|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||

Available online on http://www.ijmbs.info

International Journal of Medical and Biomedical Studies; 2026; 10(2); 49-53

Original Research Article

Maternal anaemia in pregnancy and its association with low birth weight and developmental delay in infants

Monika Seth[1], Sneha Manchanda[2], Farida Iqbal[3]

[1]Senior resident, Department of Pediatrics and Neonatology, Shyamlal Chandrashekhar Medical College and Hospital, Khagaria, Bihar, India
[2]Senior Resident, Department of Obstetrics and Gynaecology, Chittranjan Seva Sadan College of Obstetrics Gynaecology and Child Health, Kolkata, India
[3]MBBS, DNB obs /gyn, Medical officer, Clinical pathology department, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India

Received: 16-02-2026 / Revised: 17-03-2026 / Accepted: 20-03-2026
DOI: https://doi.org/10.32553/ijmbs.v10i2.3228
Corresponding author: Monika Seth
Conflict of interest: No conflict of interest

Abstract:

Background: Maternal anaemia is a prevalent condition in pregnancy, particularly in developing countries, and is associated with significant adverse neonatal outcomes. It leads to reduced oxygen-carrying capacity of blood, resulting in impaired fetal growth, low birth weight, preterm birth, and an increased risk of developmental delays in infants.

Objective: To evaluate the association between maternal anaemia, low birth weight, and developmental delay in infants.

Methods: A prospective observational study was conducted over 11 months among 100 pregnant women. Maternal haemoglobin levels were categorized into severe, moderate, mild anaemia, and normal. Birth weight was recorded at delivery, and infants were assessed for developmental delay using standard screening tools. Statistical analysis was performed using the chi-square test, with $p < 0.05$ considered significant.

Results: The prevalence of low birth weight was higher among mothers with severe and moderate anaemia. Developmental delay was also more frequent in infants born to anaemic mothers. A statistically significant association was observed between maternal anaemia and low birth weight ($p < 0.01$), as well as developmental delay ($p < 0.01$). Additionally, low birth weight infants showed a higher incidence of developmental delay ($p < 0.05$).

Conclusion: Maternal anaemia is significantly associated with low birth weight and developmental delay in infants. Early screening and management of anaemia during pregnancy are essential to improve neonatal and developmental outcomes.

Keywords: Maternal anaemia, low birth weight, developmental delay, infants, neonatal

Introduction

One of the most prevalent nutritional conditions affecting expectant mothers globally, especially in low- and middle-income nations, is maternal anaemia. Global health estimates indicate that iron deficiency anaemia affects a large percentage of pregnant women, which has serious consequences for the health of both the mother and the foetus (1). Pregnancy-related anaemia lowers blood's ability to carry oxygen, which results in persistent foetal hypoxia, compromised placental

function, and limited intrauterine growth. Additionally, it is linked to a higher risk of problems like preterm birth and infant mortality as well as increased maternal morbidity and exhaustion (2).

Neonatal morbidity and death are significantly influenced by low birth weight, which is defined as less than 2500 grammes. Maternal anaemia is closely linked to a higher chance of delivering low birth weight (LBW) infants, according to numerous research. During infancy and childhood, these babies are more vulnerable to infections, stunted growth, and unfavourable health outcomes. Maternal anaemia has been linked to long-term developmental effects in addition to immediate birth outcomes. Poor intrauterine nutritional status and insufficient oxygen flow to the developing brain have been related to early childhood developmental delays, including cognitive, motor, language, and behavioural deficits (3).

The prevalence of maternal anaemia is still high despite numerous governmental initiatives to supplement iron and folic acid, especially in environments with little resources. Its prevalence is a result of inadequate prenatal care, poor compliance, and lack of knowledge. To improve prenatal care interventions, it is essential to comprehend how it affects newborn outcomes. Using a prospective observational strategy, this study attempts to assess the relationship between low birth weight and developmental delay in newborns as well as maternal anaemia (4).

Methodology

- **Study Design:** Prospective observational study
- **Duration:** 11 months
- **Sample Size:** 100 pregnant women

Inclusion Criteria

- Pregnant women attending antenatal clinics during the study period
- Singleton pregnancies
- Gestational age ≥28 weeks at the time of recruitment
- Mothers willing to provide informed consent
- Mothers available for follow-up until delivery and infant developmental assessment

Exclusion Criteria

- Pregnant women with chronic medical disorders (e.g., hypertension, diabetes mellitus, renal disease)
- Multiple pregnancies (twins or higher-order gestation)
- Known fetal congenital anomalies
- Mothers with severe systemic illness or infections
- Preterm deliveries (<37 weeks), if excluded from analysis of developmental outcomes
- Mothers unwilling or lost to follow-up

Data Collection

- Maternal haemoglobin levels categorized as:
  - Severe (<7 g/dL)
  - Moderate (7–9.9 g/dL)
  - Mild (10–10.9 g/dL)
  - Normal (≥11 g/dL)
- Birth weight recorded at delivery
- Developmental milestones assessed using standard pediatric screening

Statistical Analysis

For statistical analysis, the chi-square test was employed. Statistical significance was defined as a p-value of less than 0.05.

Results

Table 1: Maternal Anaemia vs Birth Weight

Anaemia Level	LBW	Normal	p-value
Severe	15	4	<0.01
Moderate	14	20	

Mild	6	23	
Normal	1	17	

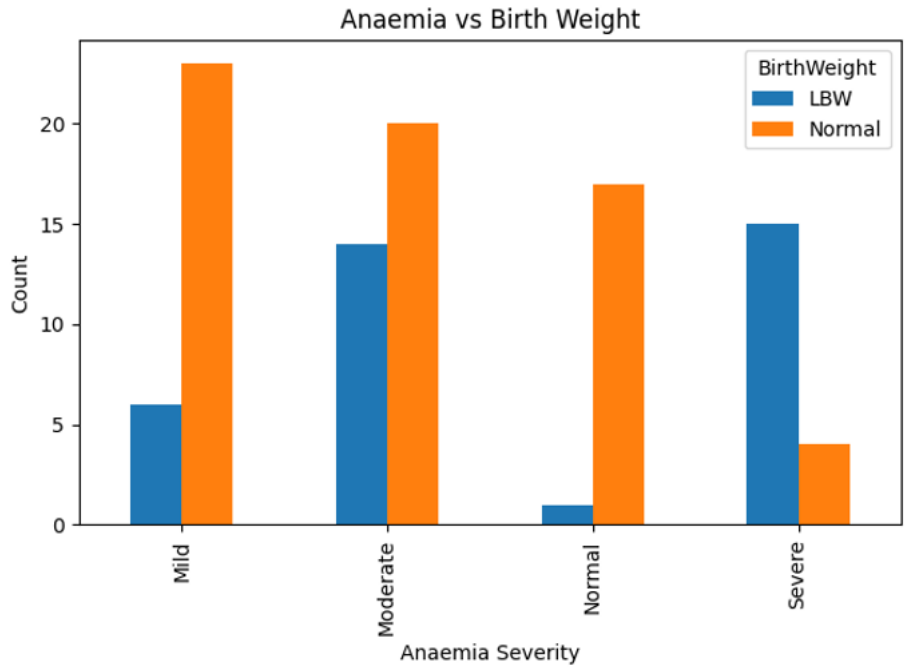

Figure 1: Anemia Vs birth weight

Table 2: Maternal Anaemia vs Developmental Delay

Anaemia Level	Delay (Yes)	Delay (No)	p-value
Severe	11	8	<0.01
Moderate	15	19	
Mild	4	25	
Normal	3	15	

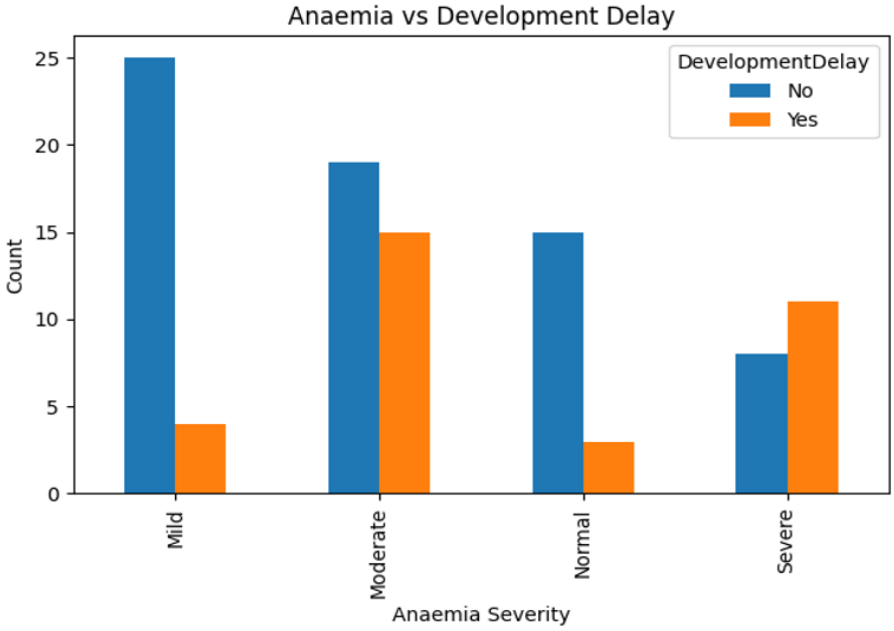

Figure 2: Anemia Vs development delay

Table 3: Birth Weight Vs Developmental Delay

Birth Weight	Delay (Yes)	Delay (No)	p-value
LBW	19	17	<0.05
Normal	14	50	

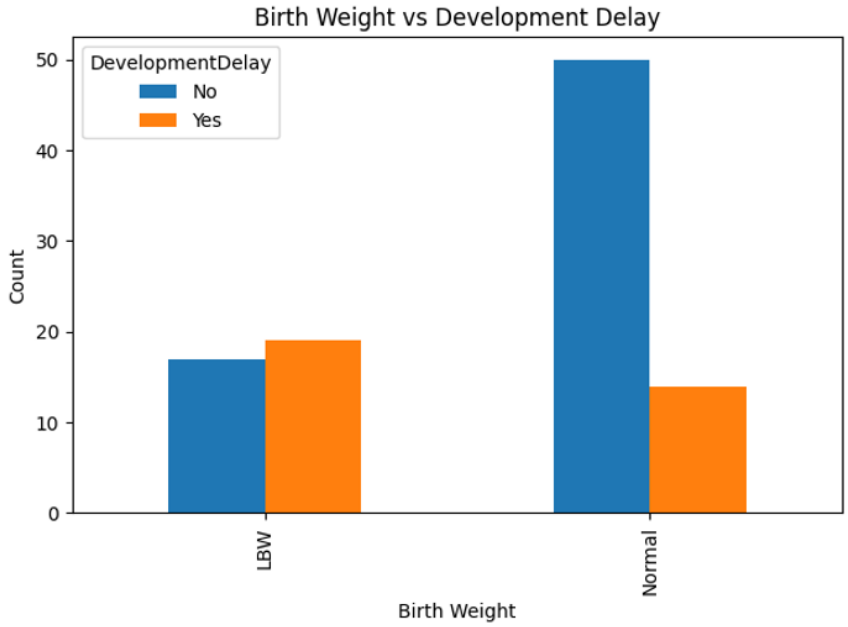

Figure 3: Birth weight vs development delay

Discussion

The current study shows a strong correlation between poor neonatal outcomes, especially low birth weight and developmental delay, and maternal anaemia. The results are in line with other research that emphasises anaemia as a significant factor in intrauterine growth restriction and unfavourable foetal outcomes. The majority of mums with severe anaemia gave birth to LBW babies, and this study found that severe anaemia had the strongest correlation with low birth weight. This is explained by the foetus receiving less oxygen, which leads to chronic hypoxia, poor foetal growth and development, and altered placental function (5).

Although less noticeable than severe anaemia, moderate anaemia still had a significant effect, suggesting a dose-response link between haemoglobin levels and foetal outcomes. Low birth weight was considerably less correlated with mild anaemia, indicating that early detection and prompt care at this stage could avoid progression to more severe forms and related problems. These results highlight how crucial it is to maintain appropriate haemoglobin levels throughout pregnancy(6).

This study's finding of a link between maternal anaemia and developmental delay is especially significant. Delays in developmental milestones were more common in infants born to anaemic mothers, which may be related to nutritional shortages, chronic foetal hypoxia, and insufficient oxygen delivery that affects brain maturation and neurological development. Additionally, it was discovered that low birth weight itself was strongly linked to developmental delay, highlighting the interrelated and complex nature of these unfavourable consequences (7).

The findings highlight the significance of regular screening and efficient anaemia

control throughout prenatal care. In order to reduce these negative consequences and enhance the health of both mothers and children, interventions like iron and folic acid supplementation, nutritional counselling, and early detection of high-risk pregnancies are crucial (8).

The single-center design, small sample size, and lack of long-term follow-up for thorough developmental assessment are some of the study's shortcomings. It is advised that these findings be further validated and expanded upon in future research with bigger populations and longitudinal follow-up (9).

Conclusion

Maternal anaemia is significantly associated with low birth weight and developmental delay in infants. The severity of anaemia directly influences neonatal outcomes, with severe anaemia posing the highest risk. Early detection and effective management of anaemia during pregnancy are crucial to improving both immediate and long-term child health outcomes.

References

1. Engidaw MT, Eyayu T, Tiruneh T. The effect of maternal anaemia on low birth weight among newborns in Northwest. Sci Rep [Internet]. 2022;12(15280):1–8.
2. Lauer JM, Bhaise S, Dhurde V, Gugel A, Shah M, Hibberd PL, et al. Maternal Anemia during Pregnancy and Infant Birth Outcomes : A Prospective Cohort Study in Eastern Maharashtra , India. Curr Dev Nutr [Internet]. 2024;8(11):104476.
3. Kumar V, Kumari A, Kumar A, Narayan JP, Nisha S, Prasad S. MATERNAL ANEMIA IN PREGNANCY AND ITS ASSOCIATION WITH LOW BIRTH WEIGHT Student ' s Journal of Health Research Africa Study Design and Setting. Student ' s J Heal Res Africa. 2024;5(11):1–5.
4. Rozhan Khezri, Fatemeh Rezaei SJ& KE. Association between maternal anemia during pregnancy with low birth weight their infants. Sci Rep. 2025;15(6446):1–9.
5. Syafiqoh G, Ghrahani R, Yuniati T, Padjadjaran U, Padjadjaran U, Hospital G. Relationship of anemia in pregnancy and low birth weight. Pediatr Oncall J. 2021;18(3):77–81.
6. Vijay M, Nandan T, Singh BB, Shukla L. Maternal Anemia in Pregnancy and its Association with Low Birth Weight and Developmental Delay in Infants : A Retrospective Study. Int J Curr Pharm Rev Res. 2025;17(2):1437–41.
7. Aggarwal M, Jain P, Mahadik K. Maternal anaemia and neonatal outcome : An observational study on rural pregnant women. Indian J Obstet Gynecol Res. 2021;8(3):371–6.
8. Biswas P, Samsuzzaman M, Chakraborty A, Das DK. Maternal anemia and low birth weight in a community development block of Purba Bardhaman , West Bengal : a retrospective cohort analysis. Int J Community Med Public Heal. 2019;6(12):5250–5.
9. Id PPSP, Mata FAF Da, Lyrio AO, Souza ES, Cruz SS, Pereira MG. Maternal Anemia and Low Birth Weight : A Systematic Review and Meta-Analysis. Nutrients. 2018;10(601):1–17.