Prevalence of Anemia in Pregnant Women under Antenatal Care at the Rivers State University Teaching Hospital, Port-Harcourt, Nigeria and Association to Knowledge and Attitude on Anemia and Its Prevention

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Authors' contributions

This work was carried out in collaboration among all authors. Author PAA designed the study, performed the statistical analyses and wrote the first draft of the manuscript. Authors CO and BN assisted in data collection, managed the analyses of the study and literature searches. All authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

Background: Anemia in pregnancy is an important public health problem worldwide. Despite the efforts of government and health bodies, maternal anemia continues to be a common cause of morbidity and mortality. This suggests that other factors contribute to the high prevalence of anemia in pregnancy despite the intervention efforts.
Objective: This study sought to determine the prevalence and anemic status of pregnant women at booking, to assess their knowledge of anemia and attitude to anemia prevention measures. And to determine associated risk factors for anemia and if there is a correlation between anemic status and level of knowledge/attitude to anemia prevention
Methodology: An institutional-based, cross-sectional study was carried out. 322 consenting

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participants between 18-48 years were interviewed at booking using a structured questionnaire. Information on socio-demographic characteristics; their knowledge on causes, symptoms, prevention, and complications of anemia in pregnancy; and information on attitude towards anemia prevention strategies were collected. The PCV and HIV results of the women were retrieved. Data were entered into an Excel spreadsheet and analyzed with SPSS version 20. Associations between different variables were determined using Fisher's exact test or Chi-square test, as appropriate, and logistic regression was used to test statistical significance at P<0.05.

Results: Their mean age±SD was 31.65±4.72 years and the median parity was 1.Of the 322 women, 194(60.2%) were anemic, with 186(57.8%) having mild anemia. There was no significant association between anemia and age, marital status, education, employment, parity, pregnancy interval and socio-economic status, but there was a significant association between gestational age and HIV status, with only gestational age remaining significant after logistic regression. The relationship between anemia and knowledge and attitude was not significant, but the higher educational status was significantly related to knowledge of anemia and its prevention.

Conclusion: The prevalence of anemia in this study was high. Despite good knowledge and attitude to anemia prevention, late booking for ANC caused a significant association with the occurrence of anemia. Efforts are needed to encourage early booking and early commencement of iron and folic acid supplements.

1. INTRODUCTION

Anemia in pregnancy is an important public health problem worldwide. The World Health Organization (WHO) defines Anemia as "A condition in which the number of red blood cells or their oxygen-carrying capacity is inadequate to meet physiologic demands in the body". Anemia in pregnancy is defined as haemoglobin (Hb) concentration <11g/dl (PCV <33) and it is divided into three levels of severity, as Mild anemia - Hb level of 9.0-10.9g/dl (PCV 27-32), Moderate anemia - Hb level of 7.0-8.9g/dl (PCV 21-26) and Severe anemia - Hb level <7.0g/dl (PCV <21) [1].

Globally, anemia affects about half of all pregnant women 15-49 years with a prevalence varying from 53.8% to 90% in developing countries and 8.3% to 23% in developed countries, with the 2016 prevalence in Nigeria put at 57.80% [2]. The prevalence of anemia in pregnancy reported in previous studies from Nigeria varies widely between 15% to 77% [3-6]. Earlier studies in Port-Harcourt have reported a prevalence of 23.3% [7], 62.2% [8] and 69.6% [9].

More than 50% of global anemia cases are due to iron deficiency, resulting from inadequate dietary intake and absorption, increased iron requirements and excessive iron losses. Other causes include genetic defects and diseases affecting blood cell producing organs such as malaria, Schistosomiasis, Hookworm infestation and HIV infection [10,11]. Women often become anemic during pregnancy due to the physiological changes of pregnancy. However, many of them are said to be already anemic at conception and then the physiologic demand further worsens the anemia in these women.

Among the reported risk factors for the development of anemia during pregnancy are low socioeconomic status, illiteracy, grand-multiparity, too many and too frequent pregnancies (inadequate spacing) and late booking of pregnant women for antenatal care [12]. Anemia in pregnancy, particularly when moderate to severe, can result in pre-term delivery, low birth weight, low Apgar score and risk of birth asphyxia, low mental capacity of children and in extreme cases, intrauterine fetal death and maternal mortality [10].

Maternal anemia continues to be a common cause of morbidity and mortality despite the policy of routine iron and folate supplementation and intermittent preventive treatment for malaria with drugs. This suggests that there are other factors than those on the focus of the malaria control program, which contributes to the trend of a high prevalence of anemia in pregnancy. This study, therefore, sought to determine the current prevalence and anaemic status of pregnant women at booking for antenatal care in RSUTH, to assess their knowledge of anemia and attitude to anemia prevention measures, to determine associated risk factors for anemia in these women, and to determine if there is a correlation between anaemic status and level of

knowledge/attitude to anemia prevention. The findings of this study may identify areas of lapses in the knowledge and attitude to anemia and its prevention. This will aid in improving the content of antenatal education sessions and focus on risk factor reduction.

2. METHODOLOGY

2.1 Study Site and Area

This study was conducted in the antenatal clinic of RSUTH located in Port Harcourt city, an urban area in Nigeria, a tertiary hospital owned and funded by the Government of Rivers State of Nigeria. Patients are expected to pay directly for services they receive (except few that participate in the National Health Insurance Scheme). The hospital provides emergency obstetric services to women referred from other centers, as well as providing antenatal care and delivery services for low and high-risk pregnant women registered with the hospital. There are Five teams headed by consultants that run antenatal care services Mondays through Fridays. There is an average annual ANC attendance of over 12,000.

2.2 Study Design and Population

An institutional-based, cross-sectional study was carried out. Consenting participants were interviewed using a structured questionnaire that required about ten minutes to complete. The study population was all pregnant women between the ages of 18-48 years booking for the first time in the current pregnancy for antenatal care at the RSUTH. All previously booked patients already receiving supplementation and health talks in the clinic were excluded.

2.3 Sample Size Determination

The required sample size, of 322, was determined by using sample size for single population proportion formula [13] with the prevalence of anemia from a previous study in the study area by Okoh et al 2015 [9].

$$n = (Z\alpha/2)^2 \times p (1-p) / d^2$$

Where, Z = critical value for normal distribution at 95% confidence level which equals to 1.96 (z value at α =0.05, two tailed).

p = Proportion 69.6% who had anemia in previous study. d = margin of error = 5% in case of our study = 0.05. n = sample size

$$n = 1.96^2 \times 0.70 \times (1-0.70) / (0.05)^2$$
$$n = 3.84 \times 0.70 \times 0.30 / 0.0025 = 322.$$

2.4 Sampling Technique and Procedures

All consecutive consenting pregnant women booking for ANC on each clinic day were recruited for the study until the required sample size was attained. An average of 15 women registers for antenatal care daily in this Centre. With five clinic days per week, about 10 women were recruited daily using convenient sampling to achieve the required number. The recruitment however lasted for about 8 weeks due to a drop in attendance witnessed due to the Covid 19 pandemic.

2.5 Data Collection Instrument and Methods

Data were collected by a structured questionnaire administered to the study participants to collect information on socio-demographic characteristics; their knowledge on causes, symptoms, prevention, and complications of anemia in pregnancy; and information on attitude towards anemia prevention strategies.

Anemia knowledge was determined using an index summated scale to which 16 questions were put to the respondents to assess their knowledge about anemia. Each correct answer was scored 1, while each wrong answer was scored 0. The attitude of the women towards anemia prevention was determined with a Likert summated scale, with 8 items scoring a minimum of 8 and a maximum of 40 points. To each item on the scale, the participants were asked to give one of the following responses: 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree).

The participant's folders were tagged for easy follow-up. The packed cell volume of all participating women was retrieved from their antenatal records at their subsequent visit, a week after booking when the results of their routine investigation are generally available. This was used to calculate the prevalence and anemia status of the participants. The HIV status, which is one of the risk factors for anemia, was also retrieved. Antenatal care patients following testing at our clinics are usually informed about their results at the next visit and positive cases counseled by the trained nurses in the department, following which further tests are

conducted and treatment with antiretroviral drugs commenced.

The data was collected by trained internship doctors running routine antenatal care for each clinic day Monday through Friday. Before data collection, the data collectors were trained for one day. Close supervision and daily check-up of the data were carried out by one of the authors daily, to improve the quality of data.

2.6 Data Analysis

Index summated scale was used to group the participants into those with Low-knowledge (1-6), Average-knowledge (7-12) and High-knowledge (13-16) of anemia. Based on Likert summated scale scores, the participants were categorized into groups of Poor-attitude (8.0-23.0), Neutral-attitude (24.0) and Good-attitude (25.0-40.0) towards anemia prevention in pregnancy. The participant's "family feeding expenditure per capita" was determined by their estimated monthly feeding expenditure divided by the number of persons in the household. This was classed as Low - <$22 (<N10,000), Middle - $22 - $32 (N10,000 – N15,000) and High - >$33 (≥N16,000) using exchange rate of N460 to $1. This served to determine their socio-economic circumstance.

The association of anemia as a dependent variable was compared with possible risk factors of the age of respondent, educational status, parity, occupation, gestational age at booking, last pregnancy interval, HIV status, and knowledge of anemia and attitude to anemia prevention of the respondents. Coded data were entered into Excel spreadsheet and exported to SPSS version 20 for statistical analysis. Descriptive statistics such as Mean and frequencies were used to present the results in tables and figures. Cross-tabulation was used to determine associations between different variables using Fisher's exact test or Chi-square test, as appropriate, and logistic regression was used to test statistical significance at P<0.05.

3. RESULTS

Three hundred and twenty-two women consented to participate. Their Mean age ± SD was 31.65±4.72years; the Median age was 32years and Range was 18 – 43years. The majority of the women, 313(97.2%) were married, had tertiary education 57.7% and 78.0% were employed or making income, while 22.0%

of them were unemployed and without any source of personal income. As regards their 'family feeding expenditure per capita', the majority 182(56.5%) were in the Middle class, 86(26.7%) were in the High class and 54(16.8%) were in a Low class (Table 1).

Regarding their obstetric characteristics, Their Median parity was Para 1, with a Range of Para 0 – 6. Majority of the women, 171(53.1%) booked in the second trimester, 93(28.9%) booked in the third trimester and only 57(17.7%) booked early as recommended in the first trimester. Concerning the interval between their previous pregnancy and the current pregnancy, of the 219 women who had previously given birth, 127(58.0%) had an adequate interval of two or more years in between the pregnancies, while 92(42%) had less than two years in between their pregnancies (Table 2).

Fig. 1 refers to the HIV status of the women, with 28(8.7%) testing positive, while 294 of the women (91.3%) were negative for the virus. Fig. 2-3. refers to the prevalence of anemia in the study participants, 194(60.2%) of the women were anaemic and 128(39.8%) had no anemia. Of those found to be anaemic, 194(60.2%), the majority 186 (57.8%) had mild anemia, with moderate and severe anemia being found in 4(1.2%) each.

Their percentage knowledge of anemia in pregnancy, calculated using the index summated scale, revealed a majority 171(53.1%) had an average knowledge with another 116(36.0%) having good knowledge, only 35(10.9%) had poor knowledge (Fig. 4). On the other hand, their attitude to anemia prevention, as calculated with the Likert scale and as shown in Fig. 4, revealed 249(77.3%) had a good attitude, while 45(14.0%) were neutral and 28(8.7%) recorded poor attitude.

Comparison of the socio-demographic factors with anemia among the women revealed no statistically significant difference with their age (P=0.516), marital status (P=0.358), educational status (P=0.818) and socio-economic status (P=0.068) see Table 3. However, a comparison of obstetric factors with anemia among the women revealed a significant association of anemia with the gestational age at booking (P=0.0001) and the HIV status of the women (P=0.038), but not significant for parity (P=0.611) and interpregnancy interval (P=0.493) see Table 4A. However, on multiple logistic regression (Table 4B) only gestational age at booking

remained significant (P=0.0001). Table 5 shows the relationship between anaemic status with knowledge of anemia and attitude to the prevention of anemia among the women, with no significant association with knowledge (P=0.431) and attitude (P=0.737).

Table 1. Sociodemographic characteristics of women at booking for ANC in RSUTH

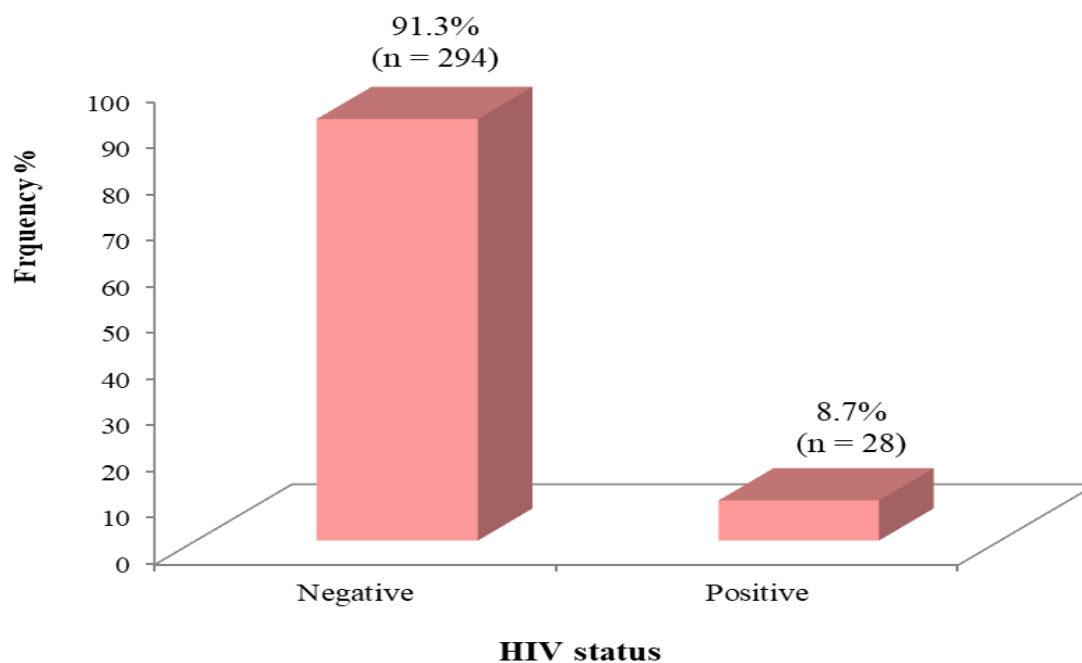| Variables (N = 322)	Frequency	Percentage
Age in years		
≤24 years	20	6.2
25 – 29 years	88	27.3
30 – 34 years	119	37.0
35 – 39 years	80	24.8
≥40 years	15	4.7
Marital status		
Single	8	2.5
Married	313	97.2
Widowed	1	0.3
Educational level		
Primary	6	1.9
Secondary	84	26.1
Post-secondary	46	14.3
Tertiary	186	57.7
Employment status		
Unemployed/student	71	22.0
Employee	109	33.9
Self-employed	142	44.1
Socio-economic status		
High	86	26.7
Middle	182	56.5
Low	54	16.8

Fig.1. HIV status of women at booking for ANC in RSUTH

Table 2. Obstetric characteristics of women at booking for ANC in RSUTH

Variables (N = 322)	Frequency	Percentage
Parity		
Para 0	103	32.0
Para 1	95	29.5
Para 2 – 4	116	36.0
Para ≥5	8	2.5
Median = Para 1; Range = Para 0 – 6		
Gestational age		
First trimester	57	17.7
Second trimester	171	53.1
Third trimester	93	28.9
Post-term	1	0.3
The interval between previous and current pregnancy (N = 219)		
Adequate (≥2 years)	127	58.0
Short (<2 years)	92	42.0

Table 3. Socio-demographic factors associated with anemia among women at booking for ANC in RSUTH

	Anemia		
	Yes	No	Total
Variables (N = 322)	n (%)	n (%)	n
Age in years			
≤24 years	13 (65.0)	7 (35.0)	20
25 – 29 years	56 (63.6)	32 (36.4)	88
30 – 34 years	72 (60.5)	47 (39.5)	119
35 – 39years	47 (58.8)	33 (41.2)	80
≥40 years	6 (40.0)	9 (60.0)	15
	Chi Square = 3.256; p-value = 0.516		
Marital status			
Single	6 (75.0)	2 (25.0)	8
Married	188 (60.1)	125 (39.9)	313
Widowed	0 (0.0)	1 (100.0)	1
	Fisher's exact test = 2.050; p-value = 0.358		
Educational level			
Primary	3 (50.0)	3 (50.0)	6
Secondary	53 (63.1)	31 (36.9)	84
Post-secondary	21 (45.7)	25 (54.3)	46
Tertiary	117 (62.9)	69 (37.1)	186
	Fisher's exact test = 5.028; p-value = 0.152		
Employment status			
Unemployed/Student	41 (57.7)	30 (42.3)	71
Employee	68 (62.4)	41 (37.6)	109
Self-employed	85 (59.9)	57 (40.1)	142
	Chi Square = 0.402; p-value = 0.818		
Socio-economic status			
High	53 (61.6)	33 (38.4)	86
Middle	116 (63.7)	66 (36.3)	182
Low	25 (46.3)	29 (53.7)	54
	Chi Square = 5.382; p-value = 0.068		

Table 4A. Obstetric factors associated with anemia among women at booking for ANC in RSUTH

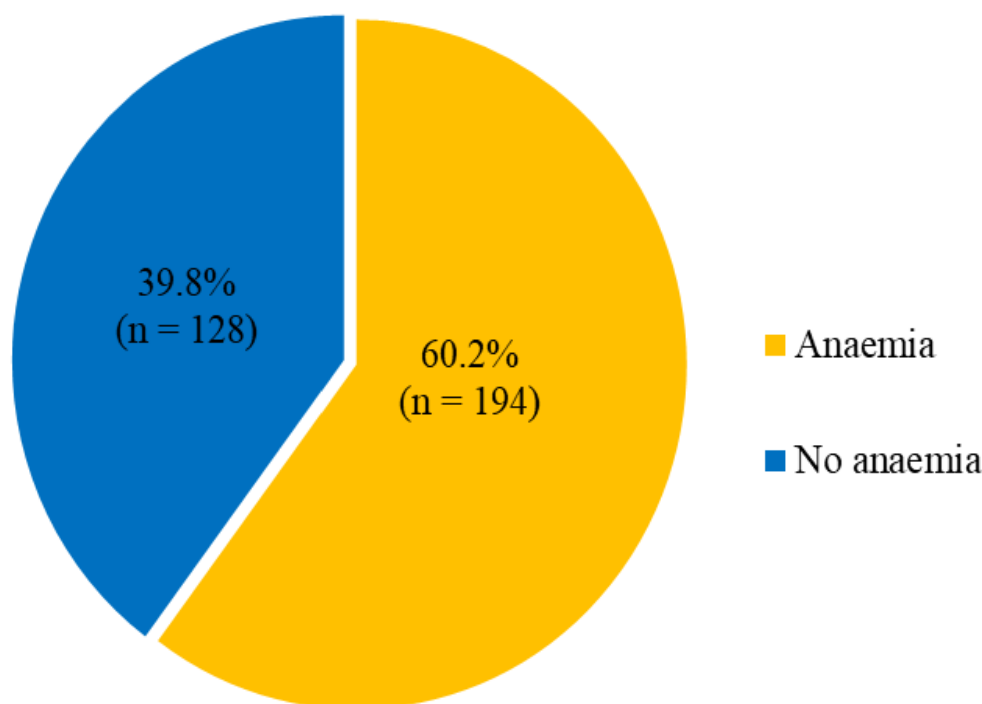|	Anemia		
	Yes	**No**	**Total**
Variables (N = 322)	**n (%)**	**n (%)**	**n**
Parity			
Para 0	62 (60.2)	41 (39.8)	103
Para 1	59 (62.1)	36 (37.9)	95
Para 2 – 4	70 (60.3)	46 (39.7)	116
Para ≥5	3 (37.5)	5 (62.5)	8
	Fisher's exact test = 1.861; p-value = 0.611		
Gestational age			
First trimester	17 (29.8)	40 (70.2	57
Second trimester	117 (68.4)	54 (31.6)	171
Third trimester	59 (63.4)	34 (36.6)	93
Post-third trimester	1 (100.0)	0 (0.0)	1
	Fisher's exact test = 27.223; p-value = 0.0001*		
Interval between previous and current pregnancy (N = 219)			
Adequate (≥2 years)	79 (62.2)	48 (37.8)	127
Short (<2 years)	53 (57.6)	39 (42.4)	92
	Chi Square = 0.471; p-value = 0.493		
HIV status			
Positive	22 (78.6)	6 (21.4)	28
Negative	172 (58.5)	122 (41.5)	294
	Chi Square = 4.299; p-value = 0.038*		

*Statistically significant (p<0.05)

Fig. 2. Prevalence of anemia among women at booking for ANC in RSUTH

Table 4B. Multiple logistic regression predictors of anemia among women at booking for ANC in RSUTH

Factors	Coefficient(B)	Odds ratio (OR)	95% CI	p value
Gestational age at booking				
After the first trimester	1.518	4.563	2.44 – 8.53	0.0001*
First trimester [R]		1		
HIV status				
Positive	0.814	2.257	0.87 – 5.86	0.095
Negative [R]		1		

*Statistically significant (p<0.05)

Table 5. Relationship between anaemic status, knowledge on anemia & its prevention and attitude to the prevention of anemia among women at booking for ANC in RSUTH

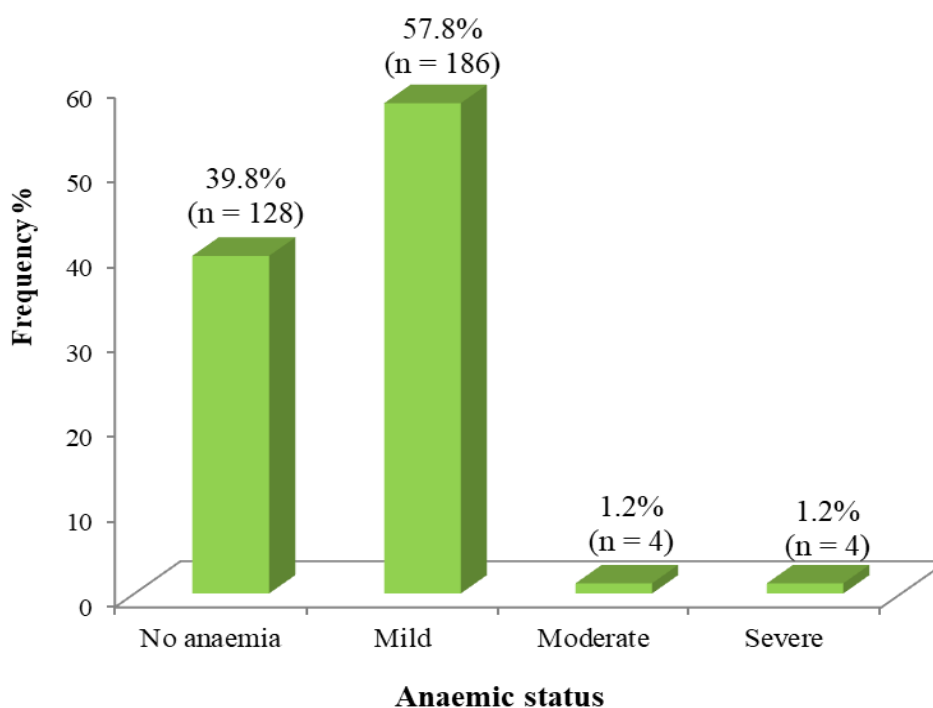|	Anemia status		
	Anemia	No Anemia	Total
Variables (N = 322)	n (%)	n (%)	n
Level of knowledge on anemia			
Good	75 (64.7)	41 (35.3)	116
Average	100 (58.5)	71 (41.5)	171
Poor	19 (54.3)	16 (45.7)	35
	Chi Square = 1.684; p-value = 0.431		
Attitude to the prevention of anemia			
Good	151 (60.6)	98 (39.4)	249
Neutral	28 (62.2)	17 (37.8)	45
Poor	15 (53.6)	13 (46.4)	28
	Chi Square = 0.611; p-value = 0.737		

Fig. 3. Anaemic status among women at booking for ANC in RSUTH

Comparison of sociodemographic factors and knowledge of anemia and its preventive measures (Table 6), revealed significant findings for educational status (P=0.003) and employment status (P=0.043) on bivariate analysis, but following logistic regression (Table 6B) only educational status (P=0.001) remained significant. The higher the educational status the more likely a woman will have good knowledge of anemia and its prevention. There were no significant findings on the comparison of obstetric factors and knowledge in the bivariate analysis (Table 7). On the other hand, comparison of sociodemographic (Table 8) and obstetric (Table 9) factors and attitude to the prevention of anemia was only significant for employment status (P=0.023).

Table 6. Sociodemographic factors association with knowledge of anemia and its prevention among women at booking for ANC in RSUTH

	Knowledge of anemia & its prevention		
	Good	Average/Poor	Total
Variables (N = 322)	n (%)	n (%)	n
Age in years			
≤24 years	7 (35.0)	13 (85.0)	20
25 – 29 years	37 (42.0)	51 (58.0)	88
30 – 34 years	38 (31.9)	81 (68.1)	119
35 – 39years	31 (38.8)	49 (61.2)	80
≥40 years	3 (20.0)	12 (80.0)	15
	Chi Square = 4.187; p-value = 0.381		
Marital status			
Single	4 (50.0)	4 (50.0)	8
Married	112 (35.8)	201 (64.2)	313
Widowed	0 (0.0)	1 (100.0)	1
	Fisher's exact test = 1.323; p-value = 0.659		
Educational level			
Primary	0 (0.0)	6 (100.0)	6
Secondary	19 (22.6)	65 (77.4)	84
Post-secondary	18 (39.1)	28 (60.9)	46
Tertiary	79 (42.5)	107 (57.5)	186
	Fisher's exact test = 13.553; p-value = 0.003[*]		
Employment status			
Unemployed/Student	27 (38.0)	44 (62.0)	71
Employee	48 (44.0)	61 (56.0)	109
Self-employed	41 (28.9)	01 (71.1)	142
	*Chi Square = 6.311; p-value = 0.043**		
Socio-economic status			
High	38 (44.2)	48 (55.8)	86
Middle	58 (31.9)	124 (68.1)	182
Low	20 (37.0)	34 (63.0)	54
	Chi Square = 3.874; p-value = 0.144		

Statistically significant (p<0.05)

Table 6B. Multiple logistic regression showing sociodemographic factors associated with knowledge of anemia & its prevention among women at booking for ANC in RSUTH

Factors	Coefficient(B)	Odds ratio (OR)	95% CI	p value
Educational level				
Above secondary	1.011	2.749	1.55 – 4.88	0.001*
Secondary and below [R]		1		
Employment status				
Unemployed	0.224	1.251	0.71 – 2.19	0.435
Employed [R]		1		

Statistically significant (p<0.05)

Table 7. Obstetric factors associated with knowledge of anemia & its prevention among women at booking for ANC in RSUTH

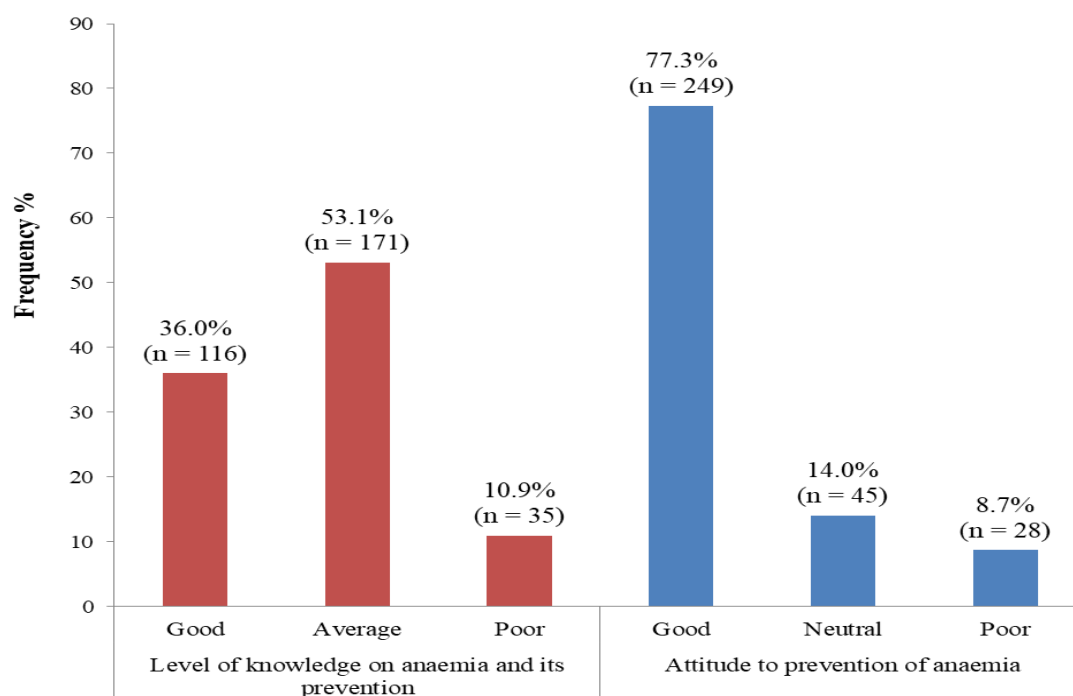|	Knowledge of anemia & its prevention		
	Yes	No	Total
Variables (N = 322)	n (%)	n (%)	n
Parity			
Para 0	32 (31.1)	71 (68.9)	103
Para 1	32 (33.7)	63 (66.3)	95
Para 2 – 4	51 (44.0)	65 (56.0)	116
Para ≥5	1 (12.5)	7 (87.5)	8
	Chi Square = 6.419; p-value = 0.093		
Gestational age			
First trimester	17 (29.8)	40 (70.2)	57
Second trimester	59 (34.5)	112 (65.5)	171
Third trimester	40 (43.0)	53 (57.0)	93
Post-third trimester	0 (0.0)	1 (100.0)	1
	Fisher's exact test = 3.561; p-value = 0.278		
The interval between previous and current pregnancy (N = 219)			
Adequate	49 (38.6)	78 (61.4)	127
Short	35 (38.0)	57 (62.0)	92
	Chi Square = 0.007; p-value = 0.935		
HIV status			
Positive	6 (21.4)	22 (78.6)	28
Negative	110 (37.4)	184 (62.6)	294
	Chi Square = 2.835; p-value = 0.092		

Fig. 4. Knowledge of anemia and its prevention and attitude to the prevention of anemia among women at booking for ANC in RSUTH

Table 8. Sociodemographic factors association with attitude to the prevention of anemia among women at booking for ANC in RSUTH

	Attitude to the prevention of anemia		
	Good	Neutral/Poor	Total
Variables (N = 322)	n (%)	n (%)	n
Age in years			
≤24 years	14 (70.0)	6 (30.0)	20
25 – 29 years	66 (75.0)	22 (25.0)	88
30 – 34 years	98 (82.4)	21 (17.6)	119
35 – 39years	61 (76.2)	19 (23.8)	80
≥40 years	10 (66.7)	5 (33.3)	15
	Chi Square = 3.624; p-value = 0.459		
Marital status			
Single	6 (75.0)	2 (25.0)	8
Married	242 (77.3)	71 (22.7)	313
Widowed	1 (100.0)	0 (0.0)	1
	Fisher's exact test = 0.599; p-value = 1.000		
Educational level			
Primary	4 (66.7)	2 (33.3)	6
Secondary	65 (77.4)	19 (22.6)	84
Post-secondary	34 (73.9)	12 (26.1)	46
Tertiary	146 (78.5)	40 (21.5)	186
	Fisher's exact test = 1.213; p-value = 0.772		
Employment status			
Unemployed/Student	61 (85.9)	10 (14.1)	71
Employee	88 (80.7)	21 (19.3)	109
Self-employed	100 (70.4)	42 (29.6)	142
	*Chi Square = 7.570; p-value = 0.023**		
Socio-economic status			
High	69 (80.2)	17 (19.8)	86
Middle	138 (75.8)	44 (24.2)	182
Low	42 (77.8)	12 (22.2)	54
	Chi Square = 0.655; p-value = 0.721		

Statistically significant (p<0.05)

4. DISCUSSION

The prevalence of anemia in pregnant women at booking in this study was 60.2%, out of which 2.4% had moderate and severe anemia. This finding is slightly lower than the prevalence of 69.6% earlier reported in the study area by Okoh et al in 2015 [9], in both magnitude and the proportion of pregnant women with moderate and severe anemia. The majority of the women (51.3%) in the earlier study had moderate anemia compared to this study, where the majority (57.8%) had mild anemia. The difference may lie in the fact that the previous study was retrospective in design and probably because, over time, the knowledge and attitude to anemia prevention in the general population may have improved.

The prevalence of anemia in these studies is unacceptably high and indicates that anemia is still a major problem in our environment. The prevalence of anemia in pregnancy reported by other studies in our city and other parts of Nigeria, and indeed Africa, varies widely. Two other studies in Port-Harcourt have reported 23.3% [7] and 62.2% [8]. Studies from other parts of Nigeria have reported figures ranging from 15% to 76.9% [3,4,5,6]. A recent study in Tanzania by Margwe and Lupindu 2018 reported a prevalence of 46.3%, out of which 10.45% had severe anemia [14]. The differences observed may be due to the stage in pregnancy that the hemoglobin concentration was estimated. While some studies were done at the booking visit, others were carried out during ANC when interventions such as Iron and Folate supplementation and malaria chemoprophylaxis had commenced. Other factors that might explain the differences recorded from region to region would include geographical variation, dietary lifestyle, and health-seeking behavior.

Table 9. Obstetric factors association with attitude to the prevention of anemia among women at booking for ANC in RSUTH

	Attitude to the prevention of anemia		
	Yes	No	Total
Variables (N = 322)	n (%)	n (%)	n
Parity			
Para 0	79 (76.7)	24 (23.3)	103
Para 1	68 (71.6)	27 (28.4)	95
Para 2 – 4	95 (81.9)	21 (18.1)	116
Para ≥5	7 (87.5)	1 (12.5)	8
	Chi Square = 3.667; p-value = 0.300		
Gestational age			
First trimester	41 (71.9)	16 (28.1)	57
Second trimester	131 (76.6)	40 (23.4)	171
Third trimester	76 (81.7)	17 (18.3)	93
Post-third trimester	1 (100.0)	0 (0.0)	1
	Fisher's exact test = 2.471; p-value = 0.498		
The interval between previous and current pregnancy (N = 219)			
Adequate	98 (77.2)	29 (22.8)	127
Short	72 (78.3)	20 (21.7)	92
	Chi Square = 0.037; p-value = 0.848		
HIV status			
Positive	23 (82.1)	5 (17.9)	28
Negative	226 (76.9)	68 (23.1)	294
	Chi Square = 0.405; p-value = 0.524		

The prevalence in this study of more than 40% is categorized as a severe public health problem, according to a WHO classification [12]. This is happening despite many years of implementation of interventions such as iron and folate supplementation, control of malaria and other infections, deworming, education to improve diet and family planning as prescribed by WHO [15]. This suggests that there are other factors, which contribute to the trend of a high prevalence of anemia in pregnancy. This study, and indeed a previous study in our Centre [16], reported late booking predominantly in the second trimester and this was significantly associated with the finding of anemia in the study population. Other studies have also observed an increasing prevalence with gestational age [5,9,17,18]. This delay in the health-seeking behavior of women contributes to the increasing prevalence of anemia seen with increasing gestational age. Hemodilution peaking at the second trimester may be another reason why anemia is seen more within this stage of pregnancy, but early booking and early supplementation with Iron and Folate should counteract this effect.

The study revealed that the women had good knowledge and attitude to anemia and its prevention measures, however, a comparison with the anaemic status of the women did not yield a significant difference. Knowledge of a problem may lead to its understanding and behavioral change, while attitude is a factor that can influence anemia intervention program. A study in Ethiopia by Oumer and Hussein 2019 reported good knowledge and attitude among their participants but poor adherence to prevention practice [19]. The report from Tanzania [14] revealed low knowledge and poor attitude among participants and a significant association of these with anemia. The difference can be explained by the study population, our study was done in an urban metropolitan setting with over 90% haven acquired secondary level education, while theirs was in a rural setting with the majority of the participant's have acquired primary and informal education.

5. CONCLUSION

The prevalence of anemia in this study at 60.2% was high. Despite the good knowledge and attitude to anemia and its prevention, late booking for ANC caused a significant association with the occurrence of anemia. Efforts are needed to encourage early booking among

pregnant women, during the first trimester as recommended by WHO, and when not possible, women should be encouraged to commence iron and folate supplements early at home.

CONSENT AND ETHICAL APPROVAL

Before data collection, the proposal was submitted to the RSUTH Research and Ethics Committee, as the study involved the use of human subjects and patients of the hospital. An ethical clearance letter was obtained (RSUTH/REC/2020002). Individual written informed consent was also collected from each participant.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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