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Socio-demographic determinants of anaemia in pregnancy at primary care level: a study in urban and rural Oyo State, Nigeria

MD Dairo and TO Lawoyin
Department of Community Medicine, University College Hospital, Ibadan, Nigeria

Summary
Anaemia in pregnancy is a serious condition contributing to maternal mortality, morbidity and fetal morbidity. Data however available on this condition in Nigeria is mainly hospital based and biased towards women with high-risk pregnancies. This study was carried out to determine the prevalence of anaemia and identify sociodemographic factors contributing to anaemia among low risk pregnant women attending primary care facilities. Five hundred and ninety seven pregnant women attending randomly selected primary care centres in urban and rural areas in Oyo State, Nigeria were enrolled and followed up till delivery of their babies. One hundred and ninety six (32.8%) of the mothers were anaemic. Prevalence of anaemia decreased with increasing maternal age in both urban and rural areas. Regression analysis showed that urban mothers ($P = 0.003$) and those who booked late in pregnancy ($P = 0.048$) were significantly more likely to be anaemic. Mothers with birth intervals 24 –35 months and women between the ages 20-29years ($P = 0.011$) had a lower risk for anaemia. Prevalence of anaemia in pregnancy is still high in Nigeria. Effort should be made to ensure that mothers attend antenatal clinic early. Longer birth spacing should be encouraged through the use of effective contraception.

Keywords: *Anaemia, pregnancy, birth interval, booking, parity*

Résumé
L'anémie en grossesse est une condition tres sérieuse contribuant a la mortalité maternelle, souffranee et déces du fétus. Les rapports disponible au Nigéria sont principalement base à l'hopital et bais vers les femmes étant a grand risque. Cette étdue déterminait la prevalence de l'anémie et identifiait les facteurs socio-démographiques contribuant a l'anémie parmi les femmes participant aux soins aux centres primaries de santé. 597 femmes grosse étaient recruitées des zones urbaines et rurales dans la province d'Oyo au Nigéria et suivies jusqu'a l'accouchement.. 196 (32.8%) étaient anémiques. La prevalence de l'anémie décrut avec l'agmentation de l'age maternel en zones rurales et urbaine.L'analyse de regression montrait que les méres en zone urbaine(P=0.003) et celles qui reservaient tard en grossesse (P=0.048) étaient significativement plus susceptible a l'anémie. Les méres avec d'intervalle de grossesse de 24-35 mois et celles entre l'age de 20-29 ans avaient moins de risque d'anémie (P=0.011). Il a été conclu que le taux d'anémie est encore tres élévé au Nigéria. L'effort doit etre faite pour encourager les méres d'atteindre les cliniques pré-natales tot et d'espacer les naissances par l'emploi des preservatifs.

Introduction

The prevalence of anaemia is inadequately documented in Nigeria. Available data on anaemia are largely facility based from secondary and tertiary levels of health care and are biased towards women with high-risk pregnancies and also towards women living in the urban areas [1-3]. Data from primary health care centres are largely unavailable though these data would be more representative of the community since the primary health centres are the first points of contact of the people with modern health care services.

The main objective of this study was to determine the prevalence of anaemia in pregnancy among women attending primary health care centres in Oyo State, Nigeria and also to identify socio-demographic and other factors that significantly increase maternal risks for developing anaemia in pregnancy. This will be useful for making recommendations when developing appropriate intervention programme at a later date.

Materials and methods

Study areas

The study areas were two randomly selected urban and one rural local government areas (LGAs) in Oyo State. Two thirds of the local government areas in Oyo State are urban. Ibarapa central LGA is rural and located on the fringe of the forest zone. Vegetation is derived savannah with patches of forest along the riverbanks. The area is populated mainly by the Yoruba speaking people. Migrant labourers from neighbouring countries also reside in the area. There are a few Fulani settlers within the area. Predominant occupation of the people is subsistent farming with a few artisans and civil servants. Ibadan north LGA is one of the selected urban LGAs and is located in the centre of the city of Ibadan. Populated mainly by the Yorubas, the people are engaged mainly in academic activities, commerce, technical works and civil service. Ibadan northwest LGA also urban is located in inner city Ibadan.

Correspondence: Dr. M.D. Dairo, Department of Community Medicine, University College Hospital, Ibadan, Nigeria. E-mail: dairomagbagbeola@yahoo.com

Populated mainly by the Yorubas, it has a significant population of Hausa settlers in Ayeye.

Study population
All consenting pregnant women attending the antenatal clinics of selected primary health care centres were enrolled in the study over a period of six months. Women who attended these primary health care centres are usually those with low risk for poor pregnancy outcome. Permission to conduct the study was obtained from the LGA medical officer of health while ethical clearance was obtained from the Joint University of Ibadan / University College Hospital Ibadan Ethical Committee.

Study design
The study was cross sectional in design. Participants were enrolled at booking clinic and were followed up till delivery of their babies. They were investigated for anaemia by measuring their haemoglobin at booking and each antenatal visit. For each woman, the mean haemoglobin value during the third trimester was used to define anaemia. Information was obtained on some socio- demographic characteristic of the women and previous obstetric history. Women with sickle cell haemoglobinopathy SS and SC were excluded from the study.

Sampling technique
Multistage sampling technique was adopted in the selection of LGAs involved in this study. In the first stage, a sampling frame of all local government areas in Oyo State was drawn up using the most recent political map of Oyo State. The 33 local government areas in the state were stratified into urban and rural local government areas using the Smelser's standard criteria [4]. Two urban and one rural local government areas were then chosen using a simple random sampling. In the second stage, from a sampling frame of all primary health centres in the selected LGAs, all health centres that provides antenatal and delivery services were chosen. In the third stage all pregnant women attending the booking clinics of the chosen health centres were enrolled in the study.

Laboratory methods
Haemoglobin determination was by means of venous blood, 5 ml of which was drawn into the potassium EDTA bottles. Haemoglobin concentration was then determined by standard methods [5].

Statistical analysis
Definition of Anaemia followed the WHO criteria. Anaemia was thus defined as haematocrit less than 33% (11g/dl) in pregnant women, moderate to severe as haematocrit less than 30% (10g/dl) and severe as haematocrit 22 (7g/dl). Education level was also categorized as high or low. Low education includes those with primary education or less. High education includes those with secondary level education or more. Data generated in the study were entered into the EPI Info version 6 Software [6] and analyzed using appropriate statistical tests. Chi Square tests were used to determine association between demographic, socioeconomic and obstetric variables and anaemia. Data were exported to Systat for regression analysis [7]. Only variables that were significant at the 0.08 levels in the bivariate analysis were entered into the stepwise logistic regression model. Odds ratio was determined at 95% confidence limit. An odds ratio less than 1.o was associated with lower risk whileodds ratio greater than 1.o was associated with higher risk.

Results
Five hundred and ninety seven women participated in the study. Two thirds of the women were from urban health centres while one third were from the rural areas.

Sociodemographic characteristics and reproductive history
Respondents particularly in the rural areas were still having babies at extremes of maternal age (<20 and >40 years). Significantly more teenage mothers and single mothers were seen in the rural areas ($P < 0.022$ vs. $P < 0.0001$). There were also more women with low formal education in the rural areas compared with the urban areas ($P < 0.0001$). Most of the women attending the booking clinics of the primary health clinics were of low parity. Excluding the first pregnancies, there were significantly more women with birth intervals less than 24 months in the urban areas than the rural areas. The proportion of women with birth interval 23-35 months was also higher in the rural areas compared with the urban ($P < 0.0001$). Majority of the women attended the booking clinic late (> 25weeks) in both locations and mean gestational age at booking was 26.7±4.8 weeks in the urban areas and 26 ± 3.6 weeks in the rural areas ($P > 0.05$)

Prevalence of anaemia in pregnancy
One hundred and ninety six of the mothers were anaemic giving an overall prevalence of anaemia in pregnancy of 32.8%(Table 1). Severe anaemia was uncommon although more commonly seen in the rural areas (Table 2).

Table 1: Prevalence of anaemia in pregnancy

Characteristic	Urban No. (%)	Rural No (%)	Total No (%)
Anaemic	173 (28.9)	23 (3.9)	196 (32.8)
Non anaemic (≥Hb 11g/dl)	222 (37.2)	179 (29.9)	401 (67.2)
Total	395 (100)	202 (100)	597 (100)

Location: Anaemia was significantly more common (29.1%) among urban women than rural women (11.9% P<0.0001)).

Age: Anaemia was more common in pregnant women 20-29 years of age (35.8%). After the teenage years, there was a progressive reduction in the prevalence of anaemia with increasing maternal age ($p < 0.01$) (Table 4)

Table 2: Severity of anaemia among the respondents

Severity of Anaemia	Urban No (%)	Rural No (%)	Total No (%)
Mild anaemia (Hb > 10 > 11g/dl	120 (20.1)	21 (3.5)	141 (23.6)
Moderate anaemia (Hb > 7g/dl < 10g/dl)	52 (8.7)	0 (0)	52 (8.7)
Severe anaemia (Hb < 7g/dl)	1 (0.2)	2 (0.3)	3 (0.5)
Others (non anaemic	222 (37.2)	179 (29.9)	401 (67.2)
Total	395 (66.2)	202 (33.8)	597 (100)

Table 3: Sociodemographic characteristics of respondents

Characteristic	No of mothers and (%) of respondents Urban N= 395	Rural N = 202	Total
Location	395 (66.2)	202 (33.8)	597 (100)
Age in years			
< 20	34 (8.7)	29 (14.5)	63 (10.6)
20-29	276 (69.8)	101 (49,9)	377 (63.1)
30-39	78 (19.8)	65 (32.1)	143 (24)
> 40	7 (1.8)	7 (3.5)	14 (2.3)
Marital status			
Married	359 (60.5)	160 (27)	519 (87.5)
Not married	32 (5.4)	42 (7.1)	74 (12.5)
Formal Educ.			
Low	175 (44.3)	123 (60.9)	298 (49.9)
High	220 (55.7)	79 (39.1)	299 (50.1)
Socioeconomic status			
Higher	58 (14.7)	35 (17.3)	93 (15.6)
Lower	337 (85.7)	167 (82.7)	504 (84.4)
Parity			
0 (1st pregnancy)	123 (31.0)	55 (27.2)	178 (29.8)
1-2	177 (45.0)	104 (51.5)	281 (47)
3-4	83 (21.0)	39 (19.3)	122 (20.5)
≥ 5	12 (3.0)	4 (2.0)	16 (2.7)
Birth interval			
1st pregnancy	128 (32.4)	55 (27.2)	183 (30.7)
< 24 months	102 (25.8)	14 (6.9)	116 (19.4)
24-35 months	85 (21.5)	92 (45.5)	177 (29.6)
> 36 months	80 (20.3)	41 (20.3)	121 (20.3)
Booking status			
Early (0-24 weeks)	150 (25.2)	21 (3.5)	171 (28.7)
Late (> 25 weeks)	244 (40.9)	181 (30.4)	425 (71.3)

Education: Prevalence of anaemia was not affected by level of formal education. The prevalence of anaemia was similar in both women with nil or low formal education and those with high education (Table 4).

Table 4: Demographic characteristics and anaemia in a bivariate analysis

Charactristics	Total No of mothers	No and (%) anaemic	Odds ratio and confidence interval
Location			
Urban	395	173 (29.1)	6.06(3.68-0.07)
Rural	202	23 (11.9)	1.00
Maternal age (in years)			
< 20	63	20 (31.7)	0.49(0.11-1.96)
20-29	377	135 (35.8)	0.95(0.16-3.43)
30-39	143	33 (23.1)	0.3 (0.08-1.14)
≥ 40	12	6 (50)	1.00
Marital status			
Married	517	194 (37.5)	1.27 (0.7-2.25)
Not married	74	21 (28.4)	1.00
Education			
Low	298	99 (33.2)	1.00
High	299	97 (32.4)	1.04(0.75-1.48)
Parity			
0	178	59 (33.1)	1.09(0.33-3.80)
1-2	281	97 (34.5)	1.16(0.36-3.95)
3-4	122	41 (33.6)	1.11(0.33-3.97)
>5	16	5 (31.3)	1.00
Birth interval			
1st pregnancy	183	61 (33.3)	2.71(1.51-4.71)
12-23 months	116	70 (60.3)	8.25 (4.55-15)
24-35 months	131	39 (29.8)	2.30(1.21-4.19)
> 36 months	167	26 (15.6)	1.00
Time of booking			
Early	171	70 (40.9)	1.00
Late	425	126 (29.6)	1.63 (1.1-2.4)

Socioeconomic status: Anaemia (28.6%) was highest among women in the lower socioeconomic status. There was an increase in the prevalence of anaemia as one went down the socioeconomic strata ($P < 0.001$).

Parity: After the first pregnancy, prevalence of anaemia also decreased with increasing parity. Highest prevalence of anaemia (34.5%) was observed among women with lower parity (1-2).

Birth interval: Highest prevalence of anaemia (60.3%) was seen in women with birth interval less than 24 months. Excluding women with first pregnancies, prevalence of anaemia also decreased with increasing birth intervals. The risk of anaemia also reduced with increasing birth interval.

Regression analysis showed that urban mothers ($P = 0.003$) and women who book at the antenatal clinics late ($P=0.048$) were significantly more likely to be anaemic compared with standard. Mothers with birth

intervals 24 –35 months and women between ages 20-29years ($P = 0.011$) had their risk lowered for anaemia following regression analysis and this was statistically significant. (Table 5).

Table 5: Adjusted odds of anaemia in pregnancy

Characteristic	Adjusted odds ratio	95% confidence interval	P value
Location			
Urban	9.1	6.1-13.9	0.003
Rural	1.0		
Maternal age (years)			
15-19	0.14	0.02-1.4	0.095
20-29	0.3	0.1-0.7	0.011
30-39	0.6	0.3-1-2	0.149
≥ 40	1.0		
Education			
High	0.69	0.25-1.9	n.s
Low	1.0		
Marital status			
Married	0.69	0.09-4.9	n.s
Unmarried	1.0		
Socio-economic status			
Higher	0.3	0.1-1.3	n.s
Lower	1.0		
Parity			
1	8.9	0.85-10.6	0.077
2-4	2.2	0.9-3.7	0.051
5	1.0		
Birth interval			
Nullip	1.7	0.2-1.9	n.s
<24 months	1.5	0.2-1.7	n.s
24-35 months	0.7	0.4-0.9	0.001
>36 months	1.0		
Gestational age at booking			
Early (0-24 weeks)	1.0		
Late (25 weeks -term)	3.0	2.8-3.4	0.048

Discussion

This study examined the prevalence of anaemia in the urban and rural areas of Oyo State with a view to identifying the factors that determine anaemia in pregnant women. The overall prevalence of anaemia in pregnancy found in this study is 32.8%. This is higher than 22% found by Otolorin *et al* in Ibadan much lower than 64% found by Adetoro and Adedoyin in Ilorin and Olusi *et al* (88%) in Ilesha.[1-3]. The prevalence of anaemia among pregnant women is also much lower than the rates found in the northern and eastern Nigeria [8,9]. However the prevalence rates documented earlier were hospital based and biased towards women in urban areas and those with high-risk pregnancies. This study was carried out among low risk women in the primary health care centres and thus more representative of the community burden of anaemia in pregnancy. The documented prevalence rates varied as the authors use different haemoglobin values to define anaemia. This makes comparison difficult. In this study the WHO definition of anaemia was used. Therefore comparison with work based on the same definition is possible. However, the high prevalence rate observed may be due to the use of a higher cut off value of haemoglobin of 11g/dl for the definition of anaemia. In low resource settings such as Nigeria, a haemoglobin value of 10g/dl is often used in the definition of anaemia thus prevalence rate of anaemia in pregnancy documented are often lower than recorded in this study.

The risk of anaemia was seen to decrease with increase in the age of the woman. Teenagers were found to have high risk of anaemia in pregnancy. Previous studies on the effect of age at first pregnancy predict anaemia only as a consequence of the pre-pregnancy nutritional status of the woman. It was found that malnourished teenage pregnant women were more at risk of anaemia in pregnancy due to the depleted iron stores that occurred during adolescent growth spurt and onset of menstruation from which they were yet to recover before their first pregnancy [10].

This study revealed that women whose last delivery were 24 months or less were one and half times more likely to develop anaemia compared with those whose last delivery was 36 months or more. An interconceptional interval shorter than 24 months was found as a risk factor for anaemia in pregnancy in this study and this was more prevalent in the urban area. This corroborated the reports of other authors who found that birth intervals greater than 24 months reduced the risk of anaemia in pregnancy. Lazovic and Pocekovac in a study of 100 randomized multipara found that birth interval less than two years was significantly associated with a higher prevalence of anaemia in all trimesters [11]. Similarly Conde-Agudelo and Belizan in a retrospective study of the impact of inter-pregnancy interval on maternal mortality and morbidity found that women with birth interval between 18-23 months had 30% higher risk of anaemia compared with those with longer birth intervals [12]. Short interval between pregnancies delays the mother's recovery from the effects of previous pregnancies thus increasing the risk of maternal depletion syndrome. The iron store in the body is one of the first to be affected. Since the foetal demand is met first the mother is left with depleted iron stores and thus develops anaemia. It has been shown that the exhausted maternal iron stores at the end of one pregnancy takes almost two years to replenish [12,13].

Therefore we recommend that at our primary health centre, routine screening of pregnant women for anaemia should be intensified so as to detect asymptomatic anaemia and enable early intervention. Furthermore the health education should be modified to include signs and symptoms of anaemia in pregnancy. Effective birth spacing among our women should be encouraged. Affordable contraception methods should also be made available in

all our primary health care centres. Pregnant women in our environment book late and this could have effect on the possible intervention in the course of the anaemia in pregnancy. The practice of late booking should be eliminated through appropriate community mobilization and campaigns.

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