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# Immediate postpartum anemia and associated factors at shewarobit health facilities, Amhara, Ethiopia, 2022: a cross sectional study

Nigus Amime Eshete<sup>1</sup>, Yohannes Moges Mittiku<sup>2</sup>, Alemayehu Gonie Mekonnen<sup>3</sup>, Tesfay Hailu Welu<sup>4\*</sup> and Teklehaimanot Gereziher Haile<sup>5</sup>

## Abstract

**Background** Immediate postpartum anemia occurs when the amount of red blood cell count is reduced or hemoglobin concentration is below 10 g/dl in the immediate postpartum. It occurs primarily due to inadequate iron intake before and during pregnancy and blood loss during delivery. The aim of this study is to assess the proportion of immediate postpartum anemia and associated factors among mothers who gave birth at Shewarobit health facilities; in Amhara, Ethiopia.

**Methods** Institutional-based cross-sectional study was conducted from June to September 2022. A systematic random sampling method was employed to select the study participants. The data were collected through interviewer-assisted questions. Data were entered into Epi Data software version 4.6.0.4 and exported to SPSS 21 for analysis, and descriptive statistics were computed. Logistic regression was applied, and P-values less than 0.05 were considered statistically significant.

**Results** This study was conducted among 307 study participants and, the proportion of immediate postpartum anemia was 41.4% [95% CI: 36.7–46.6]. Having postpartum hemorrhage [AOR=4.76, 95% CI: 2.44–9.28], not taking iron and folic acid supplementation [AOR=6.19, 95% CI: 2.69, 14.22], having a prolonged second stage of labor [AOR=2.52, 95% CI: 1.16–5.44], and mid-upper arm circumference < 23 cm [AOR=2.02, 95% CI: 1.11–3.68] were factors significantly associated with immediate postpartum anemia.

**Conclusions** The proportion of immediate postpartum anemia was public problem in Shewarobit health facilities. Following the progress of labor using a partograph, closely monitoring and immediate intervention of PPH, and prevent undernutrition during antenatal care is recommended.

**Keywords** Amhara, Anemia, Associated factors, Ethiopia, Immediate postpartum, Mothers, Proportion

\*Correspondence:  
Tefay Hailu Welu  
hailetesfay2008@gmail.com

Full list of author information is available at the end of the article



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## Background

Postpartum anemia continues to be a major public health concern in developing nations, especially in sub-Saharan Africa. It is the most frequent non-direct cause of death and morbidity in mothers [1]. Immediate postpartum anemia is defined as Hgb < 10 g/dl, Hgb < 11 g/dl, and Hgb < 12 g/dl cut-off values within the first 48 h of delivery, at 1 week and 6 weeks of postpartum duration, respectively [1–4]. Immediate postpartum anemia could be defined as postpartum anemia within 24 h of the delivery of the placenta [5]. It is also known as the postnatal period, or puerperium [6–9]. Similarly, the immediate postpartum period refers to the time just after delivery of the placenta, during which the risks of postpartum hemorrhage and other significant morbidity are highest and covers the first 24 h from birth [9].

Immediate Post-Partum Anemia (IPPA) occurs when the red blood cell count is reduced or the hemoglobin concentration is below 10 g/dl in the immediate postpartum [10–13], primarily due to inadequate iron intake before and during pregnancy and blood loss during delivery. In other words, the combination of iron deficiency anemia (IDA) and hemorrhagic anemia leads to postpartum anemia [14]. The magnitude of postpartum hemorrhage in Ethiopia was 8.18%, which is a leading direct cause of maternal morbidity and mortality [14]. IDA is common during the postpartum period and accounts for 50% of cases of anemia [15, 16].

Immediate postpartum anemia is a global health problem in both developing and developed countries, with major consequences for maternal health as well as social and economic development [4]. Worldwide, the World Health Organization (WHO) estimated the number of anemic mothers to be about 1.5 billion, and approximately 50% of all cases can be attributed to iron deficiency [5, 17]. It is estimated that 1 out of 5 maternal deaths are caused by postpartum hemorrhage and anemia [6–8]. In 2017, 295 000 women died during and following pregnancy and childbirth. The vast majority occurred in low-resource settings [18].

Although the incidence of postpartum anemia is estimated to be low in countries with high development, in countries with low development, the incidence is as high as 50–80% [10]. The most at-risk population groups are both pregnant women and women of reproductive age, next to children, for anemia on a global scale [11]. African and Asian countries account for more than 80% of the anemia burden in high-risk groups [12].

In Ethiopia, anemia accounted for 10.39% of all reported indirect causes of maternal mortality. Therefore, the maternity ward presents a crucial window of opportunity for postpartum women to get medical management for anemia [19]. The Ministry of Health has advocated nutritional treatments, such as the Essential

Nutrition Action Plan, which consists of vitamin A, iron, iodine supplements and, others to lessen the incidence of anemia among Ethiopian women [20].

Anemia associated with infections has also contributed to postpartum anemia [5]. According to WHO, pregnancy-specific hemoglobin levels are used to categorize anemia in pregnancy and the postpartum period; that is, 10–10.9 g/dl is considered mild anemia, 7–9.9 g/dl is considered moderate, and < 7 g/dl is considered severe anemia [5, 21, 22]. When the hemoglobin concentration falls below 4.1 g/dl most of the body tissues become starved of oxygen, and the heart muscles are likely to fail, resulting in death [10, 23].

Despite the fact that studies on anemia have been conducted in the general population, there is insufficient evidence on the proportion and factors associated with immediate postpartum anemia among mothers who gave birth in Shewarobit health facilities. Therefore, the aim of this study is to assess the proportion of immediate postpartum anemia and associated factors among mothers who gave birth at Shewarobit health facilities; in Amhara, Ethiopia. As a result, postpartum mothers may benefit from the intervention taken based on result findings. This study might also provide insight into IPPA for midwives as a baseline in their counseling to minimize IPPA. Furthermore, this might help stakeholders and policymakers to strengthen their plans for the prevention of immediate postpartum anemia.

## Methods

### Study design, period, and study setting

A facility-based cross-sectional study was conducted from June to September 2022 at Shewarobit health facilities. This is located in the North Shewa Zone, Amhara Region, Ethiopia. It has nine administrative units (Kebele) with a total population of 50,528, of which 25,890 (51.2%) are women.

### Source and study population

The source population consisted of all postpartum mothers who gave birth at Shewarobit Health Facilities as well as mothers who gave birth elsewhere but visited the hospital within 24 h of the postpartum period. The study population consisted of mothers who met the requirements to be a source population and made themselves available during the data collection period.

### Inclusion and exclusion criteria

This study included all postnatal women who gave birth at Shewarobit Health Facilities as well as mothers who gave birth elsewhere but visited the hospital within a day of the data collection period. This study did not include mothers who were anemic prior to conception or during pregnancy.

### Sample size determination and sampling procedure

The sample size calculation was based on the single population proportion formula by using the following assumptions: proportion=24.3% from previous studies [5],  $z$ =standard normal distribution at 95% confidence interval (1.96),  $\alpha$ =level of significance (5%),  $d$ =margin of error (5%),  $n$ =required sample size, then the formula for calculating the sample size is,

$$n = \frac{(z\alpha/2)^2 \times P(1-P)}{d^2} = \frac{(1.96)^2 \times 0.243(1-0.243)}{(0.05)^2} \text{ therefore, } n=283.$$

Epi Info version 7.2.5.0 was used to determine the sample size based on the second objective, which is statistically significant factors. A maximum sample size of 198 was determined. As a result, the sample size indicated by the second objective was smaller than the one computed by the first objective. Therefore, the final sample size was determined using the sample size derived from the first objective. The bare minimum suitable sample size, considering a 10% non-response rate, was 311. Based on the high number of maternity ward admission services provided by these three public institutions, the sample size was proportionately assigned to each, considering the average monthly maternity admission from each facility's health management and information system report.

### Study variables

#### **Dependent variables: immediate postpartum anemia**

Independent variables: sociodemographic characteristics, obstetrical-related variables, Coexisting infection-related variables, and dietary and micronutrient uptake-related variables.

### Data Collection Tools and procedures

Data were collected using an interviewer assigned questionnaire, which was developed after reviewing different pieces of literature [5, 17, 24, 25] conducted in Ethiopia and in different parts of the world, the questionnaire contains sociodemographic characteristics, obstetrical-related variables, coexisting infection-related variables, and dietary and micronutrient-uptake-related variables. A total of four BSc midwives were recruited for data collection and supervision. Data were collected through a face-to-face interview and supplemented by a maternal chart review. MUAC was measured via tape meters on the non-dominant hand, mostly the left hand. The result was interpreted according to WHO recommendations of a cutoff point of <23 cm as undernourished and  $\geq 23$  cm as well-nourished.

### Laboratory procedures

The 3 health facilities used the "HORIBA ABX Micros 60 Hematology Analyzer." For quality control, a sample of blood was taken and tested in all laboratories of health

facilities, and the hemoglobin level was the same. To estimate hemoglobin concentration, about 4 milliliters of anticoagulated sample blood from a superficial vein on the forearm were drawn into an ethylene diamine tetra acetic acid (EDTA) vacutainer by data collectors and taken to respective laboratories. The laboratory technologist measured the hemoglobin level using an automated hematology analyzer. Using a closed mode of blood sampling, the analyzer automatically sampled, processed, and analyzed blood and printed out hemoglobin levels. Finally, the levels of hemoglobin were attached to their respective charts. At the end, anemic mothers were treated with iron and folic acid or transfused with blood based on their hemoglobin levels and were advised on iron-rich diets.

### Data quality control management

In order to assure data quality, the English version of the questioner was translated into Amharic, and to keep its consistency, it was translated back to the English version. A pretest was done on 16 immediate postpartum mothers at Ataye Primary Hospital before the actual data collection. This helps to check the response, language clarity, and appropriateness of the questionnaire. Also, one-day training was given to data collectors and supervisors about the purpose of the study and the procedures for data collection. Finally, the data were checked on a daily basis during data collection periods by the supervisor to confirm its completeness and the presence of missing data.

### Data processing and analysis

After data collection was completed, information was assessed for its completeness, numerical coding was implemented, and it was entered into Epi Data Software version 4.6.0.4, and exported to Statistical Package for Social Science (SPSS) version 21 software for further analysis. Descriptive statistics were computed and presented with texts, tables, and graphs. Cross-tabulation and Chi-square assumptions were checked. A binary logistic regression model was fitted to identify independent factors, and variables having a  $p$ -value of less than 0.2 were entered into the multivariable logistic regression to handle possible confounders, and the crude odds ratio (COR) was computed. In the multivariable logistic regression, a  $p$ -value of  $\leq 0.05$  with a 95% CI for the adjusted odds ratio (AOR) was used to affirm the statistical association.

## Results

### Sociodemographic characteristics

Three hundred seven immediate postnatal mothers were involved in this study, giving a total response rate of about 98.7%. The minimum age was 17 and the

maximum was 45, and the mean age of the study population was  $26.92 \pm SD 5.34$  years. Based on the age category, 145 (47.2%) study participants were in the age range of 25–34 years. About 60 (19.5%) of mothers were unable to read and write, and 147 (47.9%) of mothers were housewives by their occupation. About 198 (64.5%) were orthodox Christian followers. More than half (213), or 69.4% of the participants were from urban areas. Regarding marital status, 98% (301) of women were married. About one-third (32.6%) of husbands were farmers (Table 1).

#### Obstetrical related factors

Among the total 307 study participants, 106 (34.5%) were primipara mothers. A majority of 287 (93.5%) of the study participants had antenatal care follow-up during their recent pregnancy. From those, more than half 190 (61.9%) of the mothers had  $\geq 4$  ANC visits. Sixty-one participants gave birth before 37 weeks of gestation, and sixty mothers faced a prolonged second stage of labor. From the total participants, 212 gave birth by SVD, whereas 51 (16.6%) of the study participants gave birth through a cesarean section, and 72 participants experienced PPH in their immediate postpartum period (Table 2).

#### Coexisting infection-related factors

Forty-two mothers were dewormed with mebendazole, and 129 mothers used ITN for the prevention of helminthes and malaria, respectively. One hundred sixty-five (53.7%) of the respondents had diagnosed coexisting infections during recent pregnancy, of which UTI were predominant (11.4%) whereas syphilis (1.6%) was the least (Table 3).

#### Dietary and micronutrients utilization related factors

Two hundred sixty-five of the study participants were started on IFA tablets during recent pregnancy. Among these, 149 (48.5%) were started before 20 weeks of gestation. Among mothers supplied with IFA tablets, 216 (70.4%) took their iron supplementation for at least 90 days. Ninety-four (30.6%) of the mothers' mid-upper arm circumference was less than 23 cm (Table 4).

#### The proportion of Immediate Postpartum Anemia

Immediate postpartum anemia was observed among 127 (41.4%) mothers. The postpartum hemoglobin concentrations of study participants ranged from 2 g/dl to 17 g/dl, with a mean value of 11.56 g/dl, and  $SD \pm 1.755$  g/dl. From the total 41.4% of anemic mothers, 87 (28.3%), 36 (11.7%), and 4 (1.3%) of them were categorized as having mild, moderate, and/or severe anemia, respectively.

**Table 1** Sociodemographic characteristics of postpartum mothers in Shewarobit health facilities ( $n = 307$ )

Variable	Category	Frequency (n)	percent (%)
Age	15–24	130	42.3
	25–34	145	47.2
	35–49	32	10.4
Religion	Orthodox	198	64.5
	Muslim	86	28
	Protestant	23	7.5
Residency	Urban	213	69.4
	Rural	94	30.6
Ethnic Group	Amhara	245	79.8
	Afar	17	5.5
	Argoba	19	6.2
	Oromo	18	5.9
	Tigre	8	2.6
Educational Status	Un able to read and write	60	19.5
	Able to read and write	86	28
	Primary class completed	58	18.9
	Secondary class completed	66	21.5
	Diploma and above	37	12.1
Occupation	House Wife	147	47.9
	Government Employee	34	11.1
	Private Employee	40	13
	Merchant	36	11.7
	Farmer	50	16.3
Marital Status	Married	301	98
	Un Married	6	2
Monthly Income (ET birr)	< 2000	34	11.1
	2000–5000	163	53.1
	5001–10,000	98	31.9
	$\geq 10,001$	12	3.9

**Table 2** Obstetrical characteristics of postnatal mothers in Shewarobit health facilities, North Shewa, Ethiopia 2022 (n = 307)

Variable	Category	Frequency (n)	Percent (%)
Parity	Primi Para	106	34.5
	Multi Parous	201	65.5
Inter pregnancy Interval of the last and present (in months)	< 24	39	12.7
	≥ 24	162	52.8
Twin Pregnancy	Yes	12	3.9
	No	295	96.1
APH	Yes	29	9.4
	No	278	90.6
ANC	Yes	287	93.5
	No	20	6.5
#of ANC	< 4	97	31.6
	≥ 4	190	61.9
GA at first ANC (in weeks)	< 16	160	52.1
	≥ 16	127	41.4
GA at delivery	< 37	61	19.9
	≥ 37	246	80.1
Mode of Delivery	SVD	212	69.1
	I/AVD	44	14.3
	C/S	51	16.6
Prolonged second stage	Yes	60	19.5
	No	247	80.5
Episiotomy	Yes	85	27.7
	No	222	72.3
Perineal Tear	Yes	54	17.6
	No	253	82.4
PPH	Yes	72	23.5
	No	235	76.5
New Born Birth Weight(gm)	< 4000	299	97.4
	≥ 4000	8	2.6

**Table 3** Coexisting infections related factors among postnatal mothers in Shewarobit health facilities 2022 (n = 307)

Variable	Category	Frequency	Percent (%)
De-wormed with Mebendazole	Yes	42	13.7
	No	265	86.3
Helminthes during pregnancy	Yes	32	10.4
	No	275	89.6
ITN used	Yes	129	42
	No	178	58
Malaria positive	Yes	7	2.3
	No	300	97.7
HIV/AIDS	Yes	13	4.2
	No	294	95.8
Syphilis positive	Yes	5	1.6
	No	302	98.4
UTI positive	Yes	35	11.4
	No	272	88.6

Note: Type of helminthes were Ameobiasis, Giardiasis and Shcistosomiasis

Regarding hemoglobin determination, the time from delivery to sample collection was recorded in hours, and the mean time of sample collection was 6:17, the minimum time was 1:00, and the maximum time was 22:00, and range of 21:00 (Fig. 1).

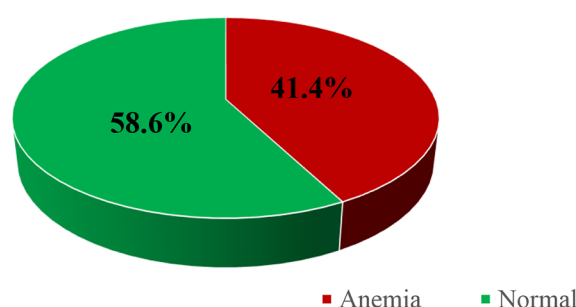
#### Associated factors of Immediate Postpartum Anemia

In bi-variable logistic regression analysis, maternal educational level (being unable to read and write), preterm delivery, prolonged second stage of labor, perineal tear, postpartum hemorrhage, not taking IFA supplementation, cesarean section mode of delivery, rural residency, and MUAC < 23 cm were variables associated with immediate PPA with a p value of < 0.2. Postpartum

**Table 4** dietary and micronutrient related factors of immediate postpartum anemia in Shewarobit health facilities ( $n = 307$ )

Variable	Category	Frequency	Percent (%)
Iron taken	Yes	265	86.3
	No	42	13.7
GA of Iron initiated (weeks)	< 20 weeks	149	48.5
	$\geq 20$ weeks	116	37.8
Duration of Iron supply	< 3 months	49	16.0
	$\geq 3$ months	216	70.4
MUAC (cm)	< 23	94	30.6
	$\geq 23$	213	69.4
Hgb determination time	< 8 h	244	79.5
	$\geq 8$ h	63	20.5

Proportion of immediate postpartum anemia

**Fig. 1** proportion of immediate postpartum anemia among mothers who gave birth at Shewarobit health facilities, Amhara, Ethiopia, 2022( $n = 307$ )

hemorrhage, not using IFA supplements, protracted second stage of labor, and MUAC < 23 cm were independent variables in multivariate logistic regression that were substantially associated with a  $p$  value < 0.05 (Table 5).

## Discussion

This study assessed the proportion and associated factors of immediate postpartum anemia among mothers in the immediate postpartum period in Shewarobit health facilities in 24 h. The proportion of immediate postpartum anemia among study participants was 41.4% (hemoglobin level below 11 g/dl), with a 95% CI: (36.7–46.6), which is slightly higher than the study conducted in China and Tanzania, in which (32.7%) [26] and 34.2% [17] postpartum mothers were found to be anemic, respectively. The proportion of this study was significantly higher than the study conducted in Costal Karnataka, the Ethiopian National Demographic Health Survey (EDHS 2016), and the study conducted in Mekele and DebreMarkos, where 26.5% [27], 24% [14], 24.2% [10], and 24.3% [5] mothers were identified as being anemic in their postpartum period, respectively.

However, the proportion was significantly lower than findings from Indonesia, Myanmar, and Burkina Faso, where 60%, 73.8%, and 51.9% (more than half of their study participants) were anemic [10, 16, 28]. The proportion was slightly lower than the study conducted in India (47.3%), Turkey (45.11%), Spain (45%), and Pakistan

(47.9%) [28–31], respectively. The mean hemoglobin concentration (11.56 g/dl) was also lower than the study conducted at DebreMarkos (12.4 g/dl) [5]. This might be due to the geographical differences and socio-cultural factors of Ethiopians, as most mothers take longer maternity rest before child delivery and are kept nourished with a variety of foods. In addition, the majority of Ethiopians consume injera, which is rich in dietary iron. The recentness of this study might also be another factor due to the increased awareness of postpartum mothers about postpartum anemia.

Regarding the severity of anemia, 1.3% of the study participants were severely anemic hemoglobin concentration less than 7 g/dl, whereas 11.7% and 28.3% of the study participants were moderately and mildly anemic, respectively. Even though the proportion of immediate postpartum anemia among current study participants was relatively low compared to most other studies, it is considered a public health problem according to the WHO classification [32].

The odds of immediate postpartum anemia among postpartum mothers who experienced massive postpartum blood loss were almost five times higher than the odds of anemia among postpartum mothers who did not develop postpartum hemorrhage [AOR=4.76, 95%CI: (2.44–9.28)]. Similar findings were reported in DebreMarkos [5], Saudi Arabia [2], and Tamil Nadu, India [29]. Excessive bleeding after birth decreases the red blood



**Table 5** Multivariable Logistic regression showing associated factors of immediate postpartum anemia among mothers in Shewarobit health facilities, Amhara, Ethiopia, 2022 (n=307)

Variables	Categories	Postpartum anemia		COR 95%CI	AOR 95%CI
		Yes	No		
Educational status	Un able to read and write	36	24	2.46(0.17–7.94)	0.41(0.14–1.18)
	able to read and write	37	49	1.24(0.37–3.78)	0.71(0.27–1.88)
	Primary school completed	19	39	0.8(0.53–1.96)	0.69(0.25–1.93)
	Secondary school completed	21	45	0.77(0.56–1.03)	0.92(0.33–2.54)
	Diploma and above	14	23	1	1
PPH	Yes	49	23	4.29(2.44–7.54)	4.76(2.44–9.28)**
	No	78	157	1	1
Prolonged second stage	Yes	39	21	3.36(1.86–6.06)	2.52(1.16–5.44)*
	No	88	159	1	1
IFA intake status	No	32	10	5.73(2.70–12.16)	6.19(2.69–14.22)**
	Yes	95	170	1	1
MUAC	< 23 cm	49	45	1.88(1.15–3.08)	2.02(1.11–3.68)*
	≥ 23 cm	78	135	1	1
GA at delivery	Preterm	33	28	1.91(1.08–3.36)	1.81(0.92–3.54)
	Term	94	152	1	1
Perineal tear	Yes	30	24	2.01(1.11–3.64)	1.82(0.90–3.70)
	No	97	156	1	1
Mode of delivery	C/S	26	25	1.71(0.32–3.08)	0.50(0.16–1.63)
	IAVD	21	23	1.51(0.34–2.28)	0.98(0.41–2.32)
	SVD	80	132	1	1
Residency	Rural	45	49	1.47(0.90–2.39)	1.14(0.60–2.14)
	Urban	82	131	1	1

Note: Reference category \* p value less than 0.05 \*\*p value less than 0.01, CI=Confidence interval COR=Odds Ratio, AOR=Adjusted Odds Ratio

cell component called hemoglobin. In every milliliter of blood loss, a half-milligram of iron will be reduced in the blood [33].

The odds of immediate postpartum anemia were six-fold higher among postpartum mothers who had not taken IFA supplements compared to their counterparts [AOR=6.19; 95% CI: (2.69,14.22)]. This finding was in agreement with the studies carried out in Debremarkos [5], Uganda, and Pakistan [31, 34]. The possible explanation might be due to the depletion of stored maternal iron since the physiologic requirements of iron during pregnancy and labor are high. Therefore, not taking IFA supplements could reduce the body's iron stores and result in anemia, even with minimal blood loss during childbirth. The odds of postpartum anemia were two times higher among postnatal mothers whose MUAC measurements were <23 cm compared to those whose MUAC measurements were ≥23 cm [AOR=2.02, 95% CI: (1.11, 3.68)]. This study was supported by the study done at Debremarkos and Mekelle [5, 24]. The most likely explanation might be iron deficiency anemia, which is usually related to nutritional deficiency. A MUAC measurement of <23 cm indicates poor muscle mass and lack of adequate energy intake. Hemoglobin concentration and maternal MUAC had a linear relationship, which was also another explanation [35].

Prolonged-second stage labor increases the chance of immediate postpartum anemia occurring almost three times compared to their counterparts [AOR=2.52, 95% CI: (1.16–5.44)]. This finding was supported by a study done in Indonesia [21]. The possible explanation might be the second stage of labor is prolonged and managements like trial of instrumental delivery, episiotomy, perineal tears, and C/S delivery are expected, which increase the chance of bleeding and the risk of immediate postpartum anemia [5, 36].

#### Limitation of the study

There may be recall bias since participants were requested to give information about the past nine months' "activity of mothers." Besides, in the postpartum period, after 24 h, there is a possibility of secondary postpartum hemorrhage persisting. Since these women were not eligible to participate in this study, it is possible that the proportion estimation was lower than the actual.

#### Conclusion

The proportion of immediate postpartum anemia in Shewarobit health facilities was a significant public health concern as earlier research done in Mekelle and Debre Markos, in Ethiopia. Immediate postpartum anemia was substantially correlated with primary postpartum hemorrhage, not taking IFA supplementation, a

prolonged second stage of labor, and MUAC less than 23 cm. By comprehending the local context of anemia in the early postpartum period, this finding may assist concerned bodies and stakeholders in improving women's health through monitoring, putting preventive measures into place, and sustaining efforts on the identified risk factors of immediate postpartum anemia during pregnancy, labor, and delivery.

#### Abbreviations

AOR	Adjusted Odds Ratio
APH	Ante Partum Hemorrhage
CI	Confidence Interval
CBC	Complete Blood Count
COR	Cruds Odds Ratio
DHS	Demographic Health Survey
IAVD	Instrumental Assisted Vaginal Delivery
IFA	Iron and Folic Acid
IPPA	Immediate Post-Partum Anemia
MUAC	Mid Upper Arm Circumference
OR	Odds Ratio
SPSS	Statistical Package for Social Science
SVD	Spontaneous Vaginal Delivery
WHO	World Health Organization

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#### Author contributions

NAE wrote the proposal, participated in the data collection, in the statistical analysis and writing the manuscript. YMM, AGM, THW & TGH approved the proposal with some revisions, participated in data analysis. NAE and THW revised subsequent drafts of the manuscript. All authors read and approved the final manuscript for publication.

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#### Data availability

The full data set and other materials pertaining to this research can be obtained from the corresponding author on reasonable request.

#### Declarations

##### Ethics approval and consent to participate

The study protocol was authorized by the Aserat Woldeyes Health Science College's Institutional Review Board (IRB) at Debre Berhan University. The study's goals and aim were explained to the respondents in a briefing. Informed written consent was obtained from each person to ensure ethical issues were addressed. For participants under sixteen years old informed written consent was obtained from at least one parent or guardian of each study participant. Study participants who cannot read and write the data collector was read the written consent and then if they decided to participate, they signed. To maintain the study participants confidentiality; name, personal identifiers was not included in the study questionnaire. In addition, participants' data was locked with a key/password to ensure confidentiality. After all, voluntary informed consent was obtained from study participants.

##### Consent to publish

Not applicable.

##### Competing interests

The authors declare no competing interests.

##### Author details

<sup>1</sup>Department of Midwifery, Shewarobit Hospital, North Shewa, Amhara, Ethiopia

<sup>2</sup>Department of Midwifery, College of Health Sciences, Debre Brhan University, Debre Brhan, Ethiopia

<sup>3</sup>School of Nursing and Midwifery, College of Health Sciences, Debre Brhan University, Debre Brhan, Ethiopia

<sup>4</sup>Department of Midwifery, College of Health Sciences and Comprehensive Specialized Hospital, Aksum University, Aksum, Tigray, Ethiopia

<sup>5</sup>Department of Maternity and Neonatal Nursing, School of Nursing, College of Health Sciences, Comprehensive Specialized Hospital, Aksum University, Aksum, Tigray, Ethiopia

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