

Dietary Diversity of Pregnant Women Attending Antenatal Care at Public Health Centers of Addis Ababa, Ethiopia

Hirut Tsegaye¹ and Abdissa Boka^{2*}

¹Lemi kura sub-city, Addis Ababa administrative health bureau, Addis Ababa, Ethiopia

²School of Nursing and midwifery, College of health science, Addis Ababa University, Ethiopia

Abstract

Introduction: Maternal dietary diversity is a proxy indicator of maternal nutrient adequacy and improves health outcomes for both mothers and babies. Lack of dietary diversity is a severe problem in the developing world. Good nutrition during pregnancy is a fundamental determinant for growth and development of infants and mothers' nutritional status.

Objective: The aim of this study is to assess dietary diversity and factors affecting it among pregnant women attending Antenatal Care in public health Centers, Addis Ababa.

Method: A facility based cross-sectional study was conducted in randomly selected public health center of Addis Ababa. Data collection was performed using standard questioners for dietary diversity guideline of Minimum Dietary Diversity for Women (MDD-W) of aged 15-49 years. Multivariate logistic regressions were computed to identify factors associated with dietary diversity.

Result: A total of 578 respondents were involved in the study with a response rate of 98.1%. From the 10 food groups the mean and standard deviation for dietary diversity was 5.1 ± 1.5 with a range of 3 to 9 food groups. Majority (n= 570, 98.6%) respondents were consumed starch food groups followed by pulse 509 (88.1%) over the past 24 hours. Adequate dietary diversity consumption was 52.7%. House hold income of \$37.5-65.5 with (AOR=2.1(CI, 1.1, 4.3), income > \$65.5 with (AOR=2.4 (CI, 1.18, 5.13) status and presence of emotional support with (AOR=1.6 (CI, 1.1, 2.3) have showed significant statistical association with dietary diversity.

Conclusion: This study revealed that the prevalence of adequate dietary diversity among pregnant mothers is low and higher household monthly income and presence of emotional support were positively associated with the adequate dietary diversity. Multi-sectoral collaboration and policy strengthening is needed to enhance the dietary diversity of pregnant women by strengthening sustainable income and advocating nutrition education regarding dietary diversity during pregnancy.

Keywords: Dietary diversity; pregnant women; Antenatal care

Introduction

Malnutrition is a universal problem that has many forms. It affects most of the world's population at some point in their lifecycle, from infancy to old age. Maternal under nutrition is one of the most important causes of maternal morbidity and mortality particularly in the developing countries that has direct association with fetal nutrition [1, 2]. Both macro and micronutrient deficiencies for pregnant mothers, is a significant public health problem in many developing countries [1]. Multiple micronutrient deficiencies remain a major public health concern in low-income and middle-income countries (LMICs) which is mainly reflected among pregnant women in sub-Saharan Africa [1, 4]. Dietary diversity refers to an increase in the variety of foods across and within food groups capable of ensuring adequate intake of essential nutrients that can promote good health, and physical and mental development [3, 5]. The diet that is sufficiently diverse may reflect nutrient adequacy and the vulnerability is critical in children and pregnant and lactating mothers [3]. Diversified food during pregnancy is the very important since it is known to affect pregnancy and birth Outcomes and as a result, has broad impacts on economic and social development in developing country [4, 5]. Lack of dietary diversity is a severe problem in the developing world particularly to pregnant mothers that is a major predisposing factor for maternal morbidity and mortality [3, 6]. Further, the vulnerability is critical in children and lactating mothers because they require additional energy and nutritious foods for their physiological and mental development [5, 6]. Dietary diversity is usually measured either

by adding the number of foods or, more often, by counting the number of food groups consumed over a reference period suggested that dietary diversity can be used as a proxy measure of food access at household level, while at individual level it is a reflection of dietary quality [5,6]. Similarly, micronutrient remains a major public health concern in developing countries due to intake of monotonous, predominantly starchy based diets that are lacking in diversity [6,7]. Different scientific researchers have demonstrated that adequate nutrient intake during pregnancy has a critical role in fetal development and wellbeing. Satisfactory nutrient intake during pregnancy will be found to reduce the risk for low birth weight by (19%), small-for-gestational-age births by (8%), and preterm birth by 16%, and infant mortality by 15% in those highly adhered to the regimen [8,9,10]. In Africa alone, 20% of women are underweight in relation to dietary diversity 800 pregnant women die every day during pregnancy(5,11). Dietary diversity score

***Corresponding author:** Abdissa Boka, School of Nursing and midwifery, College of health science, Addis Ababa University, Ethiopia, E-mail: bokaabdissa@yahoo.com

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and early marriage were independent predictors of under nutrition in Africa [5, 11]. By other hand other studies on the dietary intake of pregnant women in Africa showing that dietary diversity status may be complicated by other factors including household socioeconomic status [12, 15]. Despite the enormous progress made in Ethiopia, the issue of food security and poor nutrition among women continues to be the country's main health and development concern. To improve women's nutritional status, the Ethiopian government established the National Nutrition Program and gave priority to interventions like "Promote maternal nutrition," which includes ensuring adequate intake of a variety of foods [8]. Even though the government has tried to put the strategy into practice, micronutrient deficiencies are a frequent cause of pregnancy-related issues. Anemia and multiple micronutrient deficiencies are present in approximately 22% of pregnant women and 17% of women of reproductive age, respectively, which is a sign of a serious public health issue [13, 14]. Additionally, food insecurity, ignorance of nutritious foods, taboos and myths, cultural customs, and gender discrimination are some of the most pervasive factors affecting pregnant women's diets and nutritional status [8, 9, 11, 16, 17, 18]. Although there is a lack of excellent prenatal and perinatal care, it is well known that pregnancy malnutrition is common and that the food in the nation is of poor quality. It is also poorly studied how different diets among pregnant women in Addis Abeba affect pregnancy-related issues [19, 20].

Methods

Study design, area and period

Facility based cross sectional study design was conducted in Addis Ababa Public health centers from June 1 -30, 2022.

Source and study population

All pregnant women who attend ANC at selected public health centers in Addis Ababa were source population and pregnant women who came to ANC follow up clinics of selected public health centers, during the data collection period were study population.

Eligibility criteria

All pregnant women who came to ANC clinics during data collection were included except, mothers who were severely ill and unable to communicate for data collection were excluded.

Sample size determination

The sample size was determined by using single population proportion formula. Assuming 5% marginal error (d), 95% confidence level ($\alpha = 0.05$), and using from previous study done in North East Ethiopia indicated the measurement of dietary diversity among pregnant women was 31.4% (19).

$$n = \frac{(Z_{\alpha/2})^2 P(1 - P)}{d^2}$$
$$n = \frac{(1.96)^2 0.314(1 - 0.314)}{0.05^2}$$
$$n=357$$

By considering design effect (1.5) and adding 10% nonresponse rate, the final sample size was (n=589).

Study Variables

Dietary diversity was the outcome variable whereas, Socio-

demographic, Pregnant/behavioral and Obstetrical factors were predicting factors.

Data collection Tools

Structured questionnaire was used to collect socio-demographic characteristics. Moreover, Dietary diversity was assessed by a structured questionnaires adapted from the Minimum Dietary Diversity for Women (MDD-W) that were a population-level indicator of diet diversity validated for women aged 15-49 years old. The MDD-W is a dichotomous indicator based on ten food groups and is considered as the standard for measuring population level dietary diversity in women of reproductive age. A validated and modified individual dietary diversity questionnaire as recommended by the Food and Agriculture Organization individual and household dietary diversity guideline. Dietary diversity of the respondents was assessed by 24 hours recall. Dietary diversity was coded as 1 for those meeting the minimum dietary diversity and 0 for those not achieving minimum dietary diversity.

Data quality Assurance

A pre-test was done on 5% of the total sample size at non selected health centers for its' clarity, simplicity and understandability. In addition, the questionnaire was prepared in English and translated into Amharic and finally back to English by bilingual translators. The collected data were checked daily for completeness by investigators.

Data process and analysis

The collected data was checked, cleared, and entered into Epi Info 7.2 software, and transferred to SPSS version 25 for analysis. Descriptive analysis like mean and frequency were performed to describe dietary diversity. Bivariate and multivariable binary logistic regressions were carried out to assess factors of dietary diversity. Variables with a p-value less than 0.25 in the bivariate analysis was enter to a multivariable logistic regression analysis to identify the final associated factors of dietary diversity. Then Variables with a p-value < 0.05 at multivariate analysis was considered to be statistically significant and taken as showing association described with Adjusted Odds Ratio (AOR).

Result

Demographic and Socio-economic Characteristics of Respondents

A total of 589 respondents were involved in the study with a response rate of 578 (98.1%). The minimum and maximum age of the respondents was 17 and 41 years respectively. The mean and standard deviation of the pregnant women age was 27.1 with ± 4.5 in years. Majority of respondents (n= 488, 84.4%) of pregnant women were married and half 290 (50.2%) of them were employed in occupation. One fourth 140 (24.2%) of the respondents have no formal education or unable to read and write while the rest of the respondents 75.8% have primary and above educational status. Almost half 279 (48.3%) of pregnant women have had household monthly income of > \$ 65.5 while 46 (8%) of them have income less than \$37.5 [Table 1].

Feeding Practices/habits and Obstetric characteristics of Respondents

Concerning the feeding practice of pregnant women 405 (70%) women used iodized salt and 453 (78.4%) of them had taken coffee or tea daily during meal. More than half 340 (58.8%) of pregnant women have had history of eating snack and 430 (74.4%) of them had a meal frequency of 4 and above per day. Nearly half 288 (49.8%) of pregnant

Table 1: Demographic And Socio-Economic Characteristics Of Pregnant Women Attending Antenatal Care At Public Health Centers, In Addis Ababa, Ethiopia, 2022.

Variable	Category	Frequency	Percent
marital status	Married	488	84.4
	Divorced	35	6.1
	Single	48	8.3
	Widowed	7	1.2
Occupation	Employed	290	50.2
	House wife	218	37.7
	Merchant	60	10.4
	Other	10	1.7
educational status	unable to read and write	140	24.2
	grade 1-8	205	35.5
	grade 9-12	79	13.7
	college and above	154	26.6
family size	01-Feb	345	59.7
	03-Apr	211	36.5
	>5	22	3.8
age category	<20	38	6.6
	20-29	433	74.9
	30-39	103	17.8
	>40	4	0.7
monthly income	< 37.5\$	46	8
	37.5-65.5\$	253	43.8
	> 65.5\$	279	48.3

women have had emotional support from their parents and 133 (23%) of pregnant women have history of drinking alcohol during pregnancy [Table 2]. Regarding gestational age 275 (47.6%) of them were in 2nd trimester and 182 (31%) were in 3rd trimester pregnancy. Majority 513 (88.8%) of the respondents have no any medical illness while 42 (8%) of them have had gastritis as well as 69 (11.9%) of them have hyperemesis [Table 2].

Dietary Diversity of Pregnant Women

From the 10 food groups that the pregnant women consumed in the past 24 hours, the mean and standard deviation for dietary diversity was 5.1 ± 1.5 with a range of 3 to 9 food groups. Almost all of the respondents 570 (98.6%) were consumed starch food groups followed by pulse 509 (88.1%) and other vitamin A rich fruits and vegetables 319 (55.2%) over the past 24 hours [Table 3].

Based on the dietary diversity score in our study almost half of pregnant women 305 (52.7%) have adequate or have minimum required dietary diversity while the rest 273 (47.23%) have inadequate dietary diversity [Figure 1].

Factors Associated with Dietary Diversity

To identify factors associated with dietary diversity variables that are showed association during bivariate analysis with p value < 0.25 were included in multivariable analysis. Accordingly variables like marital status, educational status, occupation, emotional support, income level, alcohol drink, coffee/tea drink, meal frequency, iron supplementation and nutrition information have showed association during bivariate analysis. Finally during multivariable analysis house hold income status and emotional support have showed significant statistical association with dietary diversity at p value of < 0.05. Accordingly income of \$37.5-65.5 with (AOR=2.1(CI, 1.1, 4.3), income > 3500 birr with (AOR=2.4 (CI, 1.18, 5.13) and presence of emotional support (AOR=1.6 (CI, 1.1, 2.3) [Table 4].

Table 2: Feeding Practice and Obstetric Characteristics of Pregnant Women Attending Antenatal Care at Public Health Centers, In Addis Ababa, Ethiopia, 2022.

Variables	Category	Frequency	Percent
Emotional support	Yes	288	49.8
	No	290	50.2
Drinking alcohol in last One week	Yes	133	23
	No	445	77
Drinking coffee or tea	Yes	453	78.4
	No	125	21.6
Use iodized salt	Yes	405	70.1
	No	173	29.9
Habits of eating snack	Yes	340	58.8
	No	238	41.2
Do you take iron supplement	Yes	420	72.7
	No	158	27.3
Frequency of meal per day	1-3 per day	148	25.6
	4 and above	430	74.4
Nutrition information during pregnancy	Yes	492	85.1
	No	86	14.9
Hyperemesis during pregnancy	Yes	69	11.9
	No	509	88.1
Gestational age	1st trimester	121	20.9
	2nd trimester	275	47.6
	third trimester	182	31.5
Any medical case	Gastritis	44	7.6
	Headache	10	1.7
	lower abdominal pain	11	1.9
	None	513	88.8

Table 3: Food Group Consumptions In The Last 24 Hours Among Pregnant Women Attending Antenatal Care At Public Health Centers, In Addis Ababa, Ethiopia, 2022.

Food groups	Category	Frequency	Percent
Starch staples (grains, white roots and tuber, and plantains)	Yes	570	98.6
Pulses (beans, peas, and lentils)	Yes	509	88.1
Other vitamin A-rich fruits and vegetables	Yes	319	55.2
Dairy	Yes	290	50.2
Dark green leafy vegetables	Yes	279	48.3
Meat, poultry, and fish	Yes	240	41.5
Other vegetables	Yes	239	41.3
Egg	Yes	236	40.8
Other fruits	Yes	149	25.8
Nuts and seeds	Yes	85	14.7

Discussion

This study tried to assess the dietary diversity among ANC attending pregnant women of Addis Ababa Ethiopia. The finding was 47.23% of pregnant women had consumed less than 4 food groups out of ten groups and thus have low (inadequate) dietary diversity where as 52.77% have had a minimum dietary diversity (adequate dietary diversity), those who consumed 5 or above food groups. The prevalence of adequate diversity 52.77% in our study is lower than the study conducted in Kenya at referral hospital ANC attending mother [7] that have showed above 61% of pregnant women have had consumed six and above food groups or have had adequate dietary diversity. The difference could be due to difference in study area and socio-economic differences. On the other hand our finding (52.77%) is higher than the prevalence of adequate dietary diversity findings from the study conducted in Shashemene 25.4% (8), in Bale 44.8% (9) and in north east

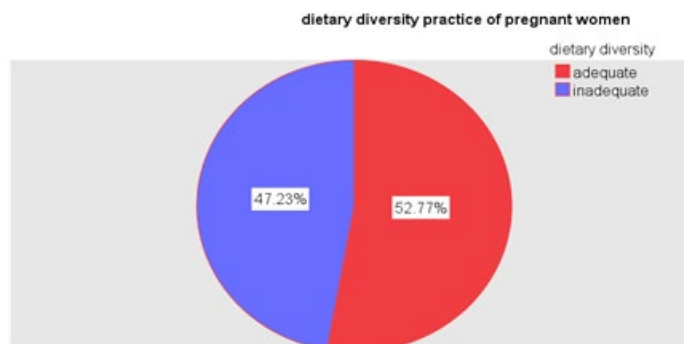


Figure 1: Dietary Diversity Practice among Pregnant Women during the Preceding 24 Hour at Public Health Centers in Addis Ababa, Ethiopia 2022.

Table 4: Factors Associated With Dietary Diversity Of Pregnant Women Attending Antenatal Care At Public Health Centers, In Addis Ababa, Ethiopia, 2022 (N=578).

Variable	Category	Dietary diversity		COR (95% CI)	AOR (95% CI)	P value
		Inadequate	Adequate			
Current marital status	Married	204	284	1.6(1.06,2.6)	1.26(0.68,2.4)	
	unmarried/single	49	41	1	1	
Meal frequency per day	1-3 times	82	66	1	1	
	4 and above times	171	259	1.8(1.2,2.7)	1.6(0.95,2.6)	
Household incomes in dollar	< 37.5\$	30	16	1	1	
	37.5-65.5\$	117	136	2.2(1.1,4.2)	2.1(1.1,4.3)*	0.049
	> 65.5\$	106	173	3(1.6,5.8)	2.4(1.18,5.13)*	0.018
Nutrition information during pregnancy	Yes	211	281	1.2(0.8,2)	0.68(0.4,1.2)	
	No	42	44	1	1	
Taking iron supplement	Yes	174	246	1.4(0.97,2)	1.4(0.9,2.1)	
	No	79	79	1	1	
Drinking coffee or tea	Yes	189	264	1.4(0.98,2.1)	1.4(0.9,2.1)	
	No	64	61	1	1	
Drinking alcohol in last one week	Yes	47	86	1.5(1.1,2.3)	1.2(0.8,1.9)	
	No	206	239	1	1	
Emotional support	Yes	102	186	1.98(1.4,2.7)	1.6(1.1,2.3)*	0.009
	No	151	139	1	1	
Participant educational status	unable to read and write	72	68	1	1	
	grade 1-8	90	115	1.35(0.87,2)	1.1(0.7,1.7)	
	grade 9-12	35	44	1.33(0.76,2.3)	0.98(0.5,1.8)	
	college and above	56	98	1.8(1.1,2.9)	1.1(0.6,2)	
Participants occupation status	Employed	113	177	1(0.28,3.7)	0.57(0.13,2.5)	
	Housewife	107	111	0.69(0.2,2.5)	0.4(0.13,1.9)	
	Merchant	29	31	0.7(0.18,2.7)	0.40(0.08,1.80)	
	Other	4	6	1	1	

Ethiopia 31.4% (10). The difference could be due to difference in study area, period and socio-economic differences. This study was conducted in capital city of the country thus all study participants were urban dwellers while the study participants in countryside were at both small town and rural dwellers. In this study almost all of the respondents 98.6% were consumed starch food groups followed by pulse 88.4% and dark green 49% over the past 24 hours. There were also similar with the study in Bale showing 87.9% consumed starch food groups followed by 75% legumes and the study in shashemene stated that starch food groups were consumed by 95% of pregnant mother [8, 9]. The reason for similarity of the finding might be indicate the abundant availability of the same food type in Ethiopia.

This study also tried to identify factors associated with dietary diversity like household income status and parent emotional support were identified that were associated with dietary diversity while variables like current marital status, meal frequency per day and alcohol drinking showed significant association during bivariate analysis and

become insignificant during multivariable analysis. Accordingly the odds of getting women with house hold monthly income of 37.5-65.5\$ were 2.1 times higher than those who have less than 37.5\$ monthly income. The odds of getting women with house hold monthly income of above 65.5\$ were 2.4 times higher than those who have less than 37.5\$ monthly income. On the other hand those pregnant women who have had monthly income 37.5-65.5\$ and above 65.5\$ were 2.1 and 2.4 times higher chance to have adequate dietary diversity compared to those having less than 37.5\$ monthly income. This means that the chance of getting adequate dietary diversity increases as household income status increase. This means that women who have higher income have higher probability of purchasing power that could increase probability of promoting dietary diversity compared to those women with low household income. This study is similar with the study conducted in north east Ethiopia, shashemene and Kenya [7, 8] showing that pregnant women who have higher monthly income have had 2.2 and 3.1 times higher chance to have adequate food diversity than those having lower monthly income. The odds of getting pregnant

mother who have emotional support from their parents were 1.6 times higher than those without emotional support. This states that pregnant women whose husbands or parents support them by encouraging and supporting them, by giving priority to them especially during food shortage and sharing their burden at home could make them to have dietary diversity. This study is similar with the study conducted in shashemene [8] showing that pregnant women who have emotional support from their husbands have had 3.49 times higher chance to have adequate dietary diversity compared to their counter parts. Similarly during emotional support there might be discussion with their husbands or spouse on the issue of importance of food diversity to pregnant women that may increase the chance of adequate food diversity consumption.

In conclusion this study revealed that the overall consumption of adequate dietary diversity of the pregnant mothers was found to be 52.7% which is relatively low. Higher household monthly income and emotional support by the husband or parents were positively associated with the adequate dietary diversity level of pregnant women's.

Limitation of the study

This study has some limitations. Food availability in the household might vary with the seasons which affect dietary diversity and the assessment of dietary intake depends on the 24-hour recall method, which may not accurately reflect their past feeding experience. Moreover, the nature of this study was a cross-sectional design, which does not show the cause and effect relationship. In addition, this study might not give the exact figure of the dietary diversity practice due to a recall bias and being self-reported.

Statement of declaration

Ethical Approval

The study received ethical clearance from the City Government of Addis Ababa Health Bureau Ethical Clearance Committee on June 1-30, 2022, with Ref. No. A/A/H/1041/338.

Consent to participate

Before collecting individual data, participants provided written informed consent after a thorough explanation of the study's purpose and benefits. The research was carried out in the aftermath of the Helsinki Declaration.

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Competing interests

All of the authors have declared that they have no potential conflicts of interest in relation to the research, authorship, and/or publication of this article.

Data availability statement

On reasonable request, the datasets used and/or analyzed during the study were made available by the corresponding author.

Consent for publication

This manuscript contains unique content.

Neither the article nor any of its essential elements, such as tables and figures, have been or will be published elsewhere.

Authors contributions

All authors conceived the study, the design, field work, data analysis and interpretation, report writing and manuscript preparation.

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