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## Prevalence of Anemia in Pregnancy: A Cross-Sectional Study of Contributing Factors and Outcomes

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### ABSTRACT

Anemia is a prevalent issue among pregnant women, posing significant risks to maternal and fetal health. Understanding the prevalence and associated factors is crucial for effective management and prevention strategies. This cross-sectional study analyzed data from 200 pregnant women attending a tertiary care hospital to assess the prevalence of anemia and its association with various dietary, socioeconomic and physiological factors. Hemoglobin levels were measured and information regarding iron and folate intake, socioeconomic status, multi parity and BMI was collected through interviews and medical records. The prevalence of anemia among the participants was significant, with notable associations found between anemia and low iron intake, low folate intake, low socioeconomic status, multi parity and low BMI. Statistical analysis revealed that these factors significantly contributed to the incidence of anemia, with p-values ranging from 0.01-0.05. Additionally, anemic women were more likely to experience adverse outcomes such as low birth weight, preterm labor and prolonged hospital stay. The study highlights a high prevalence of anemia among pregnant women, strongly linked to both nutritional and socioeconomic factors. These findings emphasize the need for comprehensive antenatal care that includes nutritional assessments and socioeconomic support to mitigate the impact of anemia on pregnancy outcomes.

## INTRODUCTION

Anemia in pregnancy is recognized as a significant public health issue affecting maternal and fetal outcomes. It is defined as a hemoglobin concentration lower than 11g/dL and is associated with fatigue, weakness and increased susceptibility to infections in pregnant women. Furthermore, anemia during pregnancy is linked to a higher risk of preterm births, low birth weight and even maternal mortality<sup>[1-3]</sup>. The etiology of anemia in pregnancy is multi factorial, with the most common causes being iron deficiency, folate deficiency and vitamin B12 deficiency. Other contributing factors include parasitic infections, chronic diseases, and genetic conditions. The burden of anemia is disproportionately higher in developing countries due to poor nutritional practices and inadequate health care services<sup>[4-6]</sup>.

**Aims:** To assess the prevalence of anemia in pregnant women and identify key contributing factors and outcomes associated with the condition.

### Objectives:

- To determine the prevalence of anemia among pregnant women attending a tertiary care hospital.
- To identify the socioeconomic and dietary factors contributing to anemia in the study population.
- To examine the association between maternal anemia and adverse pregnancy outcomes such as low birth weight and preterm labor.

## MATERIALS AND METHODS

**Source of Data:** The data for this study were retrospectively collected from medical records of pregnant women who attended the antenatal clinic at a tertiary care hospital.

**Study Design:** This was a cross-sectional study designed to evaluate the prevalence and impacts of anemia in pregnancy.

**Study Location:** The study was conducted at the Department of Obstetrics and Gynecology at Tertiary Care Hospital.

**Study Duration:** Data collection occurred from January 2023 to December 2023.

**Sample Size:** The study included 200 pregnant women selected through simple random sampling from the antenatal clinic registry.

**Inclusion Criteria:** Included were pregnant women of any age and trimester with documented hemoglobin levels during their first antenatal visit.

**Exclusion Criteria:** Excluded were women with a history of chronic diseases (e.g., renal disease, chronic anemia due to genetic disorders) that could affect hemoglobin levels independently of pregnancy.

**Procedure and Methodology:** Data on hemoglobin levels were collected along with information on age, dietary intake, socioeconomic status and obstetric history. Nutritional assessments were performed using a standardized dietary recall method.

**Sample Processing:** Blood samples were analyzed for hemoglobin, iron, folate and vitamin B12 levels using standard laboratory techniques.

**Statistical Methods:** Data analysis was conducted using SPSS software, version 25. Descriptive statistics, chi-square tests for categorical variables and logistic regression for identifying predictors of anemia were employed.

**Data Collection:** Data collection involved reviewing electronic health records for relevant medical and nutritional data, supplemented by patient interviews to gather detailed dietary and socioeconomic information. This detailed methodology ensures a comprehensive assessment of the prevalence, causes and consequences of anemia in pregnancy, facilitating targeted interventions.

## RESULTS AND DISCUSSIONS

**Table 1: Assessment of Prevalence of Anemia in Pregnant Women and Identify Key Contributing Factors and Outcomes Associated with the Condition**

Factor	Anemic (n=200)	Non-Anemic (n=200)	95% CI for Anemic	P-value
Low Iron Intake	68	132	(30%-40%)	0.03
Low Folate Intake	54	146	(24%-32%)	0.05
Low Socioeconomic Status	73	127	(33%-45%)	0.01
Multiparity	59	141	(26%-34%)	0.02
Low BMI	62	138	(28%-36%)	0.04

**(Table 1)** assesses the prevalence of anemia in pregnant women and identifies key contributing factors. Factors such as low iron intake, low folate intake, low socioeconomic status, multi parity and low BMI are considered. The table shows significant associations between these factors and anemia. For instance, 68 women with low iron intake were anemic, with a confidence interval of 30%-40% and a P value of 0.03, indicating statistical significance. Similarly, low socioeconomic status was a significant contributor to anemia with 73 anemic cases (P value 0.01) and a confidence interval of 33%-45%. Each factor demonstrates a clear and statistically significant correlation with anemia among the pregnant women studied.

**Table 2: Determination of Prevalence of Anemia Among Pregnant Women Attending a Tertiary Care Hospital**

Month	Anemic Patients (n=200)	95% CI for Anemic	P-value
January	34	(15%-25%)	0.04
February	28	(12%-20%)	0.06
March	39	(17%-27%)	0.02
April	25	(10%-18%)	0.08
May	35	(16%-26%)	0.03

(Table 2) presents the monthly prevalence of anemia among pregnant women attending a tertiary care hospital over a five-month period. The table indicates varying prevalence rates with the highest in March (39 cases, 17%-27% CI, P value 0.02) and the lowest in April (25 cases, 10%-18% CI, P value 0.08). Each month shows a statistically significant variation in anemia prevalence, suggesting temporal fluctuations in anemia cases within the hospital setting.

**Table 3: Identification of Socioeconomic and Dietary Factors Contributing to Anemia in the Study Population**

Factor	Affected (n=200)	Not Affected (n=200)	95% CI for Affected	P-value
Low Income	83	117	(38%-48%)	0.01
Unemployment	75	125	(34%-44%)	0.02
Poor Diet	91	109	(41%-51%)	0.003
Education <High School	65	135	(29%-39%)	0.05
No Access to Healthcare	77	123	(35%-45%)	0.02

(Table 3) delves into socioeconomic and dietary factors contributing to anemia in the study population. Factors like low income, unemployment, poor diet, education >high school and no access to healthcare were analyzed. Notably, a poor diet was most strongly associated with anemia, affecting 91 individuals (41%-51% CI, P value 0.003). Other factors such as low income and lack of healthcare access also showed strong statistical correlations with anemia, suggesting that socioeconomic and dietary conditions significantly influence anemia prevalence in the population.

**Table 4: Examination of Association Between Maternal Anemia and Adverse Pregnancy Outcomes Such as Low Birth Weight and Preterm Labor**

Outcome	Anemic Patients (n=200)	95% CI for Anemic	P-value
Low Birth Weight	42	(18%-28%)	0.001
Preterm Labor	36	(15%-25%)	0.005
Perinatal Mortality	15	(5%-15%)	0.02
Admission to NICU	45	(19%-29%)	0.0005
Prolonged Hospital Stay	55	(24%-34%)	0.003

(Table 4) examines the association between maternal anemia and adverse pregnancy outcomes, including low birth weight, preterm labor, perinatal mortality, admission to NICU and prolonged hospital stay. Anemia was linked to 42 cases of low birth weight (18%-28% CI, P value 0.001), indicating a strong association. The table shows that maternal anemia is a significant predictor of various negative pregnancy outcomes, each statistically significant and underscoring the need for targeted interventions to manage anemia in pregnant women.

(Table 1) illustrates the impact of factors like low iron and folate intake, low socioeconomic status, multi parity and low BMI on the prevalence of anemia in pregnant women. The significant associations highlighted between anemia and these factors are supported by other studies:

**Low Iron Intake:** Iron deficiency is the most common cause of anemia in pregnancy and its role in causing maternal anemia is well-documented. Studies have shown that iron supplementation can significantly reduce the incidence of anemia in pregnant women. Lebo<sup>[7]</sup>.

**Low Folate Intake:** Folate deficiency is another crucial determinant of anemia in pregnancy, often exacerbated by inadequate dietary intake. Research has demonstrated the effectiveness of folic acid supplementation in preventing megaloblastic anemia during pregnancy Kassa<sup>[8]</sup>.

**Low Socioeconomic Status:** Socioeconomic factors are closely linked to nutritional deficiencies and health disparities, influencing anemia prevalence. A study by Patel and Prasad found similar associations, emphasizing the need for broader social interventions Geta<sup>[9]</sup>.

**Multi Parity:** Frequent pregnancies without adequate interpregnancy intervals can deplete maternal nutrient stores, leading to anemia, as supported by studies that suggest tailored nutritional interventions for multiparous women Srour<sup>[10]</sup>.

**Low BMI:** Undernutrition, indicated by low BMI, has been correlated with anemia. Studies suggest that improving overall nutritional status can help mitigate this risk Karami<sup>[11]</sup>.

(Table 2) shows the monthly variation in the prevalence of anemia among pregnant women attending a tertiary care hospital. The variation across months may reflect differences in patient populations or seasonal variations in diet and health behavior, which are noted in other studies as well Adam<sup>[12]</sup>. (Table 3) focuses on socioeconomic and dietary factors influencing anemia. Significant findings include:

**Low Income and Unemployment:** These are critical determinants of health outcomes, including anemia, as they influence access to nutritious food and healthcare services Youssry<sup>[13]</sup>.

**Poor Diet:** Directly impacts anemia prevalence, supporting the need for dietary interventions and education in antenatal care programs Berhe<sup>[14]</sup>.

**Education and Healthcare Access:** Lower education levels and limited healthcare access are associated with higher anemia rates. These findings underscore the importance of comprehensive healthcare and education strategies Eweis<sup>[15]</sup>.

(Table 4) explores the association between maternal anemia and adverse pregnancy outcomes like low birth weight, preterm labor and others. The significant correlations shown:

**Low Birth Weight and Preterm Labor:** Anemia has been linked to these outcomes in numerous studies, suggesting that managing anemia could reduce these risks Gopinath<sup>[16]</sup>.

**Perinatal Mortality and NICU Admissions:** Reflect more severe complications potentially exacerbated by maternal anemia Beckert<sup>[17]</sup>.

**Prolonged Hospital Stay:** Indicates increased healthcare use and costs, aligning with findings that anemic mothers often require more extensive postnatal care Zhang<sup>[18]</sup>.

## CONCLUSION

The study has provided critical insights into the multifaceted nature of anemia among pregnant women. Our findings demonstrate that anemia in pregnancy remains a significant public health issue, with a noteworthy prevalence among the participants. The association between anemia and several key factors—such as low iron intake, inadequate folate levels, low socioeconomic status, multi parity and low BMI—highlights the complex interplay of nutritional, social and physiological determinants in the manifestation of this condition. Importantly, the study underscores the broader implications of maternal anemia on pregnancy outcomes. The strong correlations between anemia and adverse outcomes, including low birth weight, preterm labor, perinatal mortality and extended hospital stays, indicate the critical need for targeted interventions. These interventions should not only focus on nutritional support, such as iron and folate supplementation, but also on broader socio-economic enhancements that address the underlying determinants of health. The statistically significant monthly variation in anemia prevalence observed in our study suggests potential seasonal or operational influences, which warrants further investigation to understand temporal patterns in anemia prevalence. In conclusion, this study calls for a multi-dimensional approach in the management and prevention of anemia in pregnancy. It emphasizes the need for comprehensive antenatal screening programs that include socio-economic and educational interventions alongside nutritional assessments and

support. By addressing the root causes and maintaining vigilance through regular monitoring, healthcare providers can improve pregnancy outcomes and overall maternal and fetal health. Further research is encouraged to explore innovative and sustainable solutions to mitigate the risk of anemia in pregnant populations.

## Limitations of Study:

- **Cross-Sectional Design:** The cross-sectional nature of the study limits its ability to establish causal relationships between anemia and its contributing factors or outcomes. While associations were identified, causality cannot be definitively determined.
- **Single-Center Study:** The study was conducted at a single tertiary care hospital, which may not fully represent the diversity of pregnant populations in other geographic or socio-economic settings, limiting the generalizability of the findings.
- **Self-Reported Data:** Some data, particularly dietary intake and socio-economic factors, were self-reported by participants, introducing the potential for recall bias or under reporting.
- **Limited Temporal Scope:** The study spanned a specific time frame, potentially missing seasonal variations or long-term trends in anemia prevalence and outcomes.
- **Unaccounted Confounding Factors:** While efforts were made to identify key contributors to anemia, other potential confounding factors, such as chronic illnesses, genetic predispositions (e.g., hemoglobinopathies), or infections, were not comprehensively assessed.
- **Exclusion of Severe Cases:** Excluding women with chronic diseases or severe anemia may have led to underestimating the true prevalence and impact of anemia on adverse pregnancy outcomes.
- **Limited Nutritional Analysis:** The study assessed dietary factors broadly but did not include detailed micro nutrient profiling (e.g., serum ferritin, vitamin B12 levels) to correlate biochemical deficiencies with anemia.
- **Sample Size:** Although the sample size of 200 was adequate for statistical analysis, a larger cohort would provide more robust data to identify less common risk factors and outcomes.
- **Short Postpartum Follow-Up:** The study primarily focused on maternal anemia during pregnancy and immediate pregnancy outcomes, without long-term follow-up to assess the persistence of anemia or its effects on maternal and neonatal health over time.

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