Dietary Diversity and Nutritional Status of Pregnant Women Attending Public Hospitals in Dire Dawa City Administration, Eastern Ethiopia

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Abstract

Background: Dietary diversity refers to the balanced diet consumed by a person to meet the nutritional requirement. During pregnancy, woman's diet diversification is highly important for the growth and development of the fetus in addition to her own requirements. In order to better inform the health care system about maternal nutritional requirements, it is imperative to understand the association between dietary diversity and maternal nutritional status.

Objective: The aim of this study was to assess the association between the dietary diversity and the nutritional status of the pregnant women in Dire Dawa City Administration, Eastern Ethiopia.

Methods: A facility based cross sectional study was done in two public hospitals in Dire Dawa City Council. Data were collected from 387 pregnant women who were selected by a systematic random sampling among those who attended antenatal care service in two public hospitals of Dire Dawa City Administration. Data on a 24-hour dietary diversity recall were collected using a structured questionnaire and mid-upper arm circumference of the left arm was measured to determine the nutritional status of the women. Data were entered into Epi-data and analyzed using SPSS Version 22. Logistic regression was used to determine the significant factors associated with the nutritional status.

Results: The study revealed that 18.2% (95%CI 14.1, 22.0) of the pregnant women were undernourished and 57% (95%CI, 51.0, and 60.1) had poor dietary diversity. A high dietary diversity was marginally associated with normal nutritional status [(AOR= 2.4; 95% CI, (1.06-5.3)]. The women with low monthly income were in low nutritional status [AOR=0.48; 95% CI, (0.24-0.95)]. The unmarried study subjects were undernourished [(AOR=3.54; 95% CI, (1.2-14.8)].

Conclusion: This study revealed that one fifth of the pregnant women were undernourished and more than half had poor dietary diversity. The association between dietary diversity and the nutritional status of the pregnant women was marginal whereas their income had strong relationship with the status. Improving the dietary diversity of the women during pregnancy may improve their nutritional status.

Keywords: *Dietary Diversity Score, MUAC, Pregnant mother, Dilchora Referral and Sabian Hospital, Haramaya University*

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Introduction

Dietary diversity is a proxy indicator of general nutritional adequacy. In developing countries, where the predominant diets are starchy staples with few animal products, seasonal fruits and vegetables, consuming varieties of foods is a major problem (Kemunto, 2013; Cheng, 2009). A well balanced diet is a basic component of good health at all times, and this is particularly so for pregnant women, as they support two lives—theirs and the fetus's (Thorne-Lyman, 2010). Studies have shown that there is a strong positive relationship between the nutritional status of a pregnant woman, the growth and development of the fetus (Ali et al, 2014), the birth outcomes (Black *et al.,* 2008), and childhood morbidity and mortality (Patricia *et al.,* 2016). Pregnant women who eat a balanced diet have fewer complications during pregnancy and labor, and they are more likely to deliver live, normal, and healthier babies (Mugyia, 2016; Kemunto, 2013; Ali *et al.,* 2014). On the other hand, pregnant women's poor nutritional status results in adverse birth outcomes like low birth weight, preterm delivery and intrauterine growth retardation (Wu *et al.,* 2004). Dietary patterns are associated with socio-demographic characteristics like age, education, occupation, parity, race, and ethnicity. Increasing

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older age and education women have been associated with a healthy and diverse dietary intake in pregnant women (Northstone *et al.,* 2008).

In a similar study done in Wondo Genet, Ethiopia, almost all the nutrient intakes of the pregnant women were below the recommended level (9.2%). According to the study, undernourishment of the 9.2% respondents might have been associated with low intake of animal products. Only 7.2% consumed organ meat, 12.4% ate flesh meat, 11.1 % egg, and 2.6% ate fish (Kuche *et al.,* 2015).

Multiple cross-country studies done in 2011 have indicated that dietary diversity scores are reliable measures for micro and macro nutrient adequacy for women of reproductive ages (Branca *et al.,* 2014). However, there is limited information about the relationship between dietary diversity and the nutritional status of the pregnant women in Eastern Ethiopia, particularly, in Dire Dawa City Administration. Understanding this relationship in detail will help inform health executive bodies and determine appropriate intervention in the area.

Therefore, this study was aimed at assessing factors associated with dietary diversity and nutritional status of pregnant women attending public hospitals in Dire Dawa City Administration.

Materials and Methods

Study Design and Setting

Institution based cross-sectional study was done among pregnant women attending Antenatal Care (ANC) in Dire Dawa Dilchora Referral Hospital and Sabian Primary Hospital during February, 2017.

Dire Dawa City Administration is one of the two city administrations in Ethiopia. The city is divided into urban and rural administration. The urban administration is divided into five districts that contain nine kebeles and the 38 rural kebeles are divided into four operational districts (CSA, 2010). According to the 2013 Ethiopian census projection for 2014 to 2017, the total population of Dire Dawa City Administration is 440,000 (68% residing in urban and 32% residing in rural). In the city, there were 75,693 households, with an average of 4.5 persons per household (CSA, 2013), 15 health centers, two government and four private hospitals, and 11 private clinics.

Sample Size and Sampling Technique

The sample size for this study was calculated using a single population proportion formula, with the assumption of the prevalence of undernutrition among pregnant women from previous study in Haramaya woreda, 19% (Kedir *et al.,* 2016); with a 95% confidence level, and 4% margin of error and 5% non-response rate. The final estimated sample size was 387. The study participants were allocated to the two hospitals proportional to their monthly client flow.

All the pregnant women attending ANC in the hospitals during the study period were included, except those with chronic diseases such as hypertension, diabetes, tuberculosis, and HIV/AIDS; and those enrolled in intervention program such as supplementary feeding or general food distribution.

Data Collectors and Data Collection Methods

Four diploma nurses collected the data and two BSc nurses supervised the collection process. They were given a one- day intensive training on the aim of the study, procedures, and data collection techniques. The data were collected from the study participants face-to-face using a pre-tested structured questionnaire, which was first prepared in English and translated into Amharic, Afaan Oromo, and Somali languages; and then back into English by language experts. Maternal Mid Upper Arm Circumference (MUAC) was measured using non-stretchable tape and a cut-off point for MUAC >22cm normal and <22cm was considered underweight. MUAC has been recommended as it has been found as a potential indicator of nutritional status during pregnancy (WHO, 1995).

Data Quality Control

The questionnaire was pretested and has been used in other previously published studies. The pre-test was done on 5% of the total sample size; and the questionnaire was assessed for its clarity, length and completeness. It was also carefully translated into the local languages and checked by the language expertise to compare its consistency. Training was given for the supervisors and data collectors. In addition, the data collections were monitored on daily bases by the supervisors and the researchers.

Data processing and analysis

The data were double entered into Epi-data software Version 3.1 to check the quality of the data and transferred into SPSS Version 20 for data processing and analysis. Percentage, standard deviation, and

Crude odds ratio were estimated before the final analysis. Then, the variables with p-value less than 0.25 were included in the multivariate model to determine the predictors of maternal nutritional status. In this analysis, dietary diversity scores were calculated by summing up the number of food groups consumed over a 24 hour period by the women. The scores greater than or equal to 5 were coded as high dietary diversity scores and low dietary diversity otherwise (FHI/FAO/FANTA, 2016). The women with MUAC less than 22cm were categorized as wasted, based on previous studies (Kedir *et al.,* 2016).

Ethical consideration

Ethical clearance was obtained from Haramaya University, College of Health and Medical Sciences Health Research Ethical Review Committee (HRERC). Informed consent was obtained from study participant during the data collection. Pregnant women identified with MUAC less than 22cm were referred to the health service providers.

Results

Socio-demographic and economic characteristics of study participants

Of the initial 387 study participants, 380 (with complete information) were included in the analysis, making the response rate 98.2%. Their mean age was 25.45 (SD ± 5.29), ranging from 17 to 41 years. Almost all the respondents were married (97.4 %), and many were housewives (65.5%) and Muslim (59.5%)) (Table 1).

Nutritional status and Dietary Diversity Score

In this study, 69(18.2%) of the pregnant women were undernourished. The mean score for dietary diversity was 4.45 (SD ±1.32). Only 163 (43%) of the women scored high dietary diversity score, whereas the rest obtained low (Figure 1).

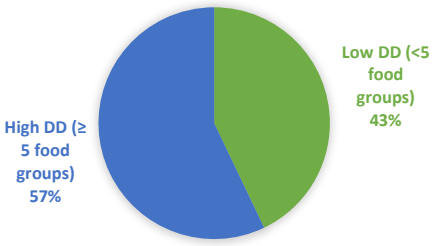

Figure 1: Dietary diversity score of pregnant mothers attending public hospitals in Dire Dawa City Administration, Eastern Ethiopia, 2017 (n=380)

Table 1. Socio-demographic and economic characteristics of pregnant women attending public hospitals in Dire Dawa, Eastern Ethiopia, 2017 (n=380)

Variable	Frequency	Percent
Marital status		
Married	370	97.4
Others	10	3.6
Age in years		
15-24	176	46.3
25-34	173	45.5
≥35	31	8.2
Religion		
Muslim	226	59.5
Orthodox	116	30.6
Protestant	31	8.2
Ethnicity		
Oromo	199	52.4
Amhara	103	27.1
Somali	51	13.4
Other	27	7.1
Family Size		
≤2	168	44.2
3	103	29.7
≥4	99	26.1
Educational status		
No formal education	106	27.9
Primary and Secondary	209	55
College & university	65	17.1
Educational status of husband		
No formal education	68	17.9
Primary and Secondary	192	50.5
Collage & university	120	31.6
Occupation of pregnant women		
Housewife	249	65.5
Private work	71	18.7
Employee	50	13.2
Others	10	2.6
Husband Occupation		
Private work	171	45.0
Employee	118	31.1
Others	91	23.9
Monthly income (Birr)		
≤1500	89	23.4
1501-2999	88	23.2
≥3000	203	53.4

All the study participants had consumed grains, white roots, and tubers in the previous 24 hours. The main grains consumed were 'Teff Injera', rice, and wheat in the form of bread, pasta, macaroni, porridge, and sorghum in the form of injera and hulbat marak sauce (beef + tripe +tomato + potato + oil + chili + fenugreek + shallot + garlic + salt) which was considered the staple food in the area. Other vegetables form an integral part of the main meal for almost all the respondents (98.7%). Many of the women (66.3%) consumed plant-based proteins from nuts and pulses group (beans, peas and lentils), 55.3 % ate other vitamin A-rich fruits and vegetables, and 46.6% fed on milk and milk products (Table 2).

Table 2. Consumption of the Minimum Dietary Diversity Score of the respondents by nine food groups in Dire Dawa City Administration, Eastern Ethiopia March 2017

Food groups	Frequency	Percentage
Grains, white roots and tubers, and plantains	380	100
Other vegetables	375	98.7
Pulses (beans, peas and lentils)	252	66.3
Other vitamin A-rich fruits and vegetables	210	55.3
Dairy	177	46.6
Dark green leafy vegetables	113	29.7
Meat, poultry and fish	105	27.6
Egg	62	16.3
Other fruit	17	4.5

Factors Associated with Undernutrition

In this study, there was an association between high dietary diversity and the normal nutritional status of the pregnant women (AOR= 2.4; 95% CI, (1.06-5.3). The women with a monthly income of less than 1500 birr were 52% less likely to be in normal nutritional status (AOR=0.479; 95% CI, (0.24-0.96)), and the married women were 3.5 times more likely to have the odd of normal nutritional status [AOR=3.54; 95% CI, (1.2-14.8)] compared to their counterparts (Table 3).

Discussion

In this study, 18.2% of the respondents were undernourished; and 57% had consumed low dietary diversity. Having lower monthly income (less than < 1500 birr), being married were less likely associated with normal nutritional status while having dietary diversity greater than 5 were identified as the factors associated with normal nutrition among the study participants. Thus, the pregnant women in the study area are risk of under nutrition, which is exacerbated by low dietary diversity food consumption. This study revealed that 18.2% of the pregnant mothers were undernourished. The finding was greater than one reported from Wondo Genet, south Ethiopia (9.2%) (Kuche *et al.,* 2015), but almost similar to the finding in Haramaya District, eastern Ethiopia (19.06%) (Kedir *et al.,* 2016). The difference might have been due to the difference in socio-economic status of the study participants. This figure indicates that malnutrition among pregnant women is a public health problem in Ethiopia that require tailored intervention.

The study showed that 43% of the pregnant women had minimum dietary diversity. The figure is less than the ones found in Islamabad, Pakistan (89%) (Ali, *et al.,* 2014); and in Kenya, where none of the study participants had a low dietary diversity score (Mitheko, 2013). This may be associated with difference in socio-economic and cultural differences.

The main food consumed by this study participants were cereal wheat in the form of breads, pasta, macaroni, porridge, rice, and sorghum in the form of injera and hulbat marak which was considered the staple diet in the area. Other leafy vegetables form an integral part of the main meal for the majority of the respondents. The finding is consistent with the finding from similar study done in Burkina Faso in 2010, which found that the common diet included cereals (98.6%), leafy vegetables (87.1%) and condiments (100%) (Becquey *et al.,* 2009); and cereals, other vegetables, oils and fats account for 99.2%, 93.3% and 92.9%, respectively (Willy *et al.,* 2016). In many developing countries commonly used diets are based on cereals or starchy roots and tubers. This indicates that the food consumption style in resource poor setting are almost similar in African and some Asian countries. This study indicated that the majority of the participants consumed dairy product, which are good sources of micronutrients.

However, it is imperative that 72.4% of the pregnant women were not consuming meat, poultry and fish food groups and they were at risk of micro nutrient deficiency. It was also reported that the consumption of meat, poultry and fish, which are good sources of the heme iron that is readily absorbable and this may implicate anemia would be one of the major problems among the pregnant women. This finding is in agreement with the findings of a study done in Kenya (Willy *et al.*), where organ meat was consumed by only 3.9%, egg by 9.4%, and flesh meat by 23.6% (Willy K *et al.,* 2016). Poor consumption of animal source food is common in Ethiopia. However, during this study participants from Orthodox Christians were on two-month fasting that may contribute partly. In this study, despite the high requirements for iron during pregnancy, only 27.6% had consumed meat, poultry and fish.

This study indicated that higher dietary diversity was associated with normal nutrition status of the pregnant women. It is known that dietary diversity is proxy for dietary adequacy for both macro and micro nutrient level of women (Black *et al.,* 2008). A Study in Kenya indicated that higher dietary diversity is associated with good nutritional status (Willy *et al.,* 2016). This calls for actions to improve the nutritional status of the pregnant women through improved dietary diversity.

The study also revealed that the married pregnant women had better nutrition than their counterparts. A Similar finding was observed in a study conducted in Sweden (Odencrants *et al.,* 2013) that showed study participants who lived alone had poor nutritional status compared to those who lived with someone else.

Table 3. Factors associated with nutritional status and dietary diversity among pregnant women attending in Dire Dawa public hospitals, Eastern Ethiopia, 2017 (n=380).

Variable	Nutritional status			
	Normal No (%)	Undernourished No (%)	COR (95% CI)	AOR (95% CI)
Marital Status				
Married	305(82.4)	65(17.6)	3.12(.85-11.4)*	3.54(1.2-14.8)*
Others	6(60)	4(40)	1	1
Age				
15-24	136(77.3)	40(22.7)	0.56(.033-.955)	0.18(.22-1.5)
≥25	175(85.8)	29(14.2)	1	1
Ethnicity				
Oromo	161(82.1)	35(17.9)	1.44(0.69-2.98)	2.7(1.07-6.8)
Amhara	83(80.6)	20(19.4)	1.46(0.33-1.44)	2.6(.94-7.2)
Others	67(85.9)	11(14.1)	1	1
Education of women				
No formal education	88(83)	18(17)	1.47(0.59-3.57)	1.03(.32-3.4)
Primary and secondary	166(79.4)	43(20.4)	1.85(0.82-4.16)	0.8(.0-2.8)
College/University	57(87.7)	8(12.3)	1	1
Education of Father				
No formal education	56(82.3)	12(17.7)	1.29(0.57-2.91)	1.2(.4-3.4)
Primary and secondary	152(79.2)	40(20.8)	1.59(0.85-2.96)	1.0(0.4-2.5)
College/University	103(85.8)	17(14.2)	1	1
Family size				
≤2	132(78.6)	36(21.4)	0.67(0.40-1.14)	0.79(.335-1.9)
≥3	179(84.4)	33(15.6)	1	1
Occupation of father				
Private	140(81.9)	31(18.1)	1.44(0.77-2.7)	1.14(.56-2.29)
Employee ∫	102(86.4)	16(13.6)	2.03(.98-4.15)	1.7(.74-3.7)
Other	69(75.8)	22(24.2)	1	1
Monthly Income (Birr)				
<1500	65(71.4)	24(28.6)	0.43(0.234-0.80)*	.479(.24-.95)**
1501-2999	71(80.7)	17(19.3)	0.65(0.320-1.314)	.64(.303-1.34)
>3000	175(86.2)	28(13.8)	1	1
Dietary Diversity				
≥5	131(80.4)	32(19.6)	0.841(.498-1.421)	2.4(1.056-5.3)*
<5	180(82.9)	37(17.1)	1	1

*P<0.005, **PV<0.05; COR-Crude Odd Ratio; AOR – Adjusted Odd Ratio

∫Employee= Government + non-government employee

Conclusion and Recommendations

This study indicated that 18.2% of the pregnant women and were undernourished and 57% had low dietary diversity. It is found that nutritional status is independently associated with dietary diversity but marginal that require further study. This call for comprehensive nutritional education for pregnant women visiting health facilities for ANC services.

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Competing interests

All the authors declare no conflict of interest.

Authors' contributions

AS, MD MA and KTR, conceived the ideas study design, helps in proposal writing and thesis writing. AS collected data. MA and KTR critically reviewed the manuscript. All read and agreed to submit for publication.

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