



Epidemiology, Risk Determinants, And Clinical Outcomes Of Singleton Preterm Births At Lagos Island Maternity, Lagos, Nigeria.

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ABSTRACT

Introduction: Preterm birth is a major public health problem and a significant contributor to neonatal morbidity and mortality globally and especially in resource-poor settings such as Nigeria. While preterm birth rates are known to be high in Sub-Saharan Africa, current data are insufficient to comprehensively explain the contributing factors in this region. This study aims to explore the prevalence, risk determinants, and clinical outcomes of singleton preterm births in Lagos Island Maternity Hospital, Lagos, Nigeria.

Methods: This is a retrospective study done over a triennium, between January 2021 and December 2023.

Results: Out of 9180 singleton birth, there were 1828 (19.9%) preterm deliveries. Due to incomplete records, 21 patients were deliberately omitted from the analysis. 1760 (97.4%) were live births while 47 (2.6%) were stillbirths. In addition, of the live births, the majority, 1043 (59.3%), were Moderate-to-late Preterm, followed by 537 (30.5%) who were Very Preterm and 180 (10.2%) were Extremely Preterm. 963 (54.7%) were admitted to the Neonatal Ward, 649 (36.4%) were asphyxiated in the fifth minute of life. Neonatal death occurred in 224 cases (12.7%). Preterm deliveries were higher among multiparous women, women without antenatal booking, and those with hypertensive pregnancy disorders.

Conclusion: The prevalence of preterm deliveries among singleton pregnancies was 19.9% and remains a significant contributor to perinatal mortality. Identified risk factors for preterm birth included multiparity, absence of antenatal care, and hypertensive disorders of pregnancy

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Introduction

Preterm birth refers to the delivery of a baby before completing 37 weeks of gestation, or less than 259 days from the first day of the woman's last menstrual period.¹ This period is commonly categorized into subgroups, though the classifications may differ across organizations. According to the World Health Organization (WHO), births occurring before 28 completed weeks are classified as extremely preterm, those between 28 weeks and 31 weeks and 6 days as very preterm, and births from 32 weeks to

36 weeks and 6 days as moderate to late preterm¹. Preterm birth is a substantial global health issue with significant consequences to the newborn, family, and society². Worldwide, prematurity, occurring mostly as a result of Preterm birth, is the leading cause of death in children under the age of 5 years¹. Globally, about 15 million babies are born preterm each year and most preterm births occur in Sub-Saharan Africa and Southern Asia^{1,3}. The incidence of preterm birth varies significantly across the world. In most

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developed nations of the world, the rate of preterm birth is below 10%; the United Kingdom has a Preterm birth rate that is around 7%, and in the United States of America, Preterm birth rate ranges between 9 and 12% with huge interstate variation. The rate is much higher in most underdeveloped and developing countries, and Nigeria is among the countries with the greatest number of Preterm births, with Preterm birth rates exceeding 15%³.

Preterm births can happen for various reasons, with the majority being spontaneous. They may also result from preterm Prelabour rupture of membranes or be medically induced due to a range of maternal and/or fetal conditions^{1,4,5}. Although most preterm births occur without warning, certain cases result from medical complications like infections and pregnancy-related hypertensive disorders such as preeclampsia and eclampsia, maternal anaemia, malnutrition in pregnant mothers, maternal infections in pregnancy and other pregnancy complications that require early delivery, either by induction of labour or caesarean birth⁶⁻⁸.

In comparison with infants born at term, preterm infants have a much greater risk of morbidity and mortality.¹⁻⁵ These infants are also more likely to have difficulty with feeding, poor blood glucose control, neonatal jaundice, temperature instability, apnea, respiratory distress, sepsis, wide spectrum of neuro-developmental disabilities, as well as growth and health problems either singly or in combination compared to neonates delivered at term⁵. Despite the various known risk factors, some preterm births have no identifiable risk factors⁹, with a study reporting a lack of identifiable risk factors in 36.4% of Preterm births¹⁰.

Although the rate of Preterm births is unacceptably high in Nigeria, the plethora of available data have not exhaustively identified all the factors associated with Preterm births in our environment. Against this background, the present study was undertaken to determine the prevalence of preterm births at Lagos Island Maternity Hospital, identify associated risk factors, and assess fetal outcomes linked to preterm deliveries at the center. The findings are intended to supplement existing data on preterm births at both local and national levels, and to inform the development of targeted intervention strategies aimed at reducing the incidence and impact of preterm births while improving perinatal outcomes.

Methods

Study Site

This study was carried out in the labour and neonatal wards of Lagos Island Maternity Hospital. Both wards operate 24 hours a day, and the hospital records over 3,000 deliveries annually. Ethical approval for the study was obtained from the hospital's Research and Ethics Committee.

Study Design and Participants

This is a retrospective cohort study carried out from January 1, 2021, to December 31, 2023. The study population was all women who had preterm delivery at the Lagos Island Maternity Hospital Lagos, Nigeria.

Criteria for Inclusion in The Study

The inclusion criteria comprised singleton births occurring between 28 and 36 weeks and 6 days of gestation, as well as live births before 28 weeks. Exclusion criteria included multiple preterm births, pregnancies with unknown gestational age, and cases with incomplete data—particularly where gestational age was not documented.

Data Collection And Analysis

Data for this study were collected using a structured proforma and retrieved from multiple sources, including the Health Information Management Department, Labour Ward Records, Neonatal Ward Registers, and participants' Electronic Medical Records. The following independent (maternal and obstetric) variables were extracted:

Maternal age, categorized as ≤ 20 years, 21–34 years, and ≥ 35 years.

Parity, categorized as primiparous (Para 1), multiparous (Para 2–4), and grand multiparous (Para ≥ 5).

Antenatal booking status classified as booked or unbooked.

Gestational age at delivery, based on WHO classification:

Extremely preterm (< 28 weeks)

Very preterm (28 weeks to 31 weeks + 6 days)

Moderate-to-late preterm (32 weeks to 36 weeks + 6 days)

Mode of delivery, categorized as vaginal delivery or caesarean section.

Pregnancy complications, including hypertensive disorders of pregnancy, antepartum haemorrhage, preterm Prelabour rupture of membranes (PPROM), intrauterine fetal demise (IUFD), and intrauterine growth restriction (IUGR).

Fetal variables included: Birth outcome, classified as live birth or stillbirth. Sex of the neonate, male or female. Birth weight, categorized as: Extremely low birth weight (ELBW): 0–999g, Very low birth weight (VLBW): 1000–1499g, Low birth weight (LBW): 1500–2499g, Normal birth weight: ≥ 2500 g,

Apgar score at 5 minutes, categorized as < 7 (asphyxiated) or ≥ 7 (normal). Neonatal ward admission, recorded as yes or no. Neonatal ward outcome, categorized as discharged, discharged against medical advice (DAMA), or died

Results

During the study period, a total of 9,180 singleton births were recorded, of which 1,828 were preterm,

resulting in a prevalence of 19.9%. Of these preterm births, 21 cases were excluded from the analysis due to incomplete data. Among our cohort 1760 were live births (97.4%) while 47 (2.6%) were stillbirths. Of the live births, majority, 1043 (59.3%), were Moderate-to-late Preterm, followed by 537 (30.5%) who were Very Preterm and 180 (10.2%) were Extremely preterm.

Demographic and Obstetric characteristics of the study population- most of our participants had more than secondary education (88.7%), 68.8% did not receive antenatal care in our facility while more than half of the women had vaginal delivery.

Table 1 shows the demographic characteristics of the women in the study. Majority of the women, 913

(50.5%) were at least 35 years old, followed by 790 (43.7%) women between ages 20 and 34 years. Women who were younger than 20 years were in the minority, 104 (5.8%). The study comprised 1088 (60.2%) multiparous women, 530 (29.3%) grandmultiparous women and 189 (10.5%) primiparous women.

564 (31.2%) were Booked, while 1243 (68.8%) were Unbooked.

Married women made in the majority, 1466 (81.1%) while unmarried women were 341 (18.9%).

Vaginal delivery accounted for 1065 (58.9%) births while 742 (41.1%) births occurred through Caesarean section.(Table 1)

Table 1. Demographic And Obstetric Characteristics Of The Study Population

Variables	Frequency (n = 1807)	Percentage (%)
Maternal age (years)		
<20	104	5.8
20-34	790	43.7
≥ 35	913	50.5
Parity		
1	189	10.5
2 – 4	1088	60.2
≥ 5	530	29.3
Level of education		
Primary	204	11.3
Secondary	1346	74.5
Tertiary	257	14.2
Booking status		
Booked	564	31.2
Unbooked	1243	68.8
Marital status		
Married	1466	81.1
Unmarried	341	18.9
Mode of delivery		
Vaginal	1065	58.9
Caesarean section	742	41.1
Delivery outcome		
Live births	1760	97.4
Stillbirths	47	2.6

Table 2 shows the neonatal characteristics/ outcome among the live births. There were 917 (52.1%) females, and 843 (47.9%) males.

Neonates with Low Birth Weight were in the majority, 851 (48.4%), followed by those with Very Low Birth Weight, 629 (35.7%). 195 (11.1%) of the Neonates had Extremely Low Birth Weight while 85 (4.8%) had normal birth weight.

649 (36.9%) of the neonates were asphyxiated in the fifth minute of life, with an Apgar score less than 7, while 1111 (63.1%) of the neonates were not

asphyxiated and had an Apgar score of at least 7.

More than half of the live births were admitted in the Neonatal Ward, 963 (54.7%), while the rest, 797 (45.3%) were nursed by their mothers.

936 (53.2%) of the neonates did not require incubator care, while 824 (46.8%) required incubator care.

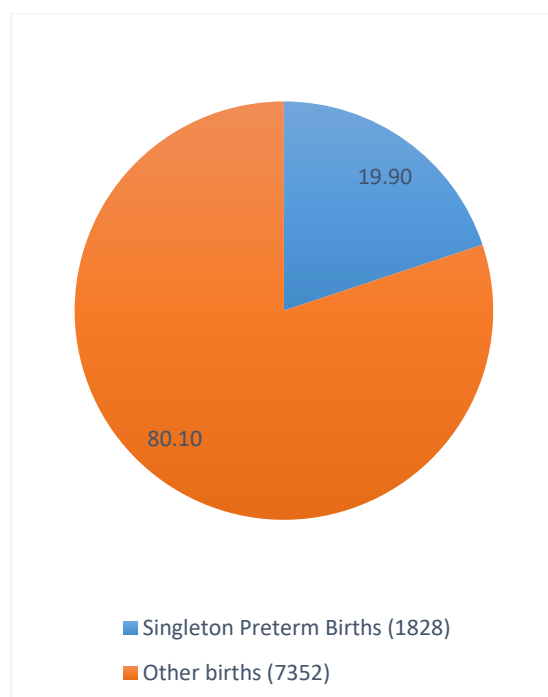
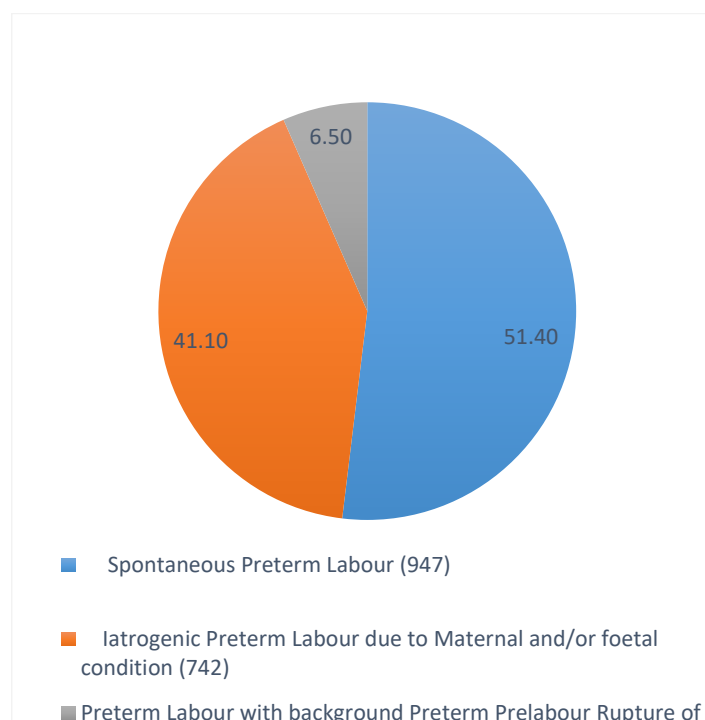
Neonates discharged alive and well were 1522 (86.5%), while 224 (12.7%) died on admission and 14 (0.8%) of the neonates were discharged against medical advice. (Table2)

Table 2. Neonatal Characteristics / Outcome Among the Live Births In Study Population

Variables (n = 1760)	GA at delivery (preterm birth)			Total, n (%)
	<28 weeks, n (%)	28-31 ⁺⁶ weeks, n (%)	32-36 ⁺⁶	
			weeks, n (%)	
Sex of neonate				
Male	83 (46.1)	155 (28.9)	605 (58.0)	843 (47.9)
Female	97 (53.9)	382 (71.1)	438 (42.0)	917 (52.1)
Birth weight (g)				
ELBW (<0-999)	180 (100)	15 (2.8)	0	195 (11.1)
VLBW (1000-1499)	0	470 (87.5)	159 (15.2)	629 (35.7)
LBW (1500-2499)	0	52 (9.7)	799 (76.6)	851 (48.4)
Normal (≥2500)	0	0	85 (8.2)	85 (4.8)
Apgar score				
Asphyxiated (Apgar <7)	180 (100)	286 (53.3)	183 (17.5)	649 (46.9)
Not asphyxiated (Apgar ≥7)	0	251 (46.7)	860 (82.5)	1111 (63.1)
Neonatal Ward admission				
Yes	180 (100)	495 (92.2)	288 (27.6)	963 (54.7)
No	0	42 (7.8)	755 (72.4)	797 (45.3)
Incubator care				
Yes	180 (100)	485 (90.3)	159 (15.2)	824 (46.8)
No	0	52 (9.7)	884 (84.8)	936 (53.2)
Neonatal outcome				
Discharged alive and well	12 (6.7)	486 (90.5)	1024 (98.1)	1522 (86.5)
Discharged against medical advice	0	2 (0.4)	12 (1.2)	14 (0.8)
Died	168 (93.3)	49 (9.1)	7 (0.7)	224 (12.7)

Figures 1 2, and 3 shows the prevalence of singleton preterm births, types of preterm

births and indications for iatrogenic preterm birth respectively.

**Figure1.** The Prevalence of Singleton Preterm Births.**Figure 2.** Types of Preterm Births.

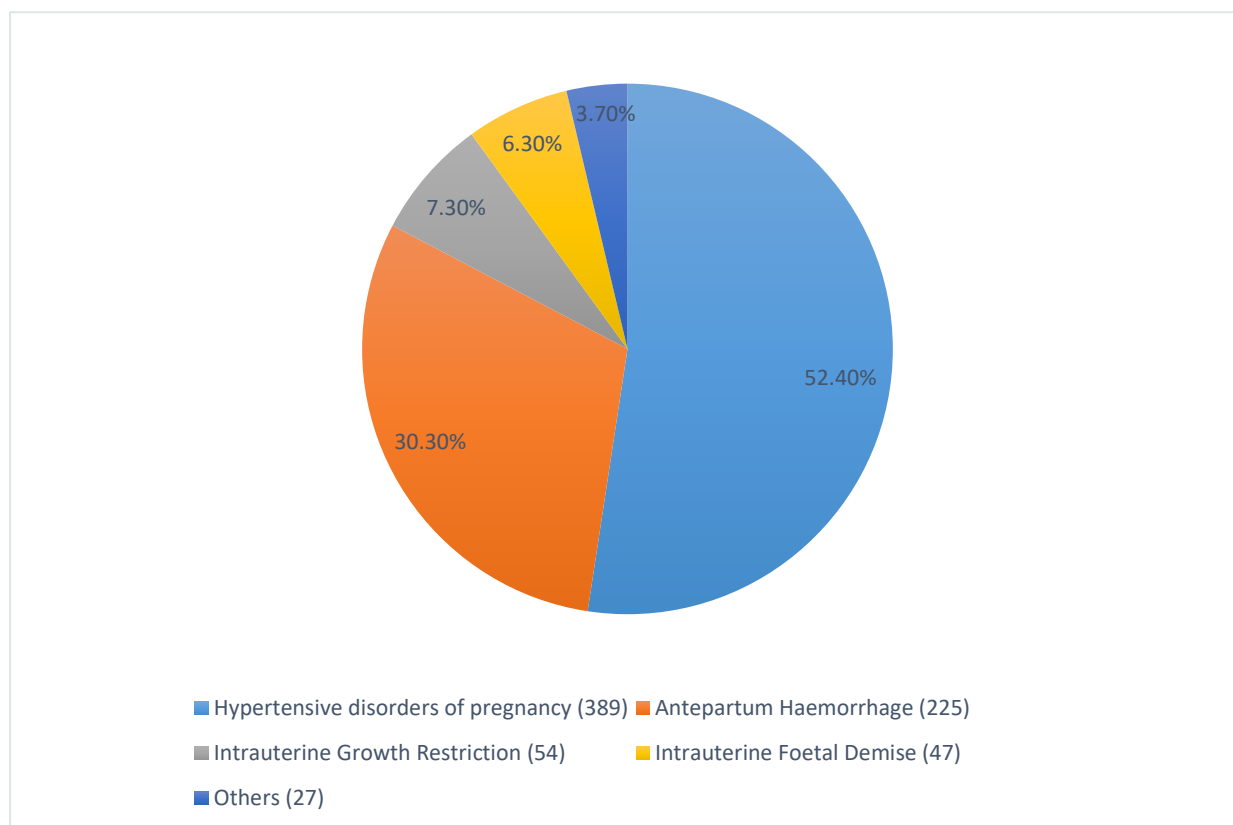


Figure 3. Indications For Iatrogenic Preterm Birth.

Figure 1 shows the Prevalence of Singleton Preterm Births. Figure 2 shows the types of Preterm births. Majority of Preterm births occurred following Spontaneous Preterm Labour, 947 (52.4%), while 742 (41.1%) Preterm births were Iatrogenic on account of maternal and/or foetal indications. 118 (6.5%) Preterm births had background Preterm Prelabour Rupture of Membranes.

Figure 3 shows the indication for Iatrogenic Preterm Births, with Hypertensive disorders of Pregnancy such as Preeclampsia with severe features and Eclampsia accounting for 389 (52.4%) of Iatrogenic Preterm births. This was followed by Antepartum haemorrhage, accounting for 225 (30.3%) of Iatrogenic Preterm births. Intrauterine Growth Restriction and Intrauterine foetal demise accounted for 54 (7.3%) and 47 (6.3%) respectively of Iatrogenic Preterm births. Other indications for Preterm Delivery such as Uncontrolled Gestational Diabetes, Cord Prolapse accounted for 27 (3.7%) of this category of Preterm births.

Discussion

Globally, preterm deliveries account for approximately 5% to 18% of all deliveries, with the majority occurring in developing countries.¹¹ In this study, the prevalence of preterm birth among singleton deliveries at Lagos Island Maternity

Hospital was 19.9%, which is notably higher than the 7.4% and 9.4% reported in tertiary hospitals in Rivers and Osun States, respectively.^{11, 12} Other similar studies in Nigeria reported a Preterm birth prevalence rate of 16%, 16.6% and 16.8%^{6, 13, 14}. A low prevalence of Preterm birth of 1.5% was reported in a multi-centre study conducted in Nasarawa State, Northcentral Nigeria¹⁵. A study conducted in Ghana reported a prevalence rate of 18.9% of preterm births¹⁶. The high prevalence rate noted in this study is largely because Lagos Island Maternity Hospital is a major referral centre for Primary Health Centres and General Hospitals in Lagos, as well as other Private Hospitals within and around the State.

Spontaneous Preterm Labour accounted for majority of Preterm births in the study, similar to a study done in Public Hospitals in Addis Ababa, Ethiopia¹⁷. Iatrogenic Preterm births on account of maternal and/or fetal indications was the second leading type of Preterm birth. Associated factors with preterm births, as identified in the study include lack of antenatal care and hypertensive disorders of pregnancy, a finding also reported by other studies^{13,18}. The finding that singleton preterm birth was associated with lack of antenatal care was consistent with previous studies in Nigeria^{11,19}.

Hypertensive disorders of pregnancy, especially preeclampsia with severe features is a known major

cause of Preterm births, as timely intervention minimizes the risk of maternal and/or fetal morbidity and mortality. It accounted for majority of the iatrogenic type of Preterm birth. This finding corroborated similar findings in other studies ^{7,12}.

Higher rate of Preterm birth was observed among multiparous women, and women who did not receive antenatal care and those who were 35 years of age or older. This pattern was also reported in a study done in Port-Harcourt, Rivers State, Nigeria ¹¹. Women of advanced age are at higher risk of having comorbidities such as Hypertensive Disorders of Pregnancy especially Chronic Hypertension and Pre-eclampsia, Gestational Diabetes Mellitus, and so on. This, amongst other reasons, may be contributory to the high prevalence of Preterm births among women who are 35 years old and older.

Majority of the Preterm Babies (86.5%) in the study were discharged home alive, with or without being admitted into the Neonatal Ward. This finding was higher than the 72.31% survival rate among Preterm Babies reported in a Tertiary Centre in Maiduguri, Northeast Nigeria ²⁰. This was however lower than the 92.8% survival rate among Preterm Babies reported in a Specialist Centre in Akure, Southwest Nigeria ²¹.

This study utilized the WHO classification system to categorize preterm births ¹, as done by Awoyesuku et al in a similar study at a teaching hospital in Rivers state, South-south Nigeria ¹¹. The prevalence rate in the categories of Preterm births however vary in both studies. In this study, Extreme Preterm, Very Preterm, and Moderate-to-late Preterm births occurred in 11.1%, 35.7%, and 48.4% respectively of the total Preterm births. This contrasts with the prevalence rate of 0.4%, 33.3% and 66.3% reported in each respective category in the Port-Harcourt Study

¹¹. Comparing the birth weights of Preterm Babies in both studies revealed similar patterns.

Both studies revealed that most Preterm Babies had Low birth weight, and Extremely low birth weight account for the least. These findings agree with the findings of Oluwafemi et al in Akure, Southwest Nigeria ²¹.

In this study, Low birth weight babies accounted for 48.4% of Preterm Babies, compared to 56.7% and 90.2% in the Port-Harcourt and Akure Studies respectively. Also, 11.1% of babies had Extremely low birth weight, compared to 6.3% and 2.1% in the two studies mentioned. Of note is that percentage Preterm Babies with Normal birth weight was 4.8%, which was lower than the 15.9% reported in the Port-Harcourt Study ¹¹.

This study also demonstrated that all indicators of poor perinatal outcomes including low birth weight, birth asphyxia, neonatal ward admission, and neonatal mortality were significantly more severe in extremely preterm neonates compared to other

preterm categories.^{6, 8, 11} As expected, very low birth weight neonates also experienced worse outcomes than those born moderate to late preterm

Limitations

Since this study was conducted at a single center, its findings are specific to that location and may not be generalizable to other settings. Larger, multi-center studies are necessary to accurately assess the prevalence and neonatal outcomes of preterm births across Nigeria, as well as to identify the underlying factors contributing to preterm delivery.

Conclusion

The prevalence of preterm birth among singleton pregnancies in this study was 19.9%, and it continues to be a major contributor to perinatal mortality. Hypertensive disorders of pregnancy and absence of antenatal care were identified as key risk factors. Indicators of poor perinatal outcomes including low birth weight, birth asphyxia, stillbirth, and neonatal ward admissions, were significantly more severe in extremely preterm infants compared to other preterm and term birth categories.

Recommendations

We recommend Continuous community enlightenment on utilization of antenatal care, increased capacity, in terms of personnel and technology, to improve the quality of neonatal care and a large-scale multi center research on Preterm births, associated factors and outcome.

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