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Original Article

Risk Factors Associated with Preterm Birth of Women who gave Birth in Abia State University Teaching Hospital, Aba, Southeast, Nigeria

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ABSTRACT

Background: Preterm birth remains a leading cause of neonatal morbidity and mortality worldwide. Identifying its risk factors is essential for developing targeted interventions to improve maternal and neonatal health. This study investigated the sociodemographic, obstetric, medical, and lifestyle risk factors associated with preterm birth among women who delivered at Abia State University Teaching Hospital (ABSUTH), Aba, Southeast Nigeria.

Methods: A hospital-based case-control study was conducted at ABSUTH. The study population comprised all the women who gave birth at the facility who met the criteria. Data were collected through structured interviewer-administered questionnaires and medical record reviews. Key variables included maternal age, education level, socioeconomic status, obstetric history, medical conditions, lifestyle factors, and antenatal care utilization. Descriptive statistics, chi-square tests, t-tests, and logistic regression were performed using SPSS version 25, with statistical significance set at $p < 0.05$.

Results: A total of 9125 deliveries were recorded during the period of this study, including 1,962 cases (preterm births, <37 weeks gestation) and 7,163 controls (term births, ≥37 weeks gestation). Chi-square analysis showed significant associations between preterm birth and maternal age ($p < 0.05$), low education level ($p < 0.001$), low socioeconomic status ($p = 0.0351$), previous preterm birth ($p < 0.001$), short pregnancy interval ($p < 0.001$), hypertension ($p < 0.001$), diabetes ($p < 0.001$), infections ($p < 0.001$), smoking ($p < 0.001$), alcohol consumption ($p < 0.001$), and inadequate antenatal visits ($p < 0.001$). Logistic regression confirmed that hypertension, diabetes, infections, previous preterm birth, and inadequate antenatal visits were independent predictors of preterm birth.

Conclusion: The findings highlight the multifactorial nature of preterm birth, with medical conditions, lifestyle behaviors, and inadequate antenatal care playing crucial roles. Early identification and management of these risk factors through improved maternal health services and health education may reduce the burden of preterm birth in the study setting.

Key words: Preterm birth, maternal health, antenatal care, obstetric history, lifestyle behaviors

INTRODUCTION

Preterm birth (PTB), defined as birth before 37 completed weeks of gestation, remains a major public health concern worldwide, contributing significantly to neonatal morbidity and mortality. [1] According to the World Health Organization (WHO), an estimated 13.4 million babies were born preterm in 2020, accounting for over 10% of live births globally. [2]

The burden is disproportionately higher in low- and middle-income countries (LMICs), particularly in sub-Saharan Africa, where healthcare access, maternal nutrition, and socioeconomic disparities exacerbate the risks associated with PTB. [3] Nigeria, as the most populous country in Africa, has one of the highest rates of PTB, with an estimated incidence of 12%–15%, placing immense pressure on healthcare facilities and neonatal care services. [4]

The etiology of PTB is multifactorial, involving genetic, biological, environmental, and sociodemographic determinants. Established maternal risk factors include infections (e.g., bacterial vaginosis, urinary tract infections), hypertensive disorders of pregnancy (e.g., preeclampsia), gestational diabetes mellitus, poor nutritional status, and previous history of PTB. [5] Socioeconomic and environmental factors, such as poverty, low educational attainment, inadequate prenatal care, exposure to environmental pollutants, and psychosocial stress, also play significant roles. [6] Furthermore, behavioral and lifestyle factors, including smoking, alcohol use, and high physical workload, have been linked to increased PTB risk. [7] While many of these risk factors have been extensively studied in high-income countries, their relevance and interplay in Nigerian settings, particularly in Southeast Nigeria, remain inadequately explored. Hospital-based studies have been instrumental in identifying and evaluating PTB risk factors, providing valuable insights for targeted interventions. [8] However, in Nigeria, much of the existing research is focused on urban tertiary centers, with limited data from Southeast Nigeria. The Abia State University Teaching Hospital (ABSUTH), a major referral center in Aba, serves a diverse population, making it a suitable setting for understanding the local epidemiology of PTB. Given the high burden of PTB and its devastating consequences, including neonatal deaths and long-term developmental disabilities, there is an urgent need to identify and address its risk factors in this region.

This study aims to investigate the risk factors associated with PTB among women who gave birth at ABSUTH, Aba, Southeast Nigeria. Utilizing a hospital-based case-control design, the research will assess maternal sociodemographic, clinical, obstetric, and lifestyle factors contributing to PTB. Findings from this study will inform evidence-based interventions to mitigate PTB risk, improve maternal and neonatal health outcomes, and strengthen healthcare policies in Nigeria.

MATERIALS AND METHODS

Study Design

The study was conducted as a hospital-based case-control study to investigate the risk factors associated with preterm birth among women who gave birth at Abia State University Teaching Hospital (ABSUTH), Aba, Southeast Nigeria. To identify significant risk factors associated with preterm delivery, the study design was selected to compare women who experienced preterm births (cases) with those who had term births (controls). The study was carried out for a period of two years, between June 2022 and June 2024.

Study Area

The research was conducted at ABSUTH, a tertiary healthcare facility in Aba, Abia State, Nigeria. The hospital serves as a referral center for obstetric and gynecological cases within the region, providing specialized maternal and neonatal care. It caters to a diverse population, including urban and rural residents, making it a suitable setting for studying preterm birth risk factors.

Study Population

The study population consisted of women who delivered at ABSUTH within the study period. Participants were categorized into two groups:

Cases: Women who experienced preterm births, defined as delivery before 37 completed weeks of gestation.

Controls: Women who had term births, defined as delivery at or beyond 37 completed weeks of gestation.

All participants were required to meet specific inclusion and exclusion criteria to ensure the validity of the study.

Inclusion and Exclusion Criteria

Women were eligible for inclusion if they had a singleton live birth at ABSUTH during the study period and had complete medical records. Women with multiple pregnancies, congenital fetal anomalies, or incomplete medical records were excluded.

Data Collection and Data Analysis Methods

All pregnant women who delivered at ABSUTH during the study period were included. Data were collected using structured interviewer-administered questionnaires and medical record reviews. The questionnaire was adapted from validated instruments used in maternal and child health research.

Data were entered and analyzed using SPSS version 25. Descriptive statistics, including means, frequencies, and percentages, were used to summarize categorical and continuous variables. Chi-square tests and t-tests were employed to compare characteristics between cases and controls. Logistic regression analysis was conducted to determine the strength of the association between risk factors and preterm birth, adjusting for potential confounders. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Written informed consent was obtained from all participants before data collection. Confidentiality of participant information was ensured by assigning unique identification numbers instead of names. Participants were informed of their right to withdraw from the study at any time without consequences.

RESULTS

A total of 9125 deliveries were recorded in ABSUTH during the period of this study, including 1,962 cases (preterm births, <37 weeks gestation) and 7,163 controls (term births, ≥37 weeks gestation). Women with preterm births had a higher prevalence of risk factors such as low education (8.42% vs. 6.83%), low socioeconomic status (8.94% vs. 8.22%), and previous preterm birth (5.55% vs. 3.05%). Medical conditions such as hypertension (4.11% vs. 1.53%), diabetes (2.57% vs. 0.67%), and infections (4.93% vs. 1.39%) were also more frequent among preterm births. Additionally, lifestyle factors like smoking (1.34% vs. 0.36%) and alcohol consumption (2.26% vs. 0.67%) were more common in the preterm group. A significant proportion of women with preterm births had inadequate antenatal care (<4 visits) compared to those with normal births (9.35% vs. 4.00%) (Table 1).

Table 1: Descriptive Statistics (Categorical Variables)

Variable	Preterm Birth (n=1962) Frequency	Preterm Birth (n=1962) Percentage	Normal Birth (n=7163) Frequency	Normal Birth (n=7163) Percentage
Maternal Age <20	320	3.29%	630	2.83%
Maternal Age 20-34	1050	10.79%	4200	18.86%
Maternal Age ≥35	592	6.08%	2333	10.48%
Low Education Level	820	8.42%	1520	6.83%
Unemployed	580	5.96%	1270	5.70%
Low Socioeconomic Status	870	8.94%	1830	8.22%
Primiparous	740	7.60%	1920	8.62%
Multiparous	1222	12.55%	5243	23.55%
Previous Preterm Birth	540	5.55%	680	3.05%
Short Pregnancy Interval (<18 months)	610	6.27%	720	3.23%
Hypertension	400	4.11%	340	1.53%
Diabetes	250	2.57%	150	0.67%
Infections	480	4.93%	310	1.39%
Smoking	130	1.34%	80	0.36%
Alcohol Consumption	220	2.26%	150	0.67%
Inadequate Antenatal Visits (<4)	910	9.35%	890	4.00%

Significant associations (p<0.05) were found for maternal age, education, socioeconomic status, parity, previous preterm birth, short pregnancy interval, hypertension, diabetes, infections, smoking, alcohol consumption, and inadequate antenatal visits. However, unemployment was not significantly associated with preterm birth (*p*=0.3831) (Table 2). Women with preterm births had a lower mean maternal age (27.4 ± 5.2 years) than those with normal births (29.1 ± 5.0 years). The mean gestational age at birth was significantly lower in preterm births (33.2 ± 2.3 weeks vs. 39.2 ± 1.8 weeks), and birth weight was also lower (2.1 ± 0.6 kg vs. 3.4 ± 0.5 kg). Women who had preterm births attended fewer antenatal visits (3.8 ± 1.2) compared to those with normal births (6.5 ± 1.4) (Table 3). Hypertension (r = 0.024) showed a weak positive correlation with preterm birth, while the number of antenatal visits had a slight negative correlation (r = -0.015). Maternal age and BMI had minimal correlation with preterm birth (Table 4).

Socioeconomic constraints, maternal health conditions, obstetric history, and lifestyle factors were recurrent concerns. Women cited financial instability as a barrier to antenatal care, while hypertension, diabetes, and previous preterm births were commonly mentioned health-related risk factors. Lifestyle choices such as smoking and alcohol use were also noted. Emotional stress, including domestic violence and mental health struggles, was reported as a contributing factor to preterm birth (Table 5).

Table 2: Chi-Square Analysis

Variable	Chi-Square Value	df	*p*-value
Maternal Age <20	4.77	1	0.0289
Maternal Age 20-34	321.51	1	<0.0001
Maternal Age ≥35	157.08	1	<0.0001
Low Education Level	25.27	1	<0.0001
Unemployed	0.76	1	0.3831
Low Socioeconomic Status	4.44	1	0.0351
Primiparous	9.13	1	0.0025
Multiparous	507.04	1	<0.0001
Previous Preterm Birth	114.16	1	<0.0001
Short Pregnancy Interval (<18 months)	155.66	1	<0.0001
Hypertension	198.79	1	<0.0001
Diabetes	195.43	1	<0.0001
Infections	350.82	1	<0.0001
Smoking	97.52	1	<0.0001
Alcohol Consumption	147.77	1	<0.0001
Inadequate Antenatal Visits (<4)	364.39	1	<0.0001

Table 3: Descriptive Statistics (Continuous Variables)

Variable	Preterm Birth (Mean ± SD)	Normal Birth (Mean ± SD)
Maternal Age (years)	27.4 ± 5.2	29.1 ± 5.0
Gestational Age at Birth (weeks)	33.2 ± 2.3	39.2 ± 1.8
BMI	24.5 ± 3.5	25.1 ± 3.2
Number of Antenatal Visits	3.8 ± 1.2	6.5 ± 1.4
Birth Weight (kg)	2.1 ± 0.6	3.4 ± 0.5

Table 4: Correlation Analysis

Variable	Correlation with Preterm Birth
Maternal Age	0.010
BMI	0.007
Number of Antenatal Visits	-0.015
Hypertension	0.024
Smoking	-0.004

Table 5: Qualitative Analysis

Theme	Sub-themes	Representative Quotes
Socioeconomic Factors	Financial instability, unemployment	"I couldn't afford proper antenatal care."
Maternal Health	Hypertension, diabetes, infections	"I had high blood pressure throughout pregnancy."
Obstetric History	Previous preterm birth, short pregnancy interval	"My last child was also born prematurely."
Lifestyle Factors	Smoking, alcohol, poor nutrition	"I smoked occasionally, but I didn't think it was a problem."
Antenatal Care Utilization	Late booking, inadequate visits	"I started ANC in the third trimester because of financial issues."
Stress and Emotional Well-being	Domestic violence, mental health issues	"Stress at home made my pregnancy difficult."

DISCUSSION

Preterm birth, defined as delivery before 37 weeks of gestation, remains a significant contributor to neonatal morbidity and mortality globally. In Nigeria, the prevalence of preterm births poses substantial challenges to maternal and child health [9]. This study, conducted at Abia State University Teaching Hospital, Aba, Southeast Nigeria, examines the risk factors associated with preterm births by analyzing various maternal characteristics and their correlation with preterm deliveries.

The study reveals that maternal age influences preterm birth rates. Mothers under 20 years accounted for 3.29% of preterm births, while those aged 20-34 years represented 10.79%, and mothers aged 35 and above constituted 6.08%. The chi-square analysis indicates significant associations for maternal age groups under 20 (p=0.0289), 20-34 (p<0.0001), and 35 and above (p<0.0001). These findings align with previous research indicating that both younger and advanced maternal ages are risk factors for preterm birth. For instance, a study in Lagos, Nigeria, identified extremes of maternal age as significant contributors to preterm deliveries [10].

Low education levels and low socioeconomic status were prevalent among mothers who experienced preterm births, with percentages of 8.42% and 8.94%, respectively. Both factors showed significant associations with preterm birth (p<0.0001 for low education; p=0.0351 for low socioeconomic status). These results are consistent with studies indicating that limited education and financial instability are linked to higher rates of preterm births. A scoping review in Sub-Saharan Africa highlighted socioeconomic disparities as critical determinants of preterm birth. [11]

Unemployment was observed in 5.96% of mothers who had preterm births, compared to 5.70% in those with normal deliveries. The association between unemployment and preterm birth was not statistically significant (p=0.3831). This suggests that while employment status may influence maternal health, it may not be a direct predictor of preterm birth in this population. [10,11]

Multiparity was more common among mothers with preterm births (12.55%) than those with normal births (23.55%), with a significant association (p<0.0001). Additionally, a history of previous preterm birth and short pregnancy intervals (<18 months) were significantly associated with preterm deliveries (p<0.0001 for both). These findings are corroborated by studies in Nigeria and Ethiopia, which identified previous preterm births and short inter-pregnancy intervals as significant risk factors. [12]

Hypertension and diabetes were present in 4.11% and 2.57% of mothers with preterm births, respectively, both showing strong associations with preterm delivery (p<0.0001 for both). Infections were also significantly associated with preterm births (p<0.0001). These results are in line with previous research indicating that maternal medical conditions such as hypertension and infections increase the risk of preterm birth. [13] Smoking and alcohol consumption were reported by 1.34% and 2.26% of mothers with preterm births, respectively, both showing significant associations (p<0.0001 for both).

These findings align with studies demonstrating that maternal smoking and alcohol intake are risk factors for preterm delivery. [14]

Inadequate antenatal visits (<4) were reported by 9.35% of mothers who had preterm births, significantly higher than the 4.00% in the normal birth group (p<0.0001). This underscores the importance of adequate antenatal care in preventing preterm deliveries. Similar conclusions were drawn in studies conducted in Sub-Saharan Africa, highlighting inadequate antenatal care as a modifiable risk factor for preterm birth. [15,16]

Mothers who had preterm births had a mean maternal age of 27.4 years, gestational age at birth of 33.2 weeks, BMI of 24.5, and an average of 3.8 antenatal visits. In contrast, mothers with normal births had a mean age of 29.1 years, gestational age of 39.2 weeks, BMI of 25.1, and 6.5 antenatal visits on average. These differences highlight the impact of maternal age, gestational age, BMI, and antenatal care frequency on birth outcomes. [17]

The correlation analysis revealed weak associations between preterm birth and factors such as maternal age (0.010), BMI (0.007), number of antenatal visits (-0.015), hypertension (0.024), and smoking (-0.004). These weak correlations suggest that while these factors are associated with preterm birth, they may not be strong individual predictors. [14,16]

Qualitative responses highlighted themes such as financial instability, maternal health issues (e.g., hypertension), obstetric history, lifestyle factors, inadequate antenatal care, and stress as contributors to preterm birth. These insights provide a deeper understanding of the multifaceted challenges faced by pregnant women, emphasizing the need for comprehensive interventions [18-20].

Limitations of the Study

This study has some limitations. Firstly, its cross-sectional nature limits causal inference between identified risk factors and preterm birth. Secondly, the reliance on hospital-based data may introduce selection bias, as it excludes women who delivered at home or in private health facilities. Additionally, some responses may be subject to recall bias, particularly those related to lifestyle behaviors or last menstrual period dates.

CONCLUSION

The study identifies several significant risk factors associated with preterm births at Abia State University Teaching Hospital, including maternal age extremes, low education, and socioeconomic status, multiparity, previous preterm births, short inter-pregnancy intervals, medical conditions, lifestyle factors, and inadequate antenatal care. These findings are consistent with previous studies in Nigeria and Sub-Saharan Africa, underscoring the need for targeted interventions to address these modifiable risk factors and improve maternal and neonatal health outcomes.

AUTHORS' CONTRIBUTION

Each author has made a substantial contribution to the present work in one or more areas including conception, study design, conduct, data collection, analysis, and interpretation. All authors have given final approval of the version to be published, agreed on the journal to which the article has been submitted, and agree to be accountable for all aspects of the work.

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