

Original Article

Maternal factors associated with low-birth-weight deliveries in Makurdi, North Central Nigeria

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Abstract

Background: Low birth weight (LBW) is an essential marker of foetal health that is predictive of mortality in childhood, stunting and adult-onset chronic conditions globally. Approximately 20 million LBW births occur every year globally, with 96.5% of them in developing countries. LBW contributes to 60%-80% of all neonatal deaths globally, and the rates have remained high in developing countries such as Nigeria. Reduction in the incidence of LBW is associated with reduced neonatal mortality and improved life outcomes. Hence, this study sought to evaluate the maternal factors associated with LBW amongst neonates delivered in health facilities in Makurdi, Benue State, Nigeria.

Methodology: A multi-centre cross-sectional descriptive study was conducted in eight selected health facilities at different levels of care within Makurdi metropolis. A multistage sampling technique was used to select 202 mothers when they presented in labour in the selected facilities, and data were collected using a pre-tested interviewer-administered questionnaire and analysed using SPSS 23

Results: Among the 202 mothers, there were 24 LBW deliveries (11.7%). Of these 24 LBW neonates, 75% (18) were term, while 25% (6) were preterm. Factors significantly associated with LBW included: gestational age at birth ($p = 0.028$), type of gestation ($p = 0.004$), non-booking for antenatal care ($p = 0.040$), place of antenatal care ($p = 0.028$), and hypertension in pregnancy ($p = 0.033$). Mothers who did not book for Antenatal care (ANC) (aOR= 6.32, 95% CI=1.24 – 32.21) were 6.32 times more likely to have LBW.

Conclusion: Lack of antenatal care and hypertension in pregnancy are significant modifiable maternal factors associated with LBW in Makurdi. Hence, education and practice of early and adequate ANC is recommended.

Keywords: Health facilities, Low birth weight, Neonates. Maternal factors.

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Introduction

Low birth weight (LBW) is defined as birth weight of less than 2500g (up to and including 2499g), regardless of the gestational age.[1] This weight is the first weight recorded after birth, ideally measured within the first hour of life, before significant postnatal weight loss has occurred.[2,3] LBW is further categorised into very low birth weight (VLBW <1500g) and extremely low birth weight (ELBW <1000g).[1] LBW is a consequence of preterm birth (birth before 37 completed weeks of gestation), intrauterine growth restriction(IUGR) or both.[4,5]

The predominant cause of LBW in developed countries is prematurity, whereas in developing countries, approximately 70% of LBW infants have intrauterine growth restriction (IUGR), and infants with IUGR have greater morbidity and mortality than do appropriately grown, gestational age-matched infants. [6,7]Globally, LBW continues to be a significant public health problem and is associated with a wide range of both short and long-term consequences, such as stunting, lower intelligence quotient (IQ) and death in childhood, with an increased risk for non-communicable diseases such as diabetes, obesity and cardiovascular disease later in life.[8]

LBW is associated with long-term neurologic disability and impaired language development as well as poor school performance.[8,9]It is estimated that 15-20% of all births worldwide are LBW, representing more than 20 million births a year, with 96.5% of them in developing countries.[10,11]

Factors that could result in a shortened gestational period, leading to preterm delivery or affect intrauterine growth independently or in combination, leading to low birth weight, are regarded as risk factors.[4] The most systematic review of the determinants of LBW is the extensive meta-analysis by Kramer that was published in the World Health Organisation bulletin.[12] Kramer identified the following maternal factors as causal risk factors for intrauterine growth restriction; maternal height, pre-pregnancy weight, maternal birth weight, parity, history of prior LBW, young maternal age, maternal education, socioeconomic status, gestational weight gain, caloric intake, episodic illness, malaria, quality of antenatal care, number of ANC visits, strenuous maternal work, cigarette smoking, and alcohol consumption.[4]

In Nigeria, previous studies, such as those by Ezugwu *et al* in Enugu, reported identified risk factors for low birth weight, such as hypertensive disease in pregnancy, malaria in pregnancy and antepartum haemorrhage (APH), etc.[13] Ugboma *et al* in Port-Harcourt reported identified factors such as nulliparity, hypertensive disorders of pregnancy, short birth spacing and low parity.[14]While in Benin, Mbazor *et al* also identified factors such as hypertensive disorders of pregnancy, maternal anaemia, low socioeconomic status and nulliparity.[15]

Globally, 2.3 million children died in the first month of life in 2023, with 37% of the deaths due to complications from preterm birth, a major known cause of LBW deliveries.[16] In Nigeria, the Neonatal Mortality Rate (NMR) is 39/1000 live births, with 31% of the deaths due to prematurity, while Benue State has a slightly higher NMR of 41/1000 live births.[17] More than 80% of neonatal deaths are in LBW newborns, of which two-thirds are preterm, and one-third are term small for gestational age neonates (SGA).[7]The global prevalence of low birth weight has stagnated between 2012 (15%) and 2020 (14.7%),and the world is clearly not on track to achieve the 2025 Global Nutrition target of reducing the global prevalence of LBWby 30%.[18]

The slow progress is partially due to the multifaceted nature of LBW, with contributing factors varying from place to place, whereas interventions tend to focus on single solutions, neglecting the critical role of multisectoral approaches to improve maternal nutrition.[18]LBW was reported to contribute the highest percentage (26.4%) to neonatal mortality in Makurdi.[19]The immediate care and management of the

LBW neonate leaves a socio-economic burden that is detrimental to the growth of the family, especially for resource-constrained settings like Benue and the country at large.[20]

Hence, efforts geared towards reducing neonatal mortality to less than 15 deaths per 1000 live births by 2030, which is the goal of the Nigerian Every Newborn Action Plan (NiENAP) and achieving the Global Nutrition Target, will entail identifying and highlighting the underlying maternal factors associated with LBW for targeted actions[18,21] Moreover, economic studies in low-income settings have demonstrated that reducing the burden of LBW would have significant cost savings both to the health system and to households, which is in keeping with the global nutrition target to reduce LBW by 30% by the year 2025.[11,20]

Hence, this study sought to determine the Maternal factors associated with LBW neonates delivered in health facilities in Makurdi and provide appropriate data on modifiable factors for targeted actions, policies, and advocacy.

Material and Methods

Benue State is located in the North Central region of Nigeria with an average population density of 186.5 persons per Km² and a projected population of about 5.7 million people according to the 2016 national population forecast, with Makurdi serving as the state headquarters.[22]

This was a multi-centre, cross-sectional, descriptive study carried out over six months, from January 2020 to June 2020, in selected health facilities within Makurdi metropolis.

The study population consisted of 202 mothers who delivered 206 neonates in 8 selected health facilities in Makurdi Metropolis. The minimum number of neonates was derived using the LBW prevalence from the Nigeria Multiple Indicator Cluster Survey, using the formula $n = z^2pq/d^2$. Mothers who delivered live newborn babies (within the first hour of life) in the selected sites at known gestations in Makurdi, determined from either the mother's last menstrual period (LMP) or Ultrasonography, and who gave informed consent were recruited.

A multistage purposive sampling technique was used to select 8 facilities across different levels of care, including two Primary health facilities, two Government Hospitals at the secondary level, two Tertiary health institutions and two Private Health Institutions with the highest number of deliveries in the preceding year. Selection of respondents was done by proportionate allocation and regular random recruitment at the facility when mothers presented for delivery until the calculated number was attained.

Maternal and neonatal data were collected using a structured, pretested, interviewer-administered questionnaire containing maternal socio-demographic information such as age of mother, parity, age at first delivery, marital status, level of education and religion. Maternal information was obtained from the mother's Antenatal cards, while other information was obtained from the partograph as well as direct questioning when they presented in labour or immediately after delivery, following informed consent. Socio-economic status was assessed according to the method suggested by Ogunlesi.[23] Babies with LBW were classified based on their weight and gestational age at birth using the 2013 Fenton preterm growth charts as either appropriate for gestational age (AGA) or small for gestational age (SGA).[24]

Data was collected and analysed using IBM SPSS Statistics version 23 (Armonk, NY: IBM Corp). Univariate analyses of categorical variables were done using descriptive statistics and presented in frequencies, percentages and prose. Continuous variables were analysed using descriptive statistics, like mean. Bivariate analyses were conducted using the Chi-squared test to evaluate the strength of association between LBW and maternal factors, and a p-value of <0.05 was considered statistically significant.

Ethical approval was obtained from the Health Research Ethics Committee of the Benue State University Teaching Hospital (BSUTH/CMAC/HREC/101/V.1/84), and approval was also obtained from the Benue State Ministry of Health, as well as the individual facilities.

Results

A total of 202 mothers were recruited, with 206 neonates, as four mothers had twin deliveries, while 24 neonates had a weight of less than 2.5kg, giving a prevalence of 11.7%. Term babies with LBW were 18 (75%), while preterm LBW were 6 (25%). Among the term LBW, 14 (77.8%) were term SGA, while 4 (22.2%) were term AGA.

Table 1: Socio-demographic characteristics of mothers (N=202)

<i>Variables</i>	<i>Frequency</i>	<i>Percentage</i>
Age (in years)		
15-25	54	26.7
26-35	121	59.9
36-45	27	13.4
Mean 28.92±5.58		
Religion		
Christianity	196	97.0
Islam	5	2.5
Traditional	1	0.5
Marital Status		
Married	202	100
Single	0	0.0
Mother's Educational Status		
Informal education	11	5.4
Primary education	22	10.9
Secondary education	85	42.1
Post-secondary education	84	41.6
Mother's Occupation		
Unemployed	89	44.1
Trading	54	26.7
Civil servant	34	16.8
Artisan	18	8.9
Farming	7	3.5
Socio-economic class		53.5

Upper class(I-III)	108	46.5
Lower class (IV-V)	94	

The mean age of the mothers was 28.92±5.58 years, with 97.0% (n=196) of the mothers being Christian, and 100% of the mothers being married. Eighty-five (42.1%) of the mothers had secondary education, while 41.6% (n=84) had post-secondary level of education. Eighty-nine (44.1%) of the mothers were housewives, while 26.7% (n=54) were traders, as shown in Table 1.

Table 2: Mother's socio-demographic characteristics by neonates' birth weight.

Mother's characteristics	Birth weight status		Test statistics χ^2	Df	p-value
	LBW	NBW			
	N=22 n(%)	N=180 n(%)			
Age (in years)			1.26	2	0.532
15-25	8(14.8)	46(85.2)			
26-35	11(9.1)	110(90.9)			
36-45	3(11.1)	24(88.9)			
Religion			1.74		0.504
Christianity	21(10.7)	175(89.3)			
Islam	1(20.0)	4(80.0)			
Traditional	0(0.0)	1(100.0)			
Mother's educational status			4.43		0.189
Informal education	3(27.3)	8(72.7)			
Primary education	1(4.5)	21(95.5)			
Secondary education	11(12.9)	74(87.1)			
Post-secondary education	7(8.3)	77(91.7)			
Mother's occupation			7.66		0.078
Farming	2(28.6)	5(71.4)			
Civil servant	1(2.9)	33(97.1)			
Trading	6(11.1)	48(88.9)			
Artisan	0(0.0)	18(100.0)			

Unemployed	13(14.6)	76(85.4)			
Socio-economic class			4.39	1	0.036*
Upper class(I-III)	8(7.4)	100(92.6)			
Lower class (IV-V)	14(14.9)	80(85.1)			

LBW deliveries were common among mothers aged 15-25 years (14.8%), followed by those aged 36-45 years (11.1%), and the least common among those aged 26-35 years (9.1%). There was no statistically significant association ($p = 0.532$) between the age groups and the delivery of LBW neonates. LBW deliveries were predominantly found among mothers who had no formal education (27.3%), and least among mothers with primary education 4.5%. However, there was no statistically significant association between mother's education and low birth weight ($p=0.189$), as shown in Table 2.

Table 3: Mother's obstetric characteristics by neonates' birth weight.

Mother's characteristics	Birth weight status		Test statistics	Df	p-value
	LBW	NBW			
	N=22 n(%)	N=180 n(%)	χ^2		
Parity			4.11		0.380
1	9(14.8)	52(85.2)			
2	7(12.1)	51(87.9)			
3	4(11.4)	31(88.6)			
4	2(8.0)	23(92.0)			
>4	0(0.0)	23(100.0)			
Age at first birth			0.31		0.986
<20	5(10.2)	44(89.8)			
20-25	9(10.5)	77(89.5)			
26-30	6(12.2)	43(87.8)			
>30	2(11.1)	16(88.9)			
Birth interval (n=136)			0.84		0.735
≤24 months	6(8.0)	69(92.0)			
25-36 months	3(10.0)	27(90.0)			
>36 months	4(12.9)	27(87.1)			
Previous LBW			1.29	1	0.254

Yes	3(25.0)	9(75.0)			
No	19(10.0)	171(90.0)			
Maternal height			0.61	1	0.434
<1.5meters	8(13.6)	51(86.4)			
≥1.5 meters	14(9.8)	129(90.2)			
Gestation at birth			4.80	1	0.028*
Preterm	4(22.2)	14(77.8)			
Term	18(9.8)	166(90.2)			
Type of gestation			8.33	1	0.004*
Twins	2(50.0)	2(50.0)			
Singleton	20(10.1)	178(89.9)			

LBW was prevalent amongst mothers who had their first birth at age 26-30 years (12.2%), while the least (10.2%) had their first baby at age less than 20 years. There was no statistically significant association ($p=0.986$) between mothers' age at first birth and LBW. Among mothers who had given birth more than once, LBW was prevalent among mothers whose birth interval was >36 months (12.9%) and least among those whose birth interval was ≤ 24 months (8.0%); however, there was no significant association between birth interval and LBW ($p=0.735$). Low birth weight was also prevalent among mothers who had a previous history of LBW delivery (25.0%) and least among those who had no previous history of LBW (10.0%). However, there was no statistically significant association between LBW and a previous history of LBW ($p=0.254$). In contrast, the association between gestational age at birth ($p=0.028$) and type of gestation ($p=0.004$) with LBW were statistically significant, as shown in Table 3.

Table 4: Maternal care during pregnancy by neonates' birth weight.

Variables	Birth weight status		Test statistics	Df	p-value
	LBW	NBW			
	N=22 n(%)	N=180 n(%)			
ANC			4.05	1	0.040*
Booked	17(9.2)	167(90.8)			
Not booked	5(27.8)	13(72.2)			
Place of ANC			8.42		0.028*
Primary Centre	0(0.0)	3(100.0)			
Secondary facility	11(14.1)	67(85.9)			
Tertiary facility	6(5.8)	97(94.2)			
None	5(27.8)	13(72.2)			

Timing of first ANC			6.30		0.083
1 st Trimester	4(6.0)	63(94.0)			
2 nd Trimester	9(10.7)	75(89.3)			
3 rd Trimester	4(12.1)	29(87.9)			
No ANC	5(27.8)	13(72.2)			
Number of ANC visits			5.17		0.072
No ANC visit	5(27.8)	13(72.2)			
<4 ANC visit	5(10.6)	42(89.4)			
≥4 ANC visit	12(8.8)	125(91.2)			
Adequacy of ANC			0.08	1	0.353
Adequate	1(3.2)	30(96.8)			
Inadequate	16(10.5)	137(89.5)			
IPT			0.61	1	0.434
Yes	17(9.9)	155(90.1)			
No	5(16.7)	25(83.3)			
IM TT			2.01	1	0.156
Yes	17(9.5)	162(90.0)			
No	5(21.7)	18(78.3)			

*= $P < 0.05$ *ANC= antenatal care, IPT= intermittent preventive treatment, IM TT= intramuscular tetanus toxoid

LBW deliveries were more common among mothers who did not book for ANC (27.8%), and the association between ANC booking and LBW was statistically significant ($p=0.040$). LBW deliveries were more among mothers who had attended ANC at a secondary facility (14.1%), and least amongst those who attended a tertiary facility (5.8%). The association between place of ANC and LBW was statistically significant ($p=0.028$) as shown in Table 4.

Table 5: Mothers' medical problems in pregnancy by neonates' birth weight.

Variables	Birth weight status		Test statistics	Df	p-value
	LBW	NBW			
	N=22	N=180	χ^2		
	n(%)	n(%)			
Hypertension in pregnancy			4.55	1	0.033*
Yes	5(25.0)	15(75.0)			

No	17(9.3)	165(90.7)			
Diabetes			0.00	1	1.000
Yes	0(0.0)	2(100.0)			
No	22(11.0)	178(89.0)			
APH			0.00	1	1.000
Yes	0(0.0)	2(100.0)			
No	22(11.0)	178(89.0)			
Maternal urinary tract infection			1.73	1	0.188
Yes	5(20.8)	19(79.2)			
No	17(9.6)	161(90.4)			
PCV Status			0.48	1	0.485
Anaemia	10(12.8)	68(87.2)			
Normal	12(9.7)	112(90.3)			

*= $P < 0.05$ † APH= antepartum haemorrhage

LBW was prevalent in mothers with hypertension in pregnancy (25.0%), while 9.3% of mothers who had LBW neonates had no hypertension in pregnancy, and the association was statistically significant ($p=0.033$). All mothers who had LBW did not have diabetes or APH. A greater proportion of mothers (20.8%) who had LBW neonates had urinary tract infection, while 9.6% had no urinary tract infection. LBW was not significantly associated with diabetes, APH, and maternal urinary tract infection, as shown in Table 5.

Table 6: Significant Maternal factors associated with low birth weight

Variables	B	Aor	95% CI	p-value
Socio-economic class				
Upper class(I-III)	-0.76	0.46	0.15 – 1.45	0.188
Lower class (IV-V)				
ANC				
Booked		6.32	1.24 – 32.21	0.026*
Not booked	1.84			
Place of ANC				
Primary centre	-20.01			
Secondary facility	0.48	1.62	0.48 – 5.44	0.435

Tertiary facility				
Hypertension in pregnancy				
Yes	0.95	2.58	0.58 – 11.40	0.209
No				
Gestation at birth				
Preterm	0.69	2.00	0.46 – 8.63	0.350
Term				
Type of gestation				
Twins	1.38	3.98	0.30 – 52.51	0.293
Singleton				

*= $P < 0.05$, B= Coefficient of determination, aOR= Adjusted Odd Ratio, CI=Confidence interval

Variables significantly associated ($P < 0.05$) with low birth weight were included in a multiple logistic regression analysis. Those who did not book for ANC (B=1.84, aOR= 6.32, CI=1.24 – 32.21, $p=0.026$) were 6.32 times more likely to have low birth weight neonates, as shown in Table 6.

Discussion

The findings of this study showed that the majority of the babies with LBW were delivered as term LBW, a finding that aligns with studies from Jos,[25] and Enugu,[26] which also reported a higher prevalence of term LBW neonates. Gestational age at birth emerged as a significant risk factor for LBW, and this finding is consistent with previous studies by Oladeinde *et al*[27] and Onyiriuka[28] in Benin, Ezugwu *et al*[13] in Enugu, Takai *et al*[29] in Maiduguri, and Isiugo-Abanihe *et al*[30] in Ibadan. The duration of pregnancy plays a crucial role in determining birth weight as foetal weight progressively increases during pregnancy. Notably, during the 3rd trimester foetal weight triples, and length doubles, with an increase in body stores of protein, fat, iron and calcium; consequently, factors that influence the length of pregnancy are directly linked to birth weight outcomes.[31]

Contrastingly, other studies reported a higher proportion of preterm LBW neonates in their findings, such as from Maiduguri,[29] Port-Harcourt,[14] Enugu,[13] and Benin.[28] In this study, despite being born at term, the majority (77.8%) of term LBW neonates were classified as symmetrical SGA. This suggests exposures to adverse pregnancy conditions, which likely contributed to foetal malnutrition and negatively impacted birth weight.[5]

The findings from this study align with other studies, which reported a higher proportion of SGA among LBW neonates, such as Ndu *et al*[26] in Enugu, Yilgwan *et al*[25] in Jos and Isiugo-Abanihe *et al*[30] in Ibadan. Interventions targeting mothers attending antenatal services, such as nutritional fortification, supplementation, promoting a balanced diet, offering nutritional education and counselling, will significantly improve maternal Nutritional status and subsequently reduce LBW.[32,33]

The type of gestation was significantly associated with LBW, with twin deliveries showing a higher proportion of LBW neonates. This is similar to findings from Benin[34] but contrasts with the reports from Lagos[35] and Port-Harcourt[14], which reported a higher incidence of LBW among singleton deliveries. The higher rate of prematurity in singletons may explain these differences in the latter studies. Despite the higher proportion of LBW among twin deliveries in our study, the finding of more singleton deliveries, coupled with fewer twin births, was consistent with previous reports indicating a low incidence of twin deliveries in Makurdi.[36]

The Majority of the mothers who delivered LBW neonates were between the ages of fifteen and twenty-five, most of whom were either first-time mothers or had given birth to only one other child. This finding is comparable to the results of Oladeinde *et al*[27] who reported more low birth weight deliveries among women between 19-23 years, Mbazor *et al* (20-29 years),[15]Avwerhota *et al* (<20 years),[37]and Amosu *et al* (<20years).[38] The study's findings are consistent with the Nigeria Multiple Indicator Cluster Survey (MICS), which also reported higher LBW rates among teenage mothers.[17]

While both age and parity were not significantly associated with LBW, these results corroborate earlier studies that identified teenage mothers and those over 35 years as being more likely to give birth to LBW neonates.[29,30,38–40] Teenage mothers face challenges such as inadequate preparation for pregnancy, poor nutrition leading to maternal malnutrition, low socioeconomic status and limited access to quality ANC- all factors contributing to a higher risk of LBW deliveries. [4,41] Strategies targeting teenage mothers, particularly in developing countries like Nigeria with high rates of teenage deliveries, such as promoting delayed childbirth and encouraging contraception, could significantly improve neonatal outcomes.[42,43]

LBW was prevalent among mothers with no formal education, supporting findings from other studies that have linked low maternal education to an increased risk of LBW.[42,44–46] Low maternal health literacy could negatively affect both the mother and foetus, limiting access to essential health interventions and reducing uptake of proven preventive measures.[47,48]

A history of previous LBW deliveries was also associated with LBW in this study, although this relationship was not statistically significant. This could be attributed to a higher proportion of first-time mothers in this study. This finding was similar to the report of Takai *et al*[29] in Maiduguri, as well as Barua *et al*[49], who also found a significant association between previous LBW deliveries and subsequent LBW births. Mothers with a previous history of LBW are more likely to have subsequent LBW neonates if the underlying risk factors are not addressed.

A greater proportion of mothers who delivered LBW neonates were shorter than 1.5 meters. While this association was not statistically significant, it is clinically relevant, as maternal short stature has been consistently associated with LBW across several studies, as reported by Oladeinde *et al*. [27] in Benin, Amosu *et al*, [38] and Isiugo-Abanihe in Ibadan, [30] Syed *et al*, [50] and Patale *et al*, [45] in India. Short maternal stature may physically limit the growth of the uterus and placenta, restricting foetal development and contributing to LBW deliveries.[4] Moreover, maternal height below 1.5 meters may compound the effects of other adverse pregnancy events, including maternal anaemia and hypertensive disorders, particularly when coupled with low SES, thereby further influencing normal birth weight.

The majority of the LBW neonates were term SGA, born to parents from a lower socioeconomic class, highlighting the role of maternal nutrition and overall health in foetal growth. Evidence from developing countries has repeatedly shown that LBW is more prevalent among women from lower socioeconomic backgrounds.[4,15] Economic disadvantage in this population often translates to inadequate dietary intake, poor nutritional status, and shorter birth intervals, which collectively compromise foetal growth and increase the risk of LBW.[4] The findings from this study are consistent with these observations, as the majority of mothers who delivered LBW neonates were from the lower socioeconomic class.

Moreover, a substantial proportion reported anaemia during pregnancy, supporting the documented evidence on the combined impact of maternal anthropometry and socioeconomic factors on neonatal birth weight. Improving maternal socioeconomic status has been found to strengthen ANC utilisation, improve uptake of maternal iron supplementation and subsequently improve pregnancy outcomes.[51,52] The majority of the mothers who had LBW deliveries were booked for ANC, which is consistent with the State's ANC coverage of 67.5% which is slightly above the National coverage of 65.8%.[17] This

finding is similar to the report of Bassey *et al*[53] who documented a booking rate of 71.6% amongst mothers who had low birth weight deliveries in Uyo, but this is in contrast to other studies, which had associated low birth weight with poor ANC. [13,14,28]

Furthermore, most mothers who delivered LBW neonates had their first ANC visit during the second or third trimester, consistent with the findings of Oladeinde *et al*[27] and Isiugo-Abanihe *et al*. [30] A greater proportion of the mothers (14.1%) who had LBW neonates attended ANC in a secondary facility, and the place of ANC was significantly associated with LBW. This finding may be attributed to the higher number of secondary facilities sampled. Additionally, the late timing of ANC booking may have impacted the quality of care. Even when booking is done early, the emphasis is not just on the number of visits but the care received during the visits, which is why the adequacy of care is important and emphasised.[54] Lack of booking for ANC was found to be a predictor for LBW, which was in keeping with previous reports from Abuja,[55] Ondo,[56] and Ogun[57]

Hypertensive disorders in pregnancy, which account for 15-20% of maternal deaths worldwide, were found to be significantly associated with LBW in this study.[58] This is consistent with findings that have associated hypertensive disorders in pregnancy with LBW from meta-analyses.[59,60] This finding is also consistent with previous findings across the country, such as the report of Yilgwan *et al*, [25] in Jos, Amosu *et al*, [38] in Ibadan, Ezugwu *et al*, [13] and Ndu *et al*, [26] both in Enugu, Ugboma *et al*, [14] in Port-Harcourt and Takai *et al*, [29] in Maiduguri. The significant association observed in this study is consistent with other findings since most of the LBW neonates were actually term SGA; hence, hypertension was identified as part of the complex interplay of factors responsible for LBW in this study. In conclusion, booking for antenatal, the place of antenatal care, hypertension in pregnancy and socioeconomic class were significant maternal risk factors associated with LBW deliveries in Makurdi, Benue State, Nigeria.

Therefore, education programmes aimed at women of reproductive age should be promoted to ensure mothers book early and attend ANC to receive adequate antenatal care during pregnancy. Integrated programmes focusing on improved maternal nutrition and socioeconomic factors are recommended to lower the risk of LBW deliveries.

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