

Maternal Nutritional Knowledge, Dietary Practices, and Nutritional Status Among Pregnant Women in Garowe Camps of Internally Displaced Persons, Puntland, Somalia

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ABSTRACT

This study was conducted in Garowe IDP camps with the aim of assessing nutritional status and to examine maternal knowledge and awareness of proper nutrition during pregnancy, to identify dietary habits and food practices among pregnant attending barwago, jilab and jowle health centers. This is a descriptive, cross-sectional survey design with mixed-methods. A total of 218 pregnant women were registered during the study period; 180 participants had complete nutritional-status data and were included in the outcome analyses.

The study revealed that multiple factors significantly influence the nutritional status of pregnant women in IDP camps attending Barwago, Jilab, and Jowle Health Centers in Garowe, Puntland. The findings indicate that higher maternal nutritional knowledge ($\chi^2 = 8.94$, $p = 0.003$; OR = 1.57), better dietary practices ($\chi^2 = 6.78$, $p = 0.009$; OR = 1.38), are positively associated with improved nutritional outcomes, specifically reflected in MUAC measurements.

Targeted interventions are needed to improve the nutritional health of pregnant women. It is recommended that health initiatives be prioritized, education programs be implemented, counseling be integrated into care.

Keywords: Nutritional Status, Pregnant Women, Maternal nutritional knowledge, Dietary practices, Internally displaced persons; MUAC

1. INTRODUCTION

Maternal nutrition during pregnancy is fundamental to maternal health, fetal growth, and favorable birth outcomes. Pregnancy increases the physiological requirements for energy and essential nutrients, and inadequate maternal nutrition can adversely affect both maternal and fetal health. Maternal undernutrition is associated with fetal growth restriction, low birth weight, preterm birth, and increased risks of maternal and neonatal morbidity and mortality [1,2]. Maternal undernutrition has also been estimated to contribute to approximately 800,000 neonatal deaths annually through small-for-gestational-age births [2].

Globally, maternal malnutrition remains an important public health challenge, particularly in low- and middle-income countries where poverty, food insecurity, and limited access to health and nutrition services persist. Micronutrient deficiencies are also common among pregnant women. Approximately 32 million pregnant women worldwide are affected by anaemia, while vitamin A deficiency affects an estimated 19 million pregnant women, mainly in Africa and South-East Asia [3,4]. Pregnant women

have increased requirements for several micronutrients, including iron, folate, iodine, zinc, and vitamin A, because of maternal physiological adaptations and fetal growth [5]. Adequate maternal nutrition is therefore essential for supporting maternal health, fetal development, and subsequent child health.

The nutritional challenges experienced by pregnant women may be particularly severe in humanitarian settings. Armed conflict can disrupt food systems, livelihoods, infrastructure, and access to health services, thereby increasing food insecurity and the risk of acute malnutrition among pregnant and breastfeeding women [6]. Displacement may further increase nutritional vulnerability by limiting access to adequate and diverse foods, safe living conditions, and essential health and nutrition services.

Somalia has experienced prolonged conflict, recurrent climatic shocks, food insecurity, and population displacement. Garowe, the administrative capital of Puntland State, hosts numerous internally displaced persons. A joint IDP site verification exercise conducted in Garowe in June 2021 identified 25 IDP sites hosting 8,535 households and 51,670 individuals [7]. The nutritional situation in Somalia also remains concerning. The Somalia Micronutrient Survey conducted in 2019 included internally displaced populations and found that more than 40% of women and children were anaemic, while iron deficiency was also widespread [8]. The survey recommended greater attention to women's diets, particularly those of pregnant women, together with nutrition information, supplementation, and food-based interventions [8].

Maternal nutritional knowledge and dietary practices are important components of maternal nutrition. Evidence from Ethiopia indicates that dietary diversity among pregnant women is influenced by maternal education, access to nutrition information, knowledge of dietary diversity, and household wealth [9]. A systematic review and meta-analysis found that only 41% of pregnant women in Ethiopia achieved

adequate dietary diversity, highlighting persistent challenges in obtaining varied and nutrient-rich diets during pregnancy [9]. Another systematic review reported a high pooled prevalence of inadequate dietary diversity among pregnant women and identified food insecurity, lack of formal education, and inadequate dietary counselling as important factors [10]. These findings suggest that improving maternal nutrition requires both appropriate nutrition knowledge and access to diverse foods.

Despite the growing evidence on maternal nutrition and dietary diversity in low-resource and humanitarian settings, limited empirical evidence is available on the relationship between maternal nutritional knowledge, dietary practices, and nutritional status among pregnant women living in IDP camps in Garowe, Puntland, Somalia. In particular, there is limited evidence concerning pregnant women attending Barwaqo, Jilab, and Jowle Health Centers. Understanding these relationships is important for developing context-specific nutrition education, dietary counselling, and maternal health interventions for women living in IDP settings.

Therefore, this study assessed maternal nutritional knowledge and dietary practices and examined their relationship with the nutritional status of pregnant women attending Barwaqo, Jilab, and Jowle Health Centers in Garowe, Puntland, Somalia. The findings may provide evidence to inform nutrition education, dietary counselling, micronutrient interventions, and maternal health services aimed at improving the nutritional status of pregnant women living in internally displaced persons camps.

2. MATERIALS AND METHODS

2.1. Description of the Study Location

Garowe is the administrative capital of Puntland State and hosts multiple IDP settlements. A joint IDP site verification conducted in June 2021 identified 25 IDP sites in Garowe, hosting 8,535 households and 51,670 individuals [6]. The displaced population may face limited livelihood

opportunities and constrained access to essential services, increasing vulnerability to food insecurity and poor nutritional outcomes.

2.2. Study Design and Setting

A descriptive cross-sectional study employing a mixed-methods approach was conducted among pregnant women attending antenatal care (ANC) services at Barwaqo, Jilab, and Jowle Health Centers located in internally displaced persons (IDP) camps in Garowe, Puntland State, Somalia. The study was designed to assess the influence of maternal nutritional knowledge and dietary practices on the nutritional status of pregnant women. The quantitative component determined the prevalence of maternal undernutrition and examined associations between study variables, while the qualitative component explored participants' perceptions and experiences regarding maternal nutrition and dietary practices.

2.3. Inclusion and Exclusion Criteria

Pregnant Women were eligible to participate if they were aged 18 years or older, resided in the selected IDP camps, attended ANC services at one of the three health facilities, had no chronic medical conditions known to influence nutritional status, and voluntarily provided informed consent. Pregnant women younger than 18 years, women with chronic illnesses such as HIV infection, tuberculosis, or diabetes mellitus, non-IDP residents, and those who declined participation were excluded from the study.

2.4 Study Sample

We used systematic random sampling with a purposive sampling technique, surveying all pregnant women attending ANC services at Barwaqo, Jilab, and Jowle Health Centers during the study period and met the inclusion criteria and provided consent. A total of 218 pregnant women were registered during the study period.

2.5. Data Collection Tools and Techniques

2.5.1. Data Collection Procedures

A letter requesting authorization to conduct the study at the health centers was sent to the ministry of health Puntland. The study was conducted after obtaining authorization from him.

Quantitative data were collected through interviewer-administered structured questionnaires. The questionnaire obtained information on socio-demographic characteristics, maternal nutritional knowledge, dietary practices, meal frequency, dietary diversity, and household characteristics. Dietary intake was assessed using a 24-hour dietary recall, while dietary diversity was evaluated using the Food and Agriculture Organization (FAO) Dietary Diversity Score (DDS). Information on meal frequency, portion sizes, and food group consumption was also collected.

Qualitative data were obtained through focus group discussions among pregnant women and key informant interviews with health workers and nutrition personnel to explore maternal nutrition practices, barriers to adequate dietary intake, and nutrition-related challenges experienced within the IDP camps.

Maternal nutritional status was assessed using Mid-Upper Arm Circumference (MUAC), observable clinical signs of malnutrition, and hemoglobin levels extracted from routine ANC records.

2.5.2. Data Analysis

Data were coded, entered into Microsoft Excel for cleaning, and exported to SPSS Statistics version 26.0 for analysis.

Descriptive statistics (frequencies, percentages, means, and standard deviation) were used to summarize participants' socio-demographic characteristics, maternal nutritional knowledge, dietary practices, and nutritional status.

A multivariate analysis was then performed using Pearson's chi-square test. Finally, logistic regression was performed by calculating the odds ratio and its 95% confidence interval between the response variable and the independent variables. Only variables with a p -value < 0.05 at this level

were considered predictors of of maternal nutritional status. Pearson correlation analysis was also performed to examine relationships between selected continuous variables.

Qualitative data obtained from FGDs and KIIs and analyzed using thematic analysis.

2.5.3. Ethical Considerations

Ethical approval for the study was obtained from the Kenya Methodist University Ethical Review Committee. Permission to conduct the study was granted by the Ministry of Health, Puntland State, Somalia. Before data collection, the purpose of the study was

presented to participants. Only respondents who gave their consent were included in our study. The survey was conducted with strict respect for confidentiality and respondent anonymity.

3. RESULTS

3.1. Description of the Sample

The tables below provide a detailed description of the various characteristics of our study sample. Tables 1-4 illustrate the Profile of the Respondents, Nutritional Status of Pregnant Women The maternal nutritional knowledge and The Dietary Practices of Pregnant Women. respectively.

Table 1 Profile of the Respondents

Category	Item	Frequency(f)	Percentage (%)
Age Group	Below 20 years	19	9.3
	21-30 years	75	36.8
	31-40 years	83	40.7
	41 years & above	27	13.2
Marital Status	Single	47	23.0
	Married	157	77.0
Level of Education	No formal education	30	14.7
	Primary education	68	33.3
	Secondary education	42	20.6
	Tertiary Education	64	31.4
Occupation	Housewife	70	34.3
	Self-employed	39	19.1
	Government worker	46	22.5
	Unemployed	49	24.0

Source: Primary Data (2025)

Table 2 Overall Nutritional Status Indicators Among Pregnant Women (N = 180)
MID-UPPER ARM CIRCUMFERENCE(MUAC) STATUS

Variable	Normal (MUAC $\geq$ 23.0 cm)	Mild Undernutrition (MUAC 21.0 – 22.9 cm)	Moderate Undernutrition (MUAC < 21.0 cm)	Total (N)	Prevalence of Undernutrition (< 23.0 cm)
Barwaqo	18	24	8	50	64.0%
Jilab	12	22	16	50	76.0%
Jowle	15	30	35	80	81.3%
Total	45	76	59	180	75.0%

FREQUENCY OF OBSERVABLE PHYSICAL SIGNS OF MALNUTRITION

Physical Sign	Present (Frequency)	Absent (Frequency)	Total (N)	Prevalence
Pallor (Pale eyelids/palms/gums)	112	68	180	62.2%
Pedal Edema (Swelling in feet/ankles)	34	146	180	18.9%
Skin/Hair Changes (Dry, flaky skin, thinning hair)	95	85	180	52.8%
Wasting/Thinness (Visibly underweight)	48	132	180	26.7%

HEMOGLOBIN LEVELS AND ANEMIA CLASSIFICATION

Health Center	Normal ($\geq$ 11.0 g/dL)	Mild Anemia (10.0 – 10.9 g/dL)	Moderate Anemia (7.0 – 9.9 g/dL)	Severe Anemia (< 7.0 g/dL)	Total (N)	Prevalence of Anemia (< 11.0 g/dL)
Barwaqo	6	15	20	9	50	88.0%

Jilab	2	8	22	18	50	96.0%
Jowle	1	10	35	34	80	98.8%
Total	9	33	77	61	180	95.0%

Table 3 Maternal Nutritional Knowledge among Pregnant Women (N = 180)

Knowledge Domain	Mean $\pm$ SD
Importance of essential nutrients	3.65 $\pm$ 1.36
Balanced diet during pregnancy	3.45 $\pm$ 1.33
Increased energy requirements	3.45 $\pm$ 1.36
Food safety during pregnancy	3.45 $\pm$ 1.29
Iron and folic acid supplementation	3.40 $\pm$ 1.28
Adequate water intake	3.90 $\pm$ 1.22
Limiting caffeine and alcohol	3.70 $\pm$ 1.15
Following antenatal dietary guidelines	3.55 $\pm$ 1.25
Nutrition prevents pregnancy complications	3.40 $\pm$ 1.36
Diet and breastfeeding	3.45 $\pm$ 1.40

Values are presented as mean $\pm$ standard deviation (5-point Likert scale).

Table 4 Dietary Practices among Pregnant Women (N = 180)

Dietary Practice	Mean $\pm$ SD
Consumes three meals per day	3.65 $\pm$ 1.32
Daily consumption of staple foods	3.80 $\pm$ 1.40
Daily vegetable consumption	3.85 $\pm$ 1.32
Daily fruit consumption	3.70 $\pm$ 1.27
Regular protein intake	3.60 $\pm$ 1.28
Boiling/steaming as food preparation method	3.85 $\pm$ 1.24
Access to safe drinking water	3.95 $\pm$ 1.25
Avoids foods causing discomfort	3.20 $\pm$ 1.54
Takes iron and folic acid supplements	3.20 $\pm$ 1.47
Receives nutrition information	3.45 $\pm$ 1.40

The results show Most participants were aged 31–40 years (40.7%), married (77.0%), and had primary (33.3%) or tertiary (31.4%) education and the presence of respondents with no formal education (14.7%) possibly impacting nutritional behaviors and the capacity to make informed choices. (table 1). Maternal undernutrition was common, with 75.0% of women having MUAC <23 cm, while 95.0% were anemic and 62.2% exhibited pallor; Jowle Health Center recorded the poorest nutritional indicators (table 2).

the findings also indicate generally good maternal nutritional knowledge, with mean scores ranging from **3.40 to 3.90**. Knowledge was highest for adequate water intake (3.90 $\pm$ 1.22) and lowest for iron and folic acid supplementation and nutrition in preventing

pregnancy complications (3.40 $\pm$ 1.28–1.36), indicating areas for further nutrition education (table 3).

The findings indicate generally good dietary practices among pregnant women, with mean scores ranging from **3.20 to 3.95**. The highest scores were for access to safe drinking water (3.95 $\pm$ 1.25), while iron and folic acid supplementation and avoiding foods causing discomfort recorded the lowest mean scores (3.20 $\pm$ 1.47–1.54), suggesting areas requiring improved nutrition counseling and supplementation (table 4).

3.2. multivariate Analysis

Tables 5-7 show the relationship Between Maternal Nutritional Knowledge, Dietary Practices and Nutritional Status

Table 5: Chi-Square Test Results

Variable	χ^2	Df	p-value
Maternal nutritional knowledge (High/Low)	8.94	1	0.003
Dietary practices (Adequate/Inadequate)	6.78	1	0.009

Table 6: Logistic Regression

Variable	B	SE	Wald	df	Sig.	OR	95% CI for OR
Maternal nutritional knowledge (mean score)	0.45	0.21	4.58	1	0.032	1.57	1.04 - 2.36
Dietary practices (mean score)	0.32	0.18	3.12	1	0.078	1.38	0.98 - 1.93

Table 7: Correlation Analysis

Variable	Correlation coefficient (r)	Sig. (2-tailed)
Nutritional knowledge & MUAC	0.52	0.001
Dietary practices & MUAC	0.48	0.002

The chi-square test explored whether there's a significant relationship between determinants and the nutritional status of pregnant women. Maternal nutritional knowledge was significantly associated with nutritional status ($\chi^2 = 8.94$, $p = 0.003$). Similarly, dietary practices demonstrated a significant relationship with nutritional status ($\chi^2 = 6.78$, $p = 0.009$). (table 5).

Binary logistic regression was performed to identify independent predictors of adequate nutritional status. Maternal nutritional knowledge was independently associated with adequate nutritional status. Women with higher nutritional knowledge had 57% higher odds of having adequate nutritional status than those with lower knowledge (OR = 1.57, 95% CI: 1.04–2.36; $p = 0.032$). Although dietary practices showed a positive association with nutritional status (OR = 1.38, 95% CI: 0.98–1.93), the association was not statistically significant ($p = 0.078$). (table 6).

Pearson correlation analysis demonstrated moderate positive correlations between maternal nutritional knowledge, dietary practices, and MUAC (Table 7). Maternal nutritional knowledge was moderately and positively correlated with MUAC ($r = 0.52$, $p = 0.001$), indicating that higher knowledge levels were associated with better nutritional status. Dietary practices also showed a significant positive correlation with MUAC ($r = 0.48$, $p = 0.002$), suggesting that healthier dietary practices were associated with improved maternal nutritional status.

3.3 Qualitative Findings

Qualitative findings from focus group discussions and key informant interviews identified two main themes: maternal

nutritional knowledge and dietary practices. Participants recognized the importance of a balanced diet during pregnancy but reported varying levels of nutrition knowledge and limited dietary diversity. Most diets consisted mainly of staple foods, while consumption of fruits, vegetables, and other nutrient-rich foods was often inadequate. Health workers also highlighted poor nutrition knowledge and deficiencies in iron, folic acid, and protein as common challenges affecting maternal nutritional status.

4. DISCUSSION

This study found a high prevalence of maternal undernutrition (75.0%) and anaemia (95.0%) among pregnant women attending health centers in IDP camps in Garowe, Somalia. These findings indicate a substantial burden of maternal nutritional problems in the study population. The prevalence of anaemia observed in this study is considerably higher than the global estimate among pregnant women, highlighting the particularly vulnerable nutritional circumstances of women in the study setting [3]. The high prevalence of undernutrition is also consistent with evidence from other resource-limited settings, where inadequate dietary practices and poor dietary diversity have been associated with maternal undernutrition [10]. Maternal nutritional knowledge was significantly associated with nutritional status in this study ($\chi^2 = 8.94$, $p = 0.003$; OR = 1.57, 95% CI: 1.04–2.36, $p = 0.032$). Women with higher nutritional knowledge had greater odds of having adequate nutritional status. This finding is consistent with evidence from Ethiopia showing that maternal nutrition knowledge and access to

nutrition information and counselling are important factors related to women's nutrition and health knowledge [11]. Although knowledge alone may not guarantee adequate nutritional intake, better understanding of recommended dietary practices may support healthier food choices and utilization of available nutrition and health services.

Dietary practices were significantly associated with nutritional status in the bivariate analysis ($\chi^2 = 6.78$, $p = 0.009$), although the association was not statistically significant after adjustment (OR = 1.38, 95% CI: 0.98–1.93, $p = 0.078$). This suggests that the relationship between dietary practices and nutritional status may be influenced by other factors. A study among pregnant women in northeastern Ethiopia similarly found that poor dietary practice and poor dietary diversity were associated with undernutrition [10]. Evidence from northwest Ethiopia also indicates that food security, attitudes, and access to food production are associated with appropriate dietary practices among pregnant women [12]. These findings support the need to address both dietary behavior and the socioeconomic conditions that influence women's ability to obtain adequate and diverse foods.

The qualitative findings complemented the quantitative results by showing that women were generally aware of recommended dietary practices, but poverty, food insecurity, limited access to diverse foods, and cultural restrictions constrained their ability to adopt healthier diets during pregnancy. Similar barriers have been reported among pregnant women in Ethiopia, where lack of nutrition knowledge, cultural food prohibitions, and gaps in nutrition counselling were identified as factors affecting dietary practices [12]. These findings suggest that nutrition education should be accompanied by interventions that improve access to diverse foods, strengthen food security, and address context-specific cultural barriers.

Overall, the findings indicate that improving maternal nutritional status in Garowe IDP camps requires an integrated approach. Nutrition education and counselling should be strengthened alongside interventions that improve access to diverse and nutritious foods, micronutrient supplementation, food security, and quality antenatal nutrition services. Such interventions should be adapted to the socioeconomic and humanitarian circumstances of internally displaced pregnant women.

6. CONCLUSION

This study assessed the influence of maternal nutritional knowledge and dietary practices on the nutritional status of pregnant women attending antenatal care in internally displaced persons (IDP) camps in Garowe, Somalia. The findings revealed a high prevalence of maternal undernutrition (75.0%) and anemia (95.0%), indicating that maternal malnutrition remains a major public health concern in the study area. Maternal nutritional knowledge was significantly associated with nutritional status, while dietary practices showed a significant association in the bivariate analysis but not after adjustment. These findings suggest that improving maternal nutrition requires integrated interventions that strengthen nutrition education, promote healthy dietary practices, and improve access to diverse foods, micronutrient supplementation, and quality antenatal nutrition services.

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