

## Under Nutrition and Associated Factors among Pregnant Women Attending Antenatal Care at Public Health Facilities on Bale Zone, South East Ethiopia

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### Abstract

**Background:** Under-nutrition during pregnancy has a major health consequence in pregnancy and beyond. To alleviate this problem, it is necessary to assess prevalence and associated factors of under nutrition among pregnant women. However, data on prevalence of under nutrition among pregnant women of study area is dearth and unconvincing. Therefore, the aim of this study was to assess prevalence of under nutrition and associated factors among pregnant women who were attending antenatal care at Public health facilities in Bale Zone, Southeast Ethiopia

**Methods:** Facilities based cross-sectional study design was used to assess the prevalence under nutrition and associated factors among randomly selected pregnant women from February to June, 2017. The sample size was calculated by a single population proportion formula. A systematic random sampling technique was employed to select 419 pregnant women. A pre-tested structured interviewer-administered questionnaire was used to collect socio demographic characteristics, dietary habits and pregnancy related trimesters (I, II & III). Mid upper arm circumference (MUAC) was used to assess under nutrition. A logistic regression analysis was carried out to identify factors associated with under nutrition. In the multivariate analysis, variables with P-value of <0.05 were considered statistically significant.

**Result:** The prevalence of under nutrition among pregnant women in the study area was 26.7%. Variable such as Family income <500 .2; 95 % CI (2.6-3.3), Inadequate dietary diversity (<4) 2.4; 95 % CI (3.4-6.1), Age (18-24) [AOR=1.5; 95 % CI (3.2-7.2)] was independently factors for under nutrition, While Having home garden.43; 95 % CI (.93-.70) protective factors for under nutrition

**Conclusion:** Prevalence of under nutrition among pregnant women in the study area was high. Attention should be paid for Variables that contribute of better living condition such as, having home gardening; further programs should be designed and implemented to address factors that determine dietary diversity of pregnant women. Nutritional education of pregnancy by a health professional is also essential in order to aware mothers on the importance of diversified diet consumption.

**Keyword:** Under nutrition, Associated factors, pregnant women, Bale Zone

**Abbreviations:** AOR: Adjusted Odd Ratio; Cm: Centimeter; MUAC: Mid-Upper Arm Circumference

### Introduction

Nutrition is basic pillar of human life, health and development across the lifespan. Proper food and good nutrition are essential for survival, physical growth, mental development, performance and productivity, health and well-being. It is an essential foundation of human and national development. For this reason everybody is expected to get good nutrient, especially during pregnancy<sup>[1]</sup>.

Good nutrition is vital for pregnancy and not only helps an expectant mother remain healthy, but also impacts the development of the fetus and ensures that the baby thrives in infancy and beyond. Pregnancy is a critical time for fetus as nourished

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directly by the mother through placenta, so the pregnant woman should be getting an adequate and well-balanced to preserve sufficient energy intake for adequate growth of fetus without drawing on mother's own tissues to keep her pregnancy<sup>[2]</sup>.

Malnutrition affects all age groups across the entire life span. From conception, throughout the fetal period and into early infancy, nutrition has a profound influence on growth, development, morbidity, and mortality. Health implications range from intrauterine brain damage and growth failure through reduced physical and mental capacity in childhood to an increased risk of developing diet-related non communicable diseases later in life<sup>[1]</sup>.

Maternal Under nutrition which is happen as result of macro nutrient or micronutrient deficiencies are causes intra-uterine growth retardation (IUGR), infant and neonatal mortality, abortion and poor cognitive development which is lead to poor educational capability and performance and the effect of this early damage on health, brain development, is largely irreversible<sup>[3-6]</sup>.

Maternal under nutrition has transfer from one generation to the next because malnourished pregnant women give to malnourished infants. These malnourished infants will be developed into malnourished mothers and the vicious cycle continues which are results in decreased resistance against infections, and lack of physical strength of the child, poor physical and mental development as well as incalculable loss of human potential and threat to the social and economic development of countries<sup>[7]</sup>.

Maternal malnutrition which includes chronic energy and micronutrient deficiencies accounts for 11% of the global burden of disease<sup>[8]</sup>. It is highly prevalent in developing countries where it ranges from 10% to 19%, which is resulting in substantial morbidity and mortality to pregnant women.

In low and middle income countries pregnant women are vulnerable to under nutrition due the physiological vulnerability. Besides to this, socio-economic factors such as low dietary intakes, low family income, inequitable distribution of food within the household, low educational level, culture and work over load in the house hold may causes under nutrition among pregnant women<sup>[9]</sup>.

It has been demonstrated that under nutrition pregnant women produce less breast milk than the adequately nourished pregnant women, which adversely affects the nutritional status of infants. In addition, the quality of breast milk is affected by maternal deficiencies of nutrients which can adversely affect the nutritional status of their child and in long run compromises the overall growth and development of the child<sup>[10]</sup>.

Many African women consume less than the recommended daily caloric intake and it is estimated that 27-51 percent of women of reproductive age are under nutrition. Even though, Pregnant women in industrialized countries gain on average twice as much as pregnant women.

Ethiopia is one of most food-insecure countries, where approximately one in three persons live below the poverty line<sup>[9]</sup> and the second highest rate of malnutrition<sup>[10]</sup>. According to the Ethiopian demographic and health survey (EDHS) in 2011 reported about 27% of women aged 15-49 years were undernourished<sup>[11]</sup>. According to the study by the Ethiopian Ministry of Economic Development and Cooperation, reported 50% of the Ethiopian population are living below the food poverty line

and cannot meet their daily minimum nutritional requirement of 2,200 calories<sup>[12]</sup>. To address this problem the government of Ethiopian had developed a long term National Nutrition Strategy .This program was divided into two phases on for detailed assessment of problems and issues for the implementation (Federal Ministry of Health of Ethiopia, 2010). So the National Nutrition Program (NNP) was developed for the implementation of this strategy by Ministry of Health of Ethiopia collaborating with partner organizations aiming to reduce the level of malnutrition amongst under five children, pregnant and lactating mother (Federal Ministry of Health of Ethiopia, 2010). Despite these efforts the area under study was not completely covered and hence the under-nutrition is still high. Therefore, this study was aimed at determining prevalence under nutrition and its risk factors among pregnant Mothers in attending antenatal care in Bale Zone, South east Ethiopia.

## Method and Materials

### Study design and study setting

Facilities based cross-sectional study was conducted in Bale Zone Southeast Ethiopia in 2017. The Zone is found in Oromia Regional State at 430 km away from Addis Ababa the capital city of Ethiopia. The main sources of food include cereal crops, fruit, vegetable and animal products According to the Bale Zone Finance and Economic Development 2017 Report, the total population of zone is 1,757,383 and out of these females were 896, 265. The ANC coverage was 64%.The study period was from January-March, 2017

### Study Population and Sampling Procedures

The study population consists of pregnant women who are attending antenatal care in selected health facility during the data collection period. The sample size was determined using a single population proportion by using assumption: 95% level of confidence, margin of error of 0.05, proportion of 50% and non-response rate: 10%, the final sample sizes became 422. Then the study subjects were selected using systematic random sampling.

### Data Collection tool and Data quality control

To ensure consistency, the English version of the questionnaire was translated into Afan-Oromo (the native language of the study area) and then back translated to English by English language and public health experts. The variables addressed in this study were socio demographic, feeding habit and pregnancy related trimesters (I, II& III). Data were collected using structured interviewer-administered questionnaire for the interview, nutritional status of pregnant women assessed by MUAC. The measurement of Mid-Upper Arm Circumference (cm) of the pregnant women < 21cm and ≥ 21cm is considered as under nutrition and adequate nutritional status respectively<sup>[13]</sup>.

A total of five data collectors and one supervisor (health officer) were recruited and participated in the study. Data were collected after they had been taking training. The training mainly focused on equipping the trainees on the objective of the study, technique of interview, collection of samples, and maintaining of ethical issues. All questioners were regularly checked for completeness, clarity, and consistency by the field supervisor. Furthermore the data collection tool was pretested on 5%

of the study subjects out of the selected health facilities. During the pretest, the acceptability and applicability of the procedures and tools were evaluated. More over during data collection field supervisors were checked the consistency and completeness of collected data in the field & on the daily basis. Furthermore, the investigators coordinated the overall data collection activities

**Data processing and analysis**

After each questionnaire was checked for completeness, the data were entered to Epi Info version 7 statistical package and then transferred to Statistical Package for Social Sciences (SPSS) version 21 for analysis. Descriptive statistics, including frequencies and proportions were used to summarize variables. A bivariate analysis was applied to see the crude effect of each independent variable on under nutrition. Variables with P-values of < 0.2 bivariate were entered into the multivariable logistic regression analysis. Both Crude Odds Ratio (COR) and Adjusted Odds Ratio (AOR) with a corresponding 95% Confidence Interval (CI) were computed to show the strength of the association. In the adjusted analysis, a P-value of <0.05 was used to declare statistical significance

**Socio demo graphic characteristics**

Results from the total 422 recruited pregnant women only three of them were refused to participate in the study, making the response rate was 99.5%, and Mean age of the participants was 26.7 with standard deviation of (SD ± 5.2) years. Half of study participants were found between ages of 25 - 34years.

The majority of the respondents were Oromo in ethnicity (73%) and Muslim (55.5%) in religion. About 254 (60.6%) were literate and more than half, 139 (33.2%) were housewives. More than half participants 280 (58.9) were living in a families with more than five people. About 131 (31.3%) of pregnant women had their monthly income<500 ETB (Table 1).

**Table 1:** Socio demographic characteristic of pregnant women attending antenatal care at public health facilities in Bale Zone, southeast Ethiopia, 2017 Ethiopia, 2017(n=419)

Variables		Frequency	Percentage
Age in years	18-24	183	43.7
	25-34	211	50.4
	>=35	25	6.0
Marital status	Married	404	96.4
	Divorced	11	2.6
	Widowed	4	1.0
Religion	Orthodox	150	35.8
	Muslim	234	55.8
	Protestant	35	8.4
Ethnicity	Oromo	306	73.0
	Amhara	83	19.8
	Tigre	17	4
	Gurrhage	9	2
	Kembata	8	1.2
Educational status	No formal education	165	39.4
	Literate	254	60.6

Occupational status	Housewife	209	50
	Government employee	130	31
	Merchant	50	12
	Laborers	30	7
Family size	< 5	172	41.1
	> 5	247	58.9
Income ETB**	< 500	131	31.3
	500-1500	150	35.8
	>500	44	10.5
	Unknown	94	22.4

\*\* Ethiopian birr

**Obstetric history, and level of Hgb , nutritional status and dietary diversity**

Out of the total 187 (44%) were second trimester. About 240 (73.3%) pregnant women were MAUC >21cm. However, 26.7% was undernourished (MUAC < 21). The majority of the study population had normal hemoglobin >= 11 g/dl. Nearby 100% of the Respondents were a height greater than or equal to 145cm. More than two-third 281 (67%) pregnant women ate inadequate dietary diversity in community. About 221 (52.7%) of pregnant women were ate 3-4 regular meals per day, while only 8.6% of them eat more time 5 times per day. More than three –fourth pregnant women had had home gardening for fruit and vegetables.

**Table 2:** Obstetric History, and Level of Hgb , Nutritional Status and Dietary Diversity Pregnant Women in Attended Antenatal Care at Public Health Facility in Bale Zone Southeast Ethiopia (n=419)

Variables	Frequency (%)		
Trimester	1	176	42.0
	2	187	44.6
	3	56	13.4
parity	<2	177	42.2
	>=2	242	57.8
MUAC	<21cm	114	26.7
	> 21cm	305	73.3
Hgb	<11ml/dl	104	24.8
	>11ml/dl	315	75.2
Height in cm	< 145.0 cm	6	1.4%
	> 145.0 cm	413	98.6
Dietary diversity	<4	281	67.1
	>4	138	32.9
Information about nutrition during pregnancy	Yes	291	69.3
	No	138	31.7
Do you avoid any food or diet in the current pregnancy	yes	43	
	no	376	
What is your current diet frequency of meal per day?	1-2	164	39.1
	3-4	221	52.7
	>5	34	8.1
Availability of home grading	yes	332	79
	no	87	21

MUAC: mid-upper arm circumference

### Factors associated with under nutrition in logistic regression analysis

Logistic regression analysis was computed to identify predictors of under nutrition among pregnant women. The Variables such as Family income, 500ETB, MUAC < 21mm, inadequate dietary diversity, having home garden having, intestinal parasite and age of pregnant women had P-value less than 0.2 in bivariate regressions were exported to a multivariable regression. Then, in the multivariable logistic regression analysis variable such as having Family income < 500 ETHB, inadequate dietary diversity, age between 18-23, MUAC <21cm at 95% confidence interval had association with under nutrition among pregnant women (Table 3).

**Table 3:** Factors Associated with Under Nutrition in Logistic Regression Analysis Among Pregnant Women Attending Antenatal Care In Public Health Facilities in Bale Zone South east Ethiopia 2017 (n=419).

Variables		Under nutrition		Crude OR (95% CI)	Adjusted OR (95% CI)
		Yes	No		
Family income	<500	27	96	.862(.5-1.6)	1.2(2.6-3.3) **
	500-1500	36	103	.530(.3 - 1)	.8(.17 -1.4)**
	>1500	14	35	1	1
Having home garden	Yes	95	268	.478(.305-.75)	.43(.93-.70)**
	No	11	39	1	1
Dietary diversity	<4	67	161	1.95 (1.3-2.9)	2.4(3.4-6.1)**
	>4	39	146	1	1
age	18-23	44	122	.568 (.24-1.3)	1.5(3.2-7.2)**
	24- 30	31	103	1.1(.44- 2.5)	.9(.34-2.32) *
	31-36	24	63	.92(.38-2.28)	.9(.31-2.3) *
	>=37	7	19	1	1

\*\* : p> 0.05 Have association; \* : p< =0.05 no association

### Discussion

The current study tried to reveal the prevalence of under nutrition and its associated factors among pregnant women in Bale Zone South east Ethiopia. The prevalence of under nutrition (MUAC < 21) among pregnant mothers in this study was 26.7. The finding was in line with what was reported from Kenya which was 31.7%<sup>[15]</sup>, reported from Gambella, Ethiopia 28.6%<sup>[16]</sup>, reports from West Arsi 34%<sup>[17]</sup>. But prevalence of under nutrition among pregnant in this study was far below the prevalence reported from Kersa Arsi, Ethiopia, 47.3%<sup>[18]</sup>, study conduct in among pregnant women in Southern Nations, Nationalities and peoples region(SNNPR) from Kenya which was 71.1%<sup>[14]</sup>.

In this study, nearly 88.9% and 75% of the pregnant women had consumed cereal, and legumes respectively in the previous 24 hours and. on the contrary, only 8.2% of them consumed fish and fish product of food group in the previous 24 hours. This finding is almost consistent with the finding of other studies conducted in Laikipia, Kenya<sup>[19]</sup> and Southern Ethiopia<sup>[20]</sup>. Furthermore, many studies in developing countries have documented that whose diet is predominantly cereal based<sup>[21]</sup>.

Pregnant women who had home gardening were 60% less likely to have under nutrition when compared with pregnant women who had no home gardening. This study agreed with studies conducted in different parts of Ethiopia<sup>[22,23]</sup>. These studies have demonstrated that home gardening was associated with diet diversity and with frequency of vegetable consumption. This might be due to the reason that households with gardens were beneficiary from gardens they own as a means to diversifying their daily food. It was also indicated that parents with home gardening would grow vegetables and get additional diet options that enhance the diversity of the household's food sources. This study agreed with studies conducted in Northern Ethiopia, Nepal and Philippines<sup>[22]</sup> that dietary diversity scores were significantly higher among households with gardens. In addition, households with home gardens were diversifying their daily food for consumption because they are easily getting it

In the current study, about (67%) of pregnant women were consumed < 4 food groups (low dietary diversity), in the last 24 hour .This prevalence was higher than the study done in Laikipia, Kenya (61%) and Gondar, Ethiopia (16.2%) . This discrepancy might be due to difference in due social demographic factors. Low dietary diversity was also independently associated with under nutrition. Pregnant women who had low DDS were two times more likely to be undernourished when they were compared with pregnant women who had better DDS. This is consistent with the result of survey done in is also similar to the community based study done in eastern Ethiopia in which pregnant women who improved their eating habits had a 53% lower risk of under nutrition than who did not. The study done in Kenya also showed that pregnant women with better dietary diversity had greater macro- and micronutrient intake when compared to pregnant women with low DDS<sup>[24]</sup>.

This study has some limitations. Food frequency questioner, biochemical and measuring amount of food compositions and dishes were didn't use while assessing. Moreover, the nature of this study is cross-sectional study design, which does not show the cause and effect relationship.

### Conclusions

Prevalence of under nutrition among pregnant women in the study area was high. Attention should be paid for Variables that contribute of better living condition such as, having home gardening; further programs should be designed and implemented to address factors that determine dietary diversity of pregnant women. Nutritional education of pregnancy by a health professional is also essential in order to aware mothers on the importance of diversified diet consumption.

### Declarations

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**Author Contributions:** SH conceived and designed the study, performed analysis and interpretation of the data. SH, prepared the manuscript. EG critically reviewed the manuscript. All authors read and approved the final manuscript.

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**Competing Interests:** The authors declare that they have no competing interests

**Ethics approval and consent to participate:** Ethical approval was obtained from the Ethical and Review committee of the Mada Walabu University. A support letter from the University to the zonal health office and then communicated to health centers and hospitals. Health center and hospital managers wrote a letter for participants. Written consent was obtained from the participants. All participants had the right to withdraw from the study at any time, without any precondition or disclosure. Moreover, the confidentiality of information obtained was guaranteed by all data collectors and investigators using code numbers rather than personal identifiers and omitting the name of the respondents during the data collection procedure.

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