

Under Nutrition and Associated Factors among Pregnant Women at ANC Clinic, Nigist Eleni Mohammad Memorial General Hospital, Hossana, Southern Ethiopia

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ABSTRACT

Objective: To assess the magnitude of under nutrition and associated factors among pregnant women.

Methods: Hospital based cross-sectional study was conducted from March, 1 to April 30, 2015, at ante natal care, Nigist Eleni Mohammed Memorial General Hospital. A total of 211 pregnant women who visited ante natal care services were selected using systematic sampling methods. Data was collected using a structured interviewer administered questionnaire. Mid upper arm circumference was measured using adult mid upper arm circumference tape. The data was edited, coded manually and entered into EPI data version 3.2.1 and analyzed using SPSS version 20.0 software. Predictors of under nutrition were identified using multi variable logistic regression models. P values<0.05 were considered for statistical significance.

Results: A total of 211 participants were interviewed giving response rate of 100% and 24.6% of the pregnant women were undernourished. Frequency of meal consumption less than three times per day (AOR=2.60 (95% CI: 1.04-6.54)), earning monthly income of greater than two thousand Birr (AOR=0.319 (95% CI: 0.11-0.90)) and having dietary diversity scores of less than five (AOR=12.39 (95% CI: 2.61-58.92)) were predictors of under nutrition.

Conclusion: Large proportions of women were undernourished in the study area. Enhancing intervention of maternal nutrition during pregnancy, focusing on diversification of diet and importance of having additional meal during pregnancy through health extension workers and women's development army is essential to curb the problem of maternal malnutrition.

Keywords: Under nutrition, Hosanna, Pregnant woman

INTRODUCTION

Appropriate levels of nutrients are essential for proper physiology of human being. Nutrition is a vital part of human life and its need differs with age, gender and physiological changes such as pregnancy [1].

Under nutrition is when the body contains below normal level of one or more nutrients, i.e., shortages in macro nutrients and/or micro nutrients. 'Under nutrition includes stunting, wasting and lack of essential vitamins and minerals (collectively referred to as micro nutrients) [2-4].

The incidence of dietary inefficiencies as a consequence of dietary habits and patterns in pregnancy is higher during pregnancy than at any other stage of the life cycles [1].

Insel and Wardlaw defines good nutrition is critical during child bearing years and the health and nutritional habit of woman in the years before pregnancy and while she is

planning to be pregnant or has the potential of becoming pregnant is particularly important [5].

Maternal under nutrition may dispose mothers to poor well-being including infection, preeclampsia/eclampsia and adverse pregnancy consequences such as preterm birth and intrauterine growth retardation [6]. Pregnant women are mainly susceptible to nutritional inefficiencies because of

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improved metabolic needs to be imposed by pregnancy including developing placenta, fetus and maternal tissues, joined with associated dietary risks [1].

Although pregnancy is considered to be normal physiological incident for most African women, it is a serious situation because of reduced quality of diet ads to the extensive energy and micro nutrient shortages [7]. Pregnancy places extra demand on the body systems of pregnant women, necessitating optimal intake of essential nutrients. Maternal diets during pregnancy have gained a lot of attention over the years. This is due to the increased physiologic, metabolic and nutritional demand placed on pregnant women by her gravidity. The dietary intake of pregnant woman requests to provide energy and nutrient for the mother [8].

Pregnancy increases energy needs by 13%, protein by 54% and vitamin and mineral by 0-50%. Research has also proven that, 30,000 kcal (336 MJ) are essential to produce a baby, increase placenta size and reproductive organs, yield energy for newly formed tissues and produce extra fat stores in the mother [5,9].

Inappropriate dietary practices characterized by reduced dietary intakes, reduced consumption of meals and insufficient intake of fruits and vegetables among pregnant women yielded to under nutrition [10]. Pregnant women need beneficial food for the fetus to mature well if not, the result will lead to underweight [11]. For healthy pregnancy, continuous supply of micro nutrients is essential for both mother and growing baby.

Majority of recent research has proven that from beginning, having right balance of key micro nutrient is appropriate to insure long term health of mothers and their infants [11,12].

Study on magnitude of under nutrition, factors independently associated with under nutrition is scarce in Ethiopia. There is no study done in Nigist Eleni Mohammed Memorial general Hospital regarding magnitude of under nutrition, factors significantly associated with under nutrition.

Therefore, our study aimed to show rate of magnitude of under nutrition as well as factors associated with under nutrition at ANC clinic of NEMMGH.

Although there are studies on maternal under nutrition, they have not included factors like household food security status, meal pattern and dietary diversity. This study will fill the knowledge gap concerning maternal under nutrition to some extent and will serve as base line information for researchers, policymakers and planners to design appropriates interventions related to maternal under nutrition in the study area.

METHODS AND MATERIALS

Study area

It was conducted in Nigist Eleni Mohammed Memorial General Hospital ANC clinic, it is government funded hospital located at 230 and 194 km away from the capital city in Ethiopia (Addis Ababa) and SNNPR (Hawassa), respectively. The Hospital currently is in transition period to be Wachemo university hospital which is serving in four majors clinical fields, i.e., Internal medicine, pediatrics, surgery and gynecology. There are also some minor specialized field like dental care service, ophthalmology, dermatology services. This hospital also renders MCH related services including EPI, PNC, FP and ANC services in separate room. Currently the hospital is serving more than one million people.

Study design and period

Hospital based cross-sectional study was conducted from March, 1 to April 30, 2015.

Sample size determination and sampling technique

Sample size determination: Sample size was determined using a formula for estimation of single population proportion with the following assumptions:

Where, n =sample size

Z =standard normal variable value corresponding to 95% level of significance=1.96

P =expected proportion of under nutrition during pregnancy=19.8%=0.198

$Q = (1-p) = (1-0.198) = 0.802$

d =Margin of sampling error tolerated (absolute precision) (5%)

None response rate=10%

Therefore, $n=244$

$N=920$

Since my target population is less than 10,000, correction formula was employed to calculate the final sample size.

$NC = n/1 + n/N = 244/1 + 244/920 = 192$

When 10% contingency is added to the total sample size, the final sample size becomes 211.

Assumption: $P=19.8\%$ [13].

Sampling technique: A systematic sampling technique was implemented to select pregnant women and to be included in the study. By dividing the potential number of ANC attendants during the study period ($N=920$) by the sample size ($n=211$) a sampling interval K of 4 was obtained. Therefore, every k women coming to ANC service was included in the study.

Study population

Sampled pregnant women who visited Nigist Eleni Mohamed Memorial General Hospital during data collection period.

Data collection

Trained nurses/public health professionals whom can speak native language collect data from the mothers using a structured questionnaire. The principal investigator supervised the data collection procedure. The structured questionnaire generated information on the socio-demographic and economic factors, dietary and reproductive factors.

Anthropometric measurements: Maternal anthropometric measurements were done according to the standards. MUAC of pregnant woman was measured at mid-point between the tip of the shoulder (olecranon process) and tip of the elbow (acromion process) of left arm. An adult MUAC tape that was non-elastic and non-stretchable was used to take measurements, after checking that the tape was applied with correct tension (not too loose or not too tight). The MUAC of woman was read and documented to nearest 0.1cm. MUAC measurement was performed by clinical nurse/public health professional following standard instructions and steps. A range below 22 cm was an indicator of under nutrition and a range of >22 cm was for normal nutritional status.

Methods for assessing food consumption of individual:

24 h recall method: The purpose of assessing dietary intake was to evaluate nutritional quality of the diet. 24 h recall dietary method provides quantitative information on food intake. Nine lists of food groups were used to assess the 24 h recall [14]. A score of 1 was given for those who responded 'yes' and a score of zero was given for those who responded 'no' for food groups listed. Finally, those who got DDS score of less than 5/9 were classified as having less diversified diet and those who got score of >5/9 were classified as having well diversified food.

Household food security status: The household food insecurity statuses of the respondents were assessed with HFIAS using nine questions adapted from FANTA guideline. The HFIAS contains two types of related questions. The first question type was called an occurrence questions. There were nine occurrence questions that ask whether a specific condition associated with experience of food insecurity ever occurred during the previous four weeks (30 days). Each severity question was followed by frequency of occurrence question, which asks how often a reported condition occurred during the previous four weeks. Each occurrence question consists of time frame for recall, body of question, and two response options (0=no, 1=yes). There is also a 'skip code' next to each "no" response option. This code instructs the enumerator to skip the related frequency-of-occurrence follow-up question whenever the respondent

answers "no" to an occurrence questions. Each HFIAS frequency of occurrence question asked respondent how often the condition reported in the previous occurrence question happened in the previous four weeks. There are three response options representing a range of frequencies (1=rarely, 2=sometimes, 3=often). Finally, those respondents who were coded as (1) and (0) were categorized as food insecurity and food security, respectively [15].

STATISTICAL ANALYSIS

Data were coded and cleaned with Epi-Data version 3.1 and were analyzed by SPSS for window version 20.0. Descriptive statistics like frequency, mean and standard deviation were implemented. Inferential statistical test like bi variable and multi variable logistic regression analyses were performed.

Bi variable and multi variable backward logistic regression were done to identify factors associated with under nutrition. Before running multi variable logistic regression, multi-collinearity between independent variables was checked in linear regression by variance inflation factors (VIF). Variables which had significant association at p-value <0.25 in the bi variable logistic regression models were candidate for multi variable logistic regression. The model fitness for the variables was assessed by the Hosmer-Lemeshow goodness of fit test. P-value of less than 0.05 was considered as independently associated in the multivariable analysis.

ETHICAL APPROVAL

Ethical clearance was obtained from Jimma University Ethical Review Committee and official permission letter to conduct study was obtained from Nigist Eleni Mohamed Memorial General Hospital administrators. Verbal informed consent was taken from each studying subject after clear orientation of study objective. Confidentiality of the information was also assured and collected anonymously.

RESULTS

Socio-demographic and economic factors

Out of 211 sampled pregnant women to be included in the study, all of them responded to questionnaire making response rate of 100%. The mean age ($\pm$ SD) of participants were 28 ($\pm$ 1.98) years, while age of participants range from 24 to 34 years.

Considering educational and occupational status of women, 15 (7.1%) of participants were illiterate and 113 (53.6%) of participants were housewife, respectively.

98 (46.4%) of respondents earn income from formal employment, 89 (42.2%) engaged in business, 18 (8.5%) from farming and 6 (2.8%) from other sources.

Regarding monthly income of women, 86 (40.8%) of participants were with an estimated monthly income of less than one thousand Ethiopian Birr (**Table 1**).

Table 1. Socio-demographic and economic factor among pregnant women at ANC clinic in NEMMGH, Hosanna, from March 1-April 30, 2015, (N=211).

Variables	Frequency	Percent
Age in years		
15-24	180	85.3
25-34	31	14.7
Marital status		
Married	209	99.0
Separated	1	0.5
Widow	1	0.5
Educational status of women		
Illiterate	15	7.1
Primary	56	26.5
Secondary	70	33.2
Diploma and above	70	33.2
Occupational status of women		
Government Employee	64	30.3
Housewife	113	53.6
Business	26	12.3
Other	8	3.8
Occupational status of husband		
Government Employee	94	44.5
Business	91	43.1
Farmer	14	6.6
NGO	12	5.7
Religion		
Muslim	23	10.9
Protestant	135	64.0
Orthodox	42	19.9
Catholic	10	4.7
Any other	1	0.5
Family size		
1-4	129	61.1
>=4	82	38.9
Main source of household income		
Formal employment	98	46.4
Business	89	42.2
Farming	18	8.5
Other (casual labor, petty trade)	6	2.8
Respondent monthly income		
<1000	86	40.8
1000-2000	50	23.7
>2000	75	35.5

Reproductive and dietary factors

14 (6.6%) of study participants had four and above pregnancies before current one and 77 (36.5%) of study participants had never been pregnant.

174 (82.5%) of study participants never experienced birth interval of less than two years and only 37 (17.5%) experienced birth interval of less than two years.

With regard to trimester of pregnancy, 99 (46.9%) of study participants were in second trimester of pregnancy. Majority of respondents, 180 (85.3%) normally consumed greater than three meals per day. 181 (85.8%) of study participants were food secured. 144 (68.2%) of study participants scored DDS of less than five (**Table 2**).

Table 2. Reproductive and dietary factors among pregnant women at ANC clinic in NEMMGH, Hosanna, from March 1-April 30, 2015, (N=211).

Variables	Frequency	Percent
Number of previous pregnancies before the current one		
None (0)	77	36.5
One-four	120	56.9
>four	14	6.6
Any birth interval of <2 years		
Yes	37	17.5
No	174	82.5
Trimester of pregnancy		
First	43	20.4
Second	99	46.9
Third	69	32.7
Number of meals/day		
Less than three meals	31	14.7
Greater than three meals	180	85.3
History of nausea or vomiting		
Yes	104	49.3
No	107	50.7
Prenatal dietary advice		
Yes	94	44.5
No	117	55.5
Household food security		
Food secures	181	85.8
Food insecure	30	14.2
Dietary diversity scores		
DDS<5	144	68.2
DDS ≥ 5	67	31.8

Magnitude of under nutrition

The overall prevalence of under nutrition in this study was 52 (24.6%).

Predictors of under nutrition

The bivariate logistic analysis showed that educational status, family size, source of income, monthly income, frequency of meal consumption per day, previous

pregnancy, food secure and DDS were associated with under nutrition. However, other factors like age, marital status, occupational status of husband and women, religion, birth interval, trimester of pregnancy, prenatal dietary advice, history of nausea and vomiting did not show any significant association with under nutrition (**Table 3**).

Table 3. Results of binary and Multi variable logistic analysis indicating predictors of under nutrition among pregnant women at ANC clinic in NEMMGH, Hosanna, from March 1-April 30, 2015 (N=211).

Variables	Under Nutrition		COR (95% CI)	AOR (95% CI)
	Yes	No		
Educational status				
Illiterate	7	8	1	1
Primary	25	31	0.92 (0.29-2.89)	1.78 (0.47-6.72)
Secondary	10	60	0.19 (0.06-0.64)	0.63 (0.15-2.62)
Diploma and above	10	60	0.19 (0.06-0.64)	1.01 (0.22-4.62)
Family size				
1-4	28	101	0.67 (0.36-1.26)	0.65 (0.24-1.82)
>=4	24	58	1	1
Main source of income				
Employment	15	83	1	1
Business	29	60	2.67 (1.32-5.42)**	1.61 (0.68-3.83)
Farming	7	11	3.52 (1.18-10.53)*	1.59 (0.41-6.14)
Other (petty trade, daily labor)	1	5	1.11 (0.12-10.15)	0.75 (0.05-12.63)
Monthly income				
<1000	27	59	1	1
1000-2000	17	33	1.13 (0.54-2.36)	0.80 (0.34-1.92)
>2000	8	67	0.26 (0.110-0.62)**	0.32 (0.11-0.90)**
Number of meals				
<3	17	14	5.03 (2.27-11.17)***	2.60 (1.04-6.54)*
>=3	35	145	1	1
Previous pregnancies				
None	18	59	0.31 (0.09-0.99)*	0.79 (0.13-4.83)
1-4	27	93	0.29 (0.09-0.90)*	0.43 (0.10-1.83)
>4	7	7	1	1
Household food security				
Food secured	40	141	0.43 (0.19-0.96)*	0.64 (0.21-1.92)
Food insecure	12	18	1	1
DDS				
<5	50	94	17.29 (4.06-73.57)***	12.393 (2.61-58.92)*
>=5	2	65	1	1

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

Variables with p -value < 0.25 like source of income, previous pregnancy, number of meals per day, monthly income, household, food security and DDS entered multi variable logistic analysis.

Frequency of meal consumption less than three times per day, earning monthly income of greater than two thousand Ethiopian birr (ETB), and having dietary diversity scores

(DDS) of less than five were factors independently associated in multivariate logistic regression analysis.

The result of multi variable logistic regression showed that pregnant women who had frequency of meal consumption less than three times per day were 2.60 times more likely to develop under nutrition as compared to pregnant women who had meal consumption greater than three times per day, (AOR=2.60 (95% CI (1.04-6.54)). Moreover, pregnant

women who earned monthly income greater than 2000 ETB decreased risk of under nutrition by 0.68 times as compared to those who earned monthly income less than 1000 ETB (AOR=0.32 (95% (0.11-0.90)).

Participants who had DDS less than five were 12.39 times more likely to increase under nutrition as compared to those who had DDS greater than 5 (AOR=12.39 (95% CI (2.61-58.92)) (Table 3).

DISCUSSION

In this study MUAC, 24 h dietary recall method and household food insecurity access scale were used to measure the magnitude of malnutrition and as indicator of nutritional status, to assess the quality/diversity of food, to assess household food insecurity among pregnant women.

Our result revealed that 24.6% of pregnant women were undernourished. The magnitude of under nutrition observed in this study was greater than study conducted in eastern Ethiopia (19.8%) [13] and southern Ethiopia (9.2%) [9]. This difference might be due to sample size difference, geographical and feeding style differences between populations in the studies. But it is consistent with finding from study conducted in Zimbabwe where significant number of respondents (76%) had MUAC equal or greater than 22 cm and only 24% had MUAC less than 22 cm [5].

Pregnant women who consumed meal less than three times per day were two times more likely malnourished than those who consumed meal for greater than or equal to three times. This is in line with World Health Organization [16] recommendation that pregnant women consume at least three meals per day with two snacks to meet increased caloric demands during pregnancy. Having less frequent meals could lead to inadequate intake of essential nutrients which finally, causes under nutrition.

The income status was an indicator of access to adequate food supplies which is main determinant of maternal nutritional status. Lower risk of under nutrition was observed among women who had monthly income of greater than two thousand Ethiopian birr in present study. This is not in line with study done in East Wollega zone, Ethiopia in which respondent's monthly income greater than two thousand Ethiopian birr was risk factors for under nutrition [1]. This discrepancy might be due to difference in control of income within household. As this study was done in the cash crops area where most of income might be controlled by men as opposed to the study area where there are no cash crops and usually men tend to spend cash mostly on non-food items.

Low dietary diversity among pregnant women was one of the factors contributing to under nutrition. In this study women who had dietary diversity scores less than five was twelve times more likely be malnourished than those women who had dietary diversity scores greater than five. This

finding is in line with reports of a study conducted in Pakistan [17] among pregnant women. It was assumed that for an increase of dietary diversity by one, pregnant women gained 0.24 kg in second trimester and 0.71 kg gain in third trimester. For an increase of one dietary diversity scores, they will gain 0.02 Kg/week. This could be due to the fact that as pregnant woman get diversified diet, they will be well nourished that will directly have beneficial role in breaking inter-generational cycle of malnutrition.

Although national nutrition program, millennium development goals and national nutrition strategy considers maternal nutrition during pregnancy to be a key factors in preventing inter-generational cycle of malnutrition, maternal and infant mortality, large proportion of pregnant women are still having under nutrition. The implication of under nutrition during the first 1000 days is far-reaching. Therefore, the findings called for strengthening the existing initiatives to combat the rate of under nutrition among pregnant women in the study area.

CONCLUSION

Large proportions of women were undernourished in the study area. Frequency of meal consumption less than three times per day, earning monthly income of greater than two thousand Ethiopian birr (ETB) and having dietary diversity scores (DDS) of less than five were factors independently associated with under nutrition of pregnant women. Different nutritional assessments methods such as 24 h dietary recall and household food security status among pregnant women were assessed according to the standard. Enhancing intervention of maternal nutrition during pregnancy, focusing on diversification of diet and importance of having additional meal during pregnancy through health extension workers and women's development army is essential to curb the problem of maternal malnutrition.

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