Original Research Article

Dietary diversity and associated factors among lactating mothers in Debre Tabor General Hospital, Northcentral Ethiopia

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ABSTRACT

Background: Dietary diversity score indicates that the intake of general nutritional adequacy. Low dietary diversity is a major problem among poor populations in the developing world due to consumption of monotonous staple diet consumption. Therefore, it has various consequences on the health and wellbeing of the family, communities, and nation at large. Overall, there are limited studies on this major issue and its contributing factors among lactating mothers.

Methods: Institution based cross-sectional study was employed among 419 participants who were selected by using a systematic sampling method. The data were collected using a pretested structured questionnaire. The collected data were checked for completeness, cleaned, coded and entered into EPI info version 7 and exported into SPSS version 20.0 software for further analysis. The degree of association between dependent and independent variables were assessed by using odds ratio with a 95% of confidence interval and variables with p≤0.05 were considered significant after fitting into logistic regression.

Results: The average dietary diversity score±SD was 4.94±0.76. The magnitude of low dietary diversity score was 25% (95% CI: 22.1, 30.4). Women's, being government employer and having meal 2 times per day were the factors associated with low dietary diversity score among lactating mothers.

Conclusions: One-fourth of the lactating women were had poor dietary diversity and age of the women, meal frequency, and respondent occupation were the determinant factors. So, appropriate counseling during maternal care are very important to halt this problem.

Keywords: Dietary diversity score, Lactating women, Ethiopia

INTRODUCTION

Globally, maternal and child malnutrition are problems in many counties with the consequences of acute and chronic diseases, healthy development, and the economic productivity of individuals and societies. Maternal undernutrition includes both macro and micronutrient deficiencies which lead to short and long-term consequences that will be prevented or reduced by applying proven nutrition interventions like to increase the production and intake of various foods items.[1]

Malnutrition is exited as a major nutritional problem in Ethiopia even to the recent decades which shows the problem is a serious public health significance problem in both lactating and pregnant women due to food insecurity, poor utilization of health care and the existence of communicable and none communicable diseases.[2,3]

Counseling the mother on an adequate diet is very important for optimal lactation and prevention of maternal nutrients depletions because of high requirement

or demand.[4] Lactating mothers from low and middle-income countries are considered as a nutritionally vulnerable group due to frequent pregnancy, caring and nurturing the family as well as workload which intern leads to high maternal mortality.[5]

The socioeconomic status of the household affects maternal dietary habit, pattern and adequate intake of nutrients which directly affect the dietary diversity in low and middle-income countries. This also vary among urban and rural dietary diversity and low intake of fruit is common in an urban area as compared to rural area residents.[6]

Dietary diversity is a key element as an indirect means of assessment to see the intake of adequate and appropriate diet that was measured as Minimum Dietary Diversity of Women (MDD-W). MDD-W helps to assess vulnerabilities and gaps in diet quality and nutrient adequacy. It is defined as a dichotomous indicator of whether or not women 15–49 years of age have consumed at least five out of ten defined food groups at the previous day or night. The proportion of women 15–49 years of age who reach this minimum in a population can be used as a proxy indicator for higher micronutrient adequacy, one important dimension of diet quality.[7-9]

A study in Nepal reported that the minimum dietary diversity score ranged from 1.3-6.7 with a mean of 3.9 among lactating and monotonous diet was common. The major determinant factors were the age of the mother, educational level, ownership of the house they were living in and the winter season.[10]

A study in Oromia, Ethiopia showed that 16% of the women practiced appropriate dietary diversity practice for their 6–23-month-old children, this reflects that dietary diversity among women as well as the household is very low since children dietary diversity is a proxy indicator to show this low DDS.[11,12]

In the rural households of Ethiopia, the dietary diversity at household level was 21.1%, 62.7% and 16.2% as low, medium and high HDD respectively. About sixteen (16.2%) had adequate HDDS and it was associated with radio, mobile phone, bank account, food exchange, and ownership of small animals.[13] Dietary diversity for children is one proxy to show households dietary diversity score as well as for women's in the lactating period. And the magnitude of having low DDS was common and some of the contributing variables were mother's educational attainment, household monthly income, maternal counseling on IYCF during postnatal care, child age and illness.[12,14]

Maternal knowledge and practice affect the minimum dietary diversity of a lactating mother. The magnitude of knowledge and practice towards dietary diversity in Ade, Oromia region was 51% and 16% respectively even if it is affected by different factors.[11] In addition in Gondar,

Southwest Ethiopia, poor dietary intake exists among lactating mothers which suggest an inadequate intake of nutrients.[2] In another study, the mean DDS was 3.4 with the prevalence of having poor/low dietary diversity among lactating mothers was 56.4% which is very high in magnitude. In this study, factors like monthly income, not having home gardening, and a source of drinking water from the protected well was the determinate to have low dietary diversity.[15] The mean±standard deviation (SD) of DDS of lactating mothers was 4.9±1.9 respectively and the magnitude of high DDS and underweight was 32.8% and 40.6% resepectively. This show that underweight was associated with lactating women's dietary diversity score and poor feeding practice.[16]

Conducting study related to the dietary diversity of lactating women is important for collecting relevant information in order to prioritize, design and initiates intervention programs to enhance lactating mother nutrition. So, conducting this study was very important to fill the gap of information and to quantify the magnitude of poor dietary diversity score and its associated factors among these venerable groups in the study area.

METHODS

Study area

The study was conducted in Debre Tabor General Hospital, Debre Tabor Town. Debre Tabor is the administrative town of South Gondar Zone which is located 666 Kms to North Centre of Addis Ababa, the capital city of Ethiopia. The hospital delivers services for 2,047,206 peoples according to 2007 census.[17] Debre Tabor General Hospital offers health services including maternal and child health services. Some of these are inpatient, outpatient, neonatal intensive care, TB/ leprosy, antenatal care, delivery, postnatal care and family planning services to the urban and nearby the rural communities of South Gondar Zone as per 2017 hospital annual report.

Study design and period

An institution-based cross-sectional study was conducted from September, 2016 to February, 2017 of none fasting months.

Study population

All lactating women were included in the study but those who were critically ill during data collection time were excluded.

Sample size determination

The sample size was determined by using single population proportion formula with the assumption of 54.6% proportion of low dietary diversity score (DDS) among lactating mother from the most recent study in

Aksum, Ethiopia[15] 95% confidence level (CL) and 5% of marginal error. We were calculating sample size for associated variables from literature but none of them have a proportion which is equal to the magnitude of low DDS. Then, the calculated sample size (n) was 381. Finally, 419 lactating women were included in this study after adding 10% of none response rate.

Sampling procedure

The study participants were selected by using a systematic random sampling technique. First, we estimate the number of lactating women at the site of post-natal care, immunization, family planning, growth monitoring and follow up, and under 5 outpatient department clinic service users for a period of six consecutive months. The expected number of lactating mothers who came for these services was 2020. Then, we calculated the Kth interval and that was 4. So, we interviewed the study participants at every five intervals in each service units by selecting the 1st participant randomly.

Operational definitions

Body mass index: was calculated as weight in kilogram divided by height in meter squared.[7]

Chronic energy deficiency: if currently breastfeeding mothers had BIM <18.5 kg/m^2.[7]

Minimum Women Dietary Diversity Score (MWDDS): was sum of consumed food groups within 24hrs by using 10 food groups. It was good DDS if they consume more than or equal to 5 food group within 24hrs.[7-9]

Data collection methods

The data were collected by five trained diploma midwives supervised by the principal investigator. The data were collected by face to face interview and taking physical measurement. The structured questionnaire had socio-demographic factors, wealth, health and diet-related factors to assess dietary diversity score and associated factors of lactating mother. The questionnaire was first prepared in the English language then translated back to Amharic, the local language of the study participant's by the third person to check its consistency. The supervisors followed the data collection process throughout the data collection period along with the principal investigator. The measurement of weights of the lactating mothers was done and recorded to the nearest 0.1 kg by using calibrated portable electronic digital scale (slater; Seca, Germany model) and heights were measured to the nearest 0.1 cm by using a portable height-measuring board with a sliding head bar. These measures of height and weight were done three times without shoes and with a possible light closing the mother faced away from the scale. The result of height and weight were recorded on the questionnaire and then used to calculate the body mass index (BMI).

Data quality assurance

The pre-test was done outside of the study area on 20 lactating mothers before the actual data collection period. The weight scale has been calibrated by using 1 kg standard weight, height measurements were checked with other meter taps. During data collection time, communication between the data collectors and the principal investigator were held on a daily basis to update data collection progress and to address problems faced. A definition of concepts and terms had been done clearly with the Amharic language to avoid ambiguity. The supervisors and data collectors were recruited outside the hospital to avoid information bias due to familiarization. The collected data were checked for completeness and consistency by the supervisors and the principal investigators during and after data collection period.

Data processing and analysis

The data was managed by editing, verification, coding, classification, and tabulation during data entry and analysis. The data were entered by using Epi info 7 then transported into SPSS version 20 statistical software for descriptive and analytical analysis. Descriptive analysis was carried out to describe the variables in number and proportion and analytical analysis were done to examine the crude and adjusted effect of each variable. A binary logistic regression model was used to assess the independent effects of each independent variable towards the dietary diversity of lactating mothers. Also, those variables were fitted into a multivariable logistic regression model to identify the independent effect of each variable for the dietary diversity score of lactating mothers. In this study, a p-value of ≤5% was considered as statistically significant after fitting to multivariable logistic regression models and 95% confidence intervals had been used at this stage to assess the independent and multivariable effect. The Hosmer-Lemeshow goodness of fit test was performed on the logistic model to assess how the constructed model is good.

Ethical consideration

Written ethical clearance was obtained from the Institutional Review Committee of Debre Tabor University and permission letter was obtained from Debre Tabor General Hospital administration office. Permission and informed consent were obtained from the study participants before the interview after explaining the purpose of the study. Finally, before starting the interview and taking a physical measurement, we informed each participant that they had the right to withdraw at any time during the interview. Confidentiality was maintained at all levels of the study and was assured about the presentation of the final result for scientific community by presenting on workshops and publication on reputable journal without a personal identifier. A lactating mother with poor dietary diversity score got information and counseling on how to increase

their dietary diversity score and its importance during data collection time.

RESULTS

Table 1: Socio-demographic and economic characteristics of lactating mother attending Debre Tabor General Hospital, 2017 (n=398).

Variable	Categories	Frequency	%
Residency	Urban	292	73.4
	Rural	106	26.6
Ethnicity	Amhara	369	92.7
	Oromo	29	7.3
Current age (in years)	20-24	88	22.1
	25-29	135	33.9
	30-34	79	19.8
	35-39	62	15.6
	40-44	34	8.5
Religion	Orthodox	338	84.9
	Muslim	49	12.3
	Protestants	11	2.8
Respondent's educational status	unable to read and write	74	18.6
	able to read and write	77	19.3
	primary education	35	8.8
	secondary education	81	20.4
	tertiary education and above	131	32.9
Husband's educational status	unable to read and write	40	10.1
	able to read and write	73	18.3
	primary education	30	7.5
	secondary education	73	18.3
	tertiary education and above	182	45.7
Respondent's occupation	Student	16	4.0
	Merchant	84	21.1
	Government employer	119	29.9
	Housewife	179	45.0
Husband's occupation	Merchant	120	30.2
	Government employer	185	46.5
	Daily labor	23	5.8
	Farmer	70	17.6
Wealth index	Very poor	138	34.7
	Poor	122	30.7
	Rich	85	21.4
	Richest	53	13.3

Socio-demographic characteristics

A total of 398 lactating mothers participated in the study with a response rate of 94.98%. The mean±Standard deviation (SD) of the respondents age was 29.45±6.20years and majority 135(33.9%) of them were between 25 and 29years of age. Majority of the respondents 338(84.9%) were Orthodox religion followers and 369(92.7%) were from Amhara ethnicity. More than 65% of the respondents were poor or had low wealth index (Table 1).

Obstetrics related characteristics

The mean±SD of age at 1st pregnancy was 21.76±4.01 years and the minimum age was 15 yrs. The mean age of the index child and number of average pregnancy with standard deviation was 11.08±9.13 months and 2.29±1.42 respectively. Majority of respondents were multi-para 230 (57.8%) and 373 (93.7%) of them attended antenatal care for the index child (Table 2).

Table 2: Obstetrics related characteristics of the respondents among lactating mother in Debre Tabor General Hospital, 2017 (n=398).

Variable	Categories	Frequency	%
Age at first pregnancy (years)	15 -1 9	133	33.4
	20-24	156	39.2
	25-29	109	27.4
Gravidity	Primi gravida	149	37.4
	Multigravida	230	57.8
	Grand gravida	19	4.8
Number of live birth	≤4	378	95.0
	>4	20	5.0
Current FP utilization	Yes	256	64.3
	No	142	35.7
Attending ANC for current child	Yes	373	93.7
	No	25	6.3
Attending PNC for current child	Yes	353	88.7
	No	45	11.3
Place of delivery	Health Center	134	33.7
	Home	42	10.6
	Hospital	222	55.8
Age of current breastfeeding child in months	<6 months	109	27.4
	6-11 months	115	28.9
	12-23 months	174	43.7

Health and nutritional status-related factors

None of the respondents reported any known chronic or acute diseases and restriction of diet. None of them were admitted for targeted supplementary feeding or food by prescription programs. The mean±SD of weight and height of respondents were 51.34±6.43 Kg and 1.57±0.05 m respectively. The mean±SD of BMI was 20.79±2.39

Kg/m^2. The magnitude of underweight and overweight was 70 (17.6%) and 25 (6.3%) respectively.

The magnitude of dietary diversity score

Dietary intake was assessed by using a 24 hour dietary recall method and 10 food groups. The average dietary diversity score±SD was 4.94±0.76. Nearly three fourth of the lactating mothers had good dietary diversity 295 (74.1%). The magnitude of low dietary diversity score was 25.9% (95% CI (22.1, 30.4)). In terms of meal frequency, lactating mothers ate two times, three times, and more than three times were 65 (16.3%) 163 (41.0%), and 170 (42.7%) respectively.

Table 3: Logistic regression analysis results of factors associated with poor dietary diversity score (DDS) among lactating mother in Debre Tabor General Hospital, 2017 (n=398).

Variable		Poor DDS		COR (95% CI)	AOR (95% CI)
		Yes	No		
Current age (in years)	20-24	21	67	0.65 (0.27, 1.56)	*4.43 (1.04, 18.73)
	25-29	35	100	0.73 (0.32, 1.65)	*4.14 (1.14, 15.05)
	30-34	12	67	0.37 (0.15, 0.96)	0.99 (0.28, 3.48)
	35-39	24	38	1.32 (0.55, 3.20)	*4.18 (1.20, 14.60)
	40-44	11	23	1	1
Respondent education	Unable to read & write	26	48	1.82 (0.97, 3.41)	2.40 (0.63, 9.09)
	Able to read and write	28	49	1.92 (1.04, 3.56)	3.33 (0.98, 11.26)
	Primary education	2	33	0.20 (0.05, 0.90)	0.22 (0.04, 1.28)
	Secondary education	17	64	0.89 (0.46, 1.75)	1.56 (0.55, 4.39)
	Tertiary and above	30	101	1	1
Respondent occupation	Student	6	10	1.35 (0.47, 3.90)	3.94 (0.99, 15.59)
	Merchant	13	71	0.41 (0.21, 0.80)	0.55 (0.25, 1.22)
	Government employer	29	90	0.73 (0.43, 1.23)	*3.01 (1.11, 8.13)
	Housewife	55	124	1	1
Husband education	Unable to read & write	13	27	1.82 (0.86, 3.87)	1.69 (0.49, 5.79)
	Able to read and write	28	45	2.36 (1.30, 4.26)	2.38 (0.87, 6.50)
	Primary education	7	23	1.15 (0.46, 2.89)	0.95 (0.26, 3.46)
	Secondary education	17	56	1.15 (0.60, 2.20)	1.30 (0.55, 3.10)
	Tertiary and above	38	144	1	1
Gravidity	Primi	34	115	0.41 (0.15, 1.09)	2.08 (0.36, 12.12)
	Multi	61	169	0.50 (0.19, 1.29)	2.22 (0.47, 10.54)
	Grand	8	11	1	1
PNC follow-up	Yes	87	266	0.59 (0.31, 1.14)	0.67 (0.29, 1.54)
	No	16	29	1	1
The current age of breastfeeding index child	<6 months	21	88	0.58 (0.32, 1.02)	0.50 (0.24, 1.01)
	6-11 months	31	84	0.89 (0.52, 1.50)	0.80 (0.43, 1.47)
	12-23 months	51	123	1	1
The frequency of maternal feeding/meal	Three times a day	45	118	1.78 (1.05, 3.00)	1.35 (0.75, 2.43)
	Two times a day	28	37	3.53 (1.88, 6.62)	*3.18 (1.49, 6.79)
	More than three	30	140	1	1
Number of live-birth	≤4	93	285	1	1
	>4	10	10	3.06 (1.24, 7.59)	17.52 (1.41, 40.06)

*= Significant during multivariable analysis (p≤0.05), 1=reference.

Factors associated with a dietary diversity score

In the bivariate logistic regression: current age of the respondent, respondent educational status, husband educational status, respondent's occupation, husband's occupation, PNC follow-up during the pregnancy of index child, meal frequency within 24 hrs, parity, number of live births, and index breastfeeding child age were significant variables. While fitted these variables into multivariable logistic regression analysis; the number of live births, the current age of the respondent's, maternal current feeding/meal frequency, and respondent's occupation were associated factors with poor dietary diversity score among lactating women (Table 3).

Lactating women whose age was between 20 and 24 were 4.4 times (AOR: 4.43, 95% CI (1.04, 18.73)) more likely to had poor DDS as compared to 40–44 years old pregnant women. Both age group of 25-29 and 35-39

years were 4 times (AOR: 4.14, 95% CI (1.14, 15.05)) and 4 times (AOR: 4.18, 95% CI (1.20, 14.60)) times more likely to had poor DDS as compared to 40-44 years old respectively. Government employer lactating women were 3 times (AOR: 3.01, 95% CI (1.11, 8.13)) more likely to had poor DDS as compared to housewives. Also, lactating women who ate at least two times per day were 3 times (AOR: 3.18, 95% CI (1.49, 6.79)) more likely to had poor DDS as compared to who ate more than three times per day.

DISCUSSION

Dietary diversity is a key element as an indirect means of assessment of adequate and appropriate diet. However, the nutritional problem in lactating and pregnant women is a serious public health problem due to food insecurity, poor utilization of health care and the existence of communicable and none communicable diseases in Ethiopia.[2,3]

Our study revealed that the magnitude of low dietary diversity score was 25% (95% CI (22.1, 30.4)). This study result is lower than the with the study conducted in South Gondar zone at household level (83.8%) and also low as compared to the study conducted in Aksum, Tigray (56.4 %), and Dedo and Seqa-Chekorsa Districts, Jimma Zone (67.2%).[13,15,16] The result of this study was also high as compared to the study done in Nepal.[12] This variation may be due to the socio-cultural difference of study settings, variation in educational status of the respondents and income disparity among lactating women.

In this study, lactating women's aged 20-24 years were 4.4 times (AOR: 4.43, 95% CI (1.04, 18.73)) more likely to had poor DDS as compared to those aged 40-44 years. Both age groups of 25-29 and 35–39 years were 4 times (AOR: 4.14, 95% CI (1.14, 15.05)) and 4 times (AOR: 4.18, 95% CI (1.20, 14.60)) more likely to had poor DDS as compared to 40-44 years old respectively. This is supported by a study done in the low and middle-income countries and study in conducted in Nepal.[6,12] This may be explained by education status, awareness and access to health education difference during and after pregnancy.

Government employer lactating women were 3 times (AOR: 3.01, 95% CI (1.11, 8.13)) more likely to had poor DDS as compared to housewives. This is also supported by a study conducted among Chinese immigrant women in the USA and Northwest China and lactating women in Axum, Ethiopia but socioeconomic status is not associated with dietary diversity among Burkina Faso women.[15,18-20] These might happen due to low income, location, and information or awareness related to the importance of having good DDS.

Also, lactating women who ate at least two times per day were 3 times (AOR: 3.18, 95% CI (1.49, 6.79)) more likely to had poor DDS as compared to who ate more

than three times per day. Low frequency of consumption with a majority of monotonous diet was also common in Nepal.[10] This is also supported by another study conducted in New York and North Carolina.[21,22] Similarly, it is also supported by a systematic review conducted in low and middle-income countries.[6] This may be due to low literacy level, food insecurity and existence of a monotonous diet due to low socioeconomic status.

CONCLUSION

The magnitude of poor dietary diversity was near to one fourth. Age of the women, meal frequency, and respondent occupation were the determinant factors to had poor dietary diversity score among lactating women. So, appropriate counseling by health professionals and health extension workers during antenatal care, delivery, and postnatal care services are very important to improve the dietary diversity during lactation time.

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