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INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 10, October 2025, pp : 549-557

e-ISSN : 2583-1062
Impact Factor : 7.001

PREVALENCE OF ANAEMIA AND ITS ASSOCIATED FACTORS AMONG PREGNANT WOMEN VISITING ANTENATAL SERVICES AT PRIMARY HEALTH CARE DAKINGARI

Abubakar Boyi Dalatu[1], Sufiyanu Muhammad Dakin-gari[2]

[1,2]Department of Mathematics, Kebbi State Polytechnic, Dakingari, Nigeria P.M.B. 1158, Kebbi State, Nigeria.

DOI: https://www.doi.org/10.58257/IJPREMS44232

ABSTRACT

Anaemia continues to be a major public health challenge worldwide, impacting both developing and developed countries. Over 1.62 billion people are affected by anaemia, with pregnant women experiencing a higher rate of prevalence. The World Health Organization estimates that during pregnancy, anaemia prevalence ranges from 53.8% to 90.2% in developing nations and from 8.3% to 23% in developed nations. This study aims to assess the prevalence of anaemia and its associated factors among pregnant women attending antenatal clinics at primary health care centers in Dakingari. A total of 250 pregnant women were randomly selected from antenatal services at the primary health care center in Dakingari, Kebbi State, following ethical approval from the Research Ethics Committee and obtaining informed consent from each participant. Data on sociodemographic details, economic status, and clinical history were collected using a pretested, structured, interviewer-administered questionnaire. Anaemia was diagnosed according to WHO criteria, defined as hemoglobin levels below 11 g/dL (less than 33%). Participants were categorized into mild, moderate, and severe anaemia based on WHO guidelines. The study revealed an overall anaemia prevalence of 59.6%, with 113 women (75.8%) classified as having mild anaemia and 36 women (24.2%) as having moderate anaemia. Significant factors associated with anaemia included residence, marital status, monthly family income, occupation, number of deliveries, inter-pregnancy interval, and recent episodes of malaria. The findings indicate a high prevalence of anaemia among pregnant women, underscoring its status as a critical public health issue. Key risk factors identified were rural residence, low income, short inter-pregnancy intervals (less than 18 months), having more than three previous deliveries, and recent malaria infection. To combat this, enhanced educational efforts on anaemia should be promoted within antenatal care clinics.

Keywords: Anaemia, Antenatal clinics, pregnant women, Prevalence.

1. INTRODUCTION

Anaemia is a pathophysiological condition characterized by a significant decrease in blood haemoglobin levels, red blood cell count, or defective maturation of red blood cells [1, 2]. Although it affects individuals across all age groups, pregnant women and children are particularly vulnerable [2]. It is one of the most common nutritional deficiency diseases worldwide, impacting over 1.62 billion people, including 56 million pregnant women [3, 4]. Globally, anaemia is a major public health concern affecting all age groups, with the highest prevalence among pregnant women and children under five years old [4]. During pregnancy, anaemia affects approximately half of all pregnant women worldwide and poses a significant reproductive health challenge [3]. The World Health Organization (WHO) estimates that the prevalence of anaemia in pregnancy ranges from 53.8% to 90.2% in developing countries and from 8.3% to 23% in developed nations [4]. According to WHO, during pregnancy, anaemia is defined by a haemoglobin concentration below 11.0 g/dL or a packed cell volume (PCV) of less than 33.0% [5]. The severity of anaemia in pregnancy is categorized as mild (haemoglobin 10.0–10.9 g/dL or haematocrit 30–32.9%), moderate (7.0–9.9 g/dL or 21–29.9%), or severe (less than 7 g/dL or less than 21%) [6]. Iron deficiency, resulting from prolonged negative iron balance, accounts for approximately 50% of anaemia cases in women and up to 75% among women of reproductive age globally [7]. Contributing factors include inadequate dietary iron intake or absorption, increased iron requirements during pregnancy, and iron losses due to menstruation, parasitic infections, and other illnesses [8].

Anaemia during pregnancy remains a persistent public health issue, especially in developing countries, due to a combination of sociocultural factors such as insufficient intake of essential nutrients like iron, folate, vitamin B12, C, and A, along with poor awareness, suboptimal dietary practices, parasitic infestations, blood loss, HIV, tuberculosis, malaria, early pregnancies, high parity, and low utilization of insecticide-treated nets (ITNs) [9]. Risk factors associated with anaemia in pregnancy include advanced maternal age, fewer antenatal care visits, rural residence, intestinal parasitic infections, malaria parasitaemia, and primigravidity [10]. Worldwide, around 500 million women of reproductive age suffer from anaemia. In 2011, the prevalence among non-pregnant women aged 15-49 was 29%,

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and among pregnant women, it was 38%, with the highest rates observed in South Asia and Central and West Africa [11]. The prevalence ranges from 38.9% to 48.7% among pregnant women in regions such as Southeast Asia, the Eastern Mediterranean, and Africa [7]. In India, prevalence rates vary between 65% and 75% [12], while studies in Nigeria report rates from 24.5% to 76.5% [13, 14].

The consequences of anaemia during pregnancy include general fatigue, fetal anaemia, low birth weight, preterm delivery, increased risk of postpartum haemorrhage, intrauterine growth restriction, perinatal mortality, still birth, reduced work capacity, decreased immunity, shortness of breath, and diminished physical and mental performance. To combat this, WHO recommends daily iron and folic acid supplementation as part of antenatal care and intermittent supplementation for menstruating women in areas with high anaemia prevalence. Prevention strategies also include routine deworming, use of insecticide-treated bed nets, nutritional counselling, food fortification, and raising awareness about anaemia's causes and complications [15, 16]. Understanding the severity and contributing factors of anaemia is essential for preventing adverse maternal and foetal outcomes.This study aimed to determine the prevalence of anaemia and identify associated factors among pregnant women attending antenatal services at primary health care facilities in Dakingari, Kebbi State, Northwest Nigeria.

2. MATERIALS AND METHODS

Study Region, Design, and Population.

The study was carried out at the Primary Health Care Center in Dakingari, Kebbi State. This facility is situated in the headquarters of Suru Local Government Area, Dakingari, in Kebbi State, Northwestern Nigeria. The research was institution-based, descriptive, and cross-sectional in nature, involving 250 pregnant women who attended antenatal services at the Dakingari Primary Health Care Center from July 2025 to October 2025.

Sampling Technique.

The study participants comprised pregnant women attending antenatal services at primary health care facilities in Dakingari, Kebbi State. Women who consented to participate and were not critically ill were eligible for inclusion. The sample size was calculated to be 250, using the formula for determining sample size for proportions in cross-sectional studies [17], based on a 75.7% prevalence of anemia in pregnancy from a previous study [18], with a 5% margin of error and an expected response rate of 95%. Eligible participants were selected through a systematic sampling method: every fifth patient presenting consecutively at the clinic was enrolled until the desired sample size was reached, over a nine-clinic-day period.

Ethical Clearance.

The study design and methodology were reviewed and approved by the ethical committee of Primary Health Care Dakingari. Written consent was obtained from participants after thoroughly explaining the consent form to them. Confidentiality was maintained by not collecting identifiers during data collection, and access to the collected data was limited exclusively to the research team.

Data Collection and Laboratory Analysis.

A structured, pretested interviewer's questionnaire was employed to gather data on demographics and socioeconomic status, administered by trained research assistants. Approximately four millilitres (4 ml) of venous blood was collected from each consenting participant using a syringe, transferred into a labeled EDTA container, and transported to the laboratory for analysis. Trained laboratory technicians conducted the analyses at primary health care facilities in Dakingari, Kebbi State. Hematocrit (PCV) was determined using standard laboratory techniques and procedures. Anaemia was diagnosed based on the WHO-recommended threshold of a packed cell volume (PCV) of less than 33%. Participants were further classified into severity subgroups mild, moderate, and severe anaemia according to WHO cut-offs [6].

Data Management and Analysis.

Data was collected and entered into the database weekly following thorough cleaning. To ensure confidentiality, identifiers were excluded, and access to the data was strictly limited to the research team. Upon completion of data collection, the data underwent both descriptive and inferential statistical analysis using IBM SPSS Statistics Version 22.0. Quantitative variables were summarized with means and standard deviations, while qualitative variables were described using frequencies and percentages. Frequency distribution tables were created, and cross-tabulations were performed to explore relationships between categorical variables. Chi-square tests were employed to identify factors associated with anemia. A significance level of $p < 0.05$ was adopted for all statistical tests.

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3. RESULTS

Sociodemographic characteristics of respondents

All 250 questionnaires distributed were completed, returned, and analyzed, resulting in a response rate of 100%. The ages of respondents ranged from 18 to 42 years, with a mean age of 26.56 ± 4.89 years. A greater number of respondents, 127 (50.8%), were between 21 and 29 years old. The majority, 196 (78.4%), resided in rural areas. Most respondents, 227 (90.8%), practiced Islam. Additionally, 223 (89.2%) of the respondents were married, and 196 (78.4%) belonged to the Hausa ethnic group. Regarding education, 120 (48.0%) had completed secondary school. A larger proportion, 155 (62.0%), were full-time housewives. Furthermore, 102 respondents (40.8%) reported a monthly family income of N100,000 or more, as detailed in [Table 1].

Obstetric and medical characteristics of respondents

Regarding the obstetric and medical characteristics, the majority of respondents, 112 (44.8%), were in the second trimester. Additionally, 126 (50.4%) had experienced 3 to 4 deliveries. A total of 139 (55.6%) respondents reported an inter-pregnancy interval of more than 18 months, and 201 (80.4%) had no history of contraceptive use. During this pregnancy, 223 (89.2%) reported no vaginal bleeding. A history of previous medical illness was noted in 176 (70.4%) respondents, with 159 (63.6%) having experienced malaria at the time of diagnosis of their previous medical condition. Furthermore, 171 (68.4%) reported no current malarial attack, as shown in [Table 2].

Table 1: Sociodemographic characteristics of respondents

S/N	Variables	Frequency (%) n = 250
1.	**Age (Years)**	
	≤ 20	11 (4.4)
	21–29	127 (50.8)
	30–39	103 (41.2)
	> 40	9 (3.6)
2.	**Residence**	
	Rural	196(78.4)
	Urban	54(21.6)
3.	**Religion**	
	Muslim	227(90.8)
	Christian	23(9.2)
4.	**Marital status**	
	Married	223(89.2)
	Single	2(0.8)
	Widowed	6(2.4)
	Divorced/Separated	19(7.6)
5.	**Tribe**	
	Hausa	196(78.4)
	Fulani	23(9.2)
	Igbo	7(2.8)
	Yoruba	13(5.2)
	Others	11(4.4)
6.	**Education level**	
	Qur'anic education	12(4.8)
	Primary education	41(16.4)
	Secondary education	120(48.0)

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	Tertiary education	77(30.8)
7.	**Occupation**	
	Housewife	155(62.0)
	Government employee	35(14.0)
	Private employee	26(10.4)
	Trader	13(5.2)
	Handicraft	21(8.4)
8.	**Family monthly income (Naira)**	
	≤50,000	57(22.8)
	51,000-99,000	91(36.4)
	≥100,000	102(40.8)

Table 2: Obstetric and medical characteristics of respondents

SN.	**Variables**	**Frequency (%) n = 250**
1.	**Duration of current pregnancy**	
	First trimester	35(16.4)
	Second trimester	112(44.8)
	Third trimester	97(38.8)
2.	**Number of deliveries**	
	No births	11(4.4)
	1-2	84(33.6)
	3-4	126(50.4)
	>5	29(11.6)
3.	**Inter-pregnancy interval**	
	≤ 18 months	111(44.4)
	>18 months	139(55.6)
4	**Contraceptive use**	
	Yes	49(19.6)
	No	201(80.4)
5.	**Vaginal bleeding during this pregnancy**	
	Yes	27(10.8)
	No	223(89.2)
6.	**Previous medical illness**	
	Yes	176(70.4)
	No	74(29.6)
7.	**Diagnosis of previous medical illness**	
	Malaria	159(63.6)
	Intestinal parasitosis	30(12.0)
	Others	61(24.4)
8.	**Current malarial attack**	

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	Yes	79(31.6)
	No	171(68.4)

Table 3: Prevalence and pattern of anaemia among respondents

Variables	Frequency (%)
Haemoglobin concentration status (n = 250)	
Anaemic	149(59.6)
Non- Anaemic	101(40.4)
Pattern of anaemia (n = 149)	
Mild anaemia	113(75.8)
Moderate anaemia	36(24.2)

Table 4: Factors associated with anaemia among the respondents

Variables	Haemoglobin concentration status		Test of Significance
	Anaemic frequency (%)	Non Anaemic frequency (%)	
Age (Years)			
≤ 29	63 (45.7)	75 (54.3)	X^2 = 2.5458
≥ 30	43 (51.8)	40 (48.2)	p-val = .4671
Residence			
Rural	81(41.3)	115(58.7)	X^2 = 6.3917
Urban	17 (68.0)	8(32.0)	p-val = .0115*
Religion			
Muslim	97(53.3)	85(46.7)	X^2 = 3.8893
Christian	14(35.9)	25(64.1)	p-val = .0486*
Marital status			
Married	121(60.2)	80(39.8)	X^2 = 6.7869
Others	6(30.0)	14(70.0)	p-val = .0092*
Tribe			
Hausa/Fulani	96(56.5)	74(43.5)	X^2 = 5.5727
Other tribes	22(43.4)	29(56.6)	p-val = .2334
Education level			
Primary and below	23(43.4)	30(56.6)	X^2 = 1.6902
Formal	80(47.6)	88(52.4)	p-val = .6391
Occupation			
Housewife	86(68.3)	40(31.7)	X^2 = 18.21
Employed	38(40.0)	57(60.0)	p-val = .0011*
Family monthly income (Naira)			
≤ 99,000	59(49.6)	60(50.4)	X^2 = 7.1803
≥ 100,000	37(36.3)	65(63.7)	p-val = .0276*

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Duration of current pregnancy			
First trimester	15(42.9)	20(57.1)	$X^2 = 5.071$ p-val = .16667
Second trimester	47(56.6)	36(43.4)	
Third trimester	40(41.2)	57(58.8)	
Number of deliveries			
≤ 2	39(45.3)	47(54.7)	$X^2 = 0.3614$ p-val = .0157*
≥ 3	79(58.5)	56(41.5)	
Contraceptive use			
Yes	13(44.8)	16(55.2)	$X^2 = 0.6101$ p-val = . 4348
No	101(52.6)	91(47.4)	
Vaginal bleeding during this pregnancy			
Yes	12(70.6)	5(29.4)	X^2 =2.0771 p-val = . 1495
No	107(52.5)	97(47.5)	
Previous medical illness			
Yes	97(61.8)	60()38/2	$X^2 = 0.1007$ p-val = . 7501
No	41(64.0)	23(36.0)	
Diagnosis of previous medical illness			
Malaria	93(66.9)	46(33.1)	$X^2 = 2.0513$ p-val = .3586
Others	47(57.3)	35(42.7)	
Current malarial attack			
Yes	40(61.5)	25(38.5)	$X^2 = 15.7624$ p-val = .000072*
No	51(32.7)	105(67.3)	

*Statistically significant ($p < 0.05$)

Prevalence, pattern and factors associated with anaemia among respondents

A total of 149 (59.6%) out of 250 pregnant women were found to be anemic. Among these, 113 (75.8%) experienced mild anemia, while 36 (24.2%) had moderate anemia; no cases of severe anemia were observed in this study, as shown in [Table 3]. The prevalence of anemia was significantly higher ($p < 0.05$) among women residing in rural areas (68.0%) compared to urban residents (41.3%). It was also notably higher among currently married women (60.2%) compared to those not currently married (30.0%). Additionally, anemia was more common among women who were full-time housewives (68.3%) than among those who were not. The prevalence was significantly greater among respondents with a monthly family income of ≤ 99,000 Naira (64.3%) compared to those earning ≥ 100,000 Naira (36.3%). Furthermore, women with three or more previous deliveries showed a higher prevalence (58.5%) compared to those with fewer than three deliveries (45.3%). Anemia was also significantly more prevalent among women with an inter-pregnancy interval of ≤ 18 months (72.3%) compared to those with an interval of more than 18 months (25.7%). Lastly, women experiencing a current malaria attack had a higher prevalence of anemia (61.5%) compared to those without malaria (32.7%), as detailed in [Table 4].

4. DISCUSSION

The detection of anemia during antenatal booking among pregnant women is crucial, as it provides an opportunity to implement interventions aimed at preventing anemia-related complications, particularly given the high rates of maternal and perinatal morbidity and mortality associated with anemia in pregnancy within the tropics [19]. Literature from developing countries indicates that the prevalence of anemia in pregnancy varies between 35.0% and 75.0% [20]. This study examined the prevalence and associated risk factors of anemia among pregnant women attending antenatal services at the primary health care center in Dakingari, Kebbi State, Nigeria. The prevalence of anemia among the participants was 59.6%, which falls within the moderate range compared to findings from other studies in Nigeria [17, 19–21] and in countries in Southeastern Africa [22, 23]. In this study, the overall prevalence of anemia among pregnant women was 59.6%. The high rate of anemia was primarily associated with low sociodemographic status and

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obstetric history. Among the respondents, 75.8% had mild anemia, while 24.2% had moderate anemia; none exhibited severe anemia. These findings align with studies conducted in Enugu, South Eastern Nigeria, where 90.7% of women had mild anemia, 9.3% had moderate anemia, and none had severe cases [24]. Similar results have been reported in various studies across Nigeria, showing that most women experience mild anemia, with fewer cases of moderate anemia and very few or no cases of severe anemia [25, 26, 43].

In this current investigation, the majority of anemic patients (50.8%) were aged between 21 and 29 years, consistent with findings from other research [27-29]. This may be attributed to recurrent pregnancies and inadequate birth spacing among women of reproductive age, increasing their susceptibility to anemia. Approximately 78.4% of anemic women belonged to rural areas, compared to 21.6% from urban settings, which is similar to previous reports of 68% and 65.9% [30, 31]. The higher prevalence of anemia in rural populations could be linked to limited access to healthcare facilities, compounded by lack of awareness about anemia's causes and prevention strategies. Furthermore, anemia was more prevalent among individuals with a monthly income of less than 10,000 currency units (59.2%), likely reflecting the influence of socioeconomic factors such as poor education and financial constraints. Women in lower income groups tend to consume diets deficient in micronutrients, animal proteins, and vitamins [32], which correlates with findings from other studies indicating higher anemia rates among women of low socioeconomic status [33-35].

Regarding educational level, anemia was most common among women with secondary education (48.0%). However, some studies have demonstrated a direct relationship between literacy and anemia prevalence [36]. Our findings are consistent with reports showing similar rates of anemia among women with comparable educational backgrounds (37% and 38.5%) [37, 28]. The number of children was significantly associated with anemia ($p<0.05$), with higher prevalence observed in women with larger family sizes. This is likely due to increased iron depletion from repeated pregnancies, especially when occurring in quick succession an established cause of anemia in pregnancy. Women with family sizes greater than two had a higher anemia prevalence (62.0%) compared to those with family sizes of two or fewer (38.0%). Although this suggests a relationship between family size and anemia, no definitive causal link was established in this study, though similar observations have been reported elsewhere [39]. The current investigation explored that, the majority of anemic respondents (44.4%) were in the second trimester, compared to 16.4% in the first trimester and 38.8% in the third trimester. Similar findings (36.5%) were reported in a previous study [26]. The physiological hemodilution that occurs during pregnancy peaks in the second trimester and may explain the increased prevalence of anemia during this period. Additionally, the demand for micronutrients increases as pregnancy progresses. Our study also found that 70.4% of anemic women were multigravida, while 29.6% were primigravida. This could be due to the fact that repeated childbirths make women more susceptible to malnutrition, leading to anemia and depleting maternal iron reserves with each pregnancy, often due to blood loss during delivery. Another study similarly concluded that multiparous women have a higher risk of anemia [27]. Women with previous pregnancies typically lose about 500–600 mg of iron per pregnancy, a loss that is further increased by postpartum hemorrhage. Consequently, iron deficiency tends to become more common as parity increases. Regarding interpregnancy intervals, 55.6% of respondents with intervals greater than 18 months had anemia, compared to 44.4% with intervals of 18 months or less. Conversely, some studies have reported a higher prevalence of anemia among women with closely spaced pregnancies [41], though a definitive cause-effect relationship has yet to be established. In this study, current malaria infection was significantly associated with anemia in pregnant women ($p < 0.05$), consistent with findings from [42]. To prevent anemia during pregnancy, early antenatal care remains a crucial preventive measure.

5. CONCLUSION

Based on the findings of our study, there was a high prevalence of anemia (59.6%) among pregnant women attending antenatal services at primary health care facilities in Dakingari, Kebbi State, northwest Nigeria. This highlights anemia in pregnancy as a significant public health concern. The identified risk factors associated with anemia included residing in rural areas, having a low monthly family income, women with less than eighteen months between pregnancies, women with more than three previous deliveries, and recent malaria episodes. It is essential to strengthen education on anemia for pregnant women within antenatal care clinics.

ACKNOWLEDGEMENT

This study was funded by the Tertiary Education Trust Fund (TETFund) through the 2025 Institutional Based Research (IBR) projects at Kebbi State Polytechnic Dakin-Gari, Kebbi State, Nigeria. We also extend our gratitude to the management and staff of the Primary Health Care Center in Dakingari, Kebbi State, Nigeria.

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