

# Magnitude and factors associated with anemia among pregnant woman attending antenatal care in asella town arsi oromia, Ethiopia

## Abstract

**Background:** Anemia during pregnancy affects both the mother and the fetus and is a leading cause of morbidity and mortality in pregnant women in underdeveloped nations. Studies were undertaken in many sections of the nation to assess the prevalence of anemia and predictor variables despite its well-known negative impact on health; however, the topic in Asella has not been well addressed or investigated.

**Objective:** From March 15 to April 15, 2017, pregnant women receiving Antenatal Care services at a public health center in Asella, Ethiopia, were assessed for the prevalence of anemia and its contributing factors.

**Methods and materials:** A facility-based cross-sectional study design was used. Data were collected using an interviewer-administered questionnaire complemented by laboratory tests. Data were collected by face-to-face interviews using a pre-tested, semi-structured questionnaire and the Hg test. EPI ENFO version 7.1 was used for data clearing and documentation, and SPSS version 21 was used for data analysis. The predictors of anemia were found using a logistic regression analysis. To determine the strength of the association, crude and adjusted OR were computed along with their respective 95% CI. P < 0.05 was also regarded as statistically significant.

**Result:** The magnitude of anemia was 46.1% in this investigation utilizing a cut level of hemoglobin of 11 g/dl. Anemia was strongly linked with the occupation of merchant (AOR=0.066, 95%CI=0.006, 0.761), third trimester gestational age (AOR=2.631, 95%CI=1.272, 5.44), lack of nutrition education (AOR=1.723, 95%CI=1.010, 2.939), and consumption of wheat as a staple food (AOR=3.288, 95%CI=1.765, 6.128).

**Conclusion and recommendation:** In the study area, anemia is discovered to be a serious public health issue. A special focus needs to be placed on raising awareness about the consumption of iron-rich and diverse foods among pregnant women and people who work as housewives.

**Keywords:** anemia, pregnant, antenatal, asella

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## Abbreviations

Hgb, Hemoglobin; ANC, Antenatal Care; CI, Confidence Interval; SPSS, Statistical Package for Social Sciences; IDA, Iron deficiency anemia; EDHS, Ethiopian Demographic Health Survey; SDG, Sustainable Development Goal; IRB, Institutional Review Board; PNC, Post natal Care; ETB, Ethiopian Birr; AOR, Adjusted Odds Ratio.

## Background

Anemia is defined as decreasing the amount of hemoglobin concentration in Red blood cell (RBC) or laboratorial when hematocrit level in pregnant women is Hgb < 11g/dl. There are many causes of anemia; nutritional deficiency is the prominent origin of anemia. Iron deficiency, vitamin A deficiency, malaria infection, hookworm, heavy blood loss because of menstruation are causes of anemia among which can lower blood hemoglobin(Hgb) concentration<sup>1</sup>

Anemia could be classified as mild, moderate and severe. The Hgb level for each class of anemia in pregnancy are 10.0–10.9g/dl (mild), 7–9.9g/dl (moderate) and <7g/dl (severe). Anemia is a global health problem, it affects all human being, race, all age classification and both sex mainly pregnant women's are affected.<sup>2</sup>

Iron deficiency anemia (IDA) include low intake of iron, poor absorption of iron from diets, high phytate or phenolic compounds or increased requirements during childhood and pregnancy are some factors.<sup>3</sup> In addition in pregnant women because of an increased iron requirement, physiological demand, loss of blood and infections, Socio-cultural and economic factors the magnitude of anemia is high. Fatigue, breathlessness, dizziness, pallor of the mucous membranes, decreased appetite fainting, headache, shortness of breath, increased heart rate (tachycardia) and palpitations are some of the symptoms of anemia.<sup>4</sup> Anemia may also increase the chance of preeclampsia, postpartum hemorrhage, none tolerances to minimal blood loss during birth on mother and premature births, low birth weight, fetal impairment and infant deaths.<sup>5</sup>

Economically anemia increases the burden on the families, communities and the country by reducing productivity and increasing expenditure for treatment.<sup>6-8</sup> Anemia is a global health problem, it affects globally 41.8% of pregnant women are affected this contributes to 20% of all maternal deaths.<sup>1</sup> It affects over 2 billion people globally and one fifth of maternal death refers to anemia worldwide but the problem is very high and serious in children, non-pregnant women and pregnant women mainly in the developing countries of Asia and Africa.<sup>9</sup> Anemia in pregnancy is a major public health problem

especially in developing countries. There are no countries for which country-level estimates were generated where anemia is not at least a mild public health problem. It affects 32.4 million (38.2%) of pregnant women globally, with the highest prevalence in south east Asia 49% and Africa 46.3%.<sup>10</sup> Worldwide, anemia contributes to 20% of all maternal deaths. As well as directly or indirectly anemia has the major role to other cause of maternal mortality 2016 EDHS is 412 deaths per 100,000 live births; that is, for every 1,000 births in Ethiopia, there are about 4 maternal deaths.<sup>11</sup> Other consequence of anemia is the reduction in women's productivity places an economic burden on the families, communities and country, almost all SDG programs are related with cause and effect of anemia.

More than 70% of all maternal deaths are due to five major complications: hemorrhage, infection, unsafe abortion, hypertensive disorders of pregnancy, and obstructed labor. The majority of maternal deaths (61%) occur in the postpartum period, and more than half of these take place within a day of delivery.<sup>13</sup> In developing countries pregnancy is one of most important public health problem refers to anemia in the form of abortion, premature birth, intra uterine growth retardation, high infant mortality. In Asia anemia is a key public health problem among pregnant women those belonging to nutritional problem. Lower socio-economic communities are at high risk of anemia, 20-40% maternal death in India due to anemia.<sup>14</sup> In India a high prevalence of anemia 65.6% was observed in pregnant women and 86.6% prevalence which is a staggering level of anemia in north India.<sup>15,16</sup> From Africa country 22.1 % of the cases were reported in Uganda.<sup>17</sup>

In Ethiopia about one-fourth of women age 15-49 (23 percent) are anemic. The majority are mildly anemic (17 percent), 5 percent are moderately anemic, and less than 1 percent is severely anemic. Anemia prevalence different from region to region among women ranges from 16 percent in Amhara and Addis Ababa to 59 percent in Somali (11). In 2016 EDHS despite this fact, anemia still continues to be a common cause of mortality and morbidity among pregnant women. Overall, the prevalence of anemia was 39.9% in Walaita Sodo .<sup>18</sup> Anemia among antenatal care attendant pregnant women of Gamogofa zone was 32.8 %.<sup>19</sup> According to EDHS report of 2016, the prevalence of anemia in pregnant women was 26.2% in Oromia regional State. Anemia affects both physical and mental cognitive of the individual this lead to non-productive so it has been a significant public health problem in the country. Anemia remains a critical health problem for Ethiopia public health problem ranging between moderate to severe. According to different pocket studies, the prevalence of anemia is very high especially in rural areas of Ethiopia.<sup>11</sup> So identifying factors and preventing anemia is the key point of this study because this study will contribute a lot by providing up to date data on prevalence of anemia and associated factors. This means this is one means by which SDG can be achieved in 2025.

## Methods and materials

### Study area

Asella is one of the administrative centers of the Arsi Zone in the Oromia region, at 175 kilometers from Addis Abeba. The location is 2430 meters above sea level. Pregnant women in Asella town and Woredas in the Arsi Zone can receive ANC, Delivery, and PNC services from any public health center. Midwives who have received specialized training in focused prenatal care delivery models provide the ANC service. According to Ethiopia's 2007 census survey, the town's total population is predicted to be 101,739 people. The town has two government-run health facilities, one referral and teaching hospital, 20 private health facilities, and two non-government hospitals, all of which provide healthcare services.

### Study design and study period

From March 15 to April 15, 2017, a facility-based cross-sectional investigation was carried out at every public health facility.

### Source population

The source of population for this study were all pregnant women in Asella town and surrounding area.

### Study population

All pregnant woman who were attending ANC at selected public health facility.

### Inclusion criteria

All women who are pregnant and attending ANC currently in selected public health facility and willing to participate in the study.

### Exclusion criteria

Those who were mentally ill.

### Sampling technique

The number of women attending ANC was revised from the registration book of ANC of the previous month, which is (200=from Asella referral hospital),(140=from Asella health center),(50=from Halila health center). The study was conducted in 3 governmental health facilities offering ANC service in Asella town. The sample size was calculated and proportionally distributed to the health facilities based on observed records. During the study period, all pregnant women who visited an ANC service were consecutively included, and the identified women were subsequently interviewed.

### Variables of the study

#### Dependent variable

Anemia among pregnant women

#### Independent variable

Socio-economic and demographic factors: age, educational status, occupational status, family size, income of the household

Maternal factors: Birth interval, gestational age and age at birth

Dietary factors: Number of meals, dietary history, iron tablet intake and exposure to health education on nutrition.

Health related factors: -previous malaria infection and Previous intestinal helmetless

#### Operational definitions (9)

**Anemia in pregnancy:** hemoglobin level below 11g/dl during pregnancy

**Mild anemia:** hemoglobin level from 9 -10.9 g/dl

**Moderate anemia:** hemoglobin level from 7- 8.9 g/dl

**Severe anemia:** hemoglobin level from 4- 6.9 g/dl

**Very severe anemia:** hemoglobin level below 4 g/dl.

#### Data collection procedures

For the purpose of collecting data regarding the socio-demographic, obstetric, gynecological, food intake, and medical conditions of pregnant women, a face-to-face interview with a semi-structured, previously tested questionnaire was used. Antepartum hemorrhage,

nutritional consumption, and gestational age of the current pregnancy were all recorded throughout the interview. The questionnaire was initially written in English before being translated by linguists into Amharic and finally Afan Oromo. In order to determine whether the questionnaire was appropriate, it was pre-tested at the Sagure Health Center, which is not a part of the real study. Blood was drawn from the finger using a disposable lancet to obtain the sample, and a qualified laboratory technician used a portable digital hemoglobin meter to quantify the hemoglobin (Hemo Smart Gold England). Educated nurses collected the data.

### Data quality management

A pre-test was conducted on 5% of the sample population at the Sagure health center two weeks before data collection. Cross-checking, editing, coding, and entering the data into a computer utilizing EPI information were all done before using SPSS version 21 to analyze the data. Before administering the questionnaire to the study population, corrections and modifications were made to the questionnaire based on the results of the pre-test. The lead researcher oversaw the data gathering procedures and verified that they were done correctly and that the data were complete.

### Data processing and analysis

To reduce entry errors, outliers, and missing numbers, the survey's data were cleaned and verified. The codes used to code the questionnaire responses were kept in a code book and utilized to interpret the results. Using EPI info version 7.1 software, the collected data were imported into the computer. Data cleaning was done to look for missing data, consistency issues, and outliers. Software from the Statistical Package for Social Sciences (SPSS) Version 21 was used for data analysis. Variable frequencies were developed, and the results of the study were displayed using tabulation, figures, and percentages. By computing odds ratios and their 95% confidence intervals, logistic regression analysis was performed to examine the correlation between the dependent and independent variables. P-values less than or equal to 5% were regarded as statistically significant when applied to variables in multivariate logistic regression that showed p-values less than 0.2 during bivariate analysis.

### Ethical consideration

The Institutional Review Board (IRB) of Arsi University College of Health Sciences granted ethical approval, and the Department of Public Health sent a letter asking for participants to the Asella Town Health Office and Asella Referral Hospital's management. The participants' consent was assured, and anonymous typing was used to ensure the confidentiality of their information. Additionally, the participants' names and any other means of identification were not included on the questionnaire, and they were questioned alone to maintain their privacy. Clinicians working in the ANC unit were informed of the laboratory results about the Hgb level in order to receive the proper management.

## Result

The current study included 284 pregnant women receiving prenatal treatment in Asella town, with a response rate of 100%. Amhara made up 64.8% of the whole (184) ethnic group, with Oromo making up 77 (27%). This study comprised participants with ages ranging from 18 to 39 (mean 25.7 4.8). The average age of the pregnant ladies was between 18 and 25 years old (52.8%). 90.5% of them were married, 158.1% of them worked as housewives, 32.4% of them lived in rural areas, and 32.4% had at least a secondary education. 2000ETB was the median family income Table1.

**Table 1** Socio-demographic and economic characteristics of study participants attending ANC clinic in Asella town, Oromia Ethiopia: from March 15 to April 15, 2017. (n=284)

Variable	Response	Frequency	Percent
Age of mother	18-25	150	52.8
	26-34	112	39.4
	>34	22	7.7
Marital status of mother	Single	18	6.3
	Married	257	90.5
	Widowed	1	0.4
	Separated	8	2.8
Religion	Orthodox	143	50.4
	Protestant	28	9.9
	Muslin	107	37.7
	Others	6	2.1
Ethnicity of mothers	Amahara	184	64.8
	Oromo	77	27.1
	Tigre	18	6.3
	Gurage	4	1.4
Family size	<4	242	85.2
	>4	42	14.8
Occupation of mothers	House Wife	165	58.1
	Farmer	20	7
	Merchant	43	15.1
	Daily Laborer	10	3.5
	Government Employer	41	14.4
	Others	5	1.8
Residence of mother	Urban	220	77.5
	Rural	64	22.5
Family income monthly	<500 Birr	72	25.4
	500-1000 Birr	138	48.6
	>1000 Birr	74	26.1
Educational status of mothers	Read &write	25	8.8
	Primary school	88	31
	Secondary school	92	32.4
	Above secondary school	56	19.7

### Maternal characteristics of the respondent

Among the study's participants, 29.2 percent were married before the age of 18, and more than half, 168 percent, gave birth to their first child before the age of 22. Of the total responders, 112 (39.5%) were pregnant women, and 77% of them had previously had an abortion—21.5% twice. A 24 month gap existed between the first and second births for about 32.4% of women. 15.5% of women who were pregnant in the past had no ANC follow-up, while 36.6% of pregnant women who had ANC follow-up received it in a health center. In terms of gestational age, 36.3% of respondents were in the third trimester, followed by 43.3% in the second trimester. 23.9% of pregnant women begin ANC monitoring at >16 weeks' gestation Table2, Figure1.

People who avoid eating highly ominous foods out of concern of what it would do to their future selves make up 23.2% of the population. 31% of respondents don't know what iron is, and among those who have given birth in the past, 31.7% didn't take iron during

their pregnancies, and 43% didn't take iron during their most recent pregnancies. Only 1.4% of women who were pregnant at the time had ever had malaria Table3, Figure 2.

**Table 2** Maternal characteristics of pregnant women attending ANC at public health facilities in Asella, 2017

Variables	Response	Frequency	Percentage (%)
Age at Mirage	<18 year	83	29.2
	>18 year	195	68.7
Age at first birth	<22 year	168	59.2
	22-30 year	109	38.4
	>30 year	7	2.5
First pregnancy	Yes	112	39.4
	No	172	60.6
Total number of alive Children	No child	146	51.4
	1-2 child	110	38.7
	>3 child	28	9.9
Previous history of abortion	1times	219	77.1
	2times	61	21.5
	>2times	4	1.4
Birth interval of first and second	<24 month	92	32.4
	>24 month	68	23.9
No ANC follow up in previous pregnancy	Yes	44	15.5
	No	240	84.5
Number of ANC visit	Once	115	40.5
	4-Feb	138	48.6
	>4	31	10.9
Time at ANC start	<4 month	216	76.1
	>4 month	68	23.9
High proteins food is not good	Yes	66	23.2
	No	218	76.8
Meal frequency/day	<3	203	71.5
	>3	81	28.5
Agree with iron intake	Yes	180	63.4
	No	16	5.6
	Don't know	88	31
Iron is important for mother and child	Yes	185	65.1
	No	11	3.9
	Don't know	88	31
Iron in take in Previous Pregnancy	Yes	117	41.2
	No	90	31.7
	Not applicable	77	27.1
Iron intake in current pregnancy	Yes	162	57
	No	122	43
Received anti-helmete as in current pregnancy	Yes	50	17.6
	No	234	82.4

Variables	Response	Frequency	Percentage (%)
Previous malarial infection	Yes	12	4.2
	No	101	35.6
	Not applicable	171	60.2
Current malaria infection	Yes	4	1.4
	No	280	98.6

**Table3** Dietary Habits of study participants attending ANC clinic in Asella Town, Oromia Ethiopia: from March 15 to April 15, 2017

Variables	Response	Frequency	(%) Percentage
Frequency of eating meat	At list one/weak	92	32.4
	Less than once/weak	192	67.6
Frequency of eating fish	At list one/weak	19	6.7
	Less than once/weak	265	93.3
Frequency of eating egg	At list one/weak	179	63
	Less than once/weak	105	37
Frequency of eating vegetables	At list one/weak	253	89.1
	Less than once/weak	31	10.9
Frequency of eating fruits	At list one/weak	206	72.5
	Less than once/weak	78	27.5
Tea and coffee intake	Yes	276	97.2
	No	8	2.8
Time of tea in take	Within meal	238	83.8
	30 minute after meal	46	16.2
Used sorghum as staple food	Yes	49	17.3
	No	235	82.7
Used barely as staple food	Yes	69	24.3
	No	215	75.7
Used wheat as staple food	Yes	71	25
	No	213	75
Exposure of nutrition education	Yes	120	42.3
	No	164	57.7

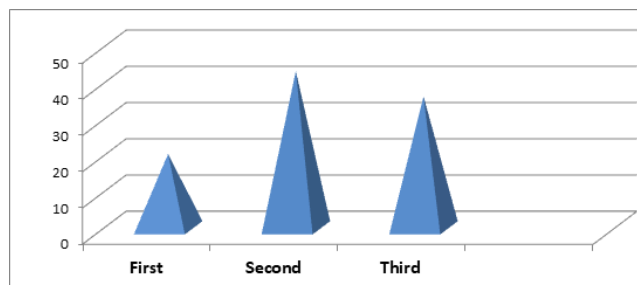


Figure 1 Classification of respondents by Trimester

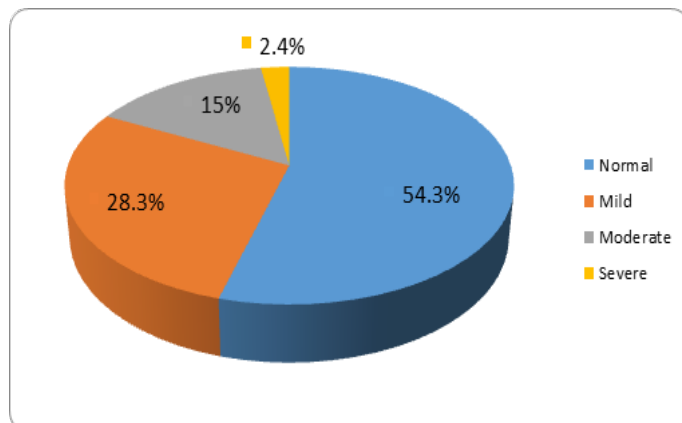


Figure 2 Level of Anemia among study participants, Asella town Public Health facilities, 2017

### Factors associated with anemia in pregnant women

Some factors in the bivariate analysis reveal significant differences with p-values of less than 0.05, but others were left out to prevent missing significant variables. P-Value was utilized as the cutoff point for multivariable analysis in another study that was comparable to this one. For backward-step wise binary logistic regression, which controls the unfavorable influence of confounders by b/n variables and the issue of multy-collinarity and declares real relationship, eight variables that were significant at p-vale, 0.2 were entered. The completeness of the model was examined using Hosmer-Lemshow goodness of fit statics. The completed model had a goodness of fit of 0.466, which is substantially different from 0.05 and clearly shows that the independent viable entry in full model properly explained the outcome. Only four entered variables continued to be reliable predictors of the outcome variables. This study's overall prevalence of anemia was 46.1%. A mild, moderate, or severe case of anemia was present in 15.0%, 2.4%, and 28.3% of the population. In the multivariate logistic regression study, mothers who worked as merchants had 0.066 times lower anemia risk than mothers who worked as housewives (AOR=0.066, 95%CI=0.006,0.761). Mothers' gestational ages were also linked to anemia in pregnancy; those in their second trimester were 2.1 times more likely to be anemic than those in their first (AOR=2.171, 95%CI=1.070,4.402) and those in their third trimester were 2.63 times more probable (AOR=2.631, 95%CI=1.272,5.44). AOR=1.723, 95%CI=1.010,2.939) showed that mothers who had not received nutrition instruction were 1.72 times more likely to have anemia than their counterparts. AOR=3.288,95%CI=1.765,6.128) found that pregnant women who ate wheat as their main source of nutrition were 1.723% more likely to be anemic than those who ate foods other than wheat as their main source of nutrition Table 4.

Table 4 Predictors of anemia among pregnant women attending ANC at public health facilities in Asella, 2017(n=284)

Variables	Response	Anemic		COR(95%CI)	AOR(95%CI)
		Yes	No		
Educational status	Illiterate	29(60.4%)	19(39.6%)	2.005(1.6,3.77)	1.357(0.628,2.931)
	Literate	102(43.2%)	134(56.8%)	1	1
Occupational status	House wife	78(59.5%)	87(56.9%)	1	1
	Farmer	6(4.6%)	14(9.2%)	0.478(0.175,1.305)	0.211(0.023,1.982)
	Merchant	17(13%)	26(17%)	0.729(0.368,1.445)	0.066(0.006,0.761)*
	Daily laborer	9(6.9%)	1(0.7%)	2.22(0.113,2.06)	0.206(0.021,2.067)
	Governmental employer	17(13%)	24(15.7%)	0.79(0.395,1.579)	2.361(0.113,49.11)
	Others	4(3.1%)	1(0.7%)	4.462(0.488,4.77)	0.263(0.26,2.672)
Monthly income	<500 Birr	43(59.7%)	29(40.3%)	1	1
	500-1000 Birr	62(44.9%)	76(55.1%)	1.226(0.877,1.714)	0.484(0.203,1.154)
	>1000 Birr	26(35.1%)	48(64.9%)	1.846(1.146,2.975)	0.484(0.203,1.154)
Gestational age	1-3 month	19(32.8%)	39(67.2%)	1	1
	4-6 month	59(48.0%)	64(52.0%)	1.08(0.762,1.545)	2.171(1.070,4.402)*
	>6 month	53(51.5%)	50(48.5%)	0.943(0.641,1.388)	2.631(1.2721,5.443)*
Exposure to nutritional education	Yes	44(36.7%)	76(63.3%)	1	1
	No	87(53.0%)	77(47.0%)	0.885(0.651,1.203)	1.723(1.010,2.939)*
Wheat as staple food	Yes	46(64.8%)	25(35.2%)	2.771(1.584,4.845)	3.288(1.765,6.128)*
	No	85(39.9%)	128(60.1%)	1	1
Consumption of Vegetables	At least once/weak	113(44.7%)	140(55.3%)	1.7(0.80,3.65)	1.275(0.515,3.160)
	Less than once/ weak	18(58.1%)	13(41.9%)	1	1
Time of tea/Coffee in take	within meal	117(49.2%)	121(50.8%)	0.4(0.23,0.89)	1.485(0.710,3.103)

Table Continued...

Variables	Response	Anemic		COR(95%CI)	AOR(95%CI)
		Yes	No		
	30 minute after meal	14(30.4%)	32(69.6%)		
Variables	Response	Anemic Yes	No	COR(95%CI)	AOR(95%CI)
<b>Educational status</b>	Illiterate	29(60.4%)	19(39.6%)	2.005(1.6,3.77)	1.357(0.628,2.931)
	Literate	102(43.2%)	134(56.8%)		
<b>Occupational status</b>	House wife	78(59.5%)	87(56.9%)		
	Farmer	6(4.6%)	14(9.2%)	0.478(0.175,1.305)	0.211(0.023,1.982)
	Merchant	17(13%)	26(17%)	0.729(0.368,1.445)	0.066(0.006,0.761)*
	Daily laborer	9(6.9%)	1(0.7%)	2.22(0.113,2.06)	0.206(0.021,2.067)
	Governmental employer	17(13%)	24(15.7%)	0.79(0.395,1.579)	2.361(0.113,49.11)
	Others	4(3.1%)	1(0.7%)	4.462(0.488,4.77)	0.263(0.26,2.672)
<b>Monthly income</b>	<500 Birr	43(59.7%)	29(40.3%)		
	500-1000 Birr	62(44.9%)	76(55.1%)	1.226(0.877,1.714)	0.484(0.203,1.154)
	>1000 Birr	26(35.1%)	48(64.9%)	1.846(1.146,2.975)	0.484(0.203,1.154)
<b>Gestational age</b>	1-3 month	19(32.8%)	39(67.2%)		
	4-6 month	59(48.0%)	64(52.0%)	1.08(0.762,1.545)	2.171(1.070,4.402)*
	>6 month	53(51.5%)	50(48.5%)	0.943(0.641,1.388)	2.631(1.2721,5.443)*
<b>Exposure to nutritional education</b>	Yes	44(36.7%)	76(63.3%)		
	No	87(53.0%)	77(47.0%)	0.885(0.651,1.203)	1.723(1.010,2.939)*
<b>Wheat as staple food</b>	Yes	46(64.8%)	25(35.2%)	2.771(1.584,4.845)	3.288(1.765,6.128)*
	No	85(39.9%)	128(60.1%)		
<b>Consumption of Vegetables</b>	At least once/weak	113(44.7%)	140(55.3%)	1.7(0.80,3.65)	1.275(0.515,3.160)
	Less than once/weak	18(58.1%)	13(41.9%)		
<b>Time of tea/Coffee in take</b>	within meal	117(49.2%)	121(50.8%)	0.4(0.23,0.89)	1.485(0.710,3.103)
	30 minute after meal	14(30.4%)	32(69.6%)		

## Discussion

### Prevalence of Anemia

In Asella town, anemia among pregnant women was investigated to establish its prevalence and contributing variables. According to this study's conclusion, anemia was present in pregnant women 46.1% of the time. The size suggests that there is significant public health relevance of anemia among pregnant women in the study area, according to the World Health Organization categorization of the condition.<sup>10</sup> The prevalence of anemia among pregnant women in Walita Sodoo, Arba Minch, Shaala, North Tigray, and Gonder was reported to be 39.9%, 36.1%, 36.6%, and 21.8%, respectively, in that study. This study's findings were higher.<sup>18,19,25,26,27,29</sup> This could be a result of the small sample size and geographic variance for the severity of the issue. The prevalence of anemia among pregnant women in North India was reported to be 63.1%.<sup>15</sup> whereas in Uganda, 50.4% Mbule Ma, Byaruhanga Yb, et al.,<sup>23</sup> of moms were anemic. This finding was lower than that. Additionally, a study on anemia in pregnant women in Gilgal Gibe, Nekemte Southern Ethiopia, Boditi found that the rates were 53.9%, 52%, and 61.6%, respectively.<sup>24,25,27</sup> The absence of malaria in the research area where this study was conducted may be the cause of the observed difference.

### Predictors of anemia

This study examined socio-demographic variables that were connected to anemia among socio-demographic parameters. In this study, job status is a separate risk factor for anemia. Compared to mothers who were housewives, mothers who worked as merchants had a 0.029 lower risk of anemia. This outcome was consistent with the research done in Uganda.<sup>23</sup> This may be due to the fact that most merchants have other sources of income outside their husbands' income, allowing them to save and spend as they like. Prevalence of anemia was shown to be higher in the second and third trimesters of pregnancy than in the first trimester based on maternal factors in this study. Pregnant women who were in their third trimester of pregnancy were 2.63 times more likely to be anemic than those who were in their first trimester, and those who were in their second trimester were 2.1 times more likely. Anemia increased from the first (7.8%) to the second (45.4%) and third (46.7%) trimesters of pregnancy, according to the Boditi study.<sup>27</sup> This finding is also supported by research done in North India, Nekemte, and Tikur Anbesa specialized hospital.<sup>15,25,31</sup> Contrary to this study, the research done in west Arsi found that anemia prevalence was higher in the early trimesters when using the second trimester as a reference group (26). This could be as a result of poor antenatal care, inadequate nutrition advice, and failing to begin iron supplementation as soon as possible, as well as an increase in hemodilution brought on by a rise in estrogen level toward the end of

gestation. Pregnant women with low monthly family income (less than 2575 Ethiopian Birr) were four times more likely to be anemic than those with high monthly family income (more than 2575 Ethiopian Birr), according to research done in Walaita Sodoo. In this study, monthly income had no association. Anemia in pregnancy was shown to be connected with being illiterate and drinking tea or coffee during meals in Arbaminch and Boditi, but these findings were not supported by this study's findings about educational status, family income, or the timing of tea or coffee consumption.<sup>18,19,27</sup>

In terms of their dietary habits, wheat was significantly associated with anemia in this study. Contrary to those who did not eat wheat as their main source of nutrition, pregnant women who did were 3.288 more likely to be anemic. The cause may be that wheat is not an iron-rich food and is widely produced in the research area, making it more affordable than other foods. Contrary to this study, studies conducted in west Arsi have shown a statistically significant relationship between eating vegetables less than once per day and anemia.<sup>26</sup> In this study, in contrast to earlier studies, pregnant women who did not receive formal education about nutrition during their pregnancies were 1.7 times more likely to be anemic than those who did. This may be brought on by differences in socioeconomic status and educational attainment. Pregnant women who did not receive nutritional education during their pregnancies may be more susceptible to anemia than those who did. These women miss out on information about eating a diet high in iron and foods that promote iron absorption, avoiding foods that inhibit iron absorption (which should be consumed separately from iron-rich foods), and more.<sup>27</sup>

## Conclusion

The total prevalence of anemia in this study is high, which is a serious public health issue since it endangers the lives of pregnant mothers and their unborn children. As the gestational age increased, the severity of anemia also increased. Pregnant women in the research area were affected by occupational status, exposure to nutritional education, and eating a lot of wheat. Health professionals need to place more attention on maintaining and strengthening intervention measures to lower the risk of anemia among pregnant women even if all of them were at risk for the condition.

## Recommendation

- I. The town administration health berue and other concerning bodies need to create awareness on the importance of taking iron supplementation and on consumption of extra meal and iron-rich foods during pregnancy.
- II. Health professionals should counsel on consumption of iron-rich foods and iron/folate supplementation to prevent anemia in pregnant women by giving special attention for those in third trimester.
- III. Health extension worker should give health education on causes of anemia, its risk factors and ANC follow-up when they visit home to home.
- IV. Pregnant woman should have to protect themselves from anemia by taking diversified foods and starting ANC follow up early.
- V. Government of the country should facilitate jobs opportunity for house wife.
- VI. Further research should be conducted by using analytic study design to show cause and effects as well as qualitative study design to understand deeply socio-cultural and nutritional related factors towards anemia during pregnancy.

## Strengths

- I. The study used primary data that should be considered as one strength of the study.
- II. Questionnaire was pre-tested and necessary modification was made, the principal investigator and supervisors were supervising the daily data collection activity.

## Limitation

- I. The study did not consider other factors like parasitic infections which can lead to anemia.
- II. The study had limited sample size in relation to other studies.
- III. The study design was cross sectional so could not identify the cause and effect relationship

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## Data availability Statement

The raw data being used during this research is not available or not attached to this document because the Ethics of institutions does not allow to share the raw data.

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There is no fund for this research publication process because we are from the poorest country which is Ethiopia. We are living subsistence live which is from hand to mouth. Our institution which is Arsi University college of health science has no extra budget to support this research publication process except our salary.

## Authors' contributions

MTA conceived and designed the study and collected the data. MTA, HFD & EDM participated in data analysis and interpretation of the findings, drafted the manuscript and critically reviewed the manuscript. All authors read and approve the final manuscript

## Conflict of interest

All authors of this paper declared that there is no any conflict of interest regarding this paper

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