**ANAEMIA AT BOOKING AND RELATED FACTORS IN PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN A RURAL HEALTH FACILITY IN SOUTH-SOUTH NIGERIA.**


## ABSTRACT

**Background:** Anaemia in pregnancy has remained a universal public health issue causing maternal and fetal morbidity and mortality.

**Aim:** To determine the prevalence of anaemia in pregnancy at booking and other related determinants.

**Study design:** This study is a prospective cross sectional descriptive study.

**Place and Duration of Study:** This study was carried out at the antenatal booking clinic Federal Medical Centre Yenagoa, Otuoke Outreach, Nigeria, from January 2017 to December 2020.

**Methodology**: The study that utilized 770 pregnant women. A structured study proforma was used to extract socio-demographic characteristics and other relevant data. Two to three drops of blood was collected from the participants and the haemoglobin was estimated using the HemoCue Hb 801 haemoglobin system.

**Results**: Overall the prevalence of anaemia in pregnancy at booking is 70.0% and the highest prevalence of anaemia in pregnancy at booking occurred in primigravida. Anemia in pregnancy was more common in; social Class 3; 308 (40.0%), and age; 25–29: 66(32.3%). Moderate anaemia occurred more frequently in grand multipara 11 (18.5%) compared to other parities but mid anaemia occurred more in para 2 to 4, 180 (67.2%). More than 50% of the women irrespective of the social class had mild anaemia. Anaemia was more frequent in the 2$^{nd}$ trimester (56.4%). Expectedly, anaemia occurred more frequently in rural dwellers


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603 (78.3%) compared to suburban 43 (5.6%) and urban dwellers 124 (16.1%). On related factors, there was only a significant association between anaemia and social class $p = 0.002$.

**Conclusion:** The prevalence of anaemia in pregnancy at booking is unacceptably high. Institution of preconception care, tailored surveillance and execution of policies aimed at prevention are apt, in the background of ensuring the education of the girl child.

***Keywords***; *anaemia*; *anaemia in pregnancy; haemoglobin; antenatal booking; Southern Nigeria.*

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## 1.0 INTRODUCTION

Anaemia has remained the commonest medical disorder in pregnancy [1] and is the most common hematologic abnormality diagnosed in pregnancy [2]. It is a frequent comorbidity in several nutritional and medical conditions [3]. Anaemia is a "medical condition which results when the number of healthy circulating erythrocytes (and consequently their oxygen-carrying capacity) is insufficient to satisfactorily transport oxygen to the tissues to meet the body's physiologic demands which may vary according to age, sex, and pregnancy status" [4]. When body tissues are supplied with a scant amount of oxygen, many organs and functions are compromised. Anaemia decreases the woman's reserve to withstand bleeding either during or after childbirth and it also predisposes to infections [5]. Anaemia during pregnancy is especially a concern because its sequela results in to increase in perinatal and maternal morbidity and mortality [6,7].

According to the World Health Organization (WHO) anaemia in pregnancy occurs when the haemoglobin concentration falls below 11g/dL (or hematocrit less than 33%) in pregnant women [8]. However, the baseline value of 10.0g/dL is recognized as the standard cut-off mark in developing countries like Nigeria and this is premised on the research by Lawson [9] who reported that significant adverse foetomaternal outcomes do not occur except the haemoglobin level drops below 10.0g/dl.

The global prevalence of anaemia in pregnant women is 36.5%, while in Africa it is 45.8% [10]. In Nigeria prevalence ranging from 23.7 to 88.7% [11,12], have been reported

The wide variations in the prevalence rates in different climes and regions are because of differences in; socio-demographic characteristics, etiological factors, lifestyles, and health-seeking behaviour across different cultures, widespread use of haematinics and use of anti-malarial prophylaxis before booking for antenatal care services [4,7,8], [13].

The etiological factors implicated in anaemia during pregnancy in developing countries are multifactorial and may occur singly or in combination. They include micronutrient deficits in folate, iron, and vitamins A and B12 and anaemia triggered by parasitic infestations such as malaria and helminths. or chronic infections like TB and HIV [14-17]. The influence and impact of each of these factors identified as culpable for anaemia during gestation differ widely due to geographic location, weather, food practice, beliefs and religion, myths and the season. In Sub-Saharan Africa, nutritional anaemia is the most commonest of anaemia during pregnancy and poor intake of diets rich in iron is implicated as the chief cause of anaemia among pregnant women [15,16,18].

This study sort to assess the prevalence of anaemia and its related factors in a rural hospital setting in South-Southern Nigeria.

## 2.0 METHODOLOGY

### 2.1 Study design

This was a prospective cross-sectional descriptive study

### 2.2 Study Area

This study was carried out at the antenatal clinic of the Federal Medical Centre, Yenagoa, Otuoke Outreach between 1st of January 2017 to 31st December 2020.

### 2.3 Study Site

The Outreach is a forty-four (44) bedded hospital situate in Otuoke town. Otuoke is a rural suburb in the Ogbia local government area of Bayelsa State in the Niger Delta region of Nigeria. The hospital acts mainly as a referral centre for other government-owned and private hospitals in Bayelsa East Senatorial zone which has a population of 661,100 people [19]. The hospital has an established Obstetrics and Gynaecology department which is manned by three (3) consultant Obstetrician and Gynaecologists and other doctors.

**2.4 study population**

This consisted of women who presented for antenatal booking regardless of maternal age, gestational age, and parity. Consent to participate in the study was gotten after they have been duly counselled on the nature of the study and assuring them of utmost confidentiality.

**2.5 Sample Collection**

The tip of the ring finger was disinfected with methylated spirit and then wiped dry. Using a lancet, the tip of the ring finger was punctured and the first 2 to 3 drops of blood were wiped off and the finger was gently squeezed until there were droplets of blood sufficient to fill the microcuvette which was then placed in the Hemocue machine and the result recorded.

**2.6 Laboratory Procedure**

The haemoglobin level was determined using the HemoCue Hb 801 haemoglobin photometer method.

**2.7 Inclusion Criteria and Exclusion**

Excluded from the study were; (1) patients with haemoglobinopathies (2) Patients with a known medical history of bleeding disorder and (3) multiple pregnancies, (4) hypertensive diseases of pregnancy, (5)A history of per vaginam bleeding before booking of index pregnancy, and (6) patients with renal or cardiac diseases. Included in the study were pregnant women without any of the exclusion criteria and who consented to participate in the study.

**2.8 Data Entry**

All pertinent data such as sociodemographic characteristics - age, parity, occupation, gestational age at booking were all entered into a self-designed study pro forma.

**2.9 Definition of Anaemia**

Anaemia was considered for Hb levels lower than 11 g/dL using the World Health Organization [20] level. It was further classified according to WHO criteria, into mild (Hb levels of 10.0 to 10.9g/dL), moderate (Hb levels of 7.0 to 9.9g/dL) and severe anaemia (Hb levels < 7.0g/dL). Lawson [9] defined anaemia in third world countries as a haemoglobin level of <10 g/dl in pregnancy.

**2.9 Statistical Analysis**

Statistical analysis was performed with the SPSS software (statistical package for social sciences, SPSS v 23.0, Chicago, IL). Statistical significance was determined using the chi-square test, *p*-value at 0.05 was considered significant.

**3.0 RESULTS**

Seven hundred and seventy (770) women met the inclusion criteria and were enrolled in the study.

Table 1: Sociodemographic characteristics of pregnant women participating in the study.

| **Characteristics** | **Frequency N = 770** | **Per cent (%)** |
|---|---|---|
| **Age Group** | | |
| Teenagers | 32 | 4.2 |
| 20 - 24 years | 149 | 19.4 |
| 25 - 29 years | 249 | 32.3 |
| 30 - 34 years | 198 | 25.7 |
| >35 years | 142 | 18.4 |
| **Mean Age ± SD** | **28.8 ± 5.5** | |
| **Religion** | | |

| | | |
|---|---|---|
| Christian | 758 | 98.4 |
| Muslim | 8 | 1.0 |
| Others | 4 | 0.5 |
| **Level of Education** | | |
| Primary | 39 | 5.1 |
| Secondary | 398 | 51.7 |
| Tertiary | 333 | 43.2 |
| **Marital Status** | | |
| Single | 20 | 2.6 |
| Married | 750 | 97.4 |
| **Family Type** | | |
| Monogamous | 746 | 99.5 |
| Polygamous | 4 | 0.5 |
| **Residence** | | |
| Rural | 603 | 78.3 |
| Suburban | 43 | 5.6 |
| Urban | 124 | 16.1 |

As shown in table 1, the mean age at booking is 28.8 ± 5.5. Expectedly, teenagers constituted the smallest group in the study accounting for only 4.2% of the study population whilst the highest number of participants were in the age bracket 25 to 29 years representing 32.2%. The majority of the women; had secondary education (51.7%) and in keeping with where the study was carried out, were rural dwellers (78.3%



**Table 2: Clinical and Obstetric features among pregnant women participating in the study**

| **Characteristics** | **Frequency N = 770** | **Percent (%)** |
|---|---|---|
| **Parity** **Range (0.0 – 11.0)** | | |
| 0 | 269 | 34.9 |

| | | |
|---|---|---|
| 1 | 174 | 22.6 |
| 2-4 | 268 | 34.8 |
| ≥ 5 | 59 | 7.7 |
| **Total** | **770** | **100** |
| **Trimester at booking** | | |
| 1st trimester | 131 | 17.0 |
| 2nd trimester | 434 | 56.4 |
| 3rd trimester | 205 | 26.6 |
| **Total** | **770** | **100** |
| **Mean EGA at booking (in weeks) ± SD** | **21.2 ± 8.2** | |
| **Hb (g/dl) level at booking using Lawson criteria** | | |
| Anaemia (< 9.9) | 279 | 36.2 |
| No Anaemia (≥10.0) | 491 | 63.8 |
| **Hb (g/dl) level at booking using WHO criteria** | | |
| Anaemia (< 10.9) | 539 | 70.0 |
| No Anaemia (≥11.0) | 231 | 30.0 |
| **Mean ± SD** | **10.7 ± 3.2** | |

Comment [a4]: ???

As depicted in table 2 majority of the participant were para 0 (34.9%) and multipara (34.8%) and booking were more frequently done in the second trimester representing (56.4%).

Employing the WHO criteria, 539 pregnant women were anaemic and this gives a prevalence of anaemia of 70%. However, when the criteria by Lawson is used it drops to 36.2%.

The mean haemoglobin level at booking was 10.7 ± 3.2.

**Table 3: Association between the age and the degree of anaemia at booking**

| Age group | Haemoglobin level g/dl | | | Total (%) |
|---|---|---|---|---|
| | Anaemia (<10.9) | | Normal | |
| | (7.0 – 9.9) Moderate Freq (%) | (10.0 – 10.9) Mild Freq (%) | (≥ 11.0) Normal Freq (%) | |
| 16 – 19 years | 8 (25.0) | 18 (56.3) | 6 (18.8) | **32 ( 4.2)** |
| 20 – 24 years | 18 (12.1) | 87 (58.4) | 44 (29.5) | **149 (19.4)** |
| 25 – 29 years | 21 (8.4) | 159 (63.9) | 69 (27.7) | **249 (32.3)** |
| 30 – 34 years | 16 (8.1) | 112 (56.6) | 70 (35.4) | **198 (25.7)** |
| ≥ 30 years | 19 (13.4) | 81 (57.0) | 42 (29.6) | **142 (18.4)** |
| **Total** | **82 (10.6)** | **457 (59.4)** | | |
| **Grand Total** | **539 (70.0)** | | **231 (30.0)** | **770 (100.0)** |

Pearson $\chi^2$ = 14.85; df = 8; p – 0.062

Table 3 showed that anaemia was more common in the age group of 25 to 29 years (32.3%) No patient has severe anaemia and there was no significant statistical association between age group and the severity of anaemia p – 0.062.

**Table 4: Association between trimester at booking and anaemia**

| Trimester at booking | Haemoglobin level g/dl | | | Total (%) |
|---|---|---|---|---|
| | Anaemia | | Normal | |
| | (7.0 – 9.9) Moderate Freq (%) | (10.0 – 10.9) Mild Freq (%) | (≥ 11.0) Normal Freq (%) | |
| 1st Trimester | 7 ( 5.3) | 59 (45.0) | 65 (49.6) | **131 (17.0)** |
| 2nd Trimester | 54 (12.4) | 265 (61.1) | 113 (26.0) | **434 (56.4)** |
| 3rd Trimester | 19 ( 9.3) | 133 (64.9) | 53 (25.9) | **205 (26.6)** |
| **Total** | **82 (10.6)** | **457 (59.4)** | | |
| **Grand Total** | **539 (70.0)** | | **231 (30.0)** | **770 (100.0)** |

Pearson $\chi^2$ = 31.94; df = 4; p – 0.001

Table 4 shows that the highest prevalence of anaemia occurred in the second trimester (56.4%). There is a significant statistical relationship between anaemia and the trimester the pregnant women booked for antenatal care.

Comment [a5]: Provide p-value

**Table 5: Association between parity and anaemia at booking**

| Parity | Haemoglobin level g/dl | | | Total (%) |
|---|---|---|---|---|
| | Anaemia (<10.9) | | Normal | |
| | (7.0 – 9.9) Moderate Freq (%) | (10.0 – 10.9) Mild Freq (%) | (≥ 11.0) Normal Freq (%) | |
| 0 | 30 (11.2) | 153 (56.9) | 86 (32.0) | 269 (34.9) |
| 1 | 15 ( 8.6) | 96 (55.2) | 63 (36.2) | 174 (22.6) |
| 2 – 4 | 26 (9.7) | 180 (67.2) | 62 23.1) | 268 (34.8) |
| ≥ 5 | 11 (18.6) | 28 (47.5) | 20 (33.9) | 59 (7.7) |
| **Total** | **82 (10.6)** | **457 (59.4)** | | |
| **Grand Total** | **539 (70.0)** | | **231 (30.0)** | **770 (100.0)** |

Pearson $\chi^2$ = 16.54; df = 6; p – 0.011

**Table 5** showed that anaemia was commoner in primigravidae, while moderate anaemia was more common in grand multiparas. There was also a significant statistical association between parity and anaemia at booking, p – 0.011.

**Table 6: Association between parturients' Social class and Haemoglobin level at booking**

Comment [a6]: What are the criteria for dividing the women into social class. Who are in each social class?

| Social class | Haemoglobin level g/dl | | | Total (%) |
|---|---|---|---|---|
| | Anaemia | | Normal | |
| | (7.0 – 9.9) Moderate Freq (%) | (10.0 – 10.9) Mild Freq (%) | (≥ 11.0) Normal Freq (%) | |
| 1 | 7 (10.1) | 39 (56.5) | 23 (33.3) | 69 ( 9.0) |
| 2 | 13 ( 6.5) | 120 (60.0) | 67 (33.5) | 200 (26.0) |
| 3 | 31 (10.1) | 179 (58.1) | 98 (31.8) | 308 (40.0) |
| 4 | 25 (30.5) | 100 (61.7) | 37 (22.8) | 162 (21.0) |
| 5 | 6 (19.4) | 19 (61.3) | 6 (19.4) | 31 ( 4.0) |
| **Total** | **82 (10.6)** | **457 (59.4)** | | |
| **Grand Total** | **539 (70.0)** | | **231 (30.0)** | **770 (100.0)** |

Pearson $\chi^2$ = 9.79; df = 8; p – 0.002

Anaemia in pregnancy at booking was more prevalent in patients with social class 2 (26.0%) and 3 (40.0%). Unpredictably it was least common in the patients with social class 5. On the

grading of anaemia in pregnancy at booking, it occurred more frequently as mild (61.7%) and moderate anaemia in social classes 4 (30.5%).

**Table7: Association between parturients' Residential locality and Haemoglobin level at booking**

| Residence | Haemoglobin level g/dl | | | Total (%) |
|---|---|---|---|---|
| | Anaemia | | Normal | |
| | 7.0 – 9.9 Moderate Freq (%) | 10.0 – 10.9 Mild Freq (%) | ≥ 11.0 Normal Freq (%) | |
| Rural | 65 (10.8) | 368 (61.0) | 170 (28.2) | 603 (78.3) |
| Suburban | 7 (16.3) | 21 (48.8) | 15 (34.9) | 43 ( 5.6) |
| Urban | 10 (8.1) | 68 (54.8) | 46 (37.1) | 124 (16.1) |
| **Total** | **82 (10.6)** | **457 (59.4)** | | |
| **Grand Total** | **539 (70.0)** | | **231 (30.0)** | **770 (100.0)** |

Pearson $\chi^2$ = 6.66; df = 4; p – 0.155

Anaemia in pregnancy at booking is more prevalent in rural dwellers but there is no statistically significant association between residence and anaemia

**DISCUSSION**

The anaemia in pregnancy at booking is prevalent as revealed by our study, 539 women of the total of 770 were anaemic giving a prevalence of 70%. This is even though 16.1% of the participants booked for antenatal care are from an urban area (the hospital is 24.9km from the state capital and it is motorable). Due to the services offered in the hospital a sizeable number of our obstetric population travel this journey to access obstetric services. However, using the Lawson [9] definition of anaemia in pregnancy as haemoglobin of below 10 g/dl as the cutoff, only 36.2% of participants were anaemic at booking. Lawson [9] had reported that significant adverse foetomaternal effects do not occur until Haemoglobin falls below 10g/dl. The high prevalence reflects the meagre and harsh socioeconomic reality in a typical rural setting in the Niger Delta region of Bayelsa State, Nigeria. Similar comparable prevalence have been reported by other authors [21, 22], while other authors reported lower prevalent

values [13], [23-26]. Nonye-Enyindah et al [27] reported a prevalence of 86.4% from the same geopolitical zone this study was conducted.

The high prevalence of anaemia could be attributed to the myriad of risk factors for anaemia such as short inter-pregnancy interval, high parity, poverty, low socioeconomic status, poor health-seeking behaviour and lack of education[20], [28], [29].

On the grading of anaemia in pregnancy employing the WHO criteria, the majority of the pregnant women who had anaemia in pregnancy, 457(59.4%) had mild anaemia in pregnancy while 82 (10.6%) had moderate anaemia in pregnancy. Similar findings have been reported by other researchers [11], [5]. As it had been reported by other researchers [13], [23], [30], none of the pregnant women had severe anaemia in our study.

Mild anaemia was more prevalent in primigravida compared to other parities. However moderate anaemia was a more frequent occurrence in grand multipara.

As was similarly reported by Onoh et al [31] and Olatunbosun et al [32], anaemia was commonest in the age group 25 to 29 years and they constitute the highest number of participants in the study according to age. Within this age group, the proportion of pregnant women with anaemia was 32.3%. This finding is inconsistent with the reports by other authors, Paul et al [33] reported that the highest prevalence of anaemia in pregnant women was within the age bracket of 34 to 39 years. This study did not establish any statistically significant relationship between age and anaemia at booking in pregnant women.

Anaemia in pregnancy was more common in the second trimester accounting for 56.4% of cases across the trimesters. This might not be unconnected with the further haemodilution that occurs and reaches its peak in the second trimester because the majority of the participants in the study booked for antenatal care in the second trimester. This finding aligns with the report by Idowu et al [22] but is at variance with the report of WHO [20]. The

organization asserted that anaemia is considerably higher in the 3rd trimester of pregnancy than in the first two trimesters.

The highest prevalence of anaemia in pregnancy at booking was seen in primigravida (34.9%) and a similar finding was reported by Idowu et al [22] and Lelissa et al [30]. This was followed by multipara (para 1-4) [34.8%] and grand multipara was the least at 7.7% (table 5). Though there was a statistically significant relationship between parity and anaemia at booking, our data did not establish any defined pattern between parity and anaemia in pregnancy at booking. This is at variance with the report by Adewara et al [11] which established the correlation that the higher the parity, the higher the rate of anaemia in pregnancy at booking.

More than 50% of all pregnant women irrespective of the social class had mild anaemia using the WHO criteria. Anaemia in pregnancy at booking is more prevalent among women with social class 3 (40.0%), this is followed by social class 2 (26.0%). Surprisingly it was least prevalent in women in social 5 (4.0%). This is at variance with the finding by Onoh et al [31] and Bukar et al [34] who reported that it was more common in women in social class 4 and 5, while Onwuhafua et al [35] reported that it was more prevalent in social class 1 and 2. However, when the grading of anaemia is considered, mild and moderate anaemia was more prevalent in pregnant women in social classes 4 and 5. In this class of pregnant women, they tend to be more ignorant, poor, and illiterate, reside more in the rural areas and have poor seeking behaviour.

Expectedly anaemia in pregnancy at booking is more prevalent in rural dwellers than their counterparts in suburban and in urban areas. This was similarly reported by Iyanam et al[36] Rural dwellers more frequently had mild anaemia while suburban women had more of moderate anaemia.

## CONCLUSION

The prevalence of anaemia in pregnancy at booking in a rural setting like Otuoke situate in the Niger Delta region of Nigeria is high. The foetomaternal implications of this across the trimesters and the puerperium are far-reaching if not properly managed. It is a reflection of the non-existence of preconception care in our locality. This study has shown that the majority of the pregnant women booked for ante-natal care in the second trimester and the prevalence of anaemia is more in the second trimester and in pregnant women who are para 3. Mild anaemia was more prevalent in primigravidae while moderate anaemia was a more frequent occurrence in grand multiparas.

To curb this high prevalence, advocacy and proactive interventions which includes the utilization of contraception, preconception counselling, prompt diagnosis and treatment of febrile illness, regular deworming exercise and education of the girl child should be promoted

## CONSENT

Written informed consent was obtained from the pregnant women before recruitment into the study.

## ETHICAL APPROVAL

The authors herein affirm that this study was approved by the ethics committee of the hospital. (Approval no. FMCY/REC/ECC/2016/DEC/121). It was thus performed in accord with the ethical standards as set in the 1964 Declaration of Helsink

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