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Parental socioeconomic status and birth weight distribution of Nigerian term newborn babies

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Abstract *Background:* Birth weight is one of the most important determinants of perinatal well-being and survival. It may be influenced by socioeconomic status among other factors.
Objective: To evaluate the influence of parental socioeconomic status on birth weight distribution of term infants
Patients and Methods: Consecutive singleton, term newborns and their parents were recruited. Socioeconomic status was determined from parental education and occupation. Neonatal anthropometry was recorded soon after birth. The relationship between neonatal anthropometry and parental socioeconomic status was evaluated.
Results: The mean birth weight of the 280 newborns was 3180g ± 501 with a range of 1800g to 5000g. Most babies (181; 64.7%) weighed between 2500g and 3490g while 5.7% weighed less than 2500g and 20 (7.1%) were small for gestational age. Most parents (196; 70%) were in the upper classes I and II, 69 (24.6%) were in class III while 15 (5.4%) were in classes IV and V. Babies in the socioeconomic classes IV and V had significantly lower mean birth weight than babies in each of classes I, II and III (p = 0.005, 0.006 and 0.04 respectively). High maternal education and paternal occupation were associated with significantly higher mean birth weights (p = 0.007, 0.018 respectively). The low birth weight rate was significantly higher in the lower social classes III to V compared to the two upper classes (10.7% vs. 3.57%;, p = 0.022.
Conclusion: Disadvantaged socioeconomic status was associated with lower mean birth weights with maternal education and paternal occupation exerting the higher influences.

Key words: Socioeconomic Status, Birth weight, maternal education, paternal occupation

Introduction

Birth weight is important for assessing intrauterine growth and a very important predictor of neonatal survival.[1] Thus several factors affecting fetal growth also impact on neonatal survival. Some of these factors exert direct effects on fetal growth while the effects of other factors are indirect. Direct influences which are exerted include intrinsic fetal factors like congenital malformations and environmental factors like antenatal medical problems. One very important indirect influence is the socioeconomic status which may affect fetal growth through its effects on maternal nutritional status, maternal health-seeking behaviour and occasionally, disease pattern in pregnancy.[2, 3] In this regard; some clinical studies have identified maternal educational level[4] and parental occupation[5] as significant determinants of birth weight. There however, has not been sufficient evaluation of effects of socio-economic factors on the birth weight pattern of Nigerian babies. The need for such studies is especially relevant in the light of increasing poverty level among Nigerians.

The current study therefore aims to examine the relationship between parental socioeconomic class and infants' birth weight among Nigerian singleton term babies.

Subjects and Methods

The study was carried out at the Olabisi Onabanjo University Teaching Hospital (O.O.U.T.H) and the Medytop Specialist Hospital (M.S.H) both in Sagamu between July and December 2005. Sagamu is a semi-urban town located between Lagos and Ibadan, two major cities in south-western Nigeria. OOUTH is a 201-bed tertiary care hospital providing specialist obstetric and neonatal care. The average delivery rate is about 600 a year. The Medytop Specialist Hospital (MSH) is a 40-bed private hospital with a bias for obstetric

services. The average delivery rate for the hospital is 240 per year. The two hospitals were chosen for the study because they have the busiest public (OOUTH) and private (MSH) obstetric services in Sagamu and they serve patients from all socioeconomic strata of the community. Two hundred and eighty consecutive singleton term, newborn babies – 167 from OOUTH and 113 from MSH – and their consenting parents were recruited. Data was obtained on parental educational attainment and occupation and these were used to determine family' socio-economic classes using the method recommended by Oyedeji.[6] Stratification was from socioeconomic class 1 (the most advantaged class) to class V (the most disadvantaged). The anthropometric parameters of the babies were also recorded using standard techniques. Gestational age was determined using the Ballard score, while appropriateness of birth weight for gestation was determined using the standards of Lubchenco et al[7]. Data analysis was done using Microsoft Excel software enhanced by Megastat statistical package. The mean and standard deviation of continuous variables were derived. Tests of statistical significance included Student t-test, analysis of variance (ANOVA) and chi-square tests. In all analyses, probability values less than 0.05 were accepted as statistically significant.

Results

Two hundred and eighty (58.3%) of the 480 total deliveries were recruited into the study. These 280 babies comprised 142 (50.7%) males and 138 (49.3%) females giving a male-to-female ratio of approximately 1:1. Gestational age ranged from 37 to 42 weeks with a mean of 39.34 weeks ± 1.03 and birth weight ranged from 1800g to 5000g with a mean of 3180g ± 501. Analysis of parental educational status (Table1) revealed that most of the fathers (90.7%) and mothers (86.1%) had at least senior secondary education. Analysis of data on occupation shows that a high proportion of the mothers (73.5%) and fathers (96.4%) were skilled. The distribution of the parents into social classes was as follows: class I (71; 25.4%), class II (125; 44.6%), class III (69; 24.6%), class IV (13; 4.6%) and class V (2; 0.7%) respectively.

Table 2 shows the birth weight distribution of the babies in relation to parental socioeconomic classification. Most of the babies (181; 64.7%) weighed between 2500g and 3490g while 5.7% were low-birth-weight (LBW). All the 16 LBW babies were also small-for-gestational-age (SGA). Male babies weighed significantly more than their female counterparts (3276g ± 504 Vs 3080g ± 480; (z = 3.24, p = 0.012).
Of the 22 babies with high birth weight (≥ 4000g), 17 (77.3%) were socioeconomic classes I and II. On the other hand, 56.3% of LBW babies were in classes III to V. The LBW rate in the upper social classes I and II was significantly lower than that of the lower social classes (III to V) – (3.57% Vs 10.7%; Fisher exact test = 5.57, p = 0.022)

Table 1: Educational attainments and occupation of parents

	Mothers		Fathers	
	no	%	no	%
Educational attainment				
Tertiary Education	133	47.5	174	62.1
Senior School Certificate	108	38.6	80	28.6
Junior School Certificate	30	10.7	20	7.1
Primary School Certificate	8	2.9	5	1.8
No Formal Education	1	0.4	1	0.4
Occupation				
Senior civil servant/Businessman/ Contractor	58	20.7	103	36.8
Intermediate grade civil servant/ Senior school teacher	86	30.7	116	41.4
Junior school teacher/Driver/Artisan	62	22.1	51	18.2
Petty trader	50	17.9	5	1.8
Unemployed or fulltime housewife	24	8.6	5	1.8
Total	280	100.0	280	100.0

Table 2: Birth weight distribution in relation to socioeconomic classification of parents

Socioeconomic Class	Birth weight groups gm n (% total)				
	<2500	2500 - 2999	3000 - 3499	3500 - 3999	≥ 4000	Total
I	3 (4.2)	16 (22.5)	26 (36.6)	23 (32.4)	3 (4.2)	71 (100.0)
II	4 (3.2)	41 (32.8)	42 (33.6)	24 (19.2)	14 (11.2)	125 (100.0)
III	6 (8.7)	21 (30.4)	26 (37.7)	12 (17.4)	4 (5.8)	69 (100.0)
IV	2 (15.4)	3 (23.1)	5 (38.5)	2 (15.4)	1 (7.7)	13 (100.0)
V	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)
Total	16 (5.7)	82 (29.3)	99 (35.4)	61 (21.8)	22 (7.8)	280 (100.0)

Table 3 shows that mean birth weight was inversely related to socioeconomic advantage. With specific reference to education, mothers with tertiary education had heavier babies than those with senior secondary and those with the less than senior secondary education in that order (3269 ± 454g Vs 3135 ± 494g Vs 3004 ± 615g respectively: F = 5.07, p = 0.007). Similar findings were also recorded with respect to paternal educational attainment (3222 ± 449g Vs 3171 ± 506g Vs 2931 ± 725g respectively: F = 3.91, p = 0.021).

Table 4 illustrates that the maternal occupation had no significant impact on the mean birth weight. On the other hand, increasing paternal occupational status was associated with an increasing mean birth weight (p = 0.018).

Table 3: Mean birth weight in relation to socioeconomic class

Socioeconomic Class	Number	Mean birth weight ± SD g	Z-test	p-value
I	71	3242 ± 428	2.91	0.004
II	125	3215 ± 487	2.78	0.005
III	69	3106 ± 529	2.05	0.040
IV/V	15	2750 ± 625	Reference group	

F = 4.89, p = 0.003
Social classes IV and V were combined because the latter had very few (2) subjects
Z-test comparison was with Social class IV/V

Table 4: Mean birth weight in relation to parental occupation

	no	Birth weight	Z-test	p-value
Maternal				
Senior civil servant/ Businessman/Contractor	58	3290 ± 446	1.30	0.19
Intermediate grade civil servant/ Senior school teacher	86	3126 ± 479	0.20	0.84
Junior school teacher/ Driver/Artisan	62	3222 ± 461	0.84	0.40
Petty trader	50	3135 ± 545	0.25	0.80
Unemployed or fulltime housewife	24	3096 ± 672		
Paternal				
Senior civil servant/ Businessman/Contractor	103	3264 ± 498	2.79	0.005
Intermediate grade civil servant/ Senior school teacher	116	3175 ± 474	2.28	0.023
Junior school teacher/ Driver/Artisan	51	3071 ± 544	1.55	0.120
Petty trader/ Unemployed	8	2794 ± 456		

F = 1.33, *p = 0.258* (Maternal)
F =3.42, *p* =0.018 (Paternal)

Discussion

It is worthy of note that most of the mothers had at least secondary education, which had a significant positive effect on the birth weight. This is a positive report for the United Nations Development Goal numbers 2 and 3 which seek universal basic education and female empowerment in all fields including education. The finding was similar to an earlier report from Ibadan, southwestern Nigeria[8] and Iran [4] In the latter study, Maddah and Karrandish found that the mother's educational level may be considered as the most important determinant of birth weight in that population. This finding was corroborated by Mascie-Taylor[3] and Ebomoyi et al[9].

In the light of the relatively high level of educational attainment, it is not surprising that a large percentage of the parents were skilled. This would mean that more financial resources are likely to be available to the family and consequently, an improvement in socioeconomic status. This may also explain the concentration of HBW babies in the upper classes in this study since mothers in those classes are likely to be more empowered, have access to more health information and services and be at less risk of pregnancy-related problems which often have nutritional and infectious etiology. Therefore, they may have the opportunity of better fetal growth compared to mothers in the lower classes who are probably not as highly educated. The caveat however, is that given the various perinatal problems of HBW babies like mechanical and asphyxial injuries,[10] it is imperative to closely monitor mothers in the upper socioeconomic classes for possible fetal macrosomia.

It was noted that the influence of maternal educational attainment was stronger than that of the father. On the other hand, Paternal, but not maternal occupation played a significant role in birth weight. The latter finding is similar to that obtained by Chia and Lee[5], in an earlier study where babies born to unemployed fathers had a higher risk of being LBW. It probably underlines the wisdom in the use of maternal education and paternal occupation in the method of socioeconomic stratification designed by Olusanya, Ezimokhai and Okpere.[11]

The prevalence of LBW in the study (5.7%) was remarkably lower than the previous prevalence of 16% in an earlier study carried out in this center.[12] It was also lower than 12.6% reported from Enugu, southeastern Nigeria,[13] 24% from Bangladesh[14] and 29.8% from Nepal, South Asia. [15] These differences may be a reflection of differences in patients' selection and study designs. Preterms and products of multiple gestation are often LBW and their exclusion from this present study obviously lowered the prevalence of LBW.

The birth weight of the fetus may be a reflection of the parental socioeconomic status and at least to some extent, the mother's nutrition and health. Thus the low LBW rate in the two upper socioeconomic classes probably resulted from better maternal nutrition and health in pregnancy. An improvement in socioeconomic status was found to be responsible for higher mean birth weights in babies born to mothers in Sweden.[16]These mothers are also more likely to have better health seeking attitudes resulting in a better ANC attendance, lower incidence of pregnancy related disorders such as anaemia and pregnancy induced hypertension. Better pregnancy care and better nutrition during pregnancy were identified as factors for high birth weight in Nepal. [15] As part of routine antenatal care in Nigeria, expectant mothers are usually given iron supplementation. This had been shown to result in higher birth weights independent of other maternal nutritional factors in Zimbabwe. [17] These pregnancies may thus have a better outcome. The finding that LBW occurred more commonly among mothers in the lower socioeconomic classes was similar to findings in Brazil [18] and Botswana. [19] In both studies, the prominence of LBW in the lower socioeconomic classes was associated with poor quality of antenatal care. Unfortunately, the details of antenatal care were not examined in the present study. Therefore, the steady decline in the mean birth weight with decreasing socioeconomic status obtained in the current study is similar to reports obtained from US where denial of access to

quality pregnancy care and low standard of living, in form of segregation and isolation was identified as a cause of decreased birth weights in the studied population. [20]

Conclusion

The present study has affirmed the strong relationship between the birth weight pattern of Nigerian babies and the parental socioeconomic status. The relatively stronger influences of maternal education and paternal occupation are noted. The link possibly lies in the access to better information and resources to support good health in pregnancy. Policies which will bring about an improvement in general conditions of living (housing, food), empowerment and improved access to health services should be targeted at families in the lower socioeconomic classes. This may translate to improved birth weight in the lower social classes. The current tempo of high female education should be sustained and improved upon.

Conflict of Interest: None
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