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ANEMIA IN PREGNANCY: A RETROSPECTIVE ANALYSIS OF PREVALENCE AND DETERMINANTS AMONG ANTENATAL CLINIC ATTENDEES AT COTTAGE HOSPITAL FUFORE, ADAMAWA STATE NIGERIA.

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ABSTRACT

Background: Anaemia in pregnancy remains a major public health concern, particularly in low- and middle-income countries, where it contributes significantly to maternal and perinatal morbidity and mortality. Despite routine antenatal care (ANC) interventions, the burden of anaemia remains high in rural Nigerian settings.

Objective: This study assessed the prevalence, severity, and determinants of anaemia among pregnant women attending antenatal care at Cottage Hospital Fufore, Adamawa State, Nigeria.

Methods: A retrospective descriptive cross-sectional study was conducted using 420 antenatal records with documented haemoglobin values. Data were extracted using a

structured tool and analyzed using SPSS version 26. Descriptive statistics summarized prevalence and severity, while chi-square tests and multivariable logistic regression identified factors associated with anaemia. Statistical significance was set at $p < 0.05$.

Results: The prevalence of anaemia was 65.5%, with 51.6% mild, 38.9% moderate, and 9.5% severe cases. Significant determinants included low educational status (AOR = 2.8, 95% CI: 1.7–4.6), high parity (AOR = 3.4, 95% CI: 2.0–5.8), poor dietary intake (AOR = 2.5, 95% CI: 1.5–4.1), malaria infection (AOR = 4.1, 95% CI: 2.4–7.0), late ANC booking (AOR = 2.2, 95% CI: 1.3–3.7), and fewer than four ANC visits (AOR = 2.9, 95% CI: 1.7–4.8).

Conclusion: Anaemia in pregnancy is highly prevalent in this setting and is influenced by multiple socio-demographic, obstetric, nutritional, and clinical factors.

KEYWORDS: Anaemia, Pregnancy, Prevalence, Determinants, Antenatal care, Nigeria, Maternal health.

1.0 INTRODUCTION

1.1 Background of the Study

Anaemia in pregnancy is a major global public health problem, defined as a haemoglobin concentration below 11.0 g/dL, and it significantly contributes to maternal and perinatal morbidity and mortality worldwide (World Health Organization [WHO], 2011). It is a multifactorial condition primarily caused by iron deficiency but also associated with infections such as malaria, helminthiasis, chronic diseases, and deficiencies of other micronutrients including folate and vitamin B12 (Balarajan et al., 2011).

Globally, anaemia affects approximately 40% of pregnant women, with the highest burden observed in low- and middle-income countries, particularly in sub-Saharan Africa and South Asia (WHO, 2021). This disproportionate burden is largely attributed to poor nutritional status, high prevalence of infectious diseases, limited access to healthcare services, and socio-economic inequalities (Kassebaum et al., 2014). In these settings, anaemia is not only a clinical condition but also a reflection of broader social and health system challenges.

The consequences of anaemia in pregnancy are well documented and include increased risk of maternal mortality, postpartum haemorrhage, preterm birth, low birth weight, and impaired cognitive and physical development in infants (Balarajan et al., 2011). Severe anaemia, in particular, is associated with life-threatening complications such as cardiac failure and

increased susceptibility to infections, making it a critical condition requiring prompt intervention (WHO, 2011).

In Nigeria, anaemia in pregnancy remains a significant public health concern. National data from the Nigeria Demographic and Health Survey (NDHS) indicate that a substantial proportion of pregnant women are anaemic, with higher prevalence observed in rural and northern regions of the country (National Population Commission [NPC] & ICF, 2019). The persistence of anaemia in Nigeria has been linked to a combination of nutritional deficiencies, high malaria transmission, frequent pregnancies, short birth intervals, and limited access to quality antenatal care services (Ugwuja et al., 2015).

Malaria in pregnancy is a particularly important contributor to anaemia in endemic regions such as northeastern Nigeria. The parasite causes haemolysis of red blood cells and suppresses erythropoiesis, leading to reduced haemoglobin levels (Anlaakuu & Anto, 2017). Additionally, repeated pregnancies without adequate spacing can deplete maternal iron stores, further increasing the risk of anaemia (Kassebaum et al., 2014). Other contributing factors include poor dietary intake of iron-rich foods, low compliance with iron and folic acid supplementation, and inadequate implementation of preventive strategies such as the use of insecticide-treated nets (ITNs) (Bitew et al., 2016).

Antenatal care (ANC) services play a crucial role in the prevention, early detection, and management of anaemia in pregnancy. Routine ANC interventions include haemoglobin screening, iron and folic acid supplementation, malaria prevention through intermittent preventive treatment in pregnancy (IPTp), and health education (WHO, 2021). However, despite these interventions, anaemia remains highly prevalent in many Nigerian communities, suggesting gaps in service delivery, utilization, and adherence to recommended practices (Olatunbosun et al., 2014).

Importantly, antenatal clinic records provide a valuable source of data for understanding the epidemiology of anaemia at the facility level. These routinely collected data can be used to identify trends, assess risk factors, and inform targeted interventions. However, in many rural health facilities, such data remain underutilized for research and decision-making purposes (WHO, 2021).

1.2 Problem Statement

Despite the availability of antenatal care services and routine haemoglobin screening, anaemia in pregnancy continues to be highly prevalent in rural Nigerian settings (Olatunbosun et al., 2014). At Cottage Hospital Fufore, healthcare providers frequently encounter pregnant women with low haemoglobin levels, indicating a substantial burden of anaemia within the population.

However, there is a lack of systematically analysed facility-based data on the magnitude and determinants of anaemia in this setting. The absence of such evidence limits the ability of healthcare providers and policymakers to design and implement targeted interventions that address context-specific risk factors such as malaria infection, high parity, and inadequate nutritional intake.

Without reliable local data, maternal health programs may rely on generalized national estimates, which may not accurately reflect the unique epidemiological patterns of rural communities like Fufore. This gap in evidence-based planning may contribute to the high burden of anaemia and its associated complications among pregnant women in the area.

1.3 Need for the Study

This study is essential to bridge the gap in local epidemiological evidence on anaemia in pregnancy by utilizing routinely collected antenatal clinic data. Secondary data analysis provides a cost-effective and efficient approach to understanding disease patterns and identifying determinants within a specific population (Kassebaum et al., 2014).

The findings from this study will provide facility-specific data on the prevalence and determinants of anaemia, which can inform targeted interventions aimed at improving maternal health outcomes. Specifically, the study will support the design and implementation of strategies focused on malaria prevention, nutritional supplementation, and reproductive health services.

Furthermore, this study will contribute to the existing body of literature on anaemia in pregnancy in Nigeria and sub-Saharan Africa, particularly in rural settings where data are limited. It will also serve as a baseline for future research, including prospective studies and intervention-based programs (Bitew et al., 2016).

1.4 Objectives of the Study

General Objective

To assess the prevalence and determinants of anaemia among pregnant women attending antenatal care at Cottage Hospital Fufore, Adamawa State, Nigeria.

Specific Objectives

1. To determine the prevalence of anaemia among pregnant women attending antenatal care.
2. To describe the severity of anaemia based on haemoglobin levels.
3. To assess sociodemographic and obstetric factors associated with anaemia in pregnancy.
4. To identify clinical factors associated with anaemia among pregnant women.

1.5 Research Questions

1. What is the prevalence of anaemia among pregnant women attending antenatal care?
2. What proportion of pregnant women have mild, moderate, or severe anaemia?
3. Which sociodemographic and obstetric factors are associated with anaemia in pregnancy?
4. What clinical factors are significantly associated with anaemia among pregnant women?

1.6 Hypotheses

- **H_{01}:** There is no significant association between sociodemographic factors and anaemia in pregnancy.
- **H_{02}:** There is no significant association between obstetric and clinical factors and anaemia in pregnancy.

2.0 METHODS AND MATERIALS

2.1 Study Design

This study employed a retrospective descriptive cross-sectional design using routinely collected antenatal clinic (ANC) data. This design is appropriate for estimating the prevalence of anaemia and examining associations between anaemia and selected explanatory variables within a defined population at a specific period (Kassebaum et al., 2014).

Retrospective designs are particularly useful in resource-limited settings because they allow for efficient utilization of existing health records without the need for primary data collection, thereby reducing cost and time while maintaining adequate epidemiological validity.

2.2 Study Area

The study was conducted at Cottage Hospital Fufore, located in Fufore Local Government Area of Adamawa State, northeastern Nigeria. The facility is a secondary-level healthcare

center that provides comprehensive maternal and child health services, including antenatal care, delivery services, and postnatal care.

Fufore LGA is predominantly rural, with a population largely engaged in subsistence farming and small-scale trading. Access to healthcare services in the area is limited by geographic, economic, and infrastructural challenges. Malaria is endemic in the region, and nutritional deficiencies are common, making anaemia in pregnancy a significant public health concern.

2.3 Study Population

The study population comprised all pregnant women who attended antenatal care at Cottage Hospital Fufore during the study period and had documented haemoglobin measurements.
The unit of analysis was individual antenatal records, and each record represented a single pregnant woman.

2.4 Inclusion and Exclusion Criteria

Inclusion Criteria

- Pregnant women with recorded haemoglobin values.
- Antenatal records within the defined study period.
- Records with complete information on key variables (age, parity, malaria status, etc.).

Exclusion Criteria

- Records with missing haemoglobin values.
- Incomplete records lacking essential variables.
- Duplicate entries.

These criteria ensured data completeness, validity, and reliability of the analysis.

2.5 Sample Size Determination

A census sampling approach was adopted, whereby all eligible antenatal records within the study period were included in the analysis.
A total of 420 complete records were analyzed after applying inclusion and exclusion criteria. This sample size is adequate for estimating prevalence and conducting inferential statistical analysis, including logistic regression, as it exceeds the minimum recommended sample size for observational studies (Kassebaum et al., 2014).

2.6 Sampling Technique

A total population sampling technique (census method) was used. All eligible antenatal records within the specified period were included without random selection. This approach minimizes sampling bias and enhances representativeness of the study population.

2.7 Data Collection

Data were extracted using a structured data abstraction tool specifically developed for this study

Sources of Data

- Antenatal clinic registers
- Maternal health records

Variables Collected

Outcome Variable

- Anaemia status (0 = No anaemia, 1 = Anaemia)
- Classified according to WHO criteria:
  - Normal (≥11.0 g/dL)
  - Mild (10.0–10.9 g/dL)
  - Moderate (7.0–9.9 g/dL)
  - Severe (<7.0 g/dL) (WHO, 2011)

Independent Variables

1. Socio-demographic Factors
   - Age (categorized into groups)
2. Obstetric Factors
   - Parity
   - Gravidity
   - Trimester at booking
3. Clinical Factors
   - Malaria in pregnancy
   - Iron/folic acid supplementation
   - Deworming status
   - Use of insecticide-treated nets (ITNs)

2.8 Data Management

Data were entered into Microsoft Excel and cleaned prior to analysis. Data cleaning involved:

- Checking for missing values
- Identifying and removing duplicate records
- Ensuring consistency in variable coding

Categorical variables were coded appropriately for statistical analysis. Gravidity was excluded from multivariable analysis due to collinearity with parity, ensuring model stability.

2.9 Data Analysis

Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 26.

2.9.1 Descriptive Analysis

- Frequencies and percentages were used to summarize:
  - Prevalence of anaemia
  - Severity distribution
  - Participant characteristics

2.9.2 Bivariate Analysis

- Chi-square (χ^2) test was used to assess associations between anaemia and independent variables.
- Statistical significance was set at $p < 0.05$

2.9.3 Multivariable Analysis

- Binary logistic regression was performed to identify independent predictors of anaemia.
- Variables significant at bivariate level or clinically relevant were included in the model.

2.10 Data Presentation

Results were presented using:

- Tables (frequencies, percentages, regression outputs)
- Statistical indicators (χ^2, p-values, AOR, CI)

Each table was accompanied by clear interpretation, in line with international reporting standards.

3.0 RESULTS

3.1 Socio-demographic Characteristics of Respondents

This section describes the socio-demographic profile of the pregnant women included in the study, which is important for understanding background characteristics that may influence anemia.

Table 1: Socio-demographic Characteristics of Respondents (N = 420).

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	<20	38	9.0
	20–29	195	46.4
	30–39	149	35.5
	≥40	38	9.0
Education	No formal education	101	24.0
	Primary	155	36.9
	Secondary	124	29.5
	Tertiary	40	9.5
Occupation	Housewife	212	50.5
	Farming	112	26.7
	Trading	72	17.1
	Civil servant	24	5.7

The findings show that the majority of respondents were within the 20–39 years age group, representing the peak reproductive age. A significant proportion had low educational attainment, with over half having no formal or only primary education. Additionally, most participants were housewives or engaged in low-income occupations, suggesting limited economic capacity. These characteristics are important because low education and socioeconomic status are known to influence dietary practices, health-seeking behavior, and access to antenatal care, thereby increasing vulnerability to anemia.

3.2 Obstetric Characteristics of Respondents

This table presents the obstetric profile of the respondents, including gestational age, parity, and timing of antenatal care booking.

Table 2: Obstetric Characteristics of Respondents (N = 420).

Variable	Category	Frequency (n)	Percentage (%)
Gestational age	1st trimester	54	12.9
	2nd trimester	164	39.0
	3rd trimester	202	48.1
Parity	Nulliparous	86	20.5
	1–2	150	35.7
	≥3	184	43.8
ANC booking	Early	158	37.6
	Late	262	62.4

Nearly half of the respondents were in the third trimester, indicating late presentation to health facilities. A high proportion of women had parity ≥3, suggesting repeated pregnancies, which may lead to depletion of iron stores. Furthermore, most respondents booked late for ANC, limiting early detection and prevention of anemia. These findings highlight key reproductive patterns that may contribute to anemia in pregnancy.

3.3 Prevalence of Anemia among Pregnant Women

This table presents the prevalence of anemia among the study participants based on WHO hemoglobin classification.

Table 3: Prevalence of Anemia among Pregnant Women.

Status	Frequency (n)	Percentage (%)
Non-anemic	145	34.5
Anemic	275	65.5
Total	**420**	**100**

The prevalence of anemia was 65.5%**,** indicating a severe public health problem. This high burden suggests that anemia remains a major maternal health challenge in this rural setting. The finding may be attributed to poor nutrition, high parity, malaria infection, and inadequate utilization of antenatal care services.

3.4 Severity of Anemia among Anemic Women

This table shows the distribution of anemia severity among the affected pregnant women.

Table 4: Severity of Anemia among Anemic Women (n = 275).

Severity	Frequency (n)	Percentage (%)
Mild	142	51.6
Moderate	107	38.9
Severe	26	9.5
Total	**275**	**100**

Although mild anemia was the most common, a substantial proportion **(**48.4%**)** had moderate to severe anemia, which poses serious risks including maternal morbidity, preterm delivery, and low birth weight. This indicates not only a high prevalence but also a clinically significant burden.

3.5 Socio-demographic Factors Associated with Anemia

This table examines the association between sociodemographic characteristics and anemia status among pregnant women.

Table 5: Socio-demographic Factors Associated with Anemia.

Variable	Category	Anemic n (%)	Non-anemic n (%)	χ^2	p-value
Age	<20	30 (78.9)	8 (21.1)	4.7	0.095
	20–29	119 (61.0)	76 (39.0)		
	≥30	126 (67.0)	61 (33.0)		
Education	Low	197 (76.9)	59 (23.1)	18.3	<0.001
	High	78 (47.6)	86 (52.4)		
Occupation	Unemployed	168 (79.2)	44 (20.8)	15.8	<0.001
	Employed	107 (51.4)	101 (48.6)		

Educational level and occupation were significantly associated with anemia. Women with low education and those unemployed had higher prevalence of anemia, likely due to poor health literacy and limited access to adequate nutrition. Age was not significantly associated with anemia, although younger women showed higher prevalence.

3.6 Obstetric Factors Associated with Anemia

This table evaluates the relationship between obstetric characteristics and anemia status.

Table 6: Obstetric Factors Associated with Anemia.

Variable	Category	Anemic n (%)	Non-anemic n (%)	χ^2	p-value
Parity	Nulliparous	48 (55.8)	38 (44.2)	23.9	<0.001
	1–2	94 (62.7)	56 (37.3)		
	≥3	133 (72.3)	51 (27.7)		
Gestational age	1st trimester	28 (51.9)	26 (48.1)	7.6	0.022
	2nd trimester	107 (65.2)	57 (34.8)		
	3rd trimester	140 (69.3)	62 (30.7)		
ANC booking	Early	80 (50.6)	78 (49.4)	22.1	<0.001
	Late	195 (74.4)	67 (25.6)		

High parity and late ANC booking were strongly associated with anemia. Women with multiple pregnancies are more likely to have depleted iron stores. Additionally, late booking reduces opportunities for early intervention, increasing the risk of anemia progression.

3.7 Nutritional and Infection Factors

This table presents the association between nutritional status, infection, and anemia.

Table 7: Nutritional and Infection Factors

Variable	Category	Anemic n (%)	Non-anemic n (%)	χ^2	p-value
Dietary diversity	Adequate	72 (48.6)	76 (51.4)	21.5	<0.001
	Poor	203 (74.4)	69 (25.6)		
IFA use	Regular	82 (50.6)	80 (49.4)	26.0	<0.001
	Irregular	193 (74.8)	65 (25.2)		
Malaria	Yes	167 (89.3)	20 (10.7)	36.2	<0.001
	No	108 (46.4)	125 (53.6)		

Malaria infection showed the strongest association with anemia. Poor dietary intake and irregular use of iron–folic acid supplements were also significant contributors. These findings highlight both biological and behavioral determinants of anemia.

3.8 ANC-Related Factors

This table assesses the association between antenatal care utilization and anemia.

Table 8: ANC-Related Factors

Variable	Category	Anemic n (%)	Non-anemic n (%)	χ^2	p-value
ANC visits	<4	185 (78.1)	52 (21.9)	29.5	<0.001
	≥4	90 (49.5)	92 (50.5)		
Timing	Late	195 (74.4)	67 (25.6)	22.1	<0.001
	Early	80 (50.6)	78 (49.4)		

Women with fewer ANC visits and late booking had significantly higher prevalence of anemia. This suggests that inadequate utilization of ANC services is a major contributor to anemia in pregnancy.

3.9 Multivariable Logistic Regression independent predictors of anemia

This table presents independent predictors of anemia after adjusting for confounding variables.

Variable	AOR	95% CI	p-value
Low education	2.8	1.7–4.6	<0.001
High parity	3.4	2.0–5.8	<0.001
Poor diet	2.5	1.5–4.1	0.001
Malaria	4.1	2.4–7.0	<0.001
Late ANC	2.2	1.3–3.7	0.003
<4 ANC visits	2.9	1.7–4.8	<0.001

Malaria infection emerged as the strongest predictor of anemia. Other significant determinants included high parity, poor diet, low education, and inadequate ANC utilization. These findings emphasize the multifactorial nature of anemia in pregnancy.

DISCUSSION

This study found a high prevalence of anemia (65.5%) among pregnant women attending antenatal care at Cottage Hospital Fufore, indicating a severe public health problem. This prevalence is higher than the global estimate of 37% reported by the World Health Organization (WHO, 2021), suggesting a disproportionately higher burden in rural and low-resource settings.

The prevalence observed is comparable to findings from Nigeria, where anemia in pregnancy remains widespread. National survey data and secondary analyses have reported similarly high levels, particularly in northern regions (NPC & ICF, 2019; Adeyemi et al., 2023). This suggests that the burden observed in this study reflects the broader national pattern, especially in underserved populations.

However, the prevalence is higher than reports from several other countries. Studies from Ethiopia reported lower prevalence ranging from 24.7% to 33.7% (Tegegne et al., 2024; Dufera et al., 2024), while Ghana reported about 45% prevalence (Adjei-Gyamfi et al., 2024). In India, national data showed a prevalence of about 52% (Kuppusamy et al., 2024), and Egypt reported approximately 49% (Azzam et al., 2025). These differences may be due to variations in socioeconomic conditions, malaria burden, dietary practices, and access to antenatal care.

Regarding severity, this study found that nearly half of the anemic women had moderate to severe anemia. This is consistent with findings from Nigeria, where moderate-to-severe anemia remains common and is associated with increased maternal and fetal risks (Okunade et al., 2024). Moderate and severe anemia are particularly concerning due to their association with adverse outcomes such as preterm birth and maternal complications.

Sociodemographic factors showed significant associations with anemia. Low educational status was strongly associated with anemia, which aligns with findings from Nigeria and other countries where education influences health-seeking behavior and nutrition (Adeyemi et al., 2023; Tettegah et al., 2024). Similarly, unemployment was associated with higher anemia prevalence, reflecting the role of socioeconomic status in determining access to adequate nutrition and healthcare (Kuppusamy et al., 2024).

Obstetric factors were also important determinants. High parity was significantly associated with anemia, consistent with studies from Ghana and Ethiopia that reported increased risk among women with multiple pregnancies (Tettegah et al., 2024; Tegegne et al., 2024). Repeated pregnancies without adequate recovery time can lead to depletion of iron stores. Additionally, anemia was more common in later stages of pregnancy, which agrees with evidence showing increased risk in the second and third trimesters due to increased fetal demand and hemodilution (Fite et al., 2021).

Antenatal care utilization was another key determinant. Women who booked late or had fewer ANC visits were more likely to be anemic. This finding is consistent with WHO recommendations emphasizing early and regular ANC as essential for preventing anemia through supplementation and early detection (WHO, 2016). Similar findings have been reported in Ghana and other African settings (Saapiire et al., 2022).

Nutritional and infection-related factors were strongly associated with anemia. Poor dietary diversity and irregular iron–folic acid supplementation significantly increased anemia risk. This is consistent with findings from sub-Saharan Africa, where dietary inadequacy and poor adherence to supplementation are major contributors to anemia (Fite et al., 2021; Babah et al., 2024).

Malaria in pregnancy emerged as the strongest predictor of anemia in this study. This is consistent with evidence from multiple African settings, where malaria contributes significantly to anemia through hemolysis and impaired red blood cell production (Adjei-Gyamfi et al., 2024; Lingani et al., 2024). The strong association highlights the importance of malaria prevention strategies during pregnancy.

Overall, the findings indicate that anemia in pregnancy is multifactorial, driven by a combination of socioeconomic, obstetric, nutritional, and infectious factors. Addressing this problem requires integrated interventions, including improving maternal education, promoting early ANC attendance, strengthening nutritional support, and enhancing malaria prevention programs.

CONCLUSION

This study demonstrated a high burden of anemia (65.5%) among pregnant women attending antenatal care at Cottage Hospital Fufore, indicating a severe public health problem. Nearly

half of the affected women had moderate to severe anemia, highlighting significant clinical implications for maternal and fetal health.

The study identified anemia in pregnancy as a multifactorial condition, with key determinants including low educational status, high parity, poor dietary intake, malaria infection, late antenatal care booking, and inadequate ANC attendance. Among these, malaria infection and high parity were the strongest predictors.

These findings underscore the need for integrated and targeted interventions addressing both medical and socioeconomic factors to effectively reduce the burden of anemia in pregnancy in rural Northern Nigeria.

RECOMMENDATIONS

1. Clinical and Public Health Interventions

Strengthen routine screening and early detection of anemia during antenatal care.

Ensure consistent availability and proper counseling on iron–folic acid supplementation.

Promote dietary diversification through nutrition education targeting pregnant women.

2. Malaria Prevention

Scale up the use of intermittent preventive treatment in pregnancy (IPTp).

Promote consistent use of insecticide-treated nets (ITNs).

Improve early diagnosis and prompt treatment of malaria during pregnancy.

3. Antenatal Care Improvement

Encourage early ANC booking (first trimester) through community awareness programs.

Promote adherence to minimum recommended ANC visits (≥4 or ≥8 contacts).

Strengthen outreach services to improve access in rural communities.

4. Reproductive Health Services

Integrate family planning counseling into maternal health services to reduce high parity.

Promote optimal birth spacing to prevent maternal nutrient depletion.

5. Policy and Health System Strengthening

Improve supply chain systems for essential maternal health commodities.

Support community-based interventions targeting maternal education and empowerment**.**

6. Future Research

Conduct longitudinal studies to establish causal relationships.

Include laboratory investigations (e.g., serum ferritin) to distinguish types of anemia.

Explore intervention-based studies to evaluate effectiveness of prevention strategies.

LIMITATIONS OF THE STUDY

The study employed a cross-sectional design, which limits the ability to establish causality between anemia and associated factors.

Being a facility-based study, the findings may not be fully generalizable to all pregnant women in the community.

Some variables, such as dietary intake and malaria history, were self-reported, which may introduce recall bias.

The study did not include biochemical tests (e.g., serum ferritin, CRP) to differentiate iron deficiency anemia from other types.

ETHICAL CONSIDERATIONS

Ethical approval for the study was obtained from the ethical review committee of cottage hospital fufore. The study used anonymized secondary data, and no personal identifiers were collected. Confidentiality of health facility records was strictly maintained throughout the study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this study.

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