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Association Between Maternal Anemia and Low Birth Weight Among Newborns in Rural Dhaka: A Cross-Sectional Study

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Research Article

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Abstract

Background

Maternal anemia during pregnancy is a serious medical condition for the newborn, which can impair fetal development and lead to situation such as low birth weight. The recognition and prevent of maternal anemia remains a major challenge, especially in rural areas and areas with limited healthcare facilities.

Objective

The objective of this study was to determine the prevalence of anemia among pregnant mothers in a rural population of Dhaka and to evaluate the relationship between maternal hemoglobin status and newborn birth weight.

Methods

A quantitative cross-sectional study was conducted on 406 pregnant mothers in selected rural areas of Dhaka and Narayanganj from August 2024 to July 2025. Maternal hemoglobin data were collected from antenatal care (ANC) and medical records and maternal anemia was considered as Hb < 11 g/dL according to World Health Organization (WHO) guidelines. Birth weight of the newborn was collected from delivery records and was classified as low birth weight if < 2500 g. Data were analyzed using SPSS version 25 and Chi-square test was applied to determine the relationship.

Results

The study found that 63.1% of mothers did not receive any ANC and a similar proportion did not have their hemoglobin tested. Among mothers whose hemoglobin was tested, severe, moderate and mild anemia were detected. 49.3% of the total newborns had a birth weight of less than 2.5 kg. There was a statistically significant association between maternal hemoglobin levels and newborn birth weight ($p < 0.001$).

Conclusion

The results of this study indicate that maternal anemia, limited ANC uptake, and inadequate Hb screening in rural areas are significantly associated with adverse neonatal outcomes. Early identification of anemia during pregnancy, regular ANC care, and ensuring iron-folic acid supplementation may be important steps to reduce low birth weight.

Introduction

Red blood cells (RBC) are a component of blood in the human body. Anemia is a condition in which the concentration of hemoglobin in RBCs is lower than normal (WHO, n.d.). For a healthy woman, the hemoglobin level is 12.0–15.0/16.0 g/dL. The hemoglobin level of a pregnant woman is 11.0–14.0 g/dL(WHO, n.d.). It is most commonly observed in women. This problem is more common in women aged 15–19 years. Some of the causes of this include minor bleeding, nutritional deficiencies such as iron, vitamin B12, and folate, and other causes such as intestinal parasitic infections, chronic inflammation, and thalassemia (WHO, 2025).

A decrease in hemoglobin levels, especially during pregnancy, is very normal and common (Fente et al., 2025). One of the main causes of anemia during pregnancy is the increase in blood volume and nutritional needs of the fetus, which often leads to deficiencies in iron, folate, and vitamin B12(Young et al., 2023). A pregnant mother with anemia is at risk of severe fatigue, an increased risk of infection, premature delivery, and life-threatening postpartum hemorrhage (Zhang et al., 2021). Anemia can cause intrauterine growth retardation, low birth weight, and long-term neurocognitive delay (Obeagu & Obeagu, 2025).

Any baby born weighing less than 2500 g, regardless of gestational age, is considered to have a low birth weight. Some of the causes of low birth weight include malnutrition, poor weight gain during pregnancy, and iron deficiency anemia (Desta, 2020)

According to global statistics for 2023, 30.7% of women aged 15–49 years were anemic. In the same year, 35.5% of pregnant women of the same age were anemic, and 30.5% of non-pregnant women were anemic (Ali, Tikmani, et al., 2020). According to global statistics in 2019, 39.8% of children aged 6–59 months were anemic (Gardner & Kassebaum, 2020). A study conducted in an urban area of Bangladesh found a significant association between maternal anemia and low birth weight. Of the mothers with maternal anemia, 52.6% gave birth to low-birth-weight infants. Every year, 19.8 million babies are born with LBW. Many studies have confirmed a strong association between low hemoglobin levels and low birth weight (LBW) (Khezri et al., 2025).

Pregnant women with anemia during pregnancy were 1.3 times more likely to have a low birth weight than mothers without anemia (Fente et al., 2025). The meta-analysis included nine cohort studies involving 75,807 pregnant women from Taiwan, China, Japan, India, Bangladesh, Iran, and Colombia (Tursina & Adhimukti, 2022).

There have been several studies on the prevalence of maternal anemia and low birth weight in Bangladesh, but most of them are hospital-based or urban, with little evidence from rural community-level studies. Some studies have used recent post-epidemic data to examine the association between anemia and LBW. Limited research has examined the impact of food insecurity and disrupted antenatal care (ANC) on maternal nutrition and birth outcomes. In view of this deficiency, there is an urgent need for updated and area-based epidemiological assessments in rural upazilas, especially in the Dhaka

division, as this division, despite its urban identity, has a significant rural population. The aim of the present study was to determine the prevalence of maternal anemia in a rural upazila of Dhaka and assess its association with low birth weight in a rural upazila of Dhaka using a cross-sectional community-based design. The results of this study are expected to share deep understanding for maternal health policy, particularly in the refinement of nutritional interventions, ANC advice, and rural health programs in the country.

Literature review

Gestational anemia is one of the most persistent public health issues for mother and child, with effects not only on the fetus but also on intrauterine growth and outcomes of pregnancy. This review highlights that maternal anemia is not only a risk factor but also a indicator of low birth weight (Kharate & Choudhari, 2024). This review examines the evidence for anemia in rural and urban populations, identifies the causes of anemia, and discusses practices that can be used to treat anemia in newborns (Figueiredo et al., 2018). The prevalence of anemia in the reviewed studies ranged from 28% to 63%, meaning that in some cases, nearly one in three women suffered from anemia (Waheed et al., 2026). In particular, Husna et al. (2025) reported a prevalence of 63.4%, Azhar et al. (2021) reported a prevalence of 62.5%, Rahman et al. (2018) reported a prevalence of 56.5%, Roy et al. (2022)reported a prevalence of 53.5%, and Bashar et al. (2018) reported a prevalence of 51.6% among these groups (Heema et al., 2025). Even the decision to speak of a lower prevalence is an important indication, as is the case with Alam et al. (2020), which is 35%, and Hasan Mukh (2024), which is 38%. This difference was not determined by the large, revealing that socioeconomic status, access to healthcare, geographical location, and the quality of the measurement criteria used to measure anemia (Eltayeb et al., 2025).

Among the maternal music studies, 12 participants confirmed a statistically significant association between anemia and low birth weight (Beressa et al., 2024). This discrepancy is important because the display included different population members, sample sizes, and methodologies, yet the truth about the relationship was changed. The review found that maternal anemia was significantly associated with low birth outcomes in (Ullah et al., 2025), low birth weight and adverse neonatal outcomes in (Husna et al., 2025).

Ullah et al. (2025) found a significant association between anemia and low birth outcomes in 45.5% of 290 pregnant women. Although Husna et al. (2025) conducted their study on a small sample of 82 pregnant women, they still reported a high rate of anemia (63.4%) and confirmed a causal relationship between anemia and birth outcomes (Pokhrel et al., 2025). Kabir et al. (2022), using a much larger sample of 2,259 women, reported a 44% prevalence of anemia and a high risk of adverse outcomes among anemic mothers (Kusumawati et al., 2024).

The association between hemoglobin levels and fetal growth is also supported by studies investigating the association between maternal anemia and neonatal outcomes. Low birth weight was observed in 21.3% of the newborns, with a higher rate observed in anemic mothers (Iqbal et al., 2023). Bhattacharjee

et al. (2024) found a 21.6% prevalence of low birth weight and a significant association between maternal factors and birth outcomes. (Siddiqui et al., 2022) found a 40.1% prevalence of low birth weight in mothers and a significant association between maternal anemia and neonatal outcomes.

Carpenter et al. (2022), using a sample of 1,665 people, reported a 48.3% prevalence of maternal anemia and identified a U-shaped relationship between hemoglobin and low birth weight. This means that low hemoglobin and low birth weight can create a very new race of newborns.

A study conducted by Hyder et al. (2004) among pregnant women in rural Bangladesh found a 50% prevalence of anemia, demonstrating that anemia has been a major maternal health concern in rural populations. Similarly, Lindström et al. (2011) used data from rural Bangladesh and identified a 28% prevalence of anemia in early pregnancy, emphasizing the contribution of micronutrient deficiencies beyond iron deficiency alone. More recent studies have indicated that this burden remains unresolved. Carpenter et al. (2022), focusing on rural Bangladesh, reported 48.3% maternal anemia among 1,665 participants, while Ullah et al. (2025), studying rural Bangladeshi mothers, identified a 45.5% prevalence of anemia and found a significant association between maternal anemia and severe low birth weight.

Roy (2022) working in Sylhet reported a 53.5% maternal anemia prevalence, while Azhar et al. (2021)identified a 62.5% anemia prevalence among pregnant women receiving antenatal care in Bangladesh. In contrast, Alam et al. (2020) in a study conducted on women in a military hospital setting reported a prevalence of less than 35%.

Evidence from other South Asian contexts supports this regional argument. Studies in Nepal,Pakistan, and other countries have also shown that the rate of low birth weight is higher among babies born to mothers with anemia (Ali, Abbasi, et al., 2020). A study conducted in Nepal by Aden et al.(2023) found that 35.3% of newborns were born with low birth weights, and this rate was higher in mothers with anemia than in other comparable regions. Similarly, in Pakistan, Iqbal et al. (2023) reported that maternal hemoglobin levels were closely related to newborn birth weight, while Rauf et al. (2022) identified maternal anemia as an important risk factor for low birth weight among Pakistani mothers.

In Bangladesh, Nessa et al. (2018) reported a 21.6% prevalence of low birth weight among infants born to mothers admitted to Dhaka Medical College Hospital and found a strong association between maternal factors and birth weight. Kishwar et al. (2024) reported a 21.3% prevalence of low birth weight among infants born to anemic mothers in Pakistan. In contrast, Nessa et al. (2018) reported a much higher prevalence of 51.8% low birth weight among infants born to anemic mothers in a hospital in Dhaka.

Some studies use the World Health Organization (WHO) definition of anemia as a hemoglobin level of less than 11 g/dL, while others apply different criteria, including less than 10 g/dL.

Methodology

Research Design

This study used a quantitative cross-sectional design. The objective of the study was to evaluate the association between maternal anemia and neonatal low birth weight (LBW).

The universities were selected from rural areas of Dhaka and Narayanganj. The study sites were selected as the study sites in Dhaka, Bijoy Subard, Kalindi and Tegharia of Odhikari Keraniganj and Sonar Fatulla, Rupganj and Ogaon.

The study period was from August 1, 2024, to July 30, 2025.

Study Population and Participants

The study population included all rural mothers who gave birth to live newborns during the study period.

In total, 406 mothers participated in the study.

Inclusion criteria:

- Mothers aged 18–45 years
- Mothers living in a local business
- Mothers who gave birth to a live child during the study period
- Hemoglobin information was available in the ANC record
- Newborn birth information was available in the delivery record

This study included both vaginal and cesarean (CS) deliveries to reduce selection bias due to the delivery method and reflect real maternal and neonatal health outcomes.

Exclusion criteria:

- Stillbirth
- Twin or multiple pregnancy
- congenital anomalies

Sample Size and Sampling Method

The sample size estimation formula was used for the sample:

$n = Z^2pq/d^2$

Where,

- n = Active sample response
- Z = 95% confidence level
- p = Prevalence of previous research data (Ara et al., 2024)
- q = (1-p)
- d = = Margin of error

A total of 406 participants were selected based on this criterion.

A multistage sampling technique was used.

Data Collection Method:

A structured questionnaire was used to collect data through face-to-face interviews with the participants.

Informed consent

was obtained from all participants before data collection.

This study collected data on the following:

Socio-demographic characteristics

- Maternal age
- Educational qualifications
- Environment
- Antenatal care (ANC) intake
- Number of ANC visits
- Iron folic acid (IFA) tablet intake
- Dietary habits and supplementation

Obstetric history (Obstetric history)

- Maternal hemoglobin level
- Newborn birth weight

Maternal anemia assessment

This study followed the (World Health Organization, 2024) criteria for diagnosing maternal anemia.

Maternal anemia was defined as a hemoglobin concentration of less than 11 g/dL during pregnancy.

Maternal hemoglobin levels were collected from the ANC records and medical records of participants who had not been re-measured.

Hemoglobin Level Category: (World Health Organization, 2024)

< 7 g/dL Severe anemia

7-9.9 g/dL Moderate anemia

10-10.9 g/dL Mild anemia

≥ 11 g/dL Non-anemic

Birth weight assessment

Neonatal birth weight was assessed according to the WHO classification.

Neonates born weighing less than 2500 g (< 2.5 kg) were classified as low birth weight (LBW).

The neonate's birth weight was collected from the delivery record, where the birth weight was measured and recorded by the hospital staff at the time of delivery.

Study Variables

The exposure variables were as follows:

- Maternal anaemia status

The outcome variables were as follows:

- Low birth weight (LBW)

Other auxiliary variables included:

- Maternal age
- Educational status
- Environment
- ANC intake
- Number of ANC visits
- IFA tablet intake
- Duration of IFA intake
- Place of delivery

- Obstetric history

Ethical considerations:

Ethical approval

was obtained from the Institutional Review Board (IRB) of the University of South Asia for this study.

Informed consent

was obtained from the participants prior to their participation in the experiment.

The personal information of the participants was kept confidential (confidential) and the data collected were used only for the purpose of the study.

Data analysis:

The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 25.

The activists conducted a descriptive study on socio-demographic characteristics, ANC history, IFA supplementation, hemoglobin status, and newborn birth weight.

Result

Table 01
Socio-Demographic Profile

Variable	Response	Frequency	Percent
Age Group	< 20	120	29.6
	20–29	180	44.3
	30–39+	106	26.1
Education level	None	32	7.9
	Primary	274	67.5
	Secondary	100	24.6
Occupation	Housewife	308	75.9
	Laborer	49	12.1
	Other	49	12.1

Interpretation

The above table shows that 29.6% were less than 20 years of age, Between 20 and 29 years of age, 44.3% were between 30 and more than 39 years of age 26.1. Of these, 67.5% were female, 24.6% had secondary education, and 7.9% had no formal education. Among the participants, 76% were housewives, 12.1% were employed, and 12.1% engaged in other activities.

Antenatal Care (ANC) History

Variable	Response	Frequency	Percent
Received ANC	Yes	150	36.9
	No	256	63.1
Number of ANC visits	1–2	100	24.6
	3–4	35	8.6
	More then 4	15	3.7
	No visit	256	63.1
Hemoglobin tested during ANC	Yes	150	36.9
	No	256	63.1

Interpretation

In the above data, we found that 36.9% of women received ANC, 63.1% did not receive ANC, 24.6% received ANC only one to two times, 8.6% went three to four times, and only 3.7% of women received ANC more than four times & 63.1% female not taking any ANC visit. Analyzing the above data We found that 36.9% of mothers reported checking hemoglobin levels, while 63.1% did not check hemoglobin levels.

Dietary Intake and Supplement Use:

Variable	Response	Frequency	Percent
Took IFA tablets	Yes	150	36.9
	No	256	63.1
Duration of IFA intake	< 1 month	40	9.9
	1–3 Months	90	22.2
	> 3 months	20	4.9
	Without IFA tablets	256	63.1

Interpretation

Of the respondents, 36.9% of the mothers took IFA tablets, and 63.1% did not. Of the above respondents, 9.9% took IFA tablets for less than a month, 22.2% for one to three months, only 4.9% took them for more than three months, and 63.1% did not take any IFA tablets.

Obstetric History and Birth Outcomes

Variable	Response	Frequency	Percent
Total number of live births	1	100	24.6
	More then 2	306	75.4
Place of delivery	Home	256	63.1
	Goverment Facility	90	22.2
	Private Facility	60	14.7
Full term delivery (> 37 weeks)	Yes	300	73.9
	No	106	26.1

Interpretation

Analyzing the above results, we found that 24.6% gave birth to one live birth, and 75.4% gave birth to more than two children. Of the respondents, 63.1% gave birth at home, 22.2% in government hospitals, and 14.8% in private hospitals. The results of delivery showed that 73.9% of deliveries were full-term, that is, ≥ 37 weeks. Of the respondents, 26.1% were born prematurely.

Hemoglobin and Birth Weight:

Variable	Response	Frequency	Percent
Hemoglobin level during pregnancy (g/dL)	< 7	15	3.7
	7-9.9	80	19.7
	10-10.9	10	2.5
	11+	45	11.1
	Without HB% Check	256	63.1
Baby's birth weight category	< 2.5 kg	200	49.3
	≥ 2.5 kg	106	26.1
	Don't know	100	24.6

Interpretation

The above data show that 63.1% of mothers did not check their hemoglobin status during pregnancy, 3.7% had hemoglobin levels < 7 g/dL, 19.7% had 7-9.9 hemoglobin, 2.5% had 10-10.9 of hemoglobin level, and 11.1% of the patients had hemoglobin levels ≥ 11 g/dL. The above also shows that 49.3% of the babies weighed less than 2.5 kg at birth. Of the babies, 26.1% weighed > 2.5 kg at birth. In addition, 24.6% of mothers did not know their baby's birth weight.

Received ANC * Hemoglobin tested during ANC Crosstabulation				
Count				
		Hemoglobin tested during ANC		Total
		Yes	No	
Received ANC	Yes	150	0	150
	No	0	256	256
Total		150	256	406

Chi-Square Tests					
	Value	**df**	**Asymptotic Significance (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	406.000[a]	1	.000		
Continuity Correction[b]	401.719	1	.000		
Likelihood Ratio	534.837	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	405.000	1	.000		
N of Valid Cases	406				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 55.42.					
b. Computed only for a 2x2 table					

Interpretation

It was important to know the level of hemoglobin in this study because we found out in this study whether there is any relationship between hemoglobin and birth weight. And in view of that we saw that only those who received prenatal care had their hemoglobin level checked and we did chi square test to check the relationship between prenatal care and hemoglobin level ($\chi^2(1, N = 406) = 406.00, p < .001$) check and there we found statistically significant.

Received ANC * Took IFA tablets Crosstabulation				
Count				
		Took IFA tablets		Total
		Yes	No	
Received ANC	Yes	150	0	150
	No	0	256	256
Total		150	256	406

Chi-Square Tests					
	Value	**df**	**Asymptotic Significance (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	406.000[a]	1	.000		
Continuity Correction[b]	401.719	1	.000		
Likelihood Ratio	534.837	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	405.000	1	.000		
N of Valid Cases	406				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 55.42.					
b. Computed only for a 2x2 table					

Interpretation

The above table shows the relationship between ANC and IFA tablet intake. The results showed that 150 mothers received ANC, and all of them (100%) received IFA tablets. On the other hand, 256 mothers did not receive ANC, and none of them received IFA tablets. This result indicates a statistically significant relationship between ANC and IFA tablet intakes.

Took IFA tablets * Hemoglobin level during pregnancy (g/dL) Crosstabulation							
Count							
		Hemoglobin level during pregnancy (g/dL)					Total
		< 7	7-9.9	10-10.9	11+	Without HB% Check	
Took IFA tablets	Yes	15	80	10	45	0	150
	No	0	0	0	0	256	256
Total		15	80	10	45	256	406

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	406.000[a]	4	.000
Likelihood Ratio	534.837	4	.000
Linear-by-Linear Association	316.395	1	.000
N of Valid Cases	406		
a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 3.69.			

Interpretation

"The table shows the relationship between IFA tablet intake and hemoglobin levels during pregnancy. Among those who took IFA tablets and had their hemoglobin tested, 53.3% (80) had hemoglobin levels between 7-9.9 g/dL. The chi-square test shows that there is a statistically significant relationship between IFA tablet intake and hemoglobin levels, $\chi^2(4, N = 406) = 406.00$, $p < .001$."

Hemoglobin level during pregnancy (g/dL) * Baby's birth weight category Crosstabulation					
Count					
		Baby's birth weight category			Total
		< 2.5 kg	≥ 2.5 kg	Don't know	
Hemoglobin level during pregnancy (g/dL)	< 7	15	0	0	15
	7-9.9	80	0	0	80
	10-10.9	10	0	0	10
	11+	45	0	0	45
	Without HB% Check	50	106	100	256
Total		200	106	100	406

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	245.027[a]	8	.000
Likelihood Ratio	309.903	8	.000
Linear-by-Linear Association	155.268	1	.000
N of Valid Cases	406		
a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is 2.46.			

Interpretation

The above data were analyzed to determine if there was any relationship between hemoglobin levels during pregnancy and birth weight, and it was found to be statistically significant using the chi-square test.

Discussion

In this study, we investigated the relationship between maternal anemia and low birth weight in rural Dhaka. We also analyzed service utilization, hemoglobin testing, iron folic acid tablet intake, and delivery-related characteristics. According to our sample size, we took data from 406 mothers and found that mothers who were anemic during pregnancy had low birth weight in their children; that is, there is a significant relationship between maternal anemia and child birth weight. Since previous studies were hospital- or urban-based, this result is especially important for rural populations.

In this study, we found that 36.9% of mothers received ANC, while a large proportion, 63.1%, did not receive any prenatal care. Among those who received prenatal care, very few received more than one to two services, and only 3.7% received more than four prenatal care services. Analyzing these results, we understand that there is still a lack of awareness among the rural population in rural environments, which needs to be determined in future studies.

The association between hemoglobin testing and those who received prenatal care was very important because it allowed us to determine which mothers were suffering from anemia. All those who received prenatal care had their hemoglobin levels tested, while none of those who did not receive prenatal care had their hemoglobin levels tested. This association was statistically significant using the chi-square test. This study shows that prenatal care is the main gateway for detecting anemia in mothers in rural communities.

We found important information regarding the use of iron folic acid tablets in this study. This tablet plays a very important role for those with low hemoglobin levels, and anemia can be prevented to a large extent after taking this tablet. In our study, we found that 36.9% of mothers took this tablet, while 63.1% of mothers who did not avail any service during pregnancy did not take this tablet. We also found a statistically significant association with the intake of services during pregnancy, that is, ANC and iron and IFA. Iron folic acid. Again, only 4.9% of mothers who took this tablet took it for more than three months.

In this study, we checked the hemoglobin status of mothers during pregnancy, following the (World Health Organization, 2024) criteria. And in that information, we found that 15 mothers had severe anemia during pregnancy, 80 mothers had moderate anemia and 10 had mild anemia. This result is concerning because anemia during pregnancy hinders the weight gain of the child.

In the literature review, the prevalence of maternal anemia in various studies ranged from 28% to 63%. Hyder et al. (2004) found the prevalence of anemia in rural Bangladesh to be 50%, Carpenter et al. (2022) 48.3%, Ullah et al. (2025) 45.5%, Roy (Roy, 2022) 53.5% and 62.5%, respectively. This conclusion can be drawn from all previous studies that maternal anemia is a long-standing public health problem in Bangladesh.

A statistically significant association was also found between IFA intake and Hb status. As the study was cross-sectional, changes in hemoglobin levels before and after IFA intake were not determined. This is an important point for further research. Further research should examine hemoglobin status before and after IFA tablet intake.

In terms of birth weight, 49.3% of the children weighed less than 2.5 kg, which is a low birth weight according to the (WHO, n.d.) definition. Of the children, 26.1% weighed ≥ 2.5 kg. More significantly, the study found that 63.1% of mothers were unaware of their baby's birth weight because they gave birth at home.

The rate of low birth weight in our study was higher than that in several previous studies. Nessa et al. (2018) 21.6% in Bangladesh, Kishwar et al. (2024) 21.3% in Pakistan and Yadav et al. (2025) 35.3% reported low birth weight in Nepal. In contrast, in a hospital-based study in Dhaka, (Bhattacharjee et al., 2024) found a low birth weight of 49.3%, which is close to the rate of 49.3% in our study. (Adhimukti et al., 2023). A meta-analysis found that anemic mothers were 1.35 times more likely to have low birth weight babies than nonanemic mothers.

This study included 406 rural mothers and was conducted at the community level in India. We included both vaginal and cesarean deliveries. Maternal hemoglobin was collected from ANC and medical records, and newborn birth weight was obtained from delivery records. Anemia and low birth weight were recorded according to the WHO criteria.

Since this study was cross-sectional in design and only some rural areas were included, direct generalizations should not be made to the entire rural population of Bangladesh. Future studies should conduct multivariate analyses to better understand the relationship between maternal anemia and low birth weight.

Overall, our study highlights the concerning issues of maternal anemia, limited use of prenatal care, and low birth weight in rural areas. If more information can be disseminated about pregnancy risks and post-pregnancy activities, as well as hospital or health center-based awareness of maternal care during pregnancy can be increased and ensured, this concern can be significantly reduced.

Declarations

Patient and Public Involvement

Patients or the general public were not directly involved in the planning, research design, data analysis, or manuscript preparation for this study. However, the study was conducted to assess the health status of pregnant women in rural areas, highlighting the real health challenges related to maternal anemia, antenatal care, and neonatal birth outcomes. The results of this study may be helpful in improving rural maternal health services, anemia screening, and community-based maternal health interventions in the future.

Conflict of Interest Statement:

The authors declare that there are no financial or personal conflicts of interest in this research, the publication of its results, or the preparation of the manuscript.

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Data Availability Statement:

The data used in this study were collected in accordance with the participant confidentiality and ethical guidelines. To protect the privacy of the participants, the complete individual-level dataset has not been made publicly available. However, for reasonable reasons and within the limits of ethical approval, the study data may be made available upon request from the corresponding author.

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