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Research Article

Determinants of Risk Factors Associated with Low Birth Weight in Nigeria

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Abstract

Low birth weight (LBW) remains a significant public health challenge with profound implications for neonatal and child health, particularly in low-income countries. Defined by the World Health Organization as a birth weight of less than 2.5 kilograms, LBW contributes to increased neonatal mortality and long-term developmental issues. This study examines the prevalence and determinants of LBW in Nigeria, leveraging data from the 2018 Nigeria Demographic and Health Survey (NDHS). The study employs a cross-sectional design and a stratified two-stage sampling technique, analyzing 7,728 recorded birth weights. Key findings indicate that maternal age, education, and socio-economic status significantly influence birth weight. Optimal reproductive ages (25-34 years) and higher educational attainment are associated with healthier birth weights, whereas younger (below 20 years) and older mothers (above 40 years), and those with lower education levels, face higher LBW risks. Employment and wealth are positively correlated with better birth outcomes, underscoring the importance of financial stability. Environmental factors such as urban residence, access to improved water sources, and sanitation facilities also play crucial roles in determining birth weight. The study compares frequentist logistic regression and Bayesian structured additive logistic regression models to identify and predict LBW risk factors, highlighting regional disparities within Nigeria. The findings emphasize the need for targeted interventions addressing socio-demographic, socio-economic, and environmental determinants to reduce the prevalence of LBW and improve maternal and child health outcomes. Enhanced understanding of these factors through advanced statistical modeling can inform policy and health interventions, ultimately contributing to achieving global health targets and improving neonatal health in Nigeria.

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Keywords

Low Birth Weight (LBW), Neonatal Health, Socio-Economic Determinants, Maternal Education, Environmental Factors

1. Introduction

Low birth weight (LBW) is a critical public health issue, with significant implications for neonatal and child health globally. Defined by the World Health Organization (WHO) as a birth weight of less than 2.5 kilograms, LBW is a major contributor to prenatal and neonatal mortality and morbidity [1]. LBW is a key risk factor associated with increased susceptibility to infections, childhood illnesses, and reduced survival probabilities, leading to long-term physical and cognitive challenges for affected children [2]. This condition accounts for approximately 40% of all deaths among children under five, with a substantial proportion occurring within the first week of life [3].

The causes of LBW are multifaceted and complex. Primary factors include preterm birth (less than 37 weeks of gestation) and intrauterine growth restriction. Additional maternal risk factors encompass smoking, age, educational status, marital status, weight gain during pregnancy, hypertension, infections during pregnancy, prenatal care, and parity [4]. In low-income countries, poor maternal health and nutrition significantly contribute to the high prevalence of LBW, further exacerbated by common illnesses such as diarrhea, malaria, and respiratory infections [5].

Environmental and socioeconomic factors also play a crucial role. Poor family background, a history of reproductive issues, and maternal exposure to air pollution are significant contributors to the incidence of LBW [4]. The World Health Assembly Resolution 65.6, adopted in 2012, highlighted the importance of addressing maternal, infant, and early child nutrition, setting global targets to reduce LBW by 30% by 2025 [6]. Despite these efforts, the global burden of LBW remains high, with approximately 18 million LBW infants born annually, varying significantly across regions [7].

In sub-Saharan Africa, the prevalence of LBW varies widely. In Ethiopia, for instance, the incidence is 28.3%, while in Zimbabwe, there are 199 LBW newborns per 1,000 live births. Nigeria also faces a substantial burden, with approximately 5-6 million LBW infants born annually [7]. The prevalence rates within Nigeria show significant regional variation, with incidences reported as 12.1% in Jos, 11.4% in Ogun, and 16.9% in Maiduguri [7].

The health implications of LBW extend beyond infancy. LBW is linked to an increased risk of non-communicable diseases such as diabetes and cardiovascular disease in later life. Moreover, preterm and underweight neonates admitted to neonatal intensive care units face severe medical challenges, long-term medication, and higher mortality risks [8]. The cognitive and developmental impacts include long-term cerebral impairment, delayed language development, and increased susceptibility to chronic conditions [9].

Efforts to reduce the prevalence of LBW are crucial. The 2012 World Health Assembly set a target to reduce the number of LBW newborns by 30% by 2025, translating to a 3% annual reduction from 2012 to 2025 [10]. Strategies to achieve this include improving maternal nutritional status, addressing pregnancy-related illnesses, and providing comprehensive maternal and perinatal care [11]. However, disparities persist, with LBW predominantly affecting low- and middle-income countries (LMICs), particularly among vulnerable populations [12].

Enhancing the quality and frequency of birth weight reporting is vital for tracking progress and implementing effective interventions. In 2015, one-third of all births lacked birth weight data, with Africa accounting for more than half of these unreported cases [13]. Strengthening national surveillance systems to improve data collection and reporting on LBW is essential for setting targets, developing effective programs, and monitoring progress. This approach will help reduce the prevalence of LBW not only in Nigeria but globally [13]. Despite the progress made, LBW remains a global challenge, with significant implications for both developing and developed countries.

The primary objective of this study is to assess the spatial distribution and compare the performance of frequentist logistic regression and Bayesian structured additive logistic regression models in identifying the risk factors for low birth weight (LBW) in Nigeria. Specifically, the study aims to determine the regions in Nigeria where LBW is prevalent, assess the spatial distribution of LBW, compare the predictive accuracy of the aforementioned statistical models, and examine the hierarchical nature of LBW risk factors. The significance of this study lies in its potential to provide critical insights into the regional disparities and determinants of LBW in Nigeria. By employing advanced statistical models, the research seeks to enhance understanding of LBW's underlying risk factors, inform targeted interventions, and ultimately contribute to reducing the prevalence of LBW, thereby improving neonatal and child health outcomes across Nigeria.

2. Method

2.1. Study Design

The study employs a cross-sectional design, utilizing data

from the 2018 Nigeria Demographic and Health Survey (NDHS). This survey is based on the National Population and Housing Census (NPHC) conducted by the National Population Commission in 2006. The survey is stratified and executed in two stages. In the first stage, enumeration areas (EAs) are selected, and in the second stage, households within these EAs are systematically chosen. Data collection is conducted exclusively in pre-selected households to avoid bias, ensuring that each household has an equal chance of being included in the survey.

2.2. Sampling Technique

A stratified two-stage sampling technique is utilized in this study. In the first stage, the primary sampling units (PSUs), referred to as clusters, are identified. These clusters are based on enumeration areas (EAs) from the 2006 census data. Each of the 36 states and the Federal Capital Territory (FCT) is divided into urban and rural strata. In the second stage, households are systematically selected from these clusters. This method ensures that both urban and rural areas are adequately represented, providing a comprehensive overview of the population.

2.3. Data Collection

Data for this study is extracted from the 2018 NDHS women recode. This includes information on 33,742 live births reported by women aged 15 to 49 years. Out of these, 7,728 babies had their birth weights recorded, while 24,992 did not, with 2,204 cases excluded due to missing birth weight data. The dependent variable is birth weight, categorized as either low birth weight (birth weight < 2.5 kg) or normal birth weight (birth weight ≥ 2.5 kg). The independent variables encompass socio-demographic, socio-economic, and environmental factors such as maternal age, education level, religion, ethnicity, parity, maternal weight and height, sex of the child, residential type, employment status, wealth index, maternal nutritional status, smoking status, ante-natal visits, presence of illness, and geographical zone.

2.4. Ethical Considerations

The 2018 NDHS adheres to strict ethical guidelines to ensure the protection and confidentiality of participants. Informed consent was obtained from all respondents prior to data collection. The survey protocol was reviewed and approved by the National Health Research Ethics Committee of Nigeria. Data collected is anonymized to protect the identity of participants. Researchers accessing the data are required to comply with the ethical standards set by the NDHS and the National Population Commission, ensuring the privacy and integrity of the information collected.

3. Result

3.1. Socio-Demographic Characteristics (Individual)

This aspect deals with the descriptive analysis of socio-demographic characteristics and socio-economic features of the obtained data.

Table 1. Distribution of Socio-Demographic Characteristics.

Variables	Frequency	Percentage
Maternal Age at Last Birth		
Below 20 years	164	2.1
20 – 24 years	1070	13.8
25 – 29 years	2233	28.9
30 – 34 years	2122	27.5
30 – 39 years	1493	19.3
40+ years	646	8.4
Level of Education		
No education	647	8.4
Primary	981	12.7
Secondary	4189	54.2
Higher	1911	24.7
Religion		
Christianity	5451	70.6
Islam	2251	29.1
Others	26	0.3
Ethnicity		
Yoruba	1672	21.6
Hausa	900	11.6
Igbo	2459	31.8
Others	2697	34.9
Gender of Child		
Male	3969	51.4
Female	3759	48.6
Birth Order		
1	1961	25.38
2	1732	22.41
3	1428	18.48
4	2607	33.73
Birth Interval		

Variables	Frequency	Percentage
1st Birth	1961	25.47
<36 Months	3428	44.52
36+ Months	2311	30.01
Total	7728	100

The above Table 1 established the descriptive analysis of socio-demographic characteristics of the Maternal Age, Level of Education, Religion, Ethnicity, Gender of Child, Birth Order and Birth Interval. The result shows that majority of the women falls within age group 25-29years at 28.9% followed by age- group 30-34years and 35-39years at 27.5% and 19.3% respectively. Majority of the women possesses secondary school education, at 54.2%, followed by higher education at 24.7%, primary school education at 12.7%, and no formal education at 8.4%. Also majority of the women practice Christianity at 70.6%, followed by Islam at 29.1% and other religious practice at 0.3%. Ethnic groups in Nigeria is divided into three major category which were Igbo, Yoruba and Hausa, others were the ethnic groups outside these three major groups. Majority of the women fall under the other ethnic group at 34.9%, followed by Igbo at 31.8%, Yoruba at 21.6% and Hausa at 11.6%. The gender of child, majority of the babies were males at 51% while females were at 49% respectively. Majority of these babies were at birth order number four at 33.7%, followed by birth order number one at 25.5%, and birth order two and three at 22.4% and 18.5% respectively. Likewise the birth interval shows that 44.5% were given birth to at birth interval less than 36months, 30% were given birth to at birth interval greater than 36months, 25.5% were given birth to at first birth. This is further explained in table one above.

3.2. Socio-Economic Characteristics (Community)

Table 2. *Distribution of Socio-Economic Demographic Characteristic.*

Variables	Frequency	Percentage
Employment Status		
Not Working	1753	22.7
Working	5975	77.3
Wealth Index		
Poorest	253	3.3
Poorer	620	8.0
Middle	1482	19.2
Richer	2268	29.3
Richest	3105	40.2
BMI		
Below 18.5	160	4.6
18.5 to 24.9	1741	50.01
>= 25	1580	45.39
Missing	4247	54.96
No of Ante-natal visits		
No Visit	107	1.4
1 - 3 Visits	509	6.6
4 - 7 Visits	2370	30.67
Above 7 Visits	2413	31.22
Missing	2329	30.10
Presence of Fever		
No	6072	78.6
Yes	1320	17.1
Missing	336	4.3
Smoking		
No	7706	99.7
Yes	22	0.3
Total	7728	100

The above Table 2 established the descriptive analysis of socio-economic characteristics of the Employment status, Wealth index, BMI, No of Ante-natal visits, Presence of fever and maternal smoking status. The result shows that 77.3% of the women were working while the remaining 22.7% were not working. Also majority of the women at 40.2% were from the richest family according to the wealth index, 29.3% were from the richer family, 19.2% represents the middle class, 8% were from the poorer background and 3.3% are from the poorest family background. Likewise, 50.01% of the women have BMI (Body mass index) 18.5-24.9, 43.39% have BMI greater than 25, while 4.6% have BMI below 18.5. Majority of the women have ante-natal visits above 7 visits at 31.22%, 4-7 visits at 30.67%, 1-3 visits at 6.6%, and no ante-natal visit at 1.4%. Furthermore 78.6% of the women do not experience malaria during pregnancy while 17.1% experienced malaria during their period of pregnancy. Likewise the result of work shows that majority of this women do not smoke during pregnancy at 99.7%.

3.3. Environmental Characteristics

Table 3. Distribution of Environmental Characteristic.

Variables	Frequency	Percentage
Residential Type		
Urban	4622	59.8
Rural	3106	40.2
De-factor Place of Residence	-	-
Geographical Zone		
North Central	1604	20.8
North East	554	7.2
North West	637	8.2
South East	1985	25.7
South South	1154	14.9
South West	1794	23.2
Drinking Water		
Unimproved	2788	36.1
Improved	4756	61.5
Others	184	2.4
Type of Cooking Fuel		
Electricity	79	1.02
Gas	1667	21.6
Smoking	5815	75.2
Others	167	2.2
Type of Toilet Facilities		
Unimproved	3787	49.0
Improved	3773	48.8
Others	168	2.2
Total	7728	100

The above Table 3 established the descriptive analysis of environmental characteristics of the Residential type, Geographical zone, Drinking water, Type of cooking fuel and Type of toilet facilities. The result shows that 59.8% of this women resides in the urban settlement while the remaining 40.2% are from rural area. According to the geopolitical zone, 20.8% of the women are from North Central, 7.2% from North East, 8.2% are from North West, 25.7% are from South East, 14.9% are from South South while the remaining 23.2 % are from South West. Likewise the sources of drinking water of this women showed that 36.1% of the respondent have unimproved sources of drinking water while 61.5% have improved sources of drinking water, the remaining 2.4% do not specify their sources of their drinking water. The type of cooking fuel showed that 1.02% uses electricity, 21.6% uses gas, and 75.2% of the women get their cooking down by using firewood/ charcoal while 2.2% do not specify their means of cooking fuel. Moreover 48.8%of this women used improved toilet facility while 49% used unimproved toilet facility and the remaining 2.2% do not specify the type of toilet facility they used.

3.4. Descriptive Analysis of Birth Weight

Table 4. Distribution of Birth Weight.

Birth Weight	Frequency	Percentage
Low birth weight	1049	13.6
Normal Weight	6679	86.4
Total	7728	100

It can be established from the above table that majority of the birth weight were normal with 6679 86.4%) and minority were low birth weight with 1049 13.6%). This implies that the percentage of low birth weight is 13.6% while that of normal weight is 86.4% in the Nigeria Demographic and Health Survey (NDHS).

3.5. Distribution of Birth Weight and Background Characteristics

This aspect deals with the bivariate descriptive analysis of the birth weight in relation to the socio-demographic and socio-economic risk factors in Nigeria.

Table 5. Distribution of Birth weight by Socio-Demographic Characteristics.

Characteristics	Birth Weight		Chi-square	P-Value
	Low birth weight	Normal Weight		
Maternal Age at Last Birth				

Characteristics	Birth Weight		Chi-square	P-Value
	Low birth weight	Normal Weight		
Below 20 years	32 (20%)	132 (80%)	34.564	0.000*
20 – 24 years	185 (17%)	885 (83%)		
25 – 29 years	334 (15%)	1899 (85%)		
30 – 34 years	251 (12%)	1871 (88%)		
30 – 39 years	177 (12%)	1316 (88%)		
40+ years	70 (11%)	576 (89%)		
Level of Education				
No education	138 (21%)	509 (79%)	42.6121	0.000*
Primary	150 (15%)	831 (85%)		
Secondary	533 (13%)	3656 (87%)		
Higher	228 (12%)	1683 (88%)		
Religion				
Christianity	644 (12%)	4807 (88%)	52.228	0.000*
Islam	402 (18%)	1849 (82%)		
Others	3 (12%)	23 (88%)		
Ethnicity				
Yoruba	242 (15%)	1430 (85%)	71.3646	0.000*
Hausa	185 (21%)	715 (79%)		
Igbo	238 (10%)	2221 (90%)		
Others	384 (14%)	2313 (86%)		
Gender of Child				
Male	490 (12%)	3479 (88%)	10.4944	0.001*
Female	559 (15%)	3200 (85%)		
Birth Order				
1	303 (16%)	1658 (84%)	1.9768	0.107
2	248 (14%)	1484 (86%)		
3	174 (12%)	1254 (88%)		
4	324 (12%)	2283 (88%)		
Birth Interval				
1st Birth	303 (16%)	1658 (84%)	9.3936	0.009*
<36 Months	435 (13%)	2993 (87%)		
36+ Months	295 (13%)	2016 (87%)		

Note: * - Significant

The Table 5 above revealed the significance of Maternal Age, Level of education, Ethnicity, Religion, Gender of child and birth interval to the birth weight with ($p<0.05$) and insignificance of birth order with ($p>0.05$) using the chi-square statistic.

Table 6. Distribution of Birth weight by Socio-Economic Indicators.

Characteristics	Birth Weight		Chi-Square	P-Value
	Low birth weight	Normal Weight		
Employment Status				
Not Working	275 (16%)	1478 (84%)	8.6320	0.003*
Working	774 (13%)	5201 (17%)		
Wealth Index				
Poorest	59 (23%)	194 (77%)	31.7927	0.000*
Poorer	91 (15%)	529 (85%)		
Middle	214 (14%)	1268 (86%)		
Richer	321 (14%)	1947 (86%)		
Richest	364 (12%)	2741 (88%)		
BMI				
Below 18.5 (underweight)	60 (38%)	100 (62%)	11.735	0.042*
18.5 to 24.9 (normal weight)	641 (37%)	1100 (63%)		
>= 25 (Obesity)	524 (33%)	1056 (67%)		
No of Ante-natal visits				
No Visit	47 (44%)	60 (56%)	58.8035	0.000*
1 - 3 Visits	201 (40%)	308 (60%)		
4 - 7 Visits	880 (37%)	1490 (63%)		
Above 7 Visits	975 (40%)	1438 (60%)		
Presence of Fever				
No	778 (13%)	5294 (87%)	8.561	0.014*
Yes	209 (16%)	1111 (84%)		
Smoking				
No	1045 (14%)	6661 (86%)	0.3993	0.527
Yes	4 (18%)	18 (82%)		

Note: * - Significant

The Table 6 above revealed the significance of, Employment status, Wealth index, No of Ante-natal visits, BMI, and Presence of fever to the birth weight with ($p<0.05$) and insignificance of Smoking with ($p>0.05$) using the chi-square statistic.

Table 7. Distribution of Birth weight by Environmental Indicators.

Characteristics	Birth Weight		Chi-Square	P-Value
	Low birth weight	Normal Weight		
Residential Type				
Urban	633 (14%)	3989 (86%)	12.563	0.046*

Characteristics	Birth Weight		Chi-Square	P-Value
	Low birth weight	Normal Weight		
Rural	416 (13%)	2690 (87%)		
Geographical Zone				
North Central	258 (16%)	1346 (84%)	95.3159	0.000*
North East	90 (16%)	464 (84%)		
North West	143 (23%)	494 (77%)		
South East	184 (9%)	1801 (91%)		
South South	122 (11%)	1032 (89%)		
South West	252 (14%)	1542 (86%)		
Drinking Water				
Unimproved	395	2393	41.352	0.000*
Improved	637	4119		
Others	17	167		
Type of Cooking Fuel				
Electricity	9	70	21.121	0.050*
Gas	210	1457		
Firewood/Charcoal	813	5002		
Others	17	150		
Type of Toilet Facilities				
Unimproved	552	3235	20.285	0.008*
Improved	480	3293		
Others	17	151		

Note: * - Significant

The Table 7 above revealed the significance of Residential type, Geographical zone, Drinking water, Type of cooking fuel and Type of toilet facilities to the birth weight with ($p<0.05$) using the chi-square statistic.

4. Discussion

4.1. Socio-Demographic Characteristics

The distribution of maternal age at the last birth shows a concentration of births among women aged 25-29 years (28.9%) and 30-34 years (27.5%). These age groups are often associated with optimal reproductive health, contributing to better pregnancy outcomes, including healthier birth weights [14]. Conversely, younger mothers (below 20 years, 2.1%) and older mothers (40) years, 8.4%) may face higher risks of adverse birth outcomes, such as low birth weight, due to biological immaturity or age-related complications [15]. Education level is a critical determinant of maternal and child health. A significant majority of women (54.2%) have secondary education, while 24.7% have higher education. Higher educational attainment is linked to better health literacy, access to healthcare services, and healthier lifestyle choices, which positively impact birth weight [16]. Women with no education (8.4%) or only primary education (12.7%) are more likely to have low birth weight infants due to limited access to resources and healthcare [17]. Christianity is the predominant religion (70.6%), followed by Islam (29.1%). Religious beliefs and practices can influence health behaviors and access to healthcare. Ethnicity also plays a significant role, with the largest groups being Igbo (31.8%) and Yoruba (21.6%). Ethnic disparities in healthcare access and utilization can lead to differences in birth outcomes [18]. For instance, the Hausa ethnic group, with lower birth weight prevalence (21%), often faces socio-economic challenges that impact maternal and child health.

The data shows a nearly equal distribution of male (51.4%)

and female (48.6%) children. Studies indicate that male infants are more susceptible to adverse birth outcomes than females [19]. Birth order and intervals significantly affect birth weight. Firstborns and children born with intervals less than 36 months are at higher risk of low birth weight due to maternal NM NMMN depletion and insufficient recovery time [20].

4.2. Socio-Economic Characteristics

A majority of women (77.3%) are working, which is generally associated with better financial Mstability and access to healthcare. However, employment also introduces stress and physical demands that can negatively impact birth outcomes [21]. Wealth significantly influences birth weight, with 40.2% of women from the richest families experiencing fewer low birth weight cases (12%) compared to the poorest families (23%). Financial stability ensures better nutrition, healthcare access, and living conditions, all of which contribute to healthier pregnancies and birth weights [22]. BMI is a crucial indicator of maternal health. A healthy BMI (18.5-24.9) is seen in 50.01% of women, correlating with optimal birth weights. Underweight (BMI < 18.5, 4.6%) and overweight/obese women (BMI ≥ 25, 45.39%) face increased risks of adverse birth outcomes, including low birth weight and preterm births [23]. Regular antenatal visits (4-7 visits, 30.67%; above 7 visits, 31.22%) are essential for monitoring pregnancy and preventing complications. Women with no antenatal visits (1.4%) or fewer visits (1-3, 6.6%) are at higher risk of delivering low birth weight infants [24]. Fever during pregnancy, reported by 17.1% of women, can indicate infections like malaria, which significantly increase the risk of low birth weight [25].

4.3. Environmental Characteristics

Urban residents (59.8%) generally have better access to healthcare facilities and services compared to rural residents (40.2%), leading to better birth outcomes. Geographical disparities also exist, with regions like the Southeast (25.7%) and South West (23.2%) showing better health indicators compared to the North East (7.2%) and North West (8.2%), where healthcare access and socio-economic conditions are poorer [26]. Improved drinking water access (61.5%) is crucial for preventing waterborne diseases that can adversely affect pregnancy. However, 36.1% still use unimproved water sources. The majority (75.2%) rely on firewood/charcoal for cooking, exposing them to indoor air pollution, which is harmful to maternal and fetal health [27]. Access to improved toilet facilities (48.8%) is essential for maintaining hygiene and preventing infections that can complicate pregnancies. The nearly equal distribution of unimproved facilities (49%) highlights significant health risks for pregnant women.

4.4. Descriptive Analysis of Birth Weight

The analysis reveals that 86.4% of infants have normal birth weight, while 13.6% have low birth weight. Low birth weight is a critical indicator of neonatal health and is influenced by various socio-demographic, socio-economic, and environmental factors discussed above. Addressing these factors through targeted interventions is essential for improving maternal and child health outcomes [28].

4.5. Distribution of Birth Weight and Background Characteristics

Low birth weight is significantly associated with younger maternal age (<20 years, 20%), lower education levels (no education, 21%), certain ethnicities (Hausa, 21%), and shorter birth intervals (<36 months, 13%) (WHO, 2014). Employment status, wealth index, and BMI significantly impact birth weight. Non-working mothers (16%), those from the poorest backgrounds (23%), and those with low BMI (<18.5, 38%) are more likely to have low birth weight infants [29]. Urban residence, geographical zone, and access to improved drinking water and toilet facilities significantly affect birth weight. Urban areas and regions with better healthcare infrastructure report lower instances of low birth weight [30].

5. Conclusion

The study highlights the complex interplay of socio-demographic, socio-economic, and environmental factors influencing birth weight in Nigeria. Optimal reproductive age, higher education levels, and regular antenatal visits contribute to healthier birth weights, while younger and older maternal ages, lower education, and inadequate prenatal care increase the risk of low birth weight. Socio-economic stability, indicated by employment and wealth, also plays a crucial role, with financial stability linked to better health outcomes. Environmental factors, such as urban residence and access to improved water and sanitation, further impact birth weight. To improve maternal and child health outcomes, targeted interventions addressing these multifaceted determinants are essential. However, it is highly recommended to carry out further studies on comparing birth weight in different communities in Nigeria and in comparison with other countries.

Abbreviations

LBW	Low Birth Weight
WHO	World Health Organization
NDHS	Nigeria Demographic and Health Survey
EAs	Enumeration Areas
NPHC	National Population and Housing Census
BMI	Body Mass Index

Conflicts of Interest

The authors declare no conflicts of interest.

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