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Research Article

Determinants of Anemia Among Pregnant Women Attending Antenatal Care in Bale-robe Town Health Facilities, Bale Zone, Southeast Ethiopia: A Case-control Study

Mohammed Hasen Badeso[1]*, Falaho Sani Kalili[2], Mohammed Seid Abdulle[3] and Tuji Mohammed HajiSani[4]

[1]Public Health Emergency Management Coordinator, East Bale Zonal Health Department, Ginnir, Ethiopia

[2]Negelle Borena Health Science College, Oromia Regional State, Negelle Borena, Ethiopia

[3]Public Health Emergency Management, West Harerghe Zonal Health Department, Chiro, Ethiopia

[4]Orthopaedic and Traumatology Surgery Resident, St. Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia

***Corresponding Author:** Mohammed Hasen Badeso, Public Health Emergency Management Coordinator, East Bale Zonal Health Department, Ginnir, Ethiopia.

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Abstract

Objective: In Ethiopia, the prevalence of anemia in pregnant women differs geographically and ranged from 15.8% to 56.8%. The objective of this study is to identify the determinants of anemia among pregnant women attending antenatal care in health facilities of Bale-Robe Town, Southeast Ethiopia.

Design: A facility-based case-control study.

Setting: one hospital and one health center in Bale-Robe, Southeast Ethiopia.

Participants: A total of 282 pregnant women participated in the study (141 cases and 141 controls). Cases were pregnant women with altitude adjusted hemoglobin value < 11.0 g/dl at the first and third trimesters, and < 10.5 g/dl at second trimester. Controls were pregnant women with hemoglobin value ≥ than 11.0 g/dl at first and third trimesters, and ≥ 10.5 g/dl at second trimester.

Measures: A structured and pretested questionnaire used to collect data. A multivariable logistic regression analysis was applied to assess the determinants of anemia. Determinants were categorized as sociodemographic and economic, obstetric and medical, and dietary intake and behavioral.

Results: Housewife occupation (AOR = 2.1, 95% CI = 1.12-3.92), prolonged menstrual bleeding (AOR = 2.33, 95% CI = 1.38-3.92) and undernutrition (AOR = 4.03, 95% CI = 1.38-11.83) were factors significantly associated with anemia in pregnant women.

Conclusion: Housewife occupation, prolonged menstrual bleeding and malnutrition were the determinants of anemia in pregnant women. Hence, anemia prevention and control strategy in pregnant women should include adequate dietary intake and strengthening nutritional counselling for pregnant women during antenatal care is also required by health care provider.

Keywords: Anemia; Pregnancy; Antenatal Clinic; Case Control; Bale-robe

Background

Anemia in pregnant women is a common public health problem worldwide. It affects 38.2% of pregnant women globally, 48.7% in Southeast Asia and 46.3% in Africa [1]. Even though, anemia in pregnant women is a global public health problem, its burden is more substantial in developing countries [1,2]. Anemia in pregnant women has multiple adverse outcomes for both mothers and infants, including postpartum hemorrhage, cardiac failure, less exercise tolerability, thromboembolic problems, spontaneous abortion, puerperal infection, placenta previa, maternal mortality, preterm delivery, low birth weight, and prenatal death [2].

Neonates of anemic mothers are born with reduced iron stores and at high risk of developing iron-deficiency anemia, which leads to the long-term effects such as; neurophysiologic and poor cognitive motor development of children [3]. Worldwide, it has been reported that anemia contribute to more than 591,000 prenatal deaths and 115,000 maternal deaths in a year [4]. Approximately 20% of maternal death is due to anemia and its majority occur in developing countries [5].

In developing countries, pregnant women start pregnancy with already reduced the body stores of iron. This is mainly due to repeated infections, poor nutritional intake, frequent pregnancies and menstrual blood loss. Besides this, it is also related with socioeconomic conditions, health-seeking behaviors, and lifestyles across different cultures [6,7].

In Ethiopia, several studies showed that the prevalence anemia in pregnant women varies geographically and ranged from 15.8% to 56.8% [8-12]. Nearly one-thirds of pregnant women (31.66%) in Ethiopia has anemia accordioning to a systematic review study conducted in Ethiopia [8].

Currently in Ethiopia, different services are undertaken during antenatal care to prevent anemia during pregnancy which includes, nutritional interventions, iron and folic acid supplementation and deworming [13]. Despite many efforts made by the stakeholders and government, anemia in pregnant women is still a major public health problem. The prevalence of anemia varies within and between regions [10,11,14-18]. This suggests a need for local data to identify the determinants and address the problem. Therefore, the focus of this study was to identify the determinants of anemia among pregnant women attending antenatal care in the health facilities of Bale-Robe town, Southeast Ethiopia.

Methods

Study setting and period

The study was conducted from March 20 to June 2, 2019 among pregnant women attending antenatal care in the Bale-Robe Town health facilities. Bale-Robe town is the capital of Bale zone and located at 430 km from Addis Ababa, the capital of Ethiopia. According to the town administrative health office, the total population of the town was 148,089 in the year 2019, of whom 72,860 (49.2%) are females. The town is found at an altitude of 2492 meters above sea level and there is one general public hospital, one public health center and nine private clinics in the town. The routine focused antenatal care service is provided at the public health facilities in the town.

Study design and population

A facility-based case-control study was conducted among pregnant women who attend antenatal care in Bale-Robe town health facilities. Cases were pregnant women with altitude adjusted hemoglobin value < 11.0 g/dl at the first and third trimesters, and < 10.5 g/dl at second trimester. Controls were pregnant women with altitude adjusted hemoglobin value ≥ 11.0 g/dl at first and third trimesters, and ≥ 10.5 g/dl at second trimester [19]. Pregnant women who attend antenatal care in the health facilities of Bale-Robe town during their 1st visit, irrespective of their trimester and those who are residents in the town for a minimum of six months were included in the study. However, women who were severely ill during data collection and those already talking the ferrous sulphate were excluded from the study.

Sample size and sampling techniques

The sample size was calculated by Epi Info version 7. 1 software using a formula for unmatched case control study. The calculation was made for several determinants of anemia among pregnant women from previous studies by considering 95% confidence level, 80% power, a case-to-control ratio of 1:1. The largest sample size was obtained using the proportion of pregnant women who had anemia and not consuming chicken meat at least once per week (91.1%) and Adjusted odds ratio (AOR) of 2.88.[20] Thus, after

considering 5% non-response rate, a total of 282 participants (141 cases and 141 controls) were included in the study.

There are two public health facilities and nine private clinics in Bale-Robe town. Of these, two public health facilities (one general hospital and one health center) were included in the study considering the routine focused antenatal care service provision, which is provided only at the public health facilities. Number of the study subjects were allocated to both facilities proportional to their average first visit attendants per month by referring the antenatal care registration books in both facilities. Thus, the number of monthly antenatal care attendants was 230 in hospital and 60 in the health center. Accordingly, 238 study subjects were allocated to Bale-Robe General Hospital and 44 participants to Baha-Biftu Health Center. The consecutive sampling method was used to select the study participants.

Data collection procedures

Data were collected using structured questionnaire adapted from literatures [5,7-10,14-20]. Data were collected by eight health professionals (four BSc nurses and four BSc laboratory technicians) under supervision of two supervisors. The study subjects were identified as cases and controls based on hemoglobin level measurement, then the supervisor send to the data collectors. The questionnaire categorized to three groups of characteristics such as; sociodemographic and economic characteristics, obstetric and medical characteristics, and dietary intake and behavioral.

Measurements

Blood hemoglobin level was determined using hemocue 201 following standard operation procedures [19]. Hemoglobin cut-off value was adjusted for altitude of Bale-Robe town (2492 meters) using WHO criteria [21]. A stool sample was collected from each study subjects using leak proof stool cup and then stool wets mount as prepared using saline and/or iodine solution. Then, microscopically examined for identification of intestinal parasites. HIV test was conducted following the current testing algorism using the rapid test kit. Dietary diversity was measured using Dietary Diversity Score (DDS), a tool adapted from Food and Agricultural Organization for measuring individual dietary diversity [22]. The DDS was determined by asking each study participants to list all the food items consumed in the last 24 hours. Once the recall was finished, the participant was asked for the food group that was not stated. The food items were categorized into nine food groups. The dietary diversity score is the sum of food groups and ranged from 1-9 [22]. The mean upper arm circumference (MUAC) was measured to assess malnutrition in pregnant women using WHO standardized measuring tape [23].

Data quality control

Th questionnaire was translated to the local language Afan Oromo, and then back-translated to English for consistency (additional file 1). The questionnaire was pre-tested on the 5% of the sample size (14 participants) at Goba Referral Hospital and necessary revision was made accordingly. The supervisors and data collectors were trained for two days. The laboratory reagents were regularly monitored for proper storage. On daily basis, the supervisors were strictly checked the consistency and completeness of data collected. Furthermore, the principal investigator checked data for consistency and completeness before data entry.

Data analysis procedures

The questionnaire was coded and entered using Epi Data. The data cleaning and analysis was done by SPSS version 23 software. Kolmogorov-Smirnov test was used to check the normal distribution of continuous variables. The outcome variable which is hemoglobin level was adjusted for Bale-Robe town altitude by subtracting 1.3 g/dl from the observed hemoglobin level.[21] Descriptive statistics was computed, and the categorical variables were cross-tabulated with outcome variable, and the findings was described by frequencies and proportions for the cases and control group. The reliability of item of the scale for dietary diversity score was assessed using Cronbach's alpha.

Bivariable logistic regression was performed and variables with *P*-value less than 0.25 were transferred to multivariable logistic regression to identify the determinants of anemia. Variables with *P*-value<0.05 in multivariable logistic regression were considered statistically significant. Strength of association were described using adjusted odds ratio along with its 95% confidence interval. Multicollinearity test was done using variance inflation factor and no collinearity exists between explanatory variable. The model goodness of the test was checked by Hosmer-Lemeshow goodness of the fit test (P-value = 0.81).

Operational definition

Altitude adjusted hemoglobin level

Hemoglobin value adjusted for altitude < 11.0 g/dl at first and third trimesters and < 10.5 g/dl at second trimester were used to define anemia [19].

Dietary diversity

Adequate dietary diversity is considered when the DDS is ≥ 4 and inadequate dietary diversity is the DDS below 4 [22].

Malnutrition

The mean upper arm circumference measurement below 23 centimeters [23].

Alcohol consumption

Current alcohol drinker is considered if a woman consumed more than 14 standard drinks of alcohol per week, and ever alcohol drinker is considered if they had consumed alcohol at least once in their life time [24].

Results

Sociodemographic and economic characteristics

A total of 281 pregnant women (141 cases and 141 controls) were recruited in the study. The response rate was 100%. The median (interquartile range) age of the participants was 28 years (IQR = 25-31 years), and ranged from 18-39 years for cases and 19-40 years for controls. Fifty-three (37.6%) of the cases and 63 (44.7%) of the controls were found between 25-29 years. More than three-fourth the cases, 109 (77.3%) and 111 (78.7%) of controls were attended formal education. The occupational status of nearly to two-third of the cases, 89 (63.1%) and only 60 (42.6%) of the controls were housewives. The average monthly family income for three-fourth of the cases, 106 (75.2%) and 106 (75.2%) of the controls were above 2000 Ethiopian birr (Table 1).

Characteristics		Cases, n = 141 (%)	Controls, n = 141 (%)	COR (95%CI)	P value
Age groups	15-19	8 (5.7)	11 (7.8)	0.57 (0.19-1.71)	0.32
	20-24	26 (18.4)	24 (17)	0.85 (0.37-1.94)	0.69
	25-29	53 (37.6)	63 (44.7)	0.67 (0.32-1.35)	0.25
	30-34	31 (22)	25 (17.7)	0.97 (0.43-2.18)	0.94
	≥ 35	23 (16.3)	18 (12.8)	1	
Religion	Orthodox	44 (31.2)	55 (39)	0.4 (0.09-1.69)	0.21
	Protestant	24 (17)	17 (12.1)	0.71 (0.16-3.22)	0.65
	Muslim	67 (47.5)	66 (46.8)	0.51 (0.12-2.12)	0.35
	Catholic	6 (4.3)	3 (2.1)	1	
Marital status	Married	134 (95)	136 (96.5)	0.7 (0.22-2.27)	0.56
	Divorce	7 (5)	5 (3.5)	1	
Educational status	Illiterate	15 (10.6)	12 (8.5)	1.27 (0.57- 2.84)	0.56
	Non formal	17 (12.1)	18 (12.8)	0.96 (0.47-1.96)	0.92
	Formal education	109 (77.3)	111 (78.7)	1	
Occupation	Merchant	15 (10.6)	27 (19.1)	0.82 (0.38-1.77)	0.61
	House wife	89 (63.1)	60 (42.6)	2.18 (1.25- 3.79)	0.006
	Student	5 (3.5)	7 (5.0)	1.05 (0.31-3.59)	0.94
	Employed	32 (22.7)	47 (33.3)	1	
Monthly income	≤ 1500 ETB	14 (9.9)	13 (9.2)	1.08 (0.48-2.40)	0.87
	1501-2000 ETB	21 (14.9)	22 (15.6)	0.96 (0.49-1.84)	0.89
	> 2000 ETB	106 (75.2)	106 (75.2)	1	

Table 1: Bivariable logistic regression of socio-demographic and economic characteristics among pregnant mothers attending antenatal care in Bale-Robe town health facilities, Southeast Ethiopia, March 20 to June 02, 2019.

ETB, Ethiopian Birr; COR, Crude Odds Ratio.

Obstetric and medical characteristics

Half of the cases, 74 (52.5%) and 67 (47.5%) of the controls were multigravida. Only eleven (7.8%) of the cases and 9 (6.4%) of the control had more than four children. More than three fourth of the cases, 118 (83.7%) and 114 (80.9%) of the controls had the previous history of contraceptive use. Half of the cases, 73 (51.8%) had history of menstrual flow for more than six days, while only 40 (28.4%) among the controls. Nearly half of the cases, 64 (45.4%) and 61 (43.3%) of the controls were in the second trimester pregnancy. Fifteen (10.6%) of the cases and 6 (4.3%) of the controls had history of blood loss during the current pregnancy. Intestinal parasites were identified in only nine (6.4%) of the cases and five (3.5%) of the controls. Among the participants, only 6 (4.3%) of the cases and 6 (2.8%) of the controls reported history of chronic illness (Table 2).

Characteristics		Cases, n = 141 (%)	Controls, n = 141 (%)	COR (95%CI)	P value
Gravida	Primigravida	67 (47.5)	74 (52.5)	0.82 (0.51-1.31)	0.41
	Multigravida	74 (52.5)	67 (47.5)	1	
Number of children	≤4 children	130 (92.2)	132 (93.6)	1	
	>4 children	11 (7.8)	9 (6.4)	1.24 (0.5-3.1)	0.64
History of contraceptive use	Yes	118 (83.7)	114 (80.9)	1.22 (0.67-2.24)	0.53
	No	23 (16.3)	27 (19.1)	1	
Menstrual flow in days	>6 days	73 (51.8)	40 (28.4)	2.71 (1.66-4.44)	0.0001
	≤6 days	68 (48.2)	101 (71.6)	1	
Pregnancy Trimester	First	58 (41.1)	63 (44.7)	0.82 (0.39-1.74)	0.61
	Second	64 (45.4)	61 (43.3)	0.94 (0.45-1.97)	0.87
	Third	19 (13.5)	17 (12.1)	1	
History of blood loss during pregnancy	Yes	15 (10.6)	6 (4.3)	2.68 (1.01-7.12)	0.048
	No	126 (89.4)	135 (95.7)	1	
Intestinal parasite	Yes	9 (6.4)	5 (3.5)	1.86 (0.61-5.68)	0.28
	No	132 (93.6)	136 (96.5)	1	
HIV status	Positive	7 (5)	5 (3.5)	1.42 (0.44-4.59)	0.56
	Negative	134 (95)	136 (96.5)	1	
History of chronic illness	Yes	6 (4.3)	4 (2.8)	1.52 (0.42-5.52)	0.52
	No	135 (95.7)	137 (97.2)	1	

Table 2: Obstetric and medical characteristics of pregnant mothers attending antenatal care in Bale-Robe town health facilities, Southeast Ethiopia, March 20 to June 02, 2019.

COR, Crude Odds Ratio.

Dietary and behavioral characteristics

More than three fourth, 122 (86.5%) of the cases and 113 (80.1%) of the controls were drinking coffee immediately after meal. Only 10 (7.1%) of the cases and 13 (9.2%) of the controls had history of alcohol consumption. More than half of the cases, 84 (59.6%) and two-third of the controls, 98 (69.5%) were consuming adequate dietary diversified food. Regarding nutritional status of the participants, more than three fourth of the cases 123 (87.2%) and nearly all controls 136 (96.5%) were well-nourished (Table 3).

Bivariable analysis

Variables having P-value < 0.25 in bivariable logistic regression were transferred to multivariable logistic regression. Accordingly, religion and occupational status from sociodemographic and economic characteristics (Table 1), the duration of menstrual flow and history of blood loss during pregnancy from obstetric and medical characteristics (Table 2), drinking coffee immediately after meal, dietary diversity and nutritional status from dietary and behavior-

Characteristics		Cases, n = 141 (%)	Controls, n = 141 (%)	COR (95%CI)	P value
Drink coffee immediately after meal	Yes	122 (86.5)	113 (80.1)	1.59 (0.84-3.01)	0.153
	No	19 (13.5)	28 (19.9)	1	
Ever drink alcohol	Yes	10 (7.1)	13 (9.2)	0.75 (0.32-1.78)	0.52
	No	131 (92.9)	128 (90.8)	1	
Current alcohol drinker	Yes	6 (4.3)	9 (6.4)	0.65 (0.23-1.88)	0.43
	No	135(95.7)	132(93.6)	1	
Dietary diversity	Inadequate (DDS<4)	57 (40.4)	43 (30.5)	1.55 (0.95-2.53)	0.082
	Adequate (DDS≥4)	84 (59.6)	98 (69.5)	1	
MUAC	< 23cm	18 (12.8)	5 (3.5)	3.98 (1.44-11.04)	0.008
	≥ 23cm	123 (87.2)	136 (96.5)	1	

Table 3: Dietary and behavioral characteristics of pregnant mothers attending antenatal care in Bale-Robe town health facilities, Southeast Ethiopia, March 20 to June 02, 2019.

COR, Crude Odds Ratio.

al characteristics (Table 3) were selected as candidate variables for multivariable logistic regression.

Determinants of anemia among pregnant women

In multivariable logistic regression, three variables (occupational status, duration of menstrual flow, nutritional status) were significantly associated with anemia among pregnant women. Pregnant women whom their occupational status was housewives were two times more likely to have anemia compared to the employed women (AOR = 2.1, 95% CI = 1.12-3.92). The odds of developing anemia among pregnant women who had prolonged previous menstrual period for more than 6 days were two times higher compared to those mothers with less than six days menstrual bleeding (AOR = 2.33, 95% CI = 1.38-3.92). Similarly, pregnant women who had malnutrition were four times more likely to have anemia during pregnancy as compared to well-nourished (AOR = 4.03, 95% CI = 1.38-11.83) (Table 4).

Characteristics		Cases, n = 141 (%)	Controls, n = 141 (%)	COR (95%CI)	AOR (95%CI)
Occupation	Merchant	15 (10.6)	27 (19.1)	0.82 (0.38- .77)	0.96 (0.41-2.22)
	House wife	89 (63.1)	60 (42.6)	2.18 (1.25-3.79)	2.1 (1.12-3.92) *
	Student	5 (3.5)	7 (5.0)	1.05 (0.31-3.59)	0.93 (0.24-3.54)
	Employed	32 (22.7)	47 (33.3)		1
Duration of menstrual flow	>6 days	73 (51.8)	40 (28.4)	2.71 (1.66-4.44)	2.33 (1.38-3.92) *
	≤6 days	68 (48.2)	101 (76.1)	1	1
MUAC	< 23 cm	18 (12.8)	5 (3.5)	3.98 (1.44-11.0)	4.03 (1.38-11.83) *
	≥ 23 cm	123 (87.2)	136 (96.5)		1

Table 4: Bivariable and Multivariable logistic regression analysis showing factors associated with anemia among pregnant mothers attending antenatal care in Bale-Robe town health facilities, Southeast Ethiopia, March 20 to June 02, 2019.

*P < 0.01, COR, crude odds ratio; AOR, Adjusted odds ratio.

Discussion

Anemia in pregnant women increases the risk of both maternal and child morbidity and mortality, including impaired cognitive development of the children, and decrease work productivity in adults [25]. Prevention and control of anemia among pregnant women are a key measure to reduce the adverse effects of anemia in mothers and child. Finding of this study showed that housewife occupational status, prolonged menstrual period and malnutrition were significant determinants of anemia among pregnant women.

Housewife occupational status is found to be significantly associated with anemia in pregnant women. Pregnant women whom their occupational status was housewives were two times more likely to have anemia compared to the employed women. This finding is consistent with similar study conducted in Durame, Southern Ethiopia [26], and study in Gondar, Northern Ethiopia [27], which reported significant positive association between housewife occupational status and anemia in pregnant women. This might be due to workload on housewives and financial shortage, which result in difficulty of obtaining food. Mothers with shortage of income due to occupational status will not able to fulfill daily dietary intake needed for pregnant women and as a result develop anemia [28]. In contrast, the study conducted in North Shoa, Ethiopia found negative association between housewives occupational status and anemia during pregnancy [14]. This discrepancy might be due to the variation in study design. The implication of this finding is the importance of women engaging to an income generating occupation to fulfill dietary requirement during pregnancy.

Another finding of this study is the prolonged previous menstrual bleeding, which is significantly associated with anemia. The odds of developing anemia among pregnant women who had prolonged previous menstrual bleeding for more than 6 days were two times higher compared to those mothers with less than six days bleeding. This finding is in line with the studies conducted in Durame town, Southern Ethiopia [26], and in Mekele town, Tigray Ethiopia [29], which showed significant association between heavy menstrual bleeding and development of anemia during pregnancy. Likewise, our finding is supported by the similar studies conducted in Hawassa and Yirgalem [30], Wolayita [18], Mizantepi [12], and East Hararghe zone of Ethiopia [5]. This is due to the fact that prolonged menstrual bleeding result in blood loss and reduce the number of circulating red blood cells. In addition, prolonged blood loss may decrease iron levels enough to increase the risk of iron deficiency anemia. This finding implies the women with prolonged previous menstrual bleeding needs to take iron-rich food and iron supplementation during pregnancy.

Undernutrition during pregnancy is found to be significantly associated with anemia. Pregnant women who had malnutrition during pregnancy were four times more likely to have anemia as compared to well-nourished. This is consistent with the finding of studies conducted in Asosa, Western Ethiopia [31], and study in Gondar, Northern Ethiopia [28]. Similarly, the studies conducted in Jamaica [32], and Tanzania [33], reported positive association between undernutrition during pregnancy and anemia. Nutritional deficiency is the major contributing factor for anemia among pregnant women and this is due to undernutrition is related with iron, folate, and vitamin A and other micronutrient deficiencies [12,27,34]. This is due to the fact that, poor dietary intake and micronutrient deficiencies due to malnutrition result in anemia because pregnancy is the most nutritional demanding. In addition, malnutrition during pregnancy is result in iron deficiency anemias as a result of inadequate dietary iron intake. This is further supported by the WHO report, which stated in developing countries, inadequate intake of dietary iron as the main causes of anemia during pregnancy [35].

Our finding suggests that taking adequate dietary intake during pregnancy is required for the prevention of anemia among pregnant women.

Limitations of the Study

The temporal relationships between explanatory variables and anemia cannot be determined, as it is the case control study. Social desirability bias and recall bias are also other limitation of our study regarding to dietary diversity, alcohol consumption and monthly income. The dietary intake could also be affected by seasonal variation. Moreover, the findings of the current research cannot be generalized to the whole community because of its institution-based nature.

Conclusions

Different factors were studied to identify the determinants of anemia among pregnant women. Housewife occupation, prolonged menstrual period and malnutrition were the determinants

of anemia among pregnant women. Therefore, pregnant women with prolonged previous menstrual bleeding needs to take iron-rich food and iron supplementation. Anemia prevention and control strategy in pregnant women is required to include adequate dietary intake for the prevention of anemia. Strengthening nutritional counselling for pregnant women during antenatal care is also required by health care provider. Finally, further longitudinal studies which determine the cause of anemia in pregnant women is recommended for the researcher.

Strengths and Limitation of this Study

- This study used hemocue 201 to determine blood hemoglobin level following standard operation procedures.
- This study included several detailed measures of dietary, behavioral, obstetric and medical characteristics, and identified determinants that will be important in prevention and control of anemia in pregnant women.
- The temporal relationships between explanatory variables and anemia could not be established as we have used a case-control study design.
- Social desirability bias and recall bias might be introduced during measuring of dietary diversity, alcohol consumption and monthly income.

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Contributions

MHB involved in the study design, data collection, analysis and write-up. FSK performed analysis, interpretation of data and drafted the manuscript. MSA and TMH contributed to the design, data collection and revision of the manuscript. All authors approved the final version.

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Competing Interests

None declared.

Ethics Approval

Ethical clearance was obtained from the institutional review board of Institute of Health, Jimma University (Ref.No./IHRP-GD/767/2019) in accordance with Helsinki declarations for studies involving human subjects. Permission to conduct the study was taken from Bale town health office and the health facilities. Written informed consent was obtained from each participant after explaining the purpose of the study. The confidentiality of information obtained from the participants was assured and the study subjects were informed that, they had full right to participate to the study. The pregnant women who had anemia and those investigated positive for intestinal parasite were linked to the health facilities antenatal care unit for treatment.

Data Sharing Statement

No additional data are available.

Additional File

Additional file 1: Questionnaire used for data collection.

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