

Prevalence and Factors Associated with Anaemia Among Pregnant Women in Hossana Town, Southern Ethiopia: A Cross-Sectional Study

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ABSTRACT

Introduction: Anaemia during pregnancy is an important factor to maternal mortality, morbidity and poor foetal outcomes. It remains one of the utmost unresolved public health problems in developing countries, including Ethiopia. This study aimed to assess the prevalence and associated factors of anaemia among pregnant women in the public health facilities of Hossana Town, Southern Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 284 pregnant women using systematic random sampling from 1 to 30 April 2019. Face-to-face interviews and chart reviews were used to collect the data. Data entry was done using Epi Data 3.1, and data were exported to SPSS 24 for analysis. Both bivariate and multivariable logistic regression analyses were used to identify the associated factors at 95% CI.

Results: The overall prevalence of anaemia was found to be 75 (26.4%), among which 45 (60%), 28 (37.3%) and two (2.7%) were mild, moderate, and severe anaemia respectively. The factors associated with anaemia included maternal education (unable to write and read) (AOR = 5.1; 95% CI-1.3, 20.6), the lack of information about it (AOR = 2.3; 95% CI-1.2, 7.0), short birth interval (AOR = 2.6; 95% CI-1.1, 6.5), having history of heavy menstrual bleeding before the current pregnancy (AOR = 4.3; 95% CI-1.3, 14.0), did not eat food of an animal origin within a week (AOR = 3.2, 95% CI - 1.2, 8.9) and meal frequency of less than three times per day (AOR = 2.9; 95% CI - 1.2, 6.8).

Conclusions: The findings of this study indicate that anaemia is an unresolved public health problem in the study area. Pre-pregnancy counselling, dietary advice, and iron supplementation are recommended to avert anaemia during pregnancy.

Keywords: Anaemia; Prevalence; Pregnant women



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INTRODUCTION

Anaemia in pregnancy is defined as a haemoglobin concentration of less than 110 g/L at first and third trimesters (Less than 11 g/dL), and 10.5 g/dl in the second trimester in venous blood, and it is categorised as mild (10.0 – 10.9 g/dl), moderate (7.0 – 9.9 g/dl) and severe < 7 g/dl.¹ In 2016, the global prevalence of anaemia in pregnant women was 40.1%. However, it varies from region to region, with figures of 48.1% in South East Asia, 46.2% in Africa, 40.9% in Eastern Mediterranean, 33% in Eastern Pacific, 26.5% in Europe and 25.5% in America.² Iron deficiency is a major cause of anaemia globally.^{2,3} It is an important contributor to maternal mortality, morbidity and poor foetal outcomes.^{4,5}

Anaemia has significant consequences in the health of mothers and their children.² With regards to maternal health, the effects can include increased cardiovascular strain, reduced mental and physical performance, an increased risk of postpartum anaemia and postpartum haemorrhage, a lower ability to tolerate blood loss – leading to circulatory shock and effects on thyroid and immune functions.⁶⁻⁸ Furthermore, severe anaemia may require blood transfusion, particularly if there is also significant blood loss during delivery.⁹ Existing evidence shows that anaemia in pregnancy increases the risk of low birth weight, preterm delivery, increased perinatal and neonatal mortality, birth asphyxia, IUFD, intrauterine growth restriction as well as NICU admission.^{3,5,7,10-12} In addition, observational study indicates that iron deficiency leads to poorer cognitive, motor, and social-emotional function, as well as persistent neurophysiologic differences.¹³

The Ethiopian Government has developed a national nutrition programme to give comprehensive and routine nutritional assessments and routine iron and folic acid supplementation and deworming during pregnancy to improve the micronutrient deficiency among pregnant women.¹⁴ Despite this strategy, the issue of anaemia during pregnancy remains unresolved in Ethiopia. Various studies conducted in different places have revealed that the rates of anaemia during pregnancy and factors vary.¹⁵⁻¹⁷ Evidently probing the anaemia during pregnancy, it is important to conduct studies in various fields for identifying and designing

appropriate interventions to prevent the problem. Therefore, this study aimed to assess the prevalence and predictors of anaemia among pregnant women in the public health facilities of Hossana Town, Southern Ethiopia.

METHODS

This facility-based, cross-sectional study was conducted from 1 to 30 April 2019 in Hossana Town's public health facilities. The town is 194 km and 232 km away from Addis Ababa and Hawassa, respectively. The total reproductive age group was 25,709 and estimated pregnancy was 3,820 which constituted 3.5% of the population. According to the annual report of the town's health office, the physical health services coverage was estimated to be 100%.¹⁸ The town has one hospital, three health centres and eight urban health extension workers offices, which are all Government run. It has one hospital, 35 pharmacies, 22 primary clinics, 19 medium clinics, two dental clinics and two eye clinics, all of which are private-owned facilities. The study population were pregnant women attending an antenatal care unit in public health facilities during the study period, and the study samples were selected pregnant mothers from this group. Women who could not communicate were excluded. The sample size was determined using a single population proportion formula considering the following assumptions: a margin of error of 5% with a 95% confidence interval, the 25.5% prevalence of anaemia among pregnant women from a study done in Mizan Tepi, Ethiopia¹⁹ and a non-response rate of 10%. The final sample size then became 292. Systematic sampling was used to select the study participants, and all public health facilities in Hosanna Town were included (i.e. Wachemo University Nigist Eleni Mohammed Memorial Teaching Hospital, Hossana Health Centre, Bobicho Health Centre and Lich Amba Health Centre). The desired number of study participants was allocated proportionally for each health facility based on the flow of daily clients, which was estimated based on the previous month's client flow in each health facility. The K value ($k = 3$) was estimated by dividing the total number of pregnant women attending an antenatal care unit in public health facilities in the previous month by the sample size. The first mother was selected from 1 to 3 from the first day of the pregnant women attending an antenatal care unit using the lottery

Table 1. Socio-demographic Characteristics of the Respondents (n = 284)

Variables	Categories	Frequency	Percent
Age in years	18 - 22	94	33.1
	23 - 34	152	53.5
	≥ 35	38	13.4
Marital status	Married	277	97.5
	Other	7	2.5
Ethnicity	Hadiya	196	68.7
	Kambata	44	15.5
	Silti	19	6.7
	Amhara	13	4.6
	Gurage	12	4.2
Religion	Orthodox	32	11.2
	Protestant	218	76.8
	Catholic	6	2.1
	Muslim	28	9.9
Education status	Unable to read and write	44	15.5
	Primary level	176	62.0
	Secondary and above	64	22.5
Occupation of women	House wives	153	53.9
	Merchant	61	21.5
	Government employee	51	18
	Students	19	6.6
Size of household	≤ 3	44	15.5
	3 - 5	202	71.1
	≥ 6	38	13.4
Family monthly income in Ethiopian birr	< 2000	89	31.3
	2000 - 4500	135	47.5
	> 4500	60	21.1

Table 2. Pregnancy and Health related Characteristics of the Respondents (n = 284)

Variables	Categories	Frequency	Percent
Age at first delivery in year	≤ 18	29	10.2
	19 - 23	134	47.2
	≥ 24	121	42.6
Birth interval (n = 201)	Short birth interval	136	67.7
	Optimum birth interval	65	32.3
Place of previous delivery	Home	126	44.4
	Health institution	158	55.6
Trimester an interview	First trimester	98	34.5
	Second trimester	96	33.8
	Third trimester	90	31.7
Number of ANC visit	One-two times	136	47.9
	Three times	99	34.9
	Four times	49	17.2
Utilized contraceptive method	Yes	231	81.3
	No	53	18.7
Iron supplementation on current pregnancy	Yes	197	69.4
	No	87	30.6
History of heavy menstrual bleeding	Yes	29	10.2
	No	255	89.8
Heard about anaemia before pregnancy	Yes	232	81.7
	No	52	18.3
Had intestinal parasites	Yes	34	12.0
	No	250	88.0
Malaria attack in last one year	Yes	18	6.3
	No	266	93.7

method in each facility and preceded by adding the third one until the required sample size was achieved.

According to the average monthly report of the each facility, the average monthly ANC follow up of Wachemo University Nigist Eleni Mohammed Memorial Teaching Hospital, Bobicho Health Center and Lich Amba Health Centre and Hossana Health Centre were 486, 130, 134 and 150, respectively. Finally, 158, 42, 43, and 49 pregnant women were allocated for Wachemo University Nigist Eleni Mohammed Memorial Teaching

Hospital, Bobicho Health Centre and Lich Amba Health Centre and Hossana Health Centers, respectively.

The data were collected by face to face, interviewer-administered, structured questionnaires and reviewing the charts of the participants (to retrieve the lab results for haemoglobin and stool examinations). The questionnaire was adapted from related published research by considering the purpose of the study and local situation.^{15-17,19-21} The questionnaire comprised socio-demographic

Table 3. Nutritional Patterns and Prevalence of Anaemia among the Respondents (n = 284)

Variables	Category	Frequency	Percent
Meal frequency per day	< 3 times	52	18.3
	3 times	232	81.7
Frequency of taking vegetables	Daily	7	2.5
	2 – 3 / week	113	40.2
	4 – 6 / week	70	24.9
	Once / week	66	23.5
Frequency of taking fruits	Once / month	25	8.9
	Daily	27	9.5
	2 - 3 / week	93	32.7
	4 - 6 / week	63	22.2
	Once / week	54	19
Frequency of taking cereals	Once / month	46	16.2
	Never	1	0.4
	Daily	252	88.8
	2 - 3 / week	14	4.9
Taking food of an animal origin within a week	4 - 6 / week	16	5.6
	Never	2	0.7
	No	47	16.5
Drank coffee after meal	Yes	237	83.5
	Everyday	208	73.2
	Occasionally	72	25.4
Drank tea after meal	Never	4	1.4
	Everyday	94	33.1
	Occasionally	122	43
Anemia	Never	68	23.9
	Yes	75	26.4
	No	209	73.6

factors, obstetrics, medical characteristics and dietary intake information. All the laboratory investigations were done by laboratory technicians as part of their routine activity. Four midwives with diplomas and two with bachelor's degrees were recruited for data collection and supervision. To confirm the quality of the data, the questionnaire was translated into the local language and then translated back into English to check its uniformity. The questionnaire was pre-tested on 5% of the sample size in a Fonko Town, and the required adjustments were made based on the nature of gaps accepted in the questionnaire. Likewise, data collectors and supervisors were trained for a day by the investigators on the content of the questionnaire

and the ways to collect the data. Besides, the supervisors and the investigators closely observed the day-to-day data collection process during the pre-test and the actual data collection. Moreover, the filled questionnaire was collected and signed by the supervisor once it was checked for any omitted items and completeness. The EpiData version 3.1 software was used for data entry, and the SPSS version 20.0 was used for data analysis. Descriptive statistics, frequency, and proportions were computed to summarise the data. Both bivariate and multivariable logistic regression analysis were conducted to see the association between the outcome and explanatory variables. Variables that have a p-value ≤ 0.25 in bivariate analysis were entered into multivariable logistic regression to identify the independent effect of each explanatory variable on the outcome variable. At the end, p value ≤ 0.05 was considered statistically significant in the multivariable model with 95% CI. Hosmer and Lemeshow's goodness of fit test was used to assess whether the necessary assumptions were fulfilled. The Ethical letter was obtained from the Research Review Committee of Hossana Health Science College. Similarly, a permission letter was acquired from Hossana Town health office and respective administrative officials of each health facility. Informed written consent was sought from each study participant. The participants were told about the objective, procedures, possible risks, and benefits of the study. Moreover, the participants were ensured that rejection to consent or withdrawal from the study would not alter or put at risk their access to care.

RESULTS

Total 284 women were interviewed in this study, with a response rate of 97.2%. More than half (53.5%) of the mothers were between 20 to 34 years of age, with a mean (\pm SD) 27.2 (\pm 4.9) years. The majority of mothers, 277 in total, were married (97.5%). In regards to ethnicity, 196 (68.7%) were of Hadiya ethnicity. In regards to religion, 218 (76.8%) were Protestants. In regards to occupation, 153 (53.9%) were housewives. In terms of education, only 53 (18.7%) had completed secondary above education. The pregnancy and health related characteristics are presented in Table 2. Of the 294 study women, 83 (29.2%) were primigravida. The overall prevalence of anaemia

Table 4. Association between Anaemia and Selected Demographic and Health related Factors of the Respondents (n = 284)

Characteristics	Anaemia		COR (95 % CI)	AOR (95% CI)
	No	Yes		
Educational level				
Able to read and write	26	18	4.2 (1.7, 10.7)	5.1 (1.3, 20.6)*
Primary level	128	48	2.3 (1.1, 5.0)	2.6 (.8,8.4)
Secondary and above (ref.)	55	9	1	1
Monthly income of family				
< 2000	63	26	2.7 (1.1, 6.4)	1.6 (0.5, 5.3)
2000 - 4500	94	41	2.8 (1.2, 2.1, 6.5)	1.6 (0.5, 4.9)
> 4500(ref.)	52	8	1	1
Birth interval				
Short birth interval	92	44	2.3 (1.1, 4.9)	2.6 (1.1, 6.5)*
Optimum birth interval (ref.)	54	11	1	1
Trimester during interview				
First trimester (ref.)	77	21	1	1
Second trimester	70	26	.6 (.3, 1.2)	1.1 (0.4, 2.9)
Third trimester	62	28	.8 (.4,1.6)	1.7 (.7,4.2)
History of heavy menstrual bleeding				
No (ref.)	197	58	4.8 (2.2, 10.7)	4.3 (1.3, 14.0)**
Yes	12	17	1	1
Heard about anaemia before pregnancy				
Informed (ref.)	184	47	1	1
Uninformed	24	28	4.6 (2.4, 8.6)	2.3 (1.2, 7.0)**
Had intestinal parasites				
Yes	22	12	1.6 (.8, 3.5)	1.1 (0.3, 3.3)
No (ref.)	187	63	1	1
Malaria attack in last one year				
Yes	15	3	1.9 (.5,6.6)	1.1 (0.2, 6.4)
No (ref.)	194	72	1	1
Taking animal origin food within a week				
Yes (ref.)	20	27	1	1
No	189	48	5.3 (2.7,10.3)	3.2 (1.2, 8.9)**
Meal frequency per day				
3 times	27	25	3.4 (1.8, 6.3)	2.9 (1.2, 6.8)**
3 times (ref.)	182	50	1	1

Statistically significant at *** $P < 0.01$ and * $P < 0.05$

was found to be 75 (26.4%), among which 45 (60%), 28 (37.3%) and 2 (2.7%) were mild, moderate, and severe anaemia respectively. The mean (\pm SD) haemoglobin was 12.4 g/dl (\pm 3.21) (Table 3).

As shown in table 4, the lack of information, a history of heavy menstrual bleeding and the lack of animal-origin food at least once a week, a meal

frequency of times per day, short birth interval, and maternal education (unable to read and write) were found to be significantly associated with anaemia during pregnancy. Women uninformed about anaemia were two or more times more likely to have experienced anaemia compared to informed women (AOR = 2.3; 95% CI - 1.2, 7.0). Moreover, women with history of heavy menstrual bleeding were 4.3 times more likely to have anaemia than

their counterparts (AOR = 4.3; 95% CI - 1.3, 14.0). In addition to this, the probability of developing anaemia for pregnant women who had a meal frequency of 3 times per day was nearly triple or less (AOR = 2.9; 95% CI - 3.1, 22.2). Furthermore, anaemia was three or more times more likely to occur in women who didn't eat any animal-origin food at least once a week compared to their counterparts (AOR = 3.2; 95% CI - 1.2, 8.9). Anaemia during pregnancy was 2.6 times more likely to occur in women who had short birth interval in comparison to their counterparts (AOR = 2.6; 95% CI - 1.1, 6.5). Women who were unable to read or write were five or more times more likely to develop anaemia during pregnancy respect to their counterpart (AOR = 5.1; 95% CI - 1.3, 20.6).

DISCUSSION

Our study shows that the prevalence rate of anaemia is 26.4%. This prevalence is lower, as compared to the values reported in Arba Minch Town, and Butajira, of Ethiopia, which was 32.8%, and 27.6%, respectively.^{15,21} However, a higher prevalence of anaemia was found in the present study, compared to those of other studies in Adigrat, Bench Maji, Debre Berhan Town, Tigray and Addis Ababa, Ethiopia, which were 7.9%, 19%, 10.6%, and 11.6%, respectively.^{16,17,20,22} According to the results of the present study, the rate of anaemia was lower compared to those in other countries, such as Ghana,²³ and Kenya²⁴ reported as 51% and 57% respectively. In contrast, this study found a higher prevalence of anaemia compared to other studies in Iran²⁵ and Turkey²⁶ which were 16.6% and 20% respectively. The above-mentioned differences might be due to various geographical variations, socioeconomic status and dietary habits and might be attributed various prevalence of hemoparasites like hookworm and malaria in the one study area compared to another area. The history of heavy menstrual bleeding was a factor to birth anaemia, like that reported in Ethiopia^{16,21} and Kenya.²⁴ The possible justification could be that heavy menstrual bleeding reduces the mothers' body stores of iron leading to additional need of iron.

The present study showed that being not heard about anaemia before pregnancy has a significant association with anaemia, which is in line with the

studies in Mizan Tepi, Ethiopia²⁰ and Indonesia.²⁷ The reason might be because women who have information about anaemia had a greater chance of being aware of its prevention by taking routinely ordered iron supplementation. Second, informed women have a greater likelihood of eating additional food properly.

Short birth interval was found to be associated factor of anaemia during pregnancy and this was consistent with the studies conducted in Ethiopia.^{16,21} The possible explanation for this is that as the women who space their pregnancies inappropriately are associated with anaemia was explained biologically by the insufficient time for a pregnant mother to recover from the nutritional burden of the previous pregnancy, specifically the folate and iron deficiencies. Maternal serum and erythrocyte concentrations of folate also decrease from the fifth month of pregnancy onwards and remain low for a fairly long time after delivery.²⁸ According to this study, anaemia during pregnancy was found to be associated with an educational status of women (unable to write and read). This finding is similar to that of the studies conducted in Ethiopia.^{20,22} This finding is well known in literature that education improves awareness of health risks and thus lead to disease prevention and health promotion. Anaemia was also associated with a meal frequency less than three times per day. This is comparable with study done in Mekele, Ethiopia.²⁹ The reason could be the physiological changes which occurred during pregnancy, i.e. an upsurge in the requirement for iron and other nutrients, increased meal frequency would agree with this.

The finding of this study also revealed that women who did not eat food of an animal origin within a week suffered from anaemia. This finding is consistent to the studies done in Mekele, Ethiopia²⁹ and Turkey.³⁰ This could be due to the fact that consumption of animal-based food is an essential source for improving iron intensity of the women. Recall and / or social desirability bias might be hosted on dietary information. Moreover, since the study was cross-sectional it may not show the cause and effect relationship of anaemia. Despite these limitations, we are hopeful that our research would help more insight into this vast topic of anaemia during pregnancy.

CONCLUSIONS

The findings of this study conclude that anaemia is an unresolved public health problem in the study area. The overall prevalence of anaemia was found to be 26.4%. The factors associated with anaemia included maternal lack of education, not being heard about it, short birth interval, having history of heavy menstrual bleeding before the current pregnancy, not taking meat within a week and meal

frequency of less than three times per day. Pre-pregnancy counselling, dietary advice, and iron supplementation are recommended to avert anaemia during pregnancy.

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