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IN THIS ISSUE

- *Cannabis sativa*
- Bibliographic analysis of Ugandan Medical Research
- Patients' Perception of Anaesthesia
- Determinants of Low Birth Weight
- Risky Sexual Behaviours and HIV
- Hyoscine bromide in Hysterosalpingography
- Necrotising Fasciitis
- Autoamputation in Breast Cancer

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ORIGINAL RESEARCH

Determinants of Low Birth Weight among Term Babies at the Sacred Heart Hospital, Abeokuta, Nigeria

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Abstract

Background: Low birth weight (LBW) is a major contributor to the global burden of neonatal morbidity and mortality. It is important to identify the significant determinants of LBW, mainly among term babies, who should have achieved optimal weight gain before delivery to reduce the burden of LBW.

Objectives: To determine the Prevalence of LBW among term babies delivered in a Nigerian hospital and the socio-demographic and clinical correlates of LBW.

Methods: A cross-sectional study was conducted among two hundred and twenty-seven term babies and their mothers at the Sacred Heart Hospital, Lantoro (SHHL), Abeokuta, Nigeria, between November 2017 and February 2018.

Results: The Prevalence of LBW was 4.4%. Over 90% of the mothers were educated, married and employed. There was a significant association between term-LBW and maternal booking BMI, anaemia at booking, multiple pregnancies, alcohol intake in pregnancy and paternal level of education. Underweight booking BMI, anaemia at booking, and low paternal level of education were independent predictors of term-LBW.

Conclusions: The Prevalence of term-LBW babies in this study was relatively low. Aside from multiple pregnancies, the other main determinants of LBW include modifiable parental socioeconomic factors. Further reduction in term LBW can be achieved by improving parental education and enhancing maternal health through pre-conception care.

Keywords: Antenatal Care, Booking BMI, Anaemia at Booking, Paternal Level of Education, Pre-conception Care.

Introduction

Birth weight (BW) is an essential indicator of neonatal and childhood survival. ^[1] Low birth weight (LBW) babies (BW <2.5 kg) are at a higher risk of perinatal morbidity and mortality compared to babies with normal weight. This is due to some intrinsic or extrinsic factors, ranging

from the birth process to environmental factors. ^[1,2] For instance, LBW babies have been shown to have an intrinsically higher risk of developing cardiovascular diseases in adulthood. ^[3-5]

The proportion of babies with LBW is still unacceptable. The World Health Organization (WHO) estimated that 15 - 20 % of all newborns were LBW, with the highest proportion occurring figure is even regarded as an underestimation as

most deliveries occur outside health facilities with no record of BW and no official report of birth made to allow for reliable assessment. [6] In Nigeria, a World Bank report showed a marginal reduction in LBW rate over 20 years, from 11.9 % in 1990 through 11.6 % in 1999 to 11.7 % in 2008. [7] Previous studies in Nigeria had reported prevalence rates of 8.3 % to 20.5%, with variations noted in different regions. [8-11] Few of these reports were on term babies. The prevalence of term LBW reported in the country and other parts of the world ranged from 5.2 to 6.4%. [12-14] The report from a study close to SHHL recorded a rate of 5.7% among babies studied in 2013. [12]

Prematurity and intrauterine growth restriction (IUGR) are the main contributors to LBW. [15] Several studies on LBW have reported prematurity as a prominent cause. [2,9,10,15] It may not be surprising to find preterm babies with LBW, as such babies may not have gained adequate weight before birth. However, it is worrisome to find term babies with LBW. Unfortunately, there is a lack of studies reporting such in the environment. [12]

Various factors, including parental education, maternal health status, and socioeconomic factors, have contributed to the LBW burden. [8-10,16,17] It is necessary to identify the specific factors responsible for term babies delivered in SHHL. This centre has been providing maternal and neonatal care in Ogun state for over half a century. [18] Therefore, this study sought to determine the rate of occurrence of LBW in term babies and identify associated socio-demographic and clinical factors that could be targeted to reduce the LBW rate among term babies.

Methods

Study design

This was a hospital-based, cross-sectional study.

Setting

The study was conducted at the Sacred Heart Hospital, Lantoro (SHHL), Abeokuta, Nigeria, a secondary healthcare centre. It is the oldest hospital in Nigeria, established by the Catholic mission in 1895. [18]

Study population

These consisted of term babies delivered at the SHHL and their mothers. Mothers who had their babies in the hospital during the study were qualified for inclusion irrespective of their antenatal clinic booking status.

Sample size calculation:

The sample size was determined using the formula: [19]

$$n = z^2 p q / d^2$$

where z = Standard normal deviate of 1.96, corresponding to 95 % Confidence Interval (CI).

p = Prevalence of LBW among term babies (5.7% in Sagamu [12] = 0.057)

q = Proportion of babies without the attribute of interest = $(1.0-p)$ (= 0.943)

d = degree of accuracy desired, set at 0.03
Correction for total study population < 10,000 was done using the formula: $nf = n / \{1 + n/N\}$

Where nf = desired sample size when the sample population is less than 10,000

N = Study population size (total number of deliveries at SHHL in 2016) = 2,027 and n = 229.433

Thus, $nf = n / \{1 + n/N\} = 229.433 / \{1 + 229.433/2,027\} = 206.104$

The minimum sample size was 206. This was increased by 10 % to 226.6, approximately 227 participants, to increase its precision and make provision for non-response.

Sampling Technique

A systematic random sampling technique was used to select 227 participants. A sample interval of 2 was used, and the data was collected over 16 weeks (from November 2017 to February 2018).

Selection Criteria: Babies delivered at the gestational age of 37 completed weeks or more and their mothers who gave voluntary consent were recruited. Stillbirth/Intrauterine foetal demise and babies with uncertain gestational age were excluded. Each baby participant had their data collected from the mother. The few babies that were products of twin gestations were recruited as a set from the same mother, and they were not necessarily paired.

Definition of terms

Anaemia: This is defined as Packed Cell Volume less than 30%.

Underweight: This refers to a Body Mass Index of less than 18.5kg/m².

Term: Gestational age at birth \geq 37 weeks from the maternal last menstrual period (LMP) or using earliest first-trimester obstetric ultrasound.

The socioeconomic class of babies were determined using a validated tool created by Ogunlesi *et al.* [20] This made use of both parents' level of education and occupation to determine the social class. Babies were classified into five classes (I-V), with class I as the highest and V as the lowest.

The socio-demographic data collected included maternal age, marital status, religion, tribe, occupation, maternal and paternal educational level and income.

Clinical data included maternal parity, estimated gestational age (EGA), inter-pregnancy interval, antenatal clinic (ANC) booking weight, height, body mass index (BMI) and gestational weight gain (GWG). The booking weight and height were retrieved from ANC records and confirmed from the few mothers who registered elsewhere but were delivered at SHHL. History of chronic hypertension, pre-existing diabetes mellitus, booking packed cell volume (PCV), and the retroviral status of the mothers were retrieved from the ANC record for booked participants. Medical conditions which evolved during pregnancy [malaria, anaemia, urinary tract infection (UTI), hypertension and gestational diabetes mellitus (GDM)] were also noted. The

use of substances (alcoholism and cigarette smoking) and local herbs were also recorded.

Data Analysis

Data were analysed using IBM SPSS for Windows, version 21 (IBM Corp., Armonk, NY, USA). The socio-demographic characteristics of the respondents were described using tables and charts. Continuous variables were summarised as means and standard deviations, while categorical variables were summarised as percentages. The Chi-Square test was used to determine the association between LBW and independent variables, and the level of significance was set at a *P* value \leq 0.05. Multiple logistic regression analysis was used to determine the independent predictors of LBW in the babies. Odds ratios (OR) and 95 % confidence intervals (95 % CI) were calculated to assess the strength of association of the significant factors.

Ethical Considerations

Ethical clearance (with certificate number SHH/EC/EA/03/04/17) was obtained from the SHHL Ethical committee. Voluntary written consent was obtained from mothers. Data were collected with no harm inflicted on the study participants, and the information obtained was handled with confidentiality.

Results

Babies' characteristics at birth (Table I)

Overall, 227 babies were studied. Their mean BW was 3.23 \pm 0.46 kg (range: 1.50 - 4.75 kg), and the mean EGA at birth was 39.15 \pm 1.23 weeks. Male babies were slightly heavier than their female counterparts (3.27 \pm 0.50 kg vs 3.19 \pm 0.40 kg). The prevalence of LBW was 4.4 % (10/227).

Table I: Babies' characteristics at birth

Variables	Categories	Frequency (%)
Birth weight categories	<2.5 kg	10 (4.4)
	≥2.5 kg	217 (95.6)
Gender	Male	114 (50.2)
	Female	113 (49.8)
Congenital Anomalies	Yes	0 (0.0)
	No	227 (100.0)
Type of Pregnancy	Singleton	219 (96.5)
	Multiple	8 (3.5)
Birth Order	1	64 (28.2)
	2	68 (30.0)
	3	57 (25.1)
	4 and above	38 (16.7)
APGAR score		
	1-minute	
1-minute	<7	61 (26.9)
	7-10	166 (73.1)
5-minute	<7	23 (10.1)
	7-10	204 (89.9)

Socio-demographic characteristics of the mothers (Table II)

The maternal age range was 17 – 45 years [mean of 30.93±5.52 years], and the modal age group was 20 – 34 years (70.9 %). Most of the mothers were married (216; 96.5 %), had at least a secondary level of education (218; 96.0%) and were employed (207; 91.2 %). Most fathers had post-secondary education (167; 74.4 %), and all except one (99.6 %) were employed.

Socioeconomic class of the babies (Figure1): The majority of the babies belonged to social class III (122; 53.7 %), while only one baby (0.4 %) belonged to social class I.

Clinical characteristics of the mothers

Booking characteristics (Table III): Data on ANC booking anaemia was available from 224 mothers, and booking BMI was retrievable in 225 women. Most mothers (220; 96.92 %) booked for ANC at the study centre. The mean height of the women was 1.60±0.75m, and their mean booking weight was 66.6±12.60 kg. One hundred and twenty-one (53.3 %) had an inter-pregnancy interval of 24 months and above. Anaemia at

booking was recorded in 24 (10.7 %) of the mothers.

The medical characteristics of the mothers in pregnancy (Table IV): GWG was determined in 225 mothers with known booking weight. Among the mothers, 43 (18.9 %) developed hypertension in pregnancy, while only one (0.4 %) had gestational diabetes. Malaria in pregnancy was the prevailing medical condition recorded among 114 (50.2 %). At presentation for delivery, 15 (6.6 %) of these women had anaemia.

Correlates of low birth weight among term babies

Neonatal factors (Table V): A baby's gestational type was associated with term LBW ($p = 0.004$). There was no association between LBW and gender, birth order, and babies' social class.

Maternal socio-demographic factors (Table VI): There was no association between term LBW and maternal socio-demographic characteristics. However, paternal level of education was significantly associated with LBW (Table VI).

Maternal clinical factors (Table VII): Lower booking BMI of the mother ($p < 0.001$), anaemia at

the time of ANC booking ($p = 0.044$) and alcohol intake in pregnancy ($p = 0.033$) were associated with term LBW.

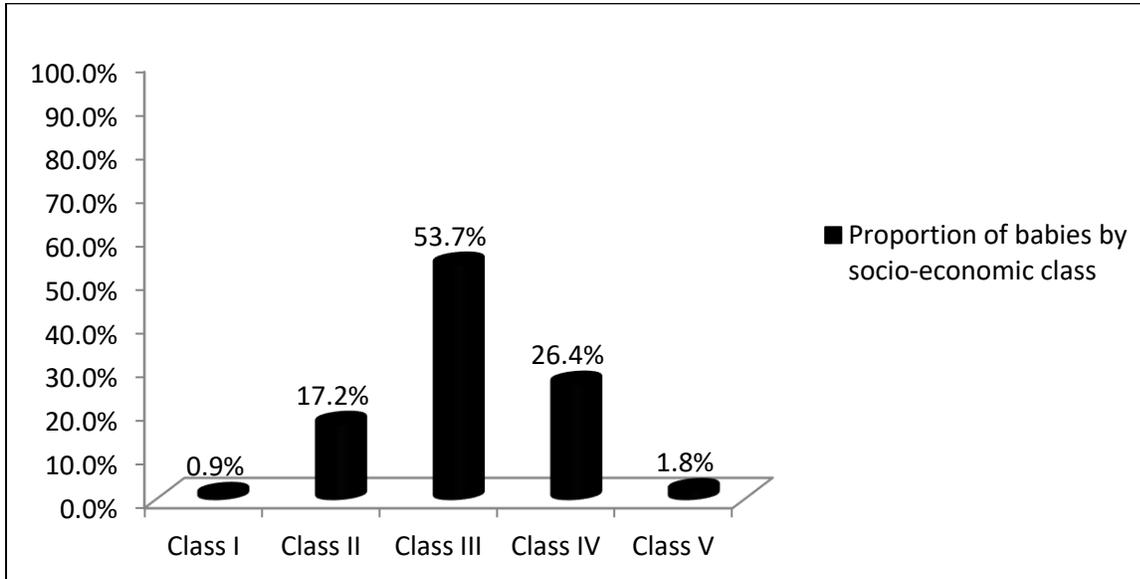


Figure 1: Distribution of babies according to families' socioeconomic classes

Independent predictors of term LBW (Table VIII): The multiple logistic regression analysis showed that maternal underweight at ANC booking ($p = 0.019$; OR= 30.228, CI= 1.761-518.963) and anaemia ($p = 0.018$; OR=8.336, CI= 1.432-48.543) as well as paternal level of education below post-secondary level ($p = 0.017$; OR= 9.985, CI= 1.636-60.957) were independent predictors of term LBW. Underweight mothers were 30 times more likely to have LBW at term. On the other hand, mothers with ANC booking anaemia and low paternal education had 8.3 times and ten times, respectively, the likelihood of having term LBW. The use of alcohol during pregnancy and the type of pregnancy did not independently predict term LBW.

Discussion

This study determined the Prevalence of LBW among term babies and the factors that predict it. The mean BW (3.23 ± 0.46 kg) of the babies in the

present study is similar to the findings reported among term babies in a retrospective study in Iran (3.20 ± 0.47 kg) [13] but slightly higher than the findings among term babies in Sagamu, Nigeria (3180 ± 501 g) [12] and Northern region of Ghana (2.98 ± 0.46 kg). [3] The heavier BW of the male babies compared to the females also agrees with the report of many studies. [11-13,16,20,21] This was not a significant finding in the present study. The higher BW in male babies has been attributed to the effect of androgen secretion by the male foetus, which results in high lean mass. [16]

The prevalence of LBW among the babies in this study (4.4%) is lower than the figures obtained from previous studies conducted among term babies in Sagamu (5.7 %), Iran (5.2 %) and Zimbabwe (6.4 %). [12-14] The lower prevalence observed in the present study could be attributed to the socio-demographic characteristics of the mothers. Most of them were educated, married and employed, and this improved maternal socioeconomic status positively impacted BW. Although this is a known fact, it bears repetition

that optimising the socioeconomic status of women, even in a low-income country like Nigeria, can significantly improve newborn's

well-being characteristics with an attendant reduction in perinatal morbidity and mortality.

Table II: Socio-demographic characteristics of the mothers and their spouses

Variables	Categories	Frequency (%)
Age range (Years)	< 20	4 (1.8)
	20 - 34	161 (70.9)
	≥ 35	62 (27.3)
Marital Status	Single	8 (3.5)
	Married	219 (96.5)
Tribe	Yoruba	204 (89.9)
	Igbo	16 (7.0)
	Hausa	4 (1.8)
	Others	3 (1.3)
Religion	Christianity	149 (65.6)
	Islam	77 (34.0)
	Traditional belief	1 (0.4)
Level of Education	No formal education	4 (1.8)
	Primary	5 (2.2)
	Junior secondary	5 (2.2)
	Senior secondary	73 (32.1)
	Post-secondary	140 (61.7)
Occupation	Trading	101 (44.5)
	Artisan	23 (10.1)
	Teaching	25 (11.0)
	Public servant	17 (7.5)
	Civil servant	25 (11.0)
	Unemployed	20 (8.8)
	Others	16 (7.1)
	Paternal level of education	No formal education
Primary		5 (2.2)
Junior secondary		4 (1.8)
Senior secondary		46 (20.3)
Post-secondary		169 (74.4)
Paternal Occupation	Trading	60 (26.4)
	Artisan	15 (6.6)
	Teaching	9 (4.0)
	Public servant	29 (12.8)
	Civil servant	53 (23.3)
	Professional	21 (9.3)
	Unemployed	1 (0.4)
	Others	39 (17.2)

The higher prevalence of LBW babies reported for women in the age group of 20 – 34 years in the present study, with none recorded among teenagers, is similar to Yilgwan *et al.* in Jos, north central Nigeria. [8] Both studies had the majority of their women in this age group and a lower proportion as teenagers, unlike the studies in Maiduguri, north-eastern Nigeria, and other

parts of Africa such as Ethiopia and Zimbabwe, where the prevalence of LBW was higher among teenagers and women aged 35 years and above. [10,14,22] Some studies had reported lower maternal education as a factor associated with LBW. [10,14] On the contrary, the present study recorded more LBW among mothers with a secondary level of education (9.6 %), with none recorded among

those of lower educational qualifications. The fact that most of the mothers had higher levels of education may explain this observation. ^[10,14]

Table III: Antenatal booking characteristics of the mothers

Variables	Categories	Frequency (%)
Booking Status	Booked	220 (96.9)
	Un-booked	6 (2.7)
	Referred	1 (0.4)
Parity	Nulliparous	64 (28.2)
	Multiparous	161 (70.9)
	Grand multiparous	2 (0.9)
Inter-pregnancy interval (months)	< 24	106 (46.7)
	> 24	121 (53.3)
Height (metres)	<1.45	0 (0.0)
	1.45 - 1.59	101 (44.5)
	≥ 1.60	126 (55.5)
Booking BMI (kg/m ²)	<18.5	8 (3.6)
	18.50 -24.99	102 (45.3)
	25.00-29.99	61 (27.1)
	≥30.00	54 (24.0)
Chronic hypertension	Yes	12 (5.3)
	No	215 (94.7)
Pre-existing Diabetes	Yes	5 (2.2)
	No	222 (97.8)
History of LBW delivery	Yes	15 (6.6)
	No	212 (93.4)
Retroviral status	Reactive	9 (4.0)
	Non-reactive	218 (96.0)
Booking PCV	< 30 %	24 (10.7)
	≥ 30 %	200 (89.3)

This could also account for the lack of association between LBW and these mothers' marital status, occupation and income. These findings also buttress the suggestion of Yilgwan *et al.* in Jos, Nigeria, on the need to avoid interpreting the role of any factor in isolation as these factors are often interrelated.^[8]

The present study observed a significant association between LBW and paternal educational status, more so as an independent correlate of LBW. Similar findings were also reported in other studies. ^[14,17,23] Higher paternal education appears protective as it improves the

family's socioeconomic status and enhances the care pregnant women receive. ^[17,23] Multiple gestation was associated with LBW in this study, similar to other studies findings. ^[17,24] However, it was not an independent predictor of term LBW in the present study unlike the finding reported by Dahlui, who used data from the 2013 Nigeria Demographic Survey. ^[17] This difference may be because the current study is hospital-based, and there were very few products of multiple gestations. Other factors in the newborn, like gender, birth order and congenital anomalies reported in other studies, were not associated with LBW in the present study. ^[16,25-27]

Table IV: Clinical characteristics of the mothers in pregnancy

Variables	Categories	Frequency (%)
GWG (kg)	< 7	64 (28.4)
	7-11.49	109 (48.4)
	≥11.5	52 (23.2)
Medical conditions managed during pregnancy		
Hypertension	Yes	43 (18.9)
	No	184 (81.1)
Gestational diabetes mellitus	Yes	1 (0.4)
	No	226 (99.6)
Urinary tract infection	Yes	26 (11.5)
	No	201 (88.5)
Malaria	Yes	114 (50.2)
	No	113 (49.8)
Anaemia	Yes	18 (7.9)
	No	209 (92.1)
Substances used in pregnancy		
Cigarette	Yes	0 (0.0)
	No	227(100.0)
Alcohol	Yes	12 (5.3)
	No	215 (94.7)
Herbal mixture	Yes	75 (33.0)
	No	152 (67.0)
PCV at presentation for delivery (%)	< 30	15 (6.6)
	≥ 30	212 (93.4)

Table V: Socio-clinical correlates of Low Birth Weight among babies

Variables	Categories	Low birth weight		Chi-Square	df	p-value
		Yes	No			
Sex	Male (n = 114)	5 (4.4)	108 (95.6)	0.000	1	0.989
	Female (n = 113)	5 (4.4)	109 (95.6)			
Type of gestation	Singleton (n = 219)	8 (6.7)	211 (96.3)	8.352	1	0.004
	Multiple (n = 8)	2 (25.0)	6 (75.0)			
Birth order	1 (n = 64)	4 (6.2)	60 (93.8)	0.910	3	0.823
	2 (n = 68)	3 (4.4)	65 (95.6)			
	3 (n = 67)	2 (3.5)	55 (96.5)			
	≥4 (n = 38)	1 (2.6)	37 (97.4)			
Social class	I (n = 2)	0 (0.0)	2 (100.0)	1.346	4	0.853
	II (n = 39)	1 (2.6)	38 (97.4)			
	III (n = 122)	5 (4.1)	117 (95.9)			
	IV (n = 60)	4 (6.7)	56 (93.3)			
	V (n = 4)	0 (0.0)	4 (100.0)			

df - Degree of freedom

This study found an association between LBW and maternal ANC booking anaemic state both

on bivariate and multivariate analyses. This could be a reflection of the pre-conception

nutritional state. This finding also agrees with the results in India, where anaemia in the first trimester was associated with LBW with an increased risk of 5 – 20%.^[28] A study in the UK found that iron depletion in women from early pregnancy was associated with an increased risk of delivery of Small-for-Gestational Age (SGA) babies, and a reduction of this risk by 30% was observed for every increase in haemoglobin concentration by 10g/l in the first half of pregnancy.^[29] Anaemia reduces the amount of oxygen and nutrient delivery to the foetus due to inadequate blood supply to the uteroplacental bed.^[25]

Although a higher prevalence of LBW was observed among women who had anaemia at delivery in this study, the finding was not statistically significant. This was unlike the results of Metgub *et al.* in India and Amosu *et al.* in Abeokuta, Nigeria.^[28,30] The ready access of most mothers in the present study to ANC could account for this difference. The booking BMI was associated with LBW and was an independent correlate of LBW. LBW was prevalent among underweight women but decreased with an increase in BMI, in agreement with other studies.^[17,23] Booking BMI reflects the nutritional state of women before pregnancy.^[21,32] There was no association between LBW and gestational weight gain (GWG) in this study, similar to the finding in Ife, Osun state Nigeria.^[31] On the contrary, the study in Northern Ghana reported an association between LBW and GWG.^[3] The fact that most women in the present study had adequate GWG could account for the difference.

Although malaria in pregnancy was the most prevalent medical condition managed among the mothers, it was not associated with LBW, unlike what was reported in Maiduguri and Ibadan, both in Nigeria.^[10,11] This can be explained by the intense preventive measures (repeated health education, counselling and use of IPTp) and early

diagnosis and treatment of malaria during ANC at SHHL.

This study found no association between LBW and the use of herbs. The use of herbs in pregnancy has generated much interest recently, with different relationships reported.^[33,34] In south-eastern Nigeria, where a relationship was reported between maternal herbal use and LBW, the availability of the herbs and the socioeconomic characteristics of both the women and their husbands were important determinants of the relationship.^[34] In two other related studies from Europe and Canada, the effect of individual agents on BW was determined with different associations reported.^[34,35] Because about one-third of the index study participants used herbal preparation in pregnancy, it may be necessary for the future to assess the effect of common substances used in this environment along with the duration of use, time of onset and associated factors to assess their effects on BW. On the contrary, although relatively few mothers consumed alcohol in this study, there was an association between LBW and alcohol consumption. Women who took alcohol during pregnancy had 4.5 times higher risks of delivering LBW babies, similar to Ireland and Zimbabwe's findings.^[14,23]

Although five factors were found to be associated with LBW on bivariate analysis in this study, only low booking BMI (underweight), anaemia at ANC booking and low paternal education were the independent determinants of LBW among term babies on multivariate analysis. These findings agree with previous studies on optimised maternal nutrition before pregnancy.

It also supports the need to improve the family's socioeconomic status through improved education of both male and female members to allow for adequate support for the women during their reproductive years and, thus, improve the health status of the family.

Table VI: Socio-demographic correlates of low birth weight among mothers

Variable	Categories	Low birth weight		Chi-Square	Df	p-value
		Yes	No			
Age (years)	<20 (n = 4)	0 (0.0)	4 (100.0)	0.775	2	0.775
	20-34 (n = 161)	8 (5.0)	153 (95.0)			
	≥35 (n = 62)	2 (3.2)	60 (96.8)			
Marital Status	Single (n = 8)	0 (0.0)	8 (100.0)	0.382	1	0.536
	Married (n = 219)	10 (4.6)	209 (95.4)			
Tribe	Yoruba (n = 204)	9 (4.4)	195 (95.6)	0.452	3	0.929
	Igbo (n = 16)	1 (6.3)	15 (93.8)			
	Hausa (n = 4)	0 (0.0)	4 (100.0)			
	Others (n = 3)	0 (0.0)	3 (100.0)			
Educational Status	No formal education (n = 4)	0 (0.0)	4 (100.0)	0.705	4	0.136
	Primary (n = 5)	0 (0.0)	5 (100.0)			
	Junior secondary (n = 5)	0 (0.0)	5 (100.0)			
	Senior secondary (n = 73)	7 (9.6)	66 (90.4)			
	Post-secondary (n = 140)	3 (2.1)	137 (97.9)			
Occupation	Trading (n = 101)	4 (4.0)	97 (96.0)	2.201	6	0.900
	Artisan (n = 123)	1 (4.3)	22 (95.7)			
	Teaching (n = 25)	0 (0.0)	25 (100.0)			
	Public servant (n = 17)	1 (5.9)	16 (94.1)			
	Civil servant (n = 25)	2 (8.0)	23 (92.0)			
	Unemployed (n = 20)	1 (5.0)	19 (95.0)			
	Others (n = 16)	1 (6.3)	15 (93.7)			
	Paternal level of Education	No formal education (n = 3)	0 (0.0)			
Primary (n = 5)		0 (0.0)	5 (100.0)			
Junior secondary (n = 4)		0 (0.0)	4 (100.0)			
Senior secondary (n = 46)		6 (13.0)	40 (87.0)			
Post-secondary (n = 169)		4 (2.4)	165 (97.6)			
Paternal Occupation	Trading (n = 60)	4 (6.7)	56 (93.3)	6.589	7	0.473
	Artisan (n = 15)	2 (13.3)	13 (86.7)			
	Teaching (n = 9)	0 (0.0)	9 (100.0)			
	Public servant (n = 29)	1 (3.4)	28 (96.6)			
	Civil servant (n = 53)	0 (0.0)	53 (100.0)			
	Professional (n = 21)	1 (4.8)	20 (95.2)			
	Unemployed (n = 101) ¹	0 (0.0)	1 (100.0)			
	Others (n = 39)	2 (5.1)	37 (94.9)			
Paternal Income (Naira - ₦)	<15000 (n = 7)	0 (0.0)	7 (100.0)	8.162	4	0.086
	15000-29999 (n = 29)	4 (13.8)	25 (86.2)			
	30000-50000 (n = 47)	1 (2.1)	46 (97.9)			
	50001-100000 (n = 81)	4 (4.9)	78 (95.1)			
	>100000 (n = 62)	1 (1.6)	61 (98.4)			

df - Degree of freedom; ₦360=₹1 at the study's time.

Emphasising the girl-child's nutrition from early childhood and puberty, as well as ensuring optimal health status before conception through effective pre-conception care, are essential to reducing the burden of LBW among term babies.

The effect of prenatal care was reflected in the study in Zimbabwe, where a lower LBW rate was reported among both term and preterm babies whose mothers accessed prenatal care before conception. ^[14]

Table VIIa: Maternal clinical correlates of low birth weight

Variables	Categories	Low birth weight		Chi-Square	df	p-value
		Yes (%)	No (%)			
Booking Status	Booked (n = 220)	10 (4.5)	210 (95.5)	0.333	2	0.847
	Unbooked (n = 6)	0 (0.0)	6 (100.0)			
	Referred (n = 1)	0 (0.0)	1 (100.0)			
Parity	Nulliparous (n = 64)	3 (4.7)	61 (95.3)	0.022	2	0.949
	Multiparous (n = 161)	7 (4.3)	154 (95.7)			
	Grand multiparous (n = 2)	0 (0.0)	2 (100.0)			
Height (m)	1.45-1.59 (n = 101)	3 (3.0)	98 (97.0)	0.046	1	0.353
	≥1.60 (n = 126)	7 (5.6)	119 (94.4)			
Booking BMI (kg/m ²)	<18.5 (n = 8)	3 (37.5)	5 (63.5)	24.721	3	0.001
	18.5- 24.9 (n = 102)	6 (5.9)	96 (94.1)			
	25-29.9 (n = 61)	1 (1.6)	60 (98.4)			
	≥30 (n = 54)	0 (0.0)	54 (100.0)			
Inter-pregnancy interval (months)	<24 (n = 106)	5 (4.7)	101 (95.3)	0.046	1	0.830
	≥24 (n = 121)	5 (4.1)	116 (95.9)			
Previous delivery of LBW	Yes (n = 15)	2 (13.3)	13 (86.7)	3.040	1	0.081
	No (n = 212)	8 (3.8)	204 (96.2)			
Gestational weight gain (kg)	<7 (n = 64)	3 (4.7)	61 (95.3)	2.035	2	0.361
	7-11.49 (n = 109)	3 (2.8)	106 (97.2)			
	≥11.5 (n = 52)	4 (7.7)	48 (92.3)			
Booking PCV (%)	<30 (n = 101)	3 (12.5)	21 (87.5)	4.070	1	0.044
	≥30 (n = 200)	7 (3.5)	193 (96.5)			

df - Degree of freedom

The findings in this study further buttress a well-established fact: that IUGR resulting from chronic health problems like malnutrition in the mother is an essential contributor to LBW at term. Thus, reducing its burden through improved nutrition and the socioeconomic state of the family would require a concerted effort by all stakeholders, including primary health care givers and health policymakers.

Conclusion

The prevalence of LBW among term babies in this study was relatively low compared to similar

reports from other developing countries. The main contributors were maternal socio-demographic and clinical factors, and Paternal education also played a significant role. Specifically, low maternal ANC booking BMI, anaemia at ANC booking, paternal level of education, multiple pregnancies and alcohol intake in pregnancy were major determinants and should receive focused attention. Introducing pre-conception care is one strategy by which maternal nutrition before pregnancy can be enhanced. Further studies are recommended to assess the effect of alcohol and herbal usage on LBW.

Table VIIb: Maternal clinical correlates of low birth weight

Variables	Categories	Low birth weight		Chi-Square	df	p-value
		Yes (%)	No (%)			
HIV infection	Yes (n = 36)	29 (22.2)	7 (77.8)	0.272	2	0.873
	No (n = 219)	8 (3.7)	210 (96.3)			
Chronic Hypertension	Yes (n = 12)	1 (8.3)	11 (91.7)	0.426	1	0.496
	No (n = 215)	9 (4.2)	206 (95.8)			
Pregnancy-induced hypertension	Yes (n = 43)	3(7.0)	40(93.0)	0.833	1	0.361
	No (n = 184)	7(3.8)	177(96.2)			
Pre-existing Diabetes	Yes (n = 5)	1(20.0)	4(80.0)	0.203	1	0.086
	No (n = 222)	9(4.1)	213(95.9)			
Gestational diabetes mellitus	Yes (n = 1)	0(0.0)	1(100.0)	0.046	1	0.830
	No (n = 226)	10(4.4)	216(95.6)			
Malaria in pregnancy	Yes (n = 114)	3(2.6)	111(97.4)	1.711	1	0.191
	No (n = 113)	7(6.2)	106(93.8)			
Anaemia in pregnancy	Yes (n = 18)	0(0.0)	18(100.0)	0.901	1	0.343
	No (n = 209)	10(4.8)	199(95.2)			
Anaemia at delivery (%)	<30 (n = 15)	1(6.3)	14(93.3)	0.659	1	0.502
	≥30 (n = 222)	9(4.2)	203(95.8)			
Urinary tract infection	Yes (n = 26)	0(0.0)	26(100.0)	1.353	1	0.245
	No (n = 201)	10(5.0)	191(95.0)			
Alcohol use	Yes (n = 12)	2(16.7)	10(83.3)	4.523	1	0.033
	No (n = 215)	8(3.7)	207(96.3)			
Herbal usage	Yes (n = 75)	2(2.7)	73(97.3)	0.804	1	0.370
	No (n = 152)	8(5.3)	144(94.7)			

Df - Degree of freedom

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Table VIII: Multiple logistic regression analysis of the correlates of term low birth weight

Variables	Category	B	P- value	OR	CI (95%)
Booking BMI	<18.5kg/m ²	3.409	0.019	30.228	1.761- 518.963
	≥18.5kg/m ²			1	
Paternal level of education	≤ Secondary	1.813	0.017	9.985	1.636-60.957
	Post-secondary			1	
Booking PCV	<30%	2.121	0.018	8.336	1.432-48.543
	≥30%			1	
Alcohol Use	Yes	2.223	0.063	10.628	0.879-128.469
	No			1	
Type of Pregnancy	Multiple	1.817	0.195	6.155	0.395-95.005
	Singleton			1	

OR-Odds ratio; CI - Confidence Interval

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