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## Prevalence and associated morbidities of preterm neonatal admissions at the University of Maiduguri Teaching Hospital, North-Eastern Nigeria

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**Abstract:** *Introduction:* Preterm delivery is of considerable concern to clinicians and researchers being a leading cause of infant morbidity and mortality in the industrialized countries and also contributes to substantial complications among survivors. Sub-Saharan Africa, including Nigeria accounts for significant proportion of preterm births, with over million deaths due to complication of prematurity.

*Objectives:* The study aimed to determine the prevalence and associated morbidities of preterm deliveries at the University of Maiduguri Teaching Hospital, Maiduguri, North-Eastern Nigeria.

*Patients and methods:* This is a retrospective review of neonates delivered before 37 completed weeks of gestation and admitted into the Special Care Baby Unit (SCBU) of the University of Maiduguri Teaching Hospital, from 1<sup>st</sup> January 2008 to 31<sup>st</sup> December 2015.

*Results:* There were 3435 admissions into the Special Care baby Unit (SCBU) during the 8 year period. Out of these 1129 were preterm babies giving a prevalence of 32.9%. Of the 1129 preterm babies managed in SCBU, 714 case records were retrieved and analyzed giving a retrieval rate of 63%. There were 372 (52.1%) males and 342 (47.9%) females; with the male to female ratio of 1:1.08. There were 17(2.3%) extreme low birth weight (<1000g), 288 (40.3%) very low birth weight (1000-1499 g), 406 (56.9%) low birth weight (1500-2499 g) babies. The range of admission weights was 700-2500g with mean of 1600±900g.

*Conclusion:* The burden, complications and mortality from preterm newborns remain significant public health challenges to care givers in Nigeria.

**Key words :** Prevalence, preterm babies, associated morbidities, Maiduguri

### Introduction

The World Health Organization (WHO) defines preterm birth as babies delivered at gestational age of less than 37 completed weeks<sup>1</sup>. Preterm delivery is recognized as a major public health problem by both clinicians and researchers because it is the leading cause of infant mortality and also contribute to substantial complications among survivors.<sup>1</sup> Each year 15 million newborns are delivered before 37 completed weeks and their chances of survival vary dramatically between developed and developing world.<sup>2</sup> Of this high population of preterm babies, Sub-Saharan Africa including Nigeria, accounts for up to 60%, with over one million deaths due to complications of prematurity.<sup>3</sup> According to Lawn et al<sup>4</sup>, Low- and Middle-income countries (LMC) of the world are responsible for 92% of preterm birth and 99% of these preterm babies die. Yet little or no effort has been made in reducing this high mortality rate. The global concern about the burden of preterm birth led the WHO to designate November 7<sup>th</sup> the World Prematurity Day.<sup>5</sup> Reports from some African countries shows that preterm birth rate range from 11.1% to 57%,<sup>5,6,7</sup> and prevalence of pregnancies that result in spontaneous preterm labour accounting for up to 68.2%.<sup>5,8</sup>

Infant mortality in Nigeria is very high (79/1000) live births, ranked 74<sup>th</sup> in the World in 2013, and this is primarily due to high mortality from preterm births. Furthermore Nigeria currently has the highest number of newborn deaths in Africa, and second highest in the world after India.<sup>9-13</sup> Improvement in care of preterm babies has resulted in the reduction of mortality in the developed countries<sup>14,15</sup> This is not so for developing countries where the management of the preterm babies is marred by difficulties arising from poor resources typified by poorly equipped special care baby units.<sup>7,9</sup> Consequently, the burden of the complications and mortality resulting from preterm births remain a significant challenges to newborn health care in poor resource settings. Currently only few publications are available on the prevalence of preterm deliveries in the Nigeria (especially North-Eastern Nigeria). The aim of this study was to determine the prevalence and associated comorbidities among preterm babies cared for, at University of Maiduguri Teaching Hospital, Maiduguri, North-eastern Nigeria.

## Subjects and methods

### Study centre

The study was conducted at the special care baby unit (SCBU) of the University of Maiduguri Teaching Hospital, Maiduguri. Our SCBU is 36-bed unit with eight incubators, two warm cots, 20 neonatal beds and four resuscitaires/radiant warmers with central oxygen supply. University of Maiduguri Teaching Hospital is a tertiary institution that serves as referral hospital for the six states in the North-east sub-region of Nigeria. It also receives referral from neighbouring countries of Niger, Chad, Cameroon and Central African Republic. The SCBU caters to term and preterm babies delivered in the institution's labour ward, those referred from other health facilities and self-referrals.

### Study design

This is a retrospective review of data of all neonates delivered before 37 completed weeks of gestation in UMTH labour ward and those referred to the unit from other health facilities. The data spans over an eight year period from 1<sup>st</sup> January 2008 to 31<sup>st</sup> December 2015.

### Study population

Gestational age was calculated from the mother's last menstrual period or first trimester antenatal ultrasound scan, where neither information was available, gestational age was estimated using modified Ballard score.

### Data collection

Maternal data retrieved include mother's age, booking status, previous preterm birth, educational and employment status, father's age, educational status and employment status as well as place of delivery. Also extracted were history of adverse events during pregnancy such as preterm/premature rupture of amniotic membranes, antepartum haemorrhage, preeclampsia, eclampsia, pregnancy-induced hypertension, and urinary tract infection.

Data obtained on the babies were; birth order, mode of delivery, type of gestation, birth weight, apgar scores at 1, 5 and 10 minutes, difficulty in breathing, apnoea, fever and feeding problems. Ethical clearance was obtained from the institution's Ethics and Research committee.

### Data analysis

The data were entered into a spreadsheet and analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0 for Windows (SPSS Inc. Chicago, IL, USA). Frequencies, means, and proportion of variables were computed. Association between categorical variables was determined using Chi-square test or Fisher's exact test where appropriate. The results were reported as adjusted Odds ratio and 95% confidence intervals. For analyses, p-values < 0.05 were considered statistically significant.

## Results

There were 3435 admissions into the Special Care baby Unit (SCBU) during the eight year period. Out of these 1129 were preterm babies giving a prevalence of 32.9%. Of the 1129 preterm babies, case files of 714 (63%) were retrieved. There were 372 (52.1%) males and 342 (47.9%) females; with male to female ratio of 1:1.08.

Seventeen babies (2.3%) were extreme low birth weight (<1000gm), 288(40.3%) very low birth weight (1000-1499gm), while 406 (56.9%) were low birth weight (1500-2499gm). There were three preterm babies whose weights were greater than 2500 g; i.e. large for gestational age. The weight of the study population ranged from 700-2650gm with a mean of 1600(±900)gm

One hundred and nineteen babies (16.7%) were early preterm, 437(61.2%) mid preterm and 158 (22.1%) late preterm

Table 1. shows the socio-demographic characteristics of the mothers.. The mean age of mothers was 26.61 ± 6.61years. Most (52.8 %) mothers were within the age-group of 21 to 30years. Majority of mothers had no formal education and most (89.9 %) were not gainfully employed.

**Table 1:** Socio-demographic characteristics of parents of preterm babies

Characteristics	Frequent	Percent
<i>Mother's Age (yrs)</i>		
20	134	22.0
21 – 30	321	52.8
31 – 40	143	23.5
41 – 50	10	1.6
<i>Mother Educational level</i>		
No formal education	199	52.6
Primary education	73	19.3
Secondary education	79	20.9
Tertiary education	27	7.1
<i>Gainful employment (mother)</i>		
Yes	72	10.1
No	641	89.9
<i>Father age (yrs)</i>		
21 -30	22	11.3
31 -40	106	54.4
41 -50	56	28.7
51 - 60	11	5.6
<i>Father Educational level</i>		
No formal education	95	28.4
Primary education	64	19.2
Secondary education	126	37.7
Tertiary education	49	14.7
<i>Gainful employment (Father)</i>		
Yes	427	59.1
No	293	40.6
<i>Type of father's employment</i>		
Self	217	40.4
Private	82	15.3
Public	199	37.1
Unemployed	39	7.3

Table 2: presents maternal obstetric characteristics. A total of 547 (76.6 %) of the babies were delivered in the hospital but only 35.3 % (251/712) were booked for ANC. A total of 146 (25.0%) of the mothers were primiparous: overall median parity as  $3.80 \pm 1.15$ . Preterm premature rupture of foetal membranes, APH, Preeclampsia, eclampsia and PIH occurred at varying frequencies.

<b>Table 2: Maternal obstetric characteristics</b>		
Characteristics	Frequency	Percent (%)
<i>Place of delivery</i>		
Home	167	23.4
Hospital	547	76.6
<i>UMTH birth/Referred</i>		
UMTH	481	67.4
Referred	254	35.6
<i>Parity</i>		
1 (Primiparous)	146	25.0
2 - 4 (Multiparous)	254	43.4
5 (Grand multiparous)	185	31.6
<i>ANC</i>		
Unbooked	461	64.7
Booked	251	35.3
<i>Previous premature birth</i>		
YES	75	10.5
NO	639	89.5
<i>PrePROM</i>		
YES	115	16.1
NO	599	83.9
<i>APH</i>		
NO	608	85.2
YES	106	14.8
<i>Preeclampsia</i>		
NO	665	93.1
YES	49	6.9
<i>Eclampsia</i>		
NO	679	95.1
YES	35	4.9
<i>PIH</i>		
NO	688	96.4
YES	26	3.6

It was apparent from the figure below (figure 1), which shows the increasing trend in prevalence of preterm neonates.

**Fig 1:** Annual prevalence of preterm babies admitted into SCBU from 2008 to 2015

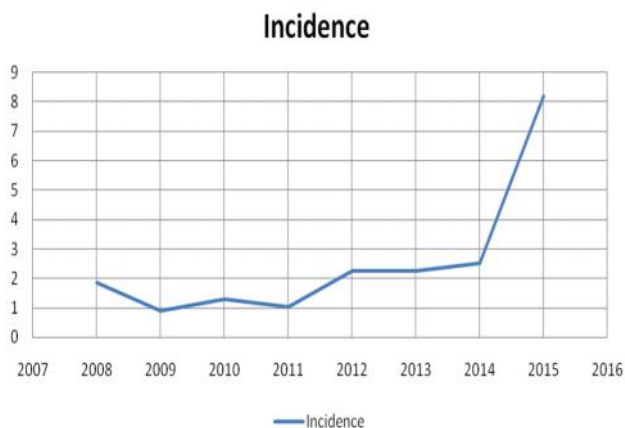


Table 3: Characteristics of preterm babies admitted into SCBU are shown in table 3. Distribution of babies by gestational age subgroup, birth weight subgroup, weight-for-gestation subgroup as well as modes of delivery and other details are shown.

<b>Table 3: Characteristics of preterm babies admitted at UMTH Maiduguri from 2008 to 2015</b>		
Characteristics	Frequency	Percent (%)
<i>Sex</i>		
Male	372	52.1
Female	342	47.9
<i>Gestational age (GA) [Weeks]</i>		
25 – 31	119	16.7
32 – 34	437	61.2
35 - 37	158	22.1
<i>Birth weight (gram)</i>		
< 1000 (ELBW)	17	2.4
1000 – 1499 (VLBW)	288	40.3
1500 – 2499 (LBW)	406	56.9
2500 (NBW)	3	.4
<i>Weight class for gestational age</i>		
Appropriate-for-gestational age	563	78.9
Small-for-gestational age	105	14.7
Large-for-gestational age	46	6.4
<i>Birth order</i>		
1	215	30.1
2 - 4	356	49.9
5	143	20.0
<i>Mode of delivery</i>		
Spontaneous vaginal delivery	488	68.3
Forceps delivery	16	2.2
Cesarean section	208	29.2
Breech delivery	2	.3
<i>Gestation type</i>		
Singleton	504	70.6
Twin	186	26.1
Triplets	24	3.4
<i>APGAR score at 1 minute</i>		
< 7	483	67.6
7	231	32.4
<i>APGAR score at 5 minutes</i>		
< 7	177	24.7
7	537	75.3
<i>APGAR score at 10 minutes</i>		
< 7	121	16.9
7	593	83.1

**Table 4:** Associated maternal and neonatal morbidities in preterm babies

Associated Maternal Morbidities	Number	percent
APH*	99	15.4
Previous preterm delivery	75	11.6
Multiple gestation	210	32.6
UTI*	34	5.3
Fever	53	8.2
Preterm premature rupture of foetal membrane	115	17.8
Preeclampsia	49	7.6
Other (goiter & chest infection)	79	11.1
<i>Neonatal Morbidities</i>		
Difficulty in breathing	311	47.1
Jaundice	146	22.1
Apnoea	40	6.1
Fever	94	14.2
Early anaemia	39	5.9
Late anaemia	25	3.8
Others (convulsion and bleeding)	50	7.0

\*APH=antepartum haemorrhage, \*UTI=urinary tract infections

## Discussion

Preterm delivery is a major clinical problem worldwide and more so in the developing countries of Africa, Asia and Latin America.<sup>5</sup> It is associated with significant morbidity and mortality in the perinatal, neonatal and childhood periods as it leads to long-term loss of human potential among survivors.<sup>5,16</sup> Contrary to some reports from Nigeria, the current figure of 32.9% is higher than the range of 8.5% to 23.7% previously reported.

The prevalence of preterm babies in this study is 32.9% higher than the 12% reported by Mokuolu et al in Ilorin<sup>17</sup>, 8.5% by Etuk et al in Calabar,<sup>18</sup> 16.9% by Iyoke et al in Enugu, Nigeria<sup>19</sup> higher than the rate observed by Ambe et al<sup>20</sup> in our centre a decade ago and higher than the prevalence rate of 23.7% observed in a tertiary health facility in Sokoto North western Nigeria.<sup>21</sup> It is also higher than the overall national prevalence of preterm birth estimates of 15% by World Health Organisation<sup>16</sup>.

The observed higher rate in our study could be explained by the sample size and duration of study. Our study had a larger sample size and covered a period of eight years as against the studies of Iyoke<sup>19</sup> and Ambe<sup>20</sup>

We observed a rising trend of preterm delivery as predicted by WHO on preterm deliveries in Africa.<sup>22</sup> Our observed trend could be explained by the increase in admission capacity of our SCBU facilities as well as skilled power

Maternal socio-demographic indices such as antenatal care, booking status, obstetric and medical variables like, maternal age, maternal/paternal educational levels, employment status, parity, history of previous preterm delivery have been implicated as associated factors of

preterm deliveries as in other studies<sup>21,27</sup>.

Other observed variables associated with preterm deliveries include un-booked pregnancy (64.6%), very low birth weight (42.7%) and multiple gestations (64.6%). Similar observations were made in some reports.<sup>18,21,27</sup>

Premature rupture of membrane (PrePROM) accounted for 16.1% of preterm deliveries which was lower than the figures observed in other reports.<sup>18,21,27</sup>

We observed more male than female preterm deliveries as Kunle-Olowu et al<sup>28</sup> reported as against female preponderance reported by McGil Ugwu et al in Warri South-south Nigeria<sup>28</sup> and Zeleke et al in Ethiopia<sup>29</sup>.

The commonest morbidity identified in this study were difficulty in breathing, jaundice and fever (sepsis). Similar observations have been reported in Nigeria<sup>28</sup> and Pakistan<sup>30</sup>. Though Onalo et al in Abuja Nigeria<sup>31</sup> reported Neonatal Jaundice as the commonest morbidity. this study. If not checked, it may likely reverse the few gains achieved under millennium development goals 4 and to extent 5. Maternal factors such as pregnancy induced hypertension, eclampsia, multiple gestation and poor antenatal care has remained factors associated with preterm babies in our settings.

However, this was in contrast to the report by Onwuaku et al<sup>32</sup> from Jos North-central Nigeria who reported neonatal sepsis as the commonest morbidity closely followed by jaundice. The respiratory system related diseases like respiratory distress syndrome especially among the moderate to severe preterm babies and neonatal sepsis were common.

## Conclusion

Preterm deliveries constitute a significant percentage of neonatal admissions in our Special Care Baby Unit, especially in recent years. There has been sustained increase in the prevalence of preterm babies as shown in this study. Maternal factors such as pregnancy induced hypertension, eclampsia, multiple gestation and poor antenatal care have remained factors associated with preterm babies in our setting.

**Conflict of Interest:** None

**Funding:** None

## Limitation

This is a retrospective analysis of preterm babies admitted and managed in our neonatal facility. The results in this study may not be a holistic representation of the management and outcome of all the preterm babies managed in the unit. We therefore recommend future prospective study.

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