Socio-demographic and obstetric factors associated with anaemia among pregnant women in Sokoto, North Western Nigeria

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Citation

Abstract
Anaemia is a problem of global public health importance. This case control study investigated the prevalence and socio-economic factors associated with anaemia in UDUTH Sokoto, Nigeria. A total of 403 women attending ANC in Sokoto, Nigeria constituted the subjects. Controls included 200 aged-matched and non-pregnant women. Haematocrit and the haemoglobin concentration was determined using the Swelab haematology analyzer. Subjects were aged 18-44 years with mean age of 32.32 ± 10.60. The mean haematocrit and haemoglobin levels were significantly lower among pregnant subjects (29.63 ± 3.4 and 9.7 ± 1.1) compared to non-pregnant controls (38.33 ± 5.4 and 12.75 ± 1.8) (p=0.001). Out of the 403 women, 228 (55.6%) were anaemic while 175 (43.4%) were non-anaemic. Anaemia was significantly lower among highly educated (p=0.034) and marginally higher among less-remunerated subjects (p=0.678). Anaemia was significantly higher among pregnant women in polygamous relationships (p=0.01) and among multigravidae women (p=0.04). This study indicates a high prevalence of anaemia among pregnant women in Sokoto, Nigeria. We advocate that routine haemoglobin be included in antenatal care protocol of pregnant women, that targeted iron supplementation, antihelminthic therapy, use of insecticide-treated bed nets (ITNs) and intermittent preventive treatment (IPTp) be implemented.

1. Introduction
Anaemia is a problem of global concern, a menace to social and economic development. It affects more than 56 million persons globally, two thirds of them from developing countries [1]. In 1993, the World Bank ranked anaemia as the eighth leading cause of disease in girls and women in developing countries [2]. Results of a study on maternal morbidity and mortality in sub-Saharan Africa showed that anaemia continues to be a major causative factor of maternal mortality. Each year more than 500,000 women die from pregnancy-related causes, 99% of these in developing countries [3].
According to a World Health Organization (WHO) review of nationally representative surveys from 1993 to 2005, 42% of pregnant women have anaemia worldwide and almost 90% of them reside in Africa or Asia [4]. Anaemia is a significant challenge associated with pregnancy particularly in developing countries [5-6]. Estimates of maternal mortality resulting from anaemia range from 34/100,000 live births in Nigeria to as high as 194/100,000 in Pakistan [7].

There is paucity of information on the prevalence of anaemia among pregnant women in Sokoto, North Western Nigeria. It is not known to what extent socioeconomic factors complicates the incidence of anaemia in the area. The aim of this present study was to investigate the prevalence and the associated socioeconomic factors associated with anaemia among pregnant women in Sokoto, North Western, and Nigeria.

1.1. Justification of Research

Anaemia is a global health problem and it contributes to its morbidity and mortality among women and children. Anaemia predisposes women in Africa to blood transfusion. Many patients, particularly in SSA, do not have access to safe and adequate supply of blood when they need it. Anaemia remains one of the world’s greatest challenge among women and children and it constitutes a substantial obstacle to social and economic development among women. This study intend to investigate the prevalence, the sociodemographic, economic and obstetric factors associated with anaemia among pregnant women. Evidenced based data gatherer can be use to potentially optimize the antenatal care offered to pregnant women in the area.

1.2. Background of the Study

This present study was a prospective observational case-control study aimed at investigating the prevalence and associated sociodemographic and economic variables associated with anaemia among pregnant women attending antenatal care in Usmanu Danfodiyo University Sokoto, North Western Nigeria. Anaemia indices of haematocrit and haemoglobin levels was determined. Socio-demographic, economic and obstetrics variables was collected from each subject. The prevalence of anaemia was compared based on the socio-demographic, economic and obstetrics variables.

1.3. Study Area

The study area is Usmanu Danfodiyo Teaching Hospital Sokoto (UDUTH) established in the year 1975 in Sokoto metropolis. It is committed to the provision of a continually improving quality tertiary health care services to the entire North Western region and our neighboring border country - Niger Republic. The metropolitan city of Sokoto lies between longitude 11° 30” to 13° 50” east and latitude 4° to 6° north and covers an area of 28,232.37sq kilometer. It is bordered in the North by Niger Republic, in the East by Zamfara state and Kebbi state to the South and West. Sokoto is one of the hottest cities in the world with an annual average temperature of 28.3C. The warmest months are February to April (temperatures exceed 45°C) while the rainy season lasts from June to October and harmattan season starts from late October to February. There are two main seasons in Sokoto, the wet (October to April) and dry (May to September). The main occupation of the people is grain production and animal husbandry. More than 80 percent of its indigenes practice agriculture. Crops produced include millet, beans, onions, tomatoes, rice, maize, guinea corn, wheat and cotton. Other occupations commonly practiced are dying, blacksmithing, weaving, carving, trading and cobbaging. Sokoto ranks second in livestock production in Nigeria. Sokoto state has a population of 3.6million [8], made up of Hausa and Fulani majority and a minority of Zabarmawa and Tuareg. The major language in this state is Hausa and Fulfulde among the Fulani. They have two major festivals Eid – el – fitri and Eid-el-Kabir. Socio cultural characteristics is homogenous as majority of its indigenes are Muslims, therefore the Muslim religion provides them the code of conduct and behavioral characteristics. Common practices include child marriage, polygamy, consanguinity, multiple births and male gender dominance.

2. Materials and Methods

This study involved four hundred and three pregnant women attending Antenatal Clinic (ANC) in Usmanu Danfodiyo University Teaching Hospital Sokoto. Qualitative data was collected using questionnaire. Three milliliters (3ml) of blood was collected under aseptic conditions from each of the study participants and dispensed into EDTA anticoagulated blood tubes. The sample collected was thoroughly mixed by inverting 5 – 6 times to enable adequate mixing of the blood and the anticoagulant. Each sample was then tested for haematocrit (HCT) and Haemoglobin (HB) concentration using the SWELAB 3 part-differential haematology analyzer (Medonic of Sweden). The manufacturer’s standard operating procedures were strictly followed in all laboratory analysis.

2.1. Statistical Analysis

Data will be analyzed using SPSS statistical software version 17.0. Data were expressed as percentages and means. The proportion of women with anaemia was compared against socio-demographic, economic and obstetrics variables using chi square statistical test. Multivariate logistic regressions were employed for variables associated with anaemia. A p-value of ≤ 0.05 was considered significant in all statistical analysis.

2.2. Inclusion Criteria

All apparently healthy pregnant women attending antenatal clinic in Usmanu Danfodiyo University Teaching Hospital (UDUTH) who consented to being subjects in this
study after counselling, across the different trimesters were consecutively recruited into this study.

2.3. Exclusion Criteria

Non-pregnant women, pregnant women who refused to give a verbal informed consent, pregnant women on haematinics and long-term medication as well as pregnant women with a known history of diseases such as pregnancy induced hypertension (PIH), pre-eclampsia and bleeding disorders were excluded from this study.

2.4. Ethical Consideration

Ethical approval was obtained from the ethical committee in Usmanu Danfodiyo University Teaching Hospital (UDUTH) Sokoto, Nigeria. Verbal informed consent was obtained from the subjects.

3. Results

A total of 403 pregnant women aged 18-44 years with mean age of 32.32 ± 10.60 constituted the subjects in this case-control study while 200 non-pregnant women served as the control. Their mean haematocrits and haemoglobin levels were significantly lower among pregnant subjects (29.63 ± 3.4 and 9.7 ± 1.1) compared to non-pregnant controls (38.33 ± 5.4 and 12.75 ± 1.8) (p=0.001). Table 1 shows the mean PCV and HB of subjects and control participants. Out of the 403 women, 228 (55.6%) had haemoglobin levels less than 10g/dl and therefore were classified as anaemic while 175 (43.4%) were non-anaemic. Table 2 shows the prevalence of anaemia among the pregnant subjects. The prevalence of anaemia although marginally higher among pregnant subjects in the 15-19 years age group, there were no statistically significant age-related differences (p=0.155). The prevalence of anaemia was significantly lower among highly educated subjects compared to less educated subjects (p=0.034). Although the prevalence of anaemia was marginally higher among less-remunerated subjects, this difference was not statistically significant (p=0.678). The prevalence of anaemia was significantly higher among pregnant women in polygamous compared to monogamous relationships (p=0.01). There was no significant difference in the prevalence of anaemia based on religious affiliation of subjects (p=0.836). Table 3 shows the prevalence of anaemia based on socio-demographic characteristics of subjects. Anaemia was marginally more prevalent among subjects who got married at < 18 years of age compared to those that married at >18 years. This difference however was not statistically significant (p=0.464). Anaemia was more prevalent among multigravidae compared to primigravidae (p=0.04) as well as among pregnant subjects with > 24 months inter pregnancy intervals compared to those less than 24 months (p=0.05). Although not statistically significant, the prevalence of anaemia was higher among grand multiparous women compared to multiparous woman and primiparous subjects (p=0.157). Table 4 shows the prevalence of anaemia based on the obstetric history of the subjects.

### Table 1. Mean PCV and HB levels of pregnant subjects and non-pregnant controls

<table>
<thead>
<tr>
<th>Variables</th>
<th>Study Groups</th>
<th>Mean (SD) pregnant subjects</th>
<th>Mean (SD) non-pregnant</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packed Cell Volume (PCV) %</td>
<td>29.63 (3.4)</td>
<td>9.7 (1.1)</td>
<td>0.001*</td>
<td></td>
</tr>
<tr>
<td>Haemoglobin (HB) g/dl</td>
<td>38.33 (5.4)</td>
<td>12.75 (1.8)</td>
<td>0.001*</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2. Prevalence of anaemia among pregnant subjects

<table>
<thead>
<tr>
<th>Pregnant subjects (N=403)</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemic (HB &lt;10g/dl)</td>
<td>228 (56.6)</td>
</tr>
<tr>
<td>Non-anaemic ≥ 10g/dl</td>
<td>175 (43.4)</td>
</tr>
</tbody>
</table>

### Table 3. Prevalence of anaemia based on socio-demographic characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N (%)</th>
<th>Anaemic N (%)</th>
<th>Non-Anaemic N (%)</th>
<th>Mean (SD) HB</th>
<th>Mean (SD) PCV</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>17 (4.2)</td>
<td>6 (35.3)</td>
<td>11 (64.7)</td>
<td>10.2 (0.8)</td>
<td>30.7 (2.1)</td>
<td>0.155</td>
</tr>
<tr>
<td>20-24</td>
<td>120 (29.9)</td>
<td>66 (55.0)</td>
<td>54 (45.0)</td>
<td>9.7 (1.3)</td>
<td>29.3 (3.5)</td>
<td></td>
</tr>
<tr>
<td>25-29</td>
<td>162 (40.4)</td>
<td>89 (54.9)</td>
<td>73 (45.1)</td>
<td>9.9 (1.3)</td>
<td>30.0 (3.6)</td>
<td></td>
</tr>
<tr>
<td>30-34</td>
<td>74 (18.4)</td>
<td>45 (60.8)</td>
<td>29 (39.2)</td>
<td>9.7 (0.9)</td>
<td>29.4 (2.6)</td>
<td></td>
</tr>
<tr>
<td>35-39</td>
<td>24 (6.0)</td>
<td>18 (75.0)</td>
<td>6 (25.0)</td>
<td>9.5 (1.4)</td>
<td>28.9 (4.1)</td>
<td></td>
</tr>
<tr>
<td>40-44</td>
<td>6 (1.5)</td>
<td>4 (66.7)</td>
<td>2 (33.3)</td>
<td>9.6 (0.1)</td>
<td>29.0 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>33 (8.2)</td>
<td>12 (36.4)</td>
<td>21 (63.6)</td>
<td>10.0 (1.2)</td>
<td>30.4 (3.2)</td>
<td>0.034*</td>
</tr>
<tr>
<td>Secondary</td>
<td>133 (33.0)</td>
<td>79 (59.4)</td>
<td>54 (40.6)</td>
<td>9.8 (1.2)</td>
<td>29.7 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>140 (35.0)</td>
<td>68 (48.6)</td>
<td>72 (51.4)</td>
<td>9.5 (1.5)</td>
<td>28.9 (4.5)</td>
<td></td>
</tr>
<tr>
<td>Non-formal</td>
<td>97 (24.0)</td>
<td>60 (61.9)</td>
<td>37 (38.1)</td>
<td>9.4 (1.2)</td>
<td>28.5 (4.5)</td>
<td></td>
</tr>
<tr>
<td>Family income (Naira)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&lt; 10,000</td>
<td>66 (17.0)</td>
<td>34 (51.5)</td>
<td>32 (48.5)</td>
<td>9.9 (1.3)</td>
<td>29.8 (3.7)</td>
<td>0.678</td>
</tr>
</tbody>
</table>
The possible reason for the higher prevalence obtained in this study, is that unlike most of these studies which used the WHO laid down HB cutoff value of 11.0g/dl as an index of anemia, our study used a haemoglobin cutoff value of 10g/dl and haematocrit levels of 30%. Haemoglobin cutoff of 11.0g/dl derived from the West continues to be used erroneously as diagnostic for anemia among Africans. A previous report suggest that it may be appropriate to have a separate criteria for all blacks to accommodate the subset with lower hemoglobin. Evaluation of the screening performance of haemoglobin found that race-specific anaemia criteria of 10 g/l yielded a comparable sensitivity with lower hemoglobin. Evaluation of the screening performances for the two races. This functional evaluation supports the consideration of a race-specific lower parity. Our finding is consistent with previous reports among grand multiparous women compared to women of 56.6% of the women among the pregnant women studied. The prevalence of anemia observed in this study (56.6%) is consistent with a previous report which indicated that the anemia is a significant challenge among pregnant women [9]. Our observed prevalence is however lower than the 70% reported in Lagos [10], 67.4% in Enugu [11], 76.5% in Ibadan [12], 59.6% in Calabar [2], 62.2% in Ilé-Ife [13], 66.0% in Burkina Faso [14], 53.9% in Southwestern Ethiopia [15].

Our observed prevalence is higher than the 30.4% prevalence in Ethiopia [16], 15.3% in Trinidad and Tobago [17], 38.8% in Port-Novo Cape Verde [18], 27.4% in Thailand [19], 42.2% in Oman [20], 40.8% in West Algeria [21], 30% and 51.8% observed in Gombe State [22-23] respectively, 40.4% in Enugu [24], 30% in Ibadan [25], 17% in Kano [26], 50% in Brazil [27] and 46.2% in Benin City [28]. The possible reason for the higher prevalence obtained in North Western Nigeria.

### Table 4. Prevalence of anemia based on the obstetric history of the subjects

<table>
<thead>
<tr>
<th>Variable</th>
<th>N (%)</th>
<th>Anaemic N (%)</th>
<th>Non-Anaemic N (%)</th>
<th>Mean (SD) HB</th>
<th>Mean (SD) PCV</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trimester of pregnancy</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>55</td>
<td>19 (34.6)</td>
<td>36 (65.4%)</td>
<td>10.4 (1.4)</td>
<td>30.7 (3.8)</td>
<td>0.01*</td>
</tr>
<tr>
<td>Second</td>
<td>228</td>
<td>158 (69.3)</td>
<td>70 (30.7)</td>
<td>9.5 (0.7)</td>
<td>29.0 (3.1)</td>
<td></td>
</tr>
<tr>
<td>Third</td>
<td>120</td>
<td>51 (42.5)</td>
<td>69 (57.5)</td>
<td>9.9 (1.3)</td>
<td>30.3 (3.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>0</td>
<td>96</td>
<td>46 (47.9)</td>
<td>50 (52.1)</td>
<td>10.0 (1.1)</td>
<td>30.2 (2.7)</td>
<td>0.157</td>
</tr>
<tr>
<td>1-5</td>
<td>283</td>
<td>167 (59.0)</td>
<td>116 (41.0)</td>
<td>9.9 (1.3)</td>
<td>30.1 (3.3)</td>
<td></td>
</tr>
<tr>
<td>≥ 6</td>
<td>24</td>
<td>15 (62.5)</td>
<td>9 (37.5)</td>
<td>9.5 (0.7)</td>
<td>29.9 (3.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Gravidity status</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multigravidae</td>
<td>215</td>
<td>132 (61.4)</td>
<td>83 (38.6)</td>
<td>8.9 (1.5)</td>
<td>28.9 (1.4)</td>
<td>0.04*</td>
</tr>
<tr>
<td>Primigravidae</td>
<td>188</td>
<td>96 (51.1)</td>
<td>92 (48.9)</td>
<td>10.1 (3.3)</td>
<td>31.2 (3.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Inter pregnancy interval (Months)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 12</td>
<td>140</td>
<td>82 (58.6)</td>
<td>58 (41.4)</td>
<td>9.3(1.30)</td>
<td>27.9(3.5)</td>
<td>0.05*</td>
</tr>
<tr>
<td>12-24</td>
<td>214</td>
<td>158 (73.8)</td>
<td>56 (26.2)</td>
<td>9.8(1.1)</td>
<td>28.9(3.5)</td>
<td></td>
</tr>
<tr>
<td>≥ 24</td>
<td>49</td>
<td>14 (28.6)</td>
<td>35 (71.4)</td>
<td>9.9(1.4)</td>
<td>29.9(4.2)</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Discussion

Each year more than 500,000 women die from pregnancy-related causes, 99% of these in developing countries. The assessment of haemoglobin and haematocrit levels as an index to anaemia during pregnancy in vital in evaluating the risk of anaemia, affording the obstetrician the opportunity for proper intervention at first booking [8] (SOGON, 2004). In this present study, we obtained a prevalence of anaemia of 56.6% of the women among the pregnant women studied. The prevalence of anemia observed in this study (56.6%) is consistent with a previous report which indicated that the anemia is a significant challenge among pregnant women [9]. Our observed prevalence is however lower than the 70% reported in Lagos [10], 67.4% in Enugu [11], 76.5% in Ibadan [12], 59.6% in Calabar [2], 62.2% in Ilé-Ife [13], 66.0% in Burkina Faso [14], 53.9% in Southwestern Ethiopia [15]. Our observed prevalence is higher than the 30.4% prevalence in Ethiopia [16], 15.3% in Trinidad and Tobago [17], 38.8% in Port-Novo Cape Verde [18], 27.4% in Thailand [19], 42.2% in Oman [20], 40.8% in West Algeria [21], 30% and 51.8% observed in Gombe State [22-23] respectively, 40.4% in Enugu [24], 30% in Ibadan [25], 17% in Kano [26], 50% in Brazil [27] and 46.2% in Benin City [28]. The possible reason for the higher prevalence obtained in this study, is that unlike most of these studies which used the WHO laid down HB cutoff value of 11.0g/dl as an index of anemia, our study used a haemoglobin cutoff value of 10g/dl and haematocrit levels of 30%. Haemoglobin cutoff of 11.0g/dl derived from the West continues to be used erroneously as diagnostic for anemia among Africans. A previous report suggest that it may be appropriate to have a separate criteria for all blacks to accommodate the subset with lower hemoglobin. Evaluation of the screening performance of haemoglobin found that race-specific anemia criteria of 10 g/l yielded a comparable sensitivity and specificity in detecting anemia for both races. In contrast, a fixed anemia criterion did not yield comparable screening performances for the two races. This functional evaluation supports the consideration of a race-specific anemia criteria for screening for anemia [29-30]. The etiology of anemia is multi-factorial and includes; iron deficiency, other micronutrient deficiency, excessive blood loss, haemoglobinopathies, malaria, other parasitic infections (hookworm and schistosomiasis infestation), HIV-infection, malnutrition, multiparity, inadequate child spacing and low socioeconomic status [5, 17, 22, 28].

In this study we observed a higher prevalence of anemia among grand multiparous women compared to women of lower parity. Our finding is consistent with previous reports...
which indicates that the grand multiparae are a high risk obstetric patients and that improving the socio-economic standard of women and increased awareness in the importance of family planning will reduce the incidence and complications of grandmultiparity [13, 31, 32]. Our finding is also consistent with previous report by Uche - Nwaichi and colleagues in Trinidad [17], Dim coworkers in Enugu [24] but at variance with previous reports by Yahaya and colleagues [20] and Zahira [33].

Anaemia in pregnancy is a serious condition contributing to maternal mortality, morbidity and foetal morbidity. Socio-demographic factors contributing to prevalence of anaemia among pregnant subjects. In this study, we observed that women with well-spaced pregnancies were less prone to anaemia. Our finding is consistent with previous report among a cohort of pregnant women in urban and rural Oyo State, Nigeria which indicated that mothers with birth intervals 24 -35 months had a lower risk for anaemia [34]. Similarly, Nwizu and colleagues [26] in Kano, Nigeria and Zahira in Pakistan [33] observed that the prevalence of anaemia was higher in women who had short intervals between pregnancies. Short inter-pregnancy intervals (IPIs) have been associated with adverse maternal and infant health outcomes [35]. However, a recent study of micronutrient status of pregnant women indicated no significant relationship between inter-pregnancy interval and maternal serum zinc, copper, magnesium, ferritin, folate or thyroid-stimulating hormone [36]. However, our finding is at variance with previous report [17] which indicated that inter pregnancy interval have no statistical relationship with low haematocrit and haemoglobin levels during pregnancy.

We observed a higher prevalence of anaemia among less educated, less remunerated pregnant and amongst women in polygamous relationships. Several factors contribute either alone or jointly to the high rates of maternal anaemia in the West African sub region. These include widespread nutritional deficiencies; high incidence of infectious diseases; low access to and poor quality of health services; low literacy rates; ineffective design, implementation and evaluation of anaemia control programmes; and poverty [9,23]. Previous reports [33, 37] indicates that a significant relationship exist between low socio-economic status and anaemia among pregnant women. Highly educated people have a greater access to finance and they are more likely to live a high quality life than less educated and poorly remunerated women. A previous report among pregnant women in Thailand indicates that educational status were associated with anemia during pregnancy [38]. Highly educated women have greater access to information and are more likely to make more evidenced -based and informed decisions concerning their nutrition, health and well-being [38-42]. Previous report indicated that there was a high prevalence of micronutrient deficiencies (folic acid, zinc, iron, copper, and magnesium) amongst pregnant women of low socioeconomic status possibly due to the poor dietary intake of food and low frequency of consumption of food groups rich in micronutrients [43]. There is increasing advocacy for the administration of iron supplements not only during the antenatal period but also after birth and even after a miscarriage to fulfill the need for depleted iron among women [44]. Polygamy is prevalent in sub Saharan Africa. It represents an expanded family structures that are based on marriages involving a husband with 2 or more wives. Polygamy is associated with a number of social ills. Women in polygamous relationships are prone to less care, less empowered, are often victims of domestic violence and abuse. Polygamous men are less likely to invest time and resources in care and support for their pregnant wives [45-47].

We observed a higher prevalence of anaemia among women in the second trimester of pregnancy. During pregnancy, the maternal plasma volume expands 45% on average to provide for the greater circulatory needs of the maternal organs. The peak of anaemia in 2nd trimester coincides with the period in pregnancy when haemodilution is at its zenith [48]. Pregnancy produces increases in plasma volume resulting in decline in the haemoglobin concentration. This finding is consistent with previous reports [17, 23, 49]. However, this result is at variance with the report of WHO in which anaemia is said to be significantly higher in the 3rd trimester of pregnancy than the first two trimesters [50] and other studies [51-52] (Akingbola et al., 2006; Dapper et al., 2006;Lama et al., 2011) which showed that the prevalence of anaemia increases as pregnancy progressed.

Although not statistically significant, the prevalence of anaemia was higher among pregnant women in the 15-19 age group compared to older women. Also, the prevalence of anaemia was higher among women who got married at < 18 years compared to those who got married at > 18 years. Our finding is consistent with previous report which indicated that age of the pregnant women plays a significant role in the prevalence of anaemia [20, 33, 53]. Our finding is however at variance with previous reports [17, 24] which indicated that parity has no statistically significant relationship with the incidence of anaemia during pregnancy. Adolescent pregnancy is an increasing challenge in Nigeria and most developing countries [54-55]. Early child bearing is not only a health problem for mother and child but is also associated with serious socio-economic and demographic implications [56]. Teenage pregnancies put mothers’ particularly in developing countries at high-risks for many health-related complications and predisposes newborn infants to poor birth-outcomes [57]. Previous report indicates that ante-partum complications (anaemia, mal-presentations, ante-partum haemorrhage, prolonged labour, preterm delivery, intra-uterine growth restriction, premature rupture of foetal membranes, past dates, premature rupture of membranes (PROM), episiotomy, low birth weight and caesarean deliveries were commoner in the teenage group [58-59].

5. Conclusion and Recommendations

This study indicates that there is a high prevalence of anaemia among pregnant women in Sokoto, North Western, Nigeria particularly in the second trimester, among younger,
grand multiparous, low socioeconomic class and in women with shorter inter pregnancy interval. We advocate for targeted iron supplementation for pregnant women in the area to potentially improve the iron status and reduce the incidence of anaemia. Laboratory measures of routine haemoglobin and haematocrit should be included in antenatal care protocol of pregnant women during antenatal visits to facilitate the commitment of the World Health Organization (WHO) to reducing the maternal mortality by three-quarter between 1990 and 2015 by early detection diagnosis, treatment and the monitoring of pregnant women with anaemia. We recommend the implementation of WHO recommendation that antihelminthic therapy be provided for pregnant women in the third trimester of pregnancy to control hookworm infection particularly in areas in which the prevalence of infection is >20–30% and anaemia is prevalent. There is also the need for the promotion of insecticide-treated bed nets (ITNs) and intermittent preventive treatment (IPTp) to protect pregnant women in the area from malaria. We recommend that interventions such as mass media campaigns peer /outreach education and life skill programmes be introduced to educate women on the advantages of early ANC booking and compliance with the use of prescribed medications.

Author’s Contribution and Conflict of Interest

Isaac IZ designed the study, Erhabor O, Ukatu S and Isaac IZ did the laboratory testing and reporting, John RT and Ahmed Y did the recruitment and counselling of study participants, Isah BA did all the statistical analysis. All authors contributed to the writing, editing and approval of the manuscript. The authors declare that there are no conflict of interest associated with this study.

Key Points Summary

- In pregnant women the mean hematocrits and haemoglobin levels were significantly lower compared to non-pregnant controls and the prevalence of anaemia is higher among pregnant women compared to non-pregnant women.
- The prevalence of anaemia is marginally higher among younger pregnant subjects (15-19 years).
- The prevalence of anaemia was significantly lower among highly educated subjects compared to less educated subjects.
- The prevalence of anaemia was significantly higher among pregnant women in polygamous compared to monogamous relationships and among subjects who got married at a younger age (< 18 years).
- Anaemia was more prevalent among multigravidae compared to primigravidae.
- Inter-pregnancy interval play a significant role in the prevalence of anaemia among pregnant women.

Abbreviations

ANC, antenatal clinic; ITNs, insecticide-treated bed nets; IPTp, intermittent preventive treatment, UDUTH, Usman Danfodiyo University Teaching Hospital.

References


