Sociodemographic factors in anaemia in pregnancy in south-western Nigeria

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Abstract

Background: Anaemia in pregnancy persists, especially in third world countries where poor diet, low levels of literacy, infections, infestations and cultural practices predispose pregnant women to being anaemic. The aim of this study was to determine the prevalence of anaemia in pregnancy and to identify the possible associations between socio-economic status and anaemia in pregnancy among antenatal care seekers at Baptist Medical Centre, Ogbomoso, Oyo State, Nigeria.

Method: A total of 350 pregnant women were recruited at booking from the antenatal clinic of the hospital. A standardised questionnaire was administered to collect sociodemographic data. The subjects were stratified into upper, middle and lower socio-economic groups according to a scoring system designed by Olusanya et al. for Nigeria and other African countries. Anaemia is defined as a haemoglobin level of less than 11 g/dl by the World Health Organization.

Results: The prevalence of anaemia in pregnancy was 58.0% in the study population. Anaemia prevalence was significantly higher among the subjects in the middle and lower socio-economic classes: 78.3% and 80.3% respectively (P < 0.05). The majority of the severely anaemic subjects (80.0%) were from the lower social class.

Conclusion: The prevalence of anaemia in pregnancy was found to be high in this population. Low socio-economic status is significantly associated with increased prevalence and severity of anaemia. It is recommended that the socio-economic situation of women be improved. This no doubt will help to reduce anaemia in pregnancy.

Introduction

Anaemia in pregnancy is thought to be one of the most common problems affecting pregnant women in developing countries.[1,2] Data collected from all over the world indicate that a total of 2.17 billion people (men, women and children) are anaemic by World Health Organization (WHO) criteria.[1] The most affected groups, in descending order, are pregnant women, the elderly, school children and adult men.[1,2]

Anaemia in pregnancy is a condition in which there is a reduction in the amount of circulating haemoglobin in pregnant women. Anaemia is defined by the WHO as a haemoglobin level of less than 11 g/dl or a packed cell volume of less than 33%.[1,2] Anaemia is the most common medical disorder in pregnancy and has a varied incidence, aetiology and degree of severity in different populations.[3-5] The reported principal causes of anaemia in pregnancy in sub-Saharan Africa include iron and folate deficiencies, malaria, parasitic infections and, more recently, infection with the human immunodeficiency virus (HIV).[2]

Anaemia in pregnancy is a major risk factor for poor pregnancy outcome. It is estimated that anaemia may be responsible for as much as 20% of all maternal deaths in sub-Saharan Africa. In addition, severe maternal anaemia may impair oxygen delivery to the fetus and interfere with normal intrauterine growth, resulting in intrauterine growth retardation, stillbirths, low birth weights and neonatal deaths.[6]

It is a well-known fact that socio-economic status and demographic factors such as age and level of formal education do have an impact on many medical conditions. Women in the lower socio-economic groups, owing to financial constraints or lack of education, cannot afford or do not have access to good health services and are therefore more likely to suffer from the deleterious effects of poor nutrition, malaria, HIV, chronic infections and worm infestations.[3]

The burden of anaemia is borne mainly by developing countries, where it is estimated that 56–61% of all women

are anaemic by the WHO criteria, compared to 18% in industrialised countries.[7] Studies have shown disparity in the prevalence of anaemia in different areas of Nigeria.[3,7,8] In a large country such as Nigeria, demographic, socio-economic and cultural factors differ in various parts to such an extent as to affect the prevalence, the severity and even the type of anaemia that might occur in pregnancy in these areas.

The identification of the sociodemographic factors that predispose pregnant women to anaemia will help to provide more complete and up-to-date information that is needed in the identification of the "at-risk" group. This would enable targeted prevention and intervention to reduce anaemia and the mortality and morbidity associated with anaemia.[7] Knowing the prevalence and severity of anaemia in pregnancy in the different communities will enable the judicious distribution and utilisation of the limited available medical resources needed to prevent anaemia in pregnancy.

Despite the measures having been taken to control anaemia in pregnancy in the last two decades, the problem of anaemia remains unresolved.[7] Hence, there is a need for rekindled interest in and continuous research on anaemia in pregnancy so as to know what progress has been made so far, and to seek more efficient ways of dealing with this persistent problem. The aim of this study, therefore, was to determine the prevalence and severity of anaemia in pregnancy and also to determine the possible association between socio-economic status and anaemia in pregnancy at booking in the antenatal care clinic of the Baptist Medical Centre, Ogbomoso, Nigeria.

Method

Ethical approval was obtained from the Committee on Ethics of Human Experimentation of the hospital. Informed consent was obtained from the participants before commencement of the study, which was carried out between July and October 2009.

The subjects were recruited at booking from the antenatal care clinic of the Baptist Medical Centre, Ogbomoso, Nigeria. Ogbomoso town is located about 100 kilometres north of Ibadan, the capital of Oyo State, in the south-western part of Nigeria. The indigenous people are from the Yoruba ethnic group. The majority of them are farmers or traders and a few are civil servants.

The hospital serves as a primary, a secondary and, recently, a tertiary care facility for a rural and semi-urban population. It is a referral centre for the state government's general hospital, 14 primary health centres and an increasing number of private hospitals within the region. Around 90 patients attends the antenatal care clinic per week, and about 25 of them are for antenatal booking.

Consecutive apparently healthy asymptomatic pregnant women visiting the antenatal clinic for the first time for booking, who consented to participate, were recruited for the study. The subjects were interviewed using a structured pre-tested questionnaire. Data on demographic variables such as age, marital status, educational status, occupation, religion, ethnicity and family type were obtained. Obstetric history, such as parity, gestational age and time interval between pregnancies, was also sought.

The following groups were excluded from the study: pregnant women not presenting for booking, women who failed to give consent, women who presented for the first time in labour, women with a history of bleeding in the index pregnancy, women with haemoglobinopathy, e.g. sickle-cell disease (HbSS and HbSC), women with a history of peptic ulcer disease and women with chronic illnesses such as HIV/acute immunodeficiency syndrome (AIDS).

Allocation into one of the five social classes was based on the women's husbands' occupation, employment and monthly income and the women's educational level according to a scoring system designed by Olusanya et al.[9] for Nigeria and other African countries as shown in Table I. Social classes 1 and 2 represent the upper class, social class 3 represents the middle class, while social classes 4 and 5 constitute the lower class on the socioeconomic ladder.[9]

Anaemia was defined as a haemoglobin level less than 11 g/dl according to the WHO criteria. This was to ensure conformity with other international studies.[10] Haemoglobin levels were determined in the hospital laboratory. A total of 2 ml of blood was taken from each subject by venepuncture of an antecubital vein or dorsal vein. The blood was put into a dipotassium EDTA specimen bottle for determination of haemoglobin using the cyanmethaemoglobin method, and the analysis was carried out by a laboratory scientist.[4,6,11,12] The haemoglobin values obtained were also used to categorise the degree of anaemia into three groups, according to the WHO definition of anaemia: group 1, Hb 9.0–10.9 g/dl = mild anaemia; group 2, Hb 7.0–8.9 g/dl = moderate anaemia; and group 3, Hb less than 7.0 g/dl = severe anaemia.[4,6,11]

The number of previous pregnancy carried beyond 28 weeks gestation irrespective of the outcome of such pregnancy was used to determine parity. The women who have never carried a pregnancy beyond 28 weeks gestation were said to be nulliparous. Women who have carried one pregnancy past the gestational age of 28 weeks were said to be primiparous. Women who have carried two to four

Table I: Scoring system for allocation into social classes[9]

Husband's occupation	
Score	
1	Professionals, top civil servants, politicians and business people
2	Middle-level bureaucrats, technicians, skilled artisans and prosperous traders
3	Unskilled workers, whose income would be at or below the national minimum wage [N7 500 (US $50) per month at the time of the study], and the unemployed
Level of educational attainment	
Score	
0	Education up to university level
1	Secondary education or tertiary education not at university level (e.g. college of education, school of nursing, polytechnic)
2	No formal education or education up to primary school level only

Each subject's social class was obtained by adding the scores from A and B above as follows:

Total score	Social class
1	Class 1
2	Class 2
3	Class 3
4	Class 4
5	Class 5

Table II: Demographic characteristics

Characteristic	Frequency (n)	Percentage (%)
Age (years)		
16–20	9	2.6
21–25	45	12.9
26–30	144	41.1
31–35	105	30.0
36–40	41	11.7
41–45	6	1.7
Marital status		
Single	5	1.4
Married	337	96.3
Cohabiting	7	2.0
Separated	1	0.3
Ethnic group		
Yoruba	324	92.6
Other	26	7.4
Religion		
Christian	289	82.6
Muslim	61	17.4
Educational status		
No formal education	8	2.3
Primary	29	8.3
Secondary	75	21.4
Tertiary	238	68.0
Family type		
Monogamous	324	92.5
Polygamous	23	6.6
Single parent	3	0.9

pregnancies past the gestational age of 28 weeks were said to be multiparous and the women with five or more pregnancies carried beyond gestational age of 28 weeks were said to be grand multiparous.

The Statistical Package for Social Science® version 11 (SPSS Inc., Chicago, USA) was used for data analysis. Simple descriptive and inferential statistics were used to assess the relationship between socioeconomic status and anaemia in pregnancy and also to analyse the relationship between anaemia and other variables. A P value of less than 0.05 was set as the level of statistical significance.

Results

A total of 350 pregnant women aged 17–42 years (mean 30.2 ± 4.9 years) were studied. Table II shows the demographic characteristics of the subjects. The modal group was in the 26–30-year age range. There was a low representation in the age ranges of 16–20 years (2.6%) and 41–45 years (1.7%). The majority of the subjects (92.6%) were from the Yoruba ethnic group, most were married (96.3%) and nearly all (92.6%) were from a monogamous family setting. The study population was mainly Christian (82.6%) while the rest (17.4%) were Muslims. More than two-thirds of the subjects (68.0%) had tertiary education and only 2.3% had no formal education.

Forty-nine point seven per cent of the subjects were from the upper class, 32.9% were from the middle class and the remaining 17.4% were from the lower class. Forty point six per cent of the subjects were nullipara, 12.3% had a time interval of less than one year between pregnancies, 27.4%

Severe anaemia 1.4%
Moderate anaemia 9.7%
Mild anaemia 46.9%
Not anaemic 42.0%
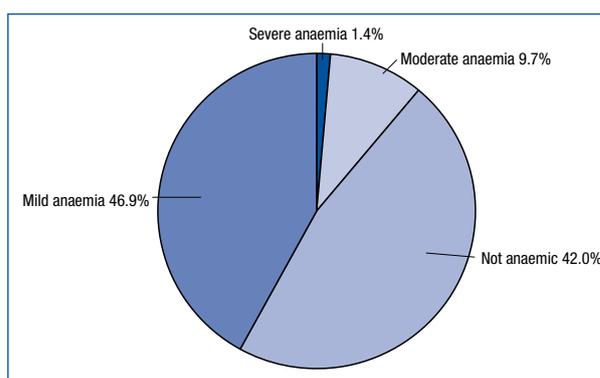
Figure 1: Distribution of subjects by the severity of anaemia

Table III: Association between some maternal characteristics and anaemia

Characteristic	Not anaemic n = 147 (%)	Anaemic n = 203 (%)	Chi-square	P value
Age (year)				
16–20	2 (22.2)	7 (77.8)		
21–25	19 (42.2)	26 (57.8)		
26–30	63 (43.8)	81 (56.2)	1.817	0.874
31–35	44 (41.9)	61 (58.1)		
36–40	17 (41.5)	24 (58.5)		
41–45	2 (33.3)	4 (66.7)		
Marital status				
Single	2 (40.0)	3 (60.0)		
Married	144 (42.7)	193 (57.3)	3.013	0.390
Cohabiting	1 (14.3)	6 (85.7)		
Separated	0 (0)	1 (100)		
Family type				
Monogamous	138 (42.6)	186 (57.4)		
Polygamous	8 (34.8)	15 (65.2)	0.631	0.729
Single parent	1 (33.3)	2 (66.7)		
Parity				
Nulliparous	60 (42.3)	82 (57.7)		
Primiparous	42 (40.0)	63 (60.0)	0.478	0.924
Multiparous	40 (43.0)	53 (57.0)		
Grand multiparous	5 (50.0)	5 (50.0)		
Time interval between pregnancies				
Nulliparous	60 (42.3)	82 (57.7)		
< 1 year	8 (18.6)	35 (81.4)	12.120	0.007
1–2 years	47 (49.0)	49 (51.0)		
> 2 years	32 (46.4)	37 (53.6)		
Educational status				
No formal education	2 (25.0)	6 (75.0)		
Primary	8 (27.6)	21 (72.4)	6.448	0.168
Secondary	29 (38.7)	46 (61.3)		
Tertiary	108 (45.4)	130 (54.6)		
Socio-economic status				
Upper class	110 (63.2)	64 (36.8)		
Middle class	25 (21.7)	90 (78.3)	64.020	0.001
Lower class	12 (19.7)	49 (80.3)		
Gestational age at booking				
First trimester	35 (68.6)	6 (31.4)		
Second trimester	82 (36.1)	145 (63.9)	18.060	0.001
Third trimester	30 (41.7)	42 (58.3)		

1 shows the distribution of subjects according to the severity of the anaemia. Of the 203 anaemic subjects, 164 (46.9%) were mildly anaemic, 34 (9.7%) were moderately anaemic and 5 (1.4%) were severely anaemic.

The association between some of the maternal characteristics and anaemia is shown in Table III. The subjects in the age range 16–20 years had the highest percentage of anaemia. There was a higher prevalence of anaemia among the women who were separated or cohabiting than those that were married or single. There was also a higher prevalence of anaemia among the primiparous women than among the nulliparous, the multiparous and the grand multiparous. The women with a pregnancy interval of less than one year had a significantly higher prevalence of anaemia than the women with a birth interval of more than one year, and those who were nulliparous ($\chi^2 = 12.12$, P = 0.007). Among the different educational groups, there was an inverse relationship showing a progressive decrease in the prevalence of anaemia with increasing levels of education of the subjects ($\chi^2 = 6.448$, P = 0.168). The women in the lower socio-economic class had a higher prevalence of anaemia than the women in the upper and middle socio-economic classes. The association between socio-economic class and anaemia in pregnancy was statistically significant ($\chi^2 = 64.02$, P = 0.001).

The association between gestational age at booking and anaemia is shown in Table II. Women who booked in the second and third trimesters had a statistically significant higher prevalence of anaemia than those who booked in the first trimester. Booking after the first trimester is significantly associated with the development of anaemia in pregnancy ($\chi^2 = 18.06$, P = 0.001).

The majority of the severely anaemic subjects (80.0%) were from the lower socio-economic class; the remaining (20%) were from the middle class. There were no subjects with severe anaemia from the upper class. There was a progressive increase in the prevalence of moderate anaemia among the different socio-economic classes, with 11.8% among the upper class, 35.3% among the middle class and 52.9% among the lower class. The prevalence of mild anaemia was higher among the subjects in the middle and upper social classes than among those in the lower class. Low socio-economic class significantly increased the risk of developing severe anaemia ($\chi^2 = 101.3$, P = 0.001; Table IV).

Discussion

The prevalence of anaemia in pregnancy of 58.0% in this study is high when compared to the 18% reported from industrialised countries.[7] This prevalence rate is, however, in line with WHO prevalence rates for anaemia in pregnant

had a time interval of one to two years while 19.7% had a time interval of greater than two years.

Of the 350 subjects, 203 (58.0%) were anaemic while 147 (42.0%) were not anaemic. Thus the prevalence of anaemia in pregnancy was 58% among the study population. Figure

Table IV: Relationship between severity of anaemia and social class

Variables (n)	Upper class n_1 (%)	Middle class n_2 (%)	Lower class n_3 (%)	χ^2	P value
Not anaemic (147)	110 (74.8)	25 (17.0)	12 (8.2)		
Mild anaemia (164)	60 (36.6)	77 (47.0)	27 (16.4)	101.3	0.001
Moderate anaemia (34)	4 (11.8)	12 (35.3)	18 (52.9)		
Severe anaemia (5)	0	1 (20.0)	4 (80.0)		

women in developing countries, which is estimated to be in the range of 40–60%.[1,2] Similar results have been reported in previous studies by Lamina et al.[13] and Komolafe et al.[14] in Ile-Ife, both in the same southwestern region of Nigeria.[13,14] However, lower prevalence has been reported from the same south-western region. Dairo et al[15] found a prevalence of 32.8% in Oyo town. The study was carried out among low risk pregnant women, the high risk pregnant women who are at greater risk of anaemia were excluded from the study, this could be responsible for the low prevalence of anaemia in that study. Anorlu et al. in a tertiary hospital in Lagos also found a prevalence of 35.3%.[3] The low prevalence rate of anaemia in that study was attributed to the population studied, which consisted mostly of women who were in the higher socio-economic group. The current high cost of medical services in hospitals in Nigeria has made them unaffordable for many women, and as a result antenatal care is mostly sought by women with a high socio-economic status who can afford to pay.

Other researchers[8] have found a much higher prevalence of anaemia (76.5%) in the same south-western region of the country than what was found in this study.[8] Their research was carried out in a federal medical centre, a general hospital and a traditional birth home (multicentred) and as such may be more representative of the true current state of prevalence of anaemia in pregnancy in our population.

The suggestion that pregnant adolescents might be at increased risk for anaemia was made by Ogbeide et al.[16] and Mahavarkar et al.[17] In our study the highest prevalence of anaemic subjects was seen among the 16–20-year age range, although this was not statistically significant. Similarly, some other studies did not find any significant difference in the prevalence of anaemia among the different age groups.[18] Oboro et al.[7] in their study concluded that adolescence may not be an independent predictor of anaemia in pregnancy, which also agrees with the reports of van den Broek et al.[19] and Haniff et al.[20]

However, some other studies suggest that teenagers are more likely to be anaemic in pregnancy.[8,21-23] Glover-Amengor et al. in their study found that youth was significantly associated with a high prevalence of maternal anaemia.[24] Their findings differ from the findings of Hinderaker et al. in

which anaemia was found to be associated with advancing age of women.[25]

Though there was a progressive decrease in the prevalence of anaemia with increasing level of education of the subjects, this trend did not reach statistical significance. Other studies also have found no association between maternal educational status and anaemia. Okwu et al. in their study in Owerri, Nigeria, found that the prevalence of anaemia did not differ significantly among the various educational groups.[26] Jamaiyah et al. similarly reported a lack of significant association between maternal level of education and prevalence of anaemia in pregnancy in Malaysia.[18] However, some other studies have found the severity of anaemia to be inversely related to maternal educational status.[27]

Parity was not significantly linked to the prevalence of anaemia in pregnancy in this study, although there was a higher prevalence of anaemia among the nulliparous and primiparous women than among the multiparous and grand multiparous women. Other studies, local and international, have reported a higher prevalence of anaemia among nulliparous and primiparous women.[3,8,24] The reason for this has been suggested to be that most of the women were possibly anaemic before pregnancy.[27]

Women with a pregnancy interval of less than one year had a significantly higher prevalence of anaemia in this study (P < 0.05). Most other studies worldwide have also shown that a pregnancy interval of less than one year is significantly associated with increased prevalence of anaemia.[3,26] Pregnancy and childbirth usually deplete iron and folic acid stores, and women need time after delivery to replenish their stores of these micronutrients. Women, especially those in the lower socio-economic group, who embark on successive pregnancies at too short an interval do not give their bodies enough time to recover, and this may be responsible for the high prevalence of anaemia found in them.[8]

Anaemia was significantly less common in women who booked in the first trimester than those who booked in the second and third trimesters of pregnancy. This finding is not different from what has been found in other studies.[3,8] Dim et al.[28] in their study also found that anaemia at booking

increased with gestational age, which is consistent with the findings in this study.

In this study, as in most other studies, low socio-economic status was found to be significantly associated with increased prevalence of anaemia (P < 0.05).[3,13,26] There was progressive increase in the prevalence of anaemia from the upper to the lower socio-economic class. The majority of the severely anaemic subjects (80.0%) were from the lower socio-economic class. The remaining subjects (20.0%) were from the middle class; there was no subject with severe anaemia from the upper class. There was also a significant association between the socio-economic class of the subjects and the severity of anaemia in pregnancy.

Pregnant women in the lower socio-economic class, owing to financial constraint or lack of education, cannot afford or do not have access to good health services. They therefore suffer the deleterious effects of poor nutrition, malaria, HIV, chronic infections and worm infestations, all of which are known to lead to the development of anaemia in pregnancy.[3]

As most of the women in this study are from the middle and upper socio-economic classes, there may be a small but important element of selection bias in the study and thus it may not be truly representative of the community. The burden of anaemia in pregnancy can be expected to be much heavier outside the hospital setting.

Conclusion

The prevalence of anaemia in pregnancy is very high in this study. Low socio-economic status was found to be significantly associated with increased prevalence and severity of anaemia. The high prevalence of this condition in Nigeria and in sub-Saharan Africa as a whole may only be reduced if governments in conjunction with health care establishments see anaemia in pregnancy as an important health problem and tackle it from the roots. To reduce the prevalence and severity of anaemia in Nigeria, the socio-economic status of women must be improved by providing good formal education and enhancing female economic empowerment. This will lead to an increased awareness and better appreciation and utilisation of antenatal care services, with all the attendant benefits. It will also help to improve the sanitary and nutritional behaviour of women. This, no doubt, will help to reduce anaemia in pregnancy. With genuine political will, these feats are achievable.

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