich fruits and vegetables
7. Other fruits and vegetables

Data quality control

Questionnaire was translated from English to local language Wolaitigna and back to English by fluent speakers of the two languages to ensure consistency. Five percent (5%) of the questionnaires were pre tested in area not selected for actual study. Any inaccuracy and inconsistency were corrected based on the pretest.

Intensive training was given for two days for both supervisors and data collectors on the purpose of study, how to handle questionnaires, how to conduct data collection and on ethical consideration. Strict supervision was done by supervisors and the overall quality of the data collection was also monitored by principal investigator. Data collectors submitted filled questionnaires daily for supervisors and data was checked for completeness, consistency and any kind of errors and it was corrected immediately.

Data analysis

Data were checked for completeness and consistence before data entry and cleaning. The data were coded and entered in to Epi-Data version 3.1 and exported to SPSS version 20 for analysis. Factor analysis (Principal component analysis) (PCA) was used to generate wealth index. Twelve variables were used which have values > 0.5 under communalities. The total variance explained by the first component was 21.15%. The list of variables used to construct wealth index (indicator of living standard of house hold) was annexed.

Descriptive summary measures were used to describe the study population and measure the level of dietary diversity. Bivariate analysis was performed to see the association between dependent and independent variables. Multicollinearities were also checked among selected variables by calculating variance inflation factor (VIF) and Tolerance (1-R²). A VIF of 10 and above or a Tolerance (1-R²) of close to zero was a concern for multicollinearity. All continuous data were checked for normality using Kolmogorov-Smirnov test at p-value > 0.05. Hosmer and Lemeshew goodness of fit test was used to assess the fitness of the model during multivariate analysis (P=0.185).

Multivariable analysis between dependent and independent variables was done for controlling possible confounders. Variables having P-value less than 0.25 on bivariate analysis were the candidate for multivariable analysis. Crude and adjusted odds ratio along with their 95% Confidence Interval (CI) were reported.

RESULT

Socio demographic and economic characteristics of mother and children A total of 603 mothers or caregivers of children aged between 6 to 23 months were participated in the study making a response rate of 98%. Majority of the respondents 246(41.6%) were aged between 24-34 years. With regard to educational status about (45.5% of mothers) were unable to read and write, less than one third (33.7 %) has attended formal education (18.3%, 15.4%), primary and secondary completed respectively. Among children 331(56%) were female. The mean age of young child was

13.55 months \pm 5.06 (SD). More than half (51.4%) of households reported that their child birth order of second to fourth range.

More than half (54.3%) has household number range from 4- 6 members. Half (49.9%) of participated children are age 6 to 11 months old.

Level of dietary diversity

Of the total respondents, only 174 (29.4%) fed their child \geq 4 food items within 24 hours preceding the survey based on WHO young child feeding guide line indicators on dietary diversity.

Figure 4 : Types of food groups consumed among 6–23 months Children in Damot sore District

Own production of mother in Damot Sore District, Wolaita Zone, South Ethiopia, 2017 (n=603)

Slightly more than one third (38%) households no plot. 79% has not get eggs from household. 77.7% get milk from house hold.

Obstetrical characteristics of mother in Damot Sore District, Wolaita Zone, South Ethiopia, 2017 (n=603)

More than half (52.5%) of Mothers has no history of utilization ANC During recent child pregnancy and two third of (66.2%) mothers has no history of PNC services utilization. More than two third of mothers delivered in home.

Factors associated with dietary diversity

All independent variables were assessed for significant association with dietary diversity in bivariate analysis. Among these factors children age, house hold own livestock, occupational status of the mother, educational status of the mother, place of delivery, birth interval, house hold own egg, receive PNC, child sex, visit for ANC, marital status were the factors found to be significantly associated with dietary diversity at $p < 0.25$.

However in the multivariable logistic regression analysis, only education and occupation of the mother and children age were found to be significantly associated with the dietary diversity.

Mothers who were able to read and write were about 2 times (AOR =1.97, 95% CI: 1.22-3.19) more likely to give diversified food as compared to those who were unable to read and write. Similarly, mothers who attended secondary school and above were about 2.5 times (AOR=2.52, 95% CI: 1.49-4.27) more likely to give diversified diet as compared to mothers who were unable to read and write.

Government employee were 8.59 times (AOR=8.59, 95% CI: 3.36-19.4) and merchant mothers were about 1.68 times (AOR=1.68, 95% CI: 1.03-2.74) more likely to feed diversified diet than house wife.

Children whose age is between 18-23 months was (AOR=1.72, 95% CI: 1.08-2.72) had about 2 times more likely to take diversified diet than those children whose age was 6-11 months.

Discussion

This study determined the prevalence and factors associated with dietary diversity among children 6-23 months of age in Damot Sore District. Study finding revealed that the level of minimum dietary diversity of 174 (29.4%); fed their child four or more varieties of foods groups in 24 hour preceding the survey.

The study also showed that education and occupation of mother, age of a child; were significantly associated with providing the minimum dietary diversity after controlling for other predictors in the model.

The finding is slightly different than national prevalence of 14% (28), 27.3% in Woliata Sodo town, South Ethiopia(15), 23.3% in kemba District, South Ethiopia(14), Gorche District, South Ethiopia, Abiyadi District, northern Ethiopia which were 10.8% (8,33,34), 18.8% in

South Ethiopia (12), 12.6% in Dangila, northwest Ethiopia(16), 13% in Amhara region(7), 21.2% in four departments of Haiti (17), 28% in Yemen (18, 19). This slight difference might be due to, season of data collection it is after the main harvest when food supplies are still adequate. However, it was relatively lower than finding from the study conducted in Mirab Abaya District, South Ethiopia which was 34.3% which study on household level dietary diversity (20).

This finding was also lower than cross sectional studies done outside of Ethiopia such as Nepal and rural area of Negapur which was 30.4%(21, 22), the study conducted in northern Ghana and Nepal were 35.3% (22, 23) and, 38% in Tanzania (24), 47.8% in rural Madhya Pradesh of India (25). These differences might be due to mothers in those countries had better economic and educational status.

The dominant dietary food items were grain (82.6%) and legumes (64.5%) this is consistent with study conducted in north Ethiopia Gondar zone and East African region, but low feeding practice is observed in flesh food(18, 26). The possible explanations might be misunderstanding of mothers young children could not be able to digest food like meat and majority of the mothers has low economic status which make unable to purchase and fed these relatively costly food sources items from the local market.

Among socio demographic factors, mothers who worked as merchant were almost 2 and government employee were 8.59 times more likely to feed diversified food as compared to those who are house wife. This is in line with the study conducted in South Ethiopia kemba District(27) and northern Ethiopia(16). The possible explanation for this finding might be, merchant mothers have able to access mixed and diversified food for their child and the government employed mothers are more educated ones as result they could be more likely to have information (media exposure) and understand the education message.

The study found that children born from mothers who were able to read and write were 1.97 times and secondary level education had 2.5 times, more likely to feed diversified foods as compared to counter parts. This is in line with the study conducted in Dangila, North West Ethiopia(16). The study conducted in Nepal showed significant association with dietary diversity after controlling other factors(21). Similar positive impact of education on diverse feeding practices is also reported in a previous study in Ethiopia (4). This could be educated mothers are more likely to have information (media exposure), easily understand the education message.

This study also revealed that factor significantly associated with minimum dietary diversity was age of children. Children 18–23 months had about almost 2 times higher of having minimum dietary diversity compared to children aged 6–11 months. This study is in line with studies conducted in Ethiopia and Ghana (16, 28). This might be due to that, mothers may perceive that the younger the child has poor ability of child's intestine to digest solid, semisolid and soft foods. As a reason mothers might give the same type of food and include only milk or cereal products like gruel.

Ethiopia has well defined policies, strategies and implementation guidelines in those sectors with the potential to affect better nutrition. This component is designed to strengthen the linkages between nutrition in all sectors that deal with the underlying and basic causes of malnutrition. Food security and diversified diet were important for proper child growth, and remains a concern in Ethiopia. There are programs that would be used for changing nutritional problems to scale up and some social protection were implementing like PSNP (Productive Safety Net Program) for food insecure households but evaluation of the first three phases of PSNP demonstrated two months improvement in food security, but there is lack of improvement in quality of children (6-23 months) diets. Although the challenges to improve nutrition are significant and may appear overwhelming, there are solutions such as Essential

Nutrition Actions that when taken together can make a difference to the wellbeing and survival of young children and women of reproductive age, nutrition sensitive agricultural activities, agricultural based solutions such as production of nutrient dense crops, practicing home gardening, production of livestock, increasing off or on farm activities were considered by government of Ethiopia to increase the production and access to diverse, safe, and nutrient dense foods(29).

Limitations of study

Obviously there are some limitations of this study that the nature of this study design was cross-sectional and it is difficult to establish cause effect relationship. The study was undertaken by employing free recall ways of interviewing methods on dietary diversity to avoid or minimize recall bias. In contrary, the study did not consider the quantity of food variety consumed by a child and social desirable bias might be introduced even effort exerted to minimize by ensuring privacy matters.

Conclusion

A children aged between 6-23 months receiving minimum dietary diversity showed better result when compared with national report, it is still low and doesn't meet WHO infant and young child feeding recommendations. Age of a child, education and occupation of mother were consistently associated with minimum dietary diversity.

Recommendation

Emphasis should be undertaken to increase maternal education status and employment because they are decisive stakeholders.

Emphasis should be undertaken to empower women in rural financing with opportunity to have better economic status.

Timely introduction of complementary foods at age of six months and above. Further study should be conducted to measure dietary adequacy by measuring food consumed by a young child per 24 hours and anthropometry measurement to see dietary feeding on nutritional status.

Declarations

Ethics and consent to participate

Ethical approval was obtained from the ethical clearance board of Wolaita Sodo University with reference number RPGC/447/2017, according to the standardized principle and procedure which in line with national and WHO guideline.

The participants were informed about the purpose of the study and oral consent was obtained from each study participant.

Consent for publication

Not applicable

Availability of data and material

Datasets generated during and/or analyzed during the current available from the corresponding author on reasonable request.

Funding

Nil

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

WA, TD and EA; conception and design of the study and data analysis. AS: analyzed the data and interpreted the findings. WA: conducted and supervised data collection and management. All authors read and approved the final manuscript.

Acknowledgements

The author's sincere gratitude goes to the study participants.

Table 1: Socio demographic characteristics of mother and children of dietary diversity in rural part of Damot Sore District South Ethiopia, 2017 (n=603)

Variables	Frequency	Percent (%)
Mother age		
15-24	146	24.7
24-34	246	41.6
35-49	199	33.7
Educational status of mother		
Unable to read and write	269	45.5
Able to read and write	123	20.8
Primary completed(1-8)	108	18.3
Secondary completed(9-12)	91	15.4
Occupation of mother		
House wife	369	62.4
Government employee	42	7.1
Merchant	147	24.9
Other	33	5.6
Wealth index		
Poor	204	34.5
Medium	192	32.5
Rich	195	33.0
Husband's educational status		
Unable to read and write	205	34.7
Able to read and write	153	25.9
Primary completed(1-8)	134	22.7
Secondary completed(9-12)	99	16.8
Family Size		
1-3	87	14.7
4-6	321	54.3
>=7	183	31.0
Children age		
6-11	295	49.9
12-17	132	22.3
18-23	164	27.7
Vaccination status		
No	235	39.8
Yes	356	60.2
Childs sex		
Female	331	56.0
Male	260	44.0
Birth order		
First	147	24.9
Second to fourth	304	51.4
Above fourth	140	23.7

Table 2: Own production of mother in Rural part of Damot Sore District, South Ethiopia, 2017

Own production characteristics	Frequency	Percent
Household plot		
No	225	38.1
Yes	366	61.9
Household getting eggs		

No	467	79.0
Yes	124	21.0
Household getting milk		
No	459	77.7
Yes	132	22.3

Table 3: Obstetrical characteristics of mother in Damot Sore District, Wolaita Zone, South Ethiopia

Obstetrical characteristics of mother	Frequency	Percent
ANC visits		
No	310	52.5
Yes	281	47.5
PNC visits		
No	391	66.2
Yes	200	33.8
Place of delivery		
Home	400	67.7
Health institution	191	32.3

Table 4: Association between minimum dietary diversity and each explanatory variable (Crude and adjusted OR) among 6 to 23 months old children in Damot sore District, South Ethiopia in 2017

Explanatory variable	Dietary diversity score feeding of 7 food	Crude OR(95 CI)	Adjusted OR(95CI)
	Yes (n, %) No (n, %)		
Birth order			
First	45(30.6%) 102 (69.4%)	1	1
Second to fourth	94 (30.9%) 210(69.1%)	1.01 (0.83-1.87)	1.24 (0.79-1.94)
Above fourth	35(25.0 %) 105(75.0%)	0.76 (0.46-1.24)**	0.75 (0.43-1.30)
Occupational status of mother			
House wife	86(29.9%) 290(77.1%)	1	1
Government employee	29(72.5%) 11(27.5%)	8.89 (4.26-18.5)**	8.59 (3.36-19.4)**
Merchant	46(32.4%) 96(67.6%)	1.61 (1.055-2.47)	1.68 (1.03-2.742)**
Other	13(39.4%) 20(60.6%)	2.19 (1.04-4.58)	2.34 (1.07-5.11)
Education level of mother			
Unable to read and write	61(22.3%) 213 (77.7%)	1	1
Able to read and write	46(35.7%) 83(64.3%)	1.93 (1.22-3.06)***	1.97 (1.21-3.19)***
Primary completed (1-8)	33(30.8%) 74(69.2%)	1.55 (0.94-2.56)	1.38 (0.80-2.37)
Secondary completed and above	34(42.0%) 47(58.0%)	2.52 (1.49-4.27)**	2.52 (1.494-4.270)**
Place of delivery			
Institution	94(23.5%) 306 (76.5%)	0.42 (0.29-0.61)**	0.47 (0.31-0.70)
Home	80(41.9%) 111 (58.1%)	1	1

House hold any livestock			
No	119(27 %) 321 (73.0%)	1	1
Yes	55 (36.4%) 96(63.6%)	1.54 (1.015-2.14)**	1.42 (0.93-2.16)
Children age			
6-11	179(62.8%) 106(37.2%)	1	1
12-17	115(85.2%) 20(14.8%)	3.40 (0.507-1.290)	0.904(0.54-1.51)
18-23	123(71.9%) 48(28.1%)	1.51 (1.24-2.84)**	1.71 (1.08-2.72)**
Children sex			
Female	96 (29.0%) 235(71.0%)	1	1
Male	78(30.0 %) 182(70.0%)	1.05 (0.82-1.61)	0.87 (0.603-1.26)
House hold egg			
No	121 (25.8%) 346(74.1%)	1	1
Yes	53(42.7%) 71(57.3%)	2.13 (1.41-3.22)	0.52 (0.31-0.86)
Visit for ANC			
No	41(13.2%) 269(86.8%)	1	1
Yes	133(47.3%) 148(52.7%)	5.89 (3.93-8.82)	3.4(2.10-5.71)
Receive PNC			
No	83(21.2%) 308(78.8%)	1	1
Yes	91(45.5%) 109(54.5%)	3.09 (2.14-4.48)	0.59 (0.372-0.96)
Marital status			
Not in marital union	113(83.1%) 23(16.9%)	1	1
Marital union	304(66.8%) 151(33.2%)	0.41 (0.25-0.66)	0.77 (0.44-1.36)

*p-value<0.05, **p-value<0.01, *** p-value<0.001

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