



Research Article

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Burden and risk factors of preterm birth in Nasarawa State, North Central, Nigeria: A five-year case review

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Abstract

Background: Preterm birth has been on the increase globally and accounting for morbidities and mortalities. Preterm delivery referred to the birth of a newborn prior to thirty seven completed gestational weeks. There is dearth of knowledge on the burden of preterm birth in this state. This study therefore determined the burden of preterm deliveries in Nasarawa State, evaluate the risk factors and identify the outcome of such deliveries. **Methods:** A descriptive cross-sectional study of all preterm delivered from the 1st of January 2014 to the 31st of December 2013 at the Dalhatu Araf Specialist Hospital (DASH) Lafia, General Hospital Akwanga and Medical Centre Mararaba Gurku in the Southern, Northern and Western senatorial zones of Nasarawa State respectively. Data was analyzed using SPSS version 20. **Results:** The mean age of mothers of preterm in this study is 26.5±5.7 years. More than three-quarter of preterm birth in Nasarawa State were at the DASH Lafia. The prevalence of preterm birth and admissions were 1.5% and 10.8% respectively. One in four of the preterm were either late preterm or extreme preterm. Singleton gestation accounted for 82.1% of the preterm births while 75.6% of such deliveries were through the vaginal mode of deliveries. Risk factors for preterm deliveries were multiple gestation, antepartum haemorrhage (placenta previa), premature rupture of membrane and previous preterm delivery. Deaths among the preterm was 11% in this study. **Conclusion:** The burden of preterm births in this study is comparable to other centre in same region. Half of the preterm were either late or extreme preterm. Risk factors for preterm deliveries were placenta previa, premature rupture of membrane, multiple gestation and previous preterm child birth. Death was recorded in one out of every nine preterm.

Keywords: Burden, Preterm, Risk factors, Outcome.

INTRODUCTION

Background of study

Preterm birth is an evolving global public health problem [1]. Due to this alarming global trend about the burden of preterm birth, November 17th of every year has been assigned as World Prematurity Day [2]. World Health Organisation (WHO) describes preterm birth as any birth at < 37 weeks of amenorrhea or < 259 days from the first day of a woman's final menstrual period [3-5]. Annually, about 1.1 million neonates die due to complications of preterm birth as appraised in 2010 [6].

Preterm birth and its complications are now globally the common cause of death in children under five years of age with averagely about 878 per thousand [7]. The first-ever nationwide estimates of preterm birth (defined as <37 completed weeks of gestation) was published in *the Lancet*, undertaken with the World Health Organisation, and comprised a country clearance process in which all United Nations member states countries were invited to review their estimates and provide feedbacks. These estimates showed a total of 15 million babies born preterm in 2010, 5% of which were under 28 weeks' gestation [8].

Statement of problem

Limited countries have dependable national preterm birth prevalence data. Worldwide in 2010, an estimated 13 million neonates are born before 37 completed weeks of gestation yearly; rates are mostly highest in low- and middle income countries [9]. Preterm birth is the primary direct source of neonatal death which is about 27% and in 2017, neonatal death accounted for about 47% of all under-five mortality [7].

Preterm birth is also the dominant risk factor for neonatal mortality, particularly for deaths due to infections [9]. Although, it occurs globally but more frequently in developing countries [10], as at 2010, more than 60% of preterm births occur in Africa and South Asia, with Nigeria being the third highest after India and China with about 773 600 preterm birth [11].

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Rationale of the study

Currently, there is no data on the prevalence of preterm birth in Nasarawa state. Establishing the prevalence of preterm birth will help to understand the current burden, risk factors and the complications of preterm birth which is one of the major causes of disability such as hearing and visual problems.

In 2014, 10.6% of all live births were preterm annually, the new estimates show that sub-Saharan Africa and Asia has the highest prevalence of preterm with 81.1% [12]. Regional preterm prevalence are 13.4% in North-Africa, 8.7% in Europe, while Bangladesh, China, India, Indonesia and Nigeria have a joint prevalence of 44% - 60% of all preterm birth globally [13].

In 2016, complications of preterm birth become the leading cause of deaths in children under five years of age which is approximately 16% of all neonatal mortality and 35% of new-borns deaths [14].

In Nigeria, 16% of new-borns are low birth weight and 12% are born preterm [15]. A research conducted by Rosena *et al* [14] in 2016 established the preterm birth prevalence in Akure, South-western Nigeria to be 15.4% and 16% in Delta state (south-south) [15]. Chukwuemeka *et al* in 2014 at medical centre in Enugu, south-eastern Nigerian established prevalence of preterm to be 16.9% [17], 6.5% in Abakaliki (south east) [18], 24.0% in Okolobiri (south-south) [19], 12.0% in Makurdi (North-central) [20], 11.8% in Ilorin (North-central) [21].

Preterm birth is a syndrome with a diversity of causes which can be grouped into two broad subtypes [6]; spontaneous preterm birth and prelabour premature rupture of membranes (pPROM) [7]. Spontaneous preterm birth is multi-factorial, caused from the relationship of factors triggering the uterus to change from inactive to active contractions and which further induced birth before 37 completed weeks of gestation. The pre-cursors to spontaneous preterm birth vary by gestational age [22].

Preterm birth can be grouped into four categories based on the completed weeks of pregnancy, these include late preterm (≥ 34 and < 37 weeks), moderately preterm (≥ 32 and < 34 weeks), very preterm (≥ 25 and < 32) and extremely preterm (< 25 weeks) [23].

Preterm birth is more common in boys, with about 55% of all preterm births occurring in males [24], but it is associated with a higher risk of death when associated to girls born at a similar gestational age [25]. Some maternal factors that contribute to spontaneous preterm birth include low maternal body mass index, smoking, alcohol consumption and advanced maternal age [26].

The exact mechanisms of preterm labour are largely idiopathic, but certain proximate pathophysiological events are probably involved in the final shared pathway for the different maternal risk factors, which are decidua haemorrhage (such as placental abruption); uterine overdistension (from multiple gestation or polyhydramnios), cervical incompetence (e.g., trauma, cone biopsy), uterine distortion (e.g., müllerian duct abnormalities, fibroid uterus), cervical inflammation (for example, bacterial vaginosis or trichomonas), maternal infection/fever (e.g., urinary tract infection), hormonal changes (e.g., mediated by maternal or fetal stress), uteroplacental insufficiency (e.g., hypertension, insulin-dependent diabetes, drug abuse, smoking, alcohol consumption) [27].

Causative risk factors of preterm birth

Smoking and excessive alcohol consumption as well as periodontal disease has been related with increased risk of preterm birth, Infection influence on preterm birth cannot be underestimated. Urinary tract infections, malaria, bacterial vaginosis, HIV and syphilis are all linked with increased risk of preterm birth [28].

There are no known specific risk factors but some causative risk factors include previous history of premature birth, multiple-pregnancy such as twins, an interval of less than six months between pregnancies, conceiving through in vitro fertilization, problems with the uteroplacental or cervix, smoking cigarettes or using illicit drugs, specific infections mostly of the amniotic fluid and lower genital tract, some chronic conditions such as high blood pressure and diabetes, being underweight or overweight before pregnancy, stressful life events such as the death of a loved one or domestic violence, multiple miscarriages or abortions and physical injury or trauma [23].

Signs of prematurity include Small body size with a disproportionately large head and body weight less than 2500g, Sharper looking, less rounded features due to a lack of stored fat, Fine hair (lanugo) covering much of the body, Low body temperature especially immediately after birth, Laboured breathing or respiratory distress, Short term complications of preterm birth include breathing problems, heart problems, hypothermia, brain problems, anaemia, immune system disorder and metabolic disorder such as hypoglycaemia [23].

Long term complications include cerebral palsy, vision and hearing impairment, impaired learning, dental problems, chronic health issues, sudden infant death syndrome (SIDS), behavioural and psychological imbalance. Women with previous history of premature birth are at high risk of having preterm birth can be provided with progesterone supplements and cervical cerclage for women with short cervix are part of the management technique.²⁷ Supportive care treatment include incubation, observation and monitoring of vital signs, blood transfusion, placement on bilirubin light to treat jaundice, administering of fluids and nutrients fluid [23].

This study was to determine the prevalence of preterm deliveries in the state, the risk factors and the outcome of such deliveries.

MATERIALS AND METHODS

Study area

Nasarawa state is one of the six states in the North-central geopolitical region. It was created in 1996 by the late General Sani Abacha regime. The state has over 760 primary health care centres and seventeen secondary health facilities (General hospitals) that refer patients to the two tertiary health facilities (Federal Medical Centre Keffi and Dalhatu Araf specialist Hospital Lafia DASH) which are distributed across the three senatorial Zones. DASH is located in Lafia the state capital, in the Southern senatorial zone. It has an average of 131,923 outpatients seen annually and about 403 bed capacity. General Hospital Akwanga is located in Akwanga, in the Northern senatorial zone with an available bed space of 80 capacity and having a clinical staff strength of 3 Doctors, 3 Pharmacist, 3 Medical laboratory scientists and 33 nurses while that of Medical Center Mararaba is located in Karu in the Western senatorial zone, with 57 available bed space and having a clinical staff strength of 3 Doctors, 4 Pharmacist, 3 Medical laboratory scientists and 44 nurses.

Study design

This was a hospital based cross sectional descriptive study of patients diagnosed and managed for preterm birth from January 1st 2014 to December 31st 2018 in Nasarawa state.

Study population

All neonates diagnosed and managed for preterm birth in Dalhatu Araf Specialist Hospital, Lafia, Medical Center Mararaba and General Hospital Akwanga; all in Nasarawa state.

Inclusion criteria

Neonates delivered before 37 completed weeks of gestational age.

Exclusion criteria

1. Neonates with incomplete relevant medical records.

Sampling techniques

All preterms that were managed within the period under review using the medical records unit and special care baby unit (SCBU) register were recruited. Dalhatu Araf Specialist Hospital, General Hospital Akwanga and Medical Center Mararaba were selected from each of the three senatorial zones using simple random sampling.

Data collection

Case notes and folders of all neonates that meet the inclusion criteria, diagnosed and managed for preterm birth or referred to the hospital for treatment of preterm birth or its complications at the Paediatrics Department between January 31st 2014 and December 31st 2018 were retrieved from the Records Department of Dalhatu Araf Specialist Hospital, Lafia, Medical Center Mararaba and General Hospital Akwanga.

Relevant data were extracted from the case notes and folders using the developed study proforma. The socio-demographic factors (such as age, religion, level of education, marital status, occupation and place of residence) were obtained. Others include types of preterm birth, birth weight, fetal sex, gestational type, mode of delivery, maternal risk factors, previous history of malaria or abortion in the mother and fetal outcome.

Data analysis

The data obtained was analyzed using SPSS (Statistical Package for Social Science) version 23.0. Results were presented in tables and charts. Frequency and percentages was computed for categorical variables, mean and standard deviation was computed for continuous variables.

Prevalence of preterm birth was determined by =

$$\frac{\text{Total number of neonates with prematurity}}{\text{Total number of all live births in the selected hospital.}}$$

Ethical consideration

Ethical clearance was obtained from Nasarawa state Ministry of Health Ethical Review Board. Confidentiality of information collected was treated with utmost regards and absolute trust.

RESULTS

Social-demographic characteristics of the study population

The mean age of mothers in this study was 26.5±5.7 years. Most of the mothers were aged between 18 – 35 years. All the mothers were married and almost all resided in urban settlements. Approximately two-third of mothers of babies delivered as preterm were holders of either primary or secondary school certificate, while a third had no any form of education. Almost all of the mothers in this study were full time house wives (Table 1).

Distribution of deliveries and admission of newborn

There are 20, 716 total live births across the state within the five years of review, with DASH accounting for 50% of these deliveries. The prevalence of preterm birth and preterm admissions in this study are 1.5% and 10.8% respectively. The DASH accounted for four out of every five preterm deliveries but almost all (94.1%) preterm were managed in the same health facility (Table 2).

Table 1: Social-demographic characteristics of the study population

Variable	Frequency n	Percentage %
Place of delivery		
Rural	3	1.0
Urban	305	99.0
Marital status		
Married	308	100.0
Age (years)		
< 18	3	1.0
18 – 25	148	48.1
26 – 35	138	44.8
36 – 45	19	6.1
Educational level		
None	100	32.5
Quranic	1	0.3
Primary	100	32.5
Secondary	95	30.8
Tertiary	12	3.9
Occupation		
Unemployed	9	2.9
Civil servant	9	2.9
Business	21	6.8
Farmer	3	1.0
House wife	262	85.1
Artisan	4	1.3
Total	308	100.0

Table 2: Distribution of deliveries and admission of newborn

Variables	Frequencies n	Percentages %
Preterm delivery		
DASH	249	80.8
GHA	32	10.4
MCMG	27	8.8
Total	308	100.0
Total live birth		
DASH	10492	50.6
GHA	3168	15.3
MCMG	7056	34.1
Total	20716	100.0
Neonatal admissions		
DASH	2685	94.1
GHA	49	1.7
MCMG	119	4.2
Total	2853	100.0
Prevalence of preterm births		
DASH	249/10492	2.4
GHA	32/3168	1.0
MCMG	27/7056	0.4
TOTAL	308/20716	1.5

DASH;Dalhatu Araf Specialist Hospital, GHA;General Hospital Akwanga, MCMG;Medical Centre Mararaba Gurku

Classification of preterm based on gender, gestational and prematurity type

Most of the preterm deliveries were product of singleton gestation. One out of every four preterm is late preterm while extreme prematurity accounted for 28.6%. Three out of four of the deliveries were vaginal and most (91.4%) were spontaneous in onset (Table 3).

Table 3: Classification of the preterm based on gender, gestational and prematurity

Variables	Frequency n	Percentage %
Gender		
Male	150	48.7
Female	158	51.3
Gestational type		
Singleton	253	82.1
Twin	52	16.9
Triplet	3	1.0
Prematurity type		
Late	79	25.6
Moderately	100	32.5
Very	41	13.3
Extreme	88	28.6
Mode of delivery		
Vaginal	233	75.6
Abdominal	75	24.4
Labour onset*		
Spontaneous	213	91.4
Induced	20	8.6
Total	308	100.0

*: Onset of labour among the vaginal deliveries.

Indications for abdominal deliveries of preterm

Placenta previa is the commonest cause of abdominal (caesarean section) deliveries leading to preterm birth accounting for 42.7% of cases. This is followed by pre-eclampsia/eclampsia and fetal distress 25.3% and 24.0% respectively (Table 4).

Table 4: Indications for abdominal deliveries of preterm

Variables	Frequency n	Percentage %
Indications for abdominal deliveries		
Pre-eclampsia/eclampsia	19	25.3
Placental previa	32	42.7
Fetal distress	18	24.0
Failed induced labour	1	1.3
Polyhydramnios	2	2.7
Breech presentation	2	2.7
Abruptio placenta	1	1.3
Total	75	100.0

Maternal risk factors among this study population

Hypertension was the commonest (32.1%) risk factor seen among the mothers with preterm deliveries in this study. Alcohol consumption and previous history of preterm birth was seen in one quarter each of mothers with preterm deliveries. Urinary tract infection, premature rupture of membrane and history of malaria in pregnancy were

common denominators among mothers of babies delivered as preterm (Table 5).

Table 5: Maternal risk factors among this study population

Variables	Frequency n	Percentage %
Maternal lifestyle		
Alcohol consumption	15	26.8
Diabetes mellitus	1	1.8
Hypertension	18	32.1
Previous history of preterm	15	26.8
Previous history of abortion	7	12.5
Presence of infection		
Urinary tract infection	67	35.1
Chorio-amnionitis	26	13.6
Chronic PID	1	0.5
Left dermoid cyst	2	1.1
Intra-uterine hematoma	1	0.5
History of malaria	42	22.0
Premature rupture of membrane	52	27.2

Multinomial Logistic Regression of relationship between preterm birth and some risk factors

The table below showed there is a significant association between the birth of preterm and the gestational type, previous preterm birth, premature rupture of membrane and placenta previa with a p value of 0.000, 0.031, 0.024 and 0.019 respectively. Multiple gestation increases the likelihood of preterm delivery thirteen times while premature rupture of membrane and placenta previa raises the chances of preterm deliveries as shown below (Table 6).

Table 6: Multinomial Logistic Regression of relationship between preterm birth and some risk factors

Risk factors	Odds ratio	95% confidence interval	P value
Gestational type	13.47	1.04 – 59.02	0.000
Mode of delivery	-1.19	-0.02 – 2.36	0.089
Alcohol consumption	3.65	-1.30 – 18.61	0.088
Diabetes	1.46	-0.19 – 1622	0.065
Hypertension	-15.13	-94.98 – 57.97	0.991
Previous preterm birth	4.07	0.27 – 62.28	0.031
Premature rupture of membrane	9.41	1.14 – 21.53	0.024
Fetal distress	2.99	0.60 – 14.93	0.183
Placenta previa	6.95	0.58 – 14.82	0.019
Malaria in pregnancy	1.19	0.26 – 5.43	0.819

Outcome of premature birth in this study population

Although most preterm were successfully managed and were discharged home in this study, a total of thirty four deaths were recorded accounting for 11% (Table 7).

Table 7: Outcome of premature birth in this study population

Outcome	Frequency n	Percentage %
Discharged home	274	89.0
Died on admission	34	11.0
Total	308	100.0

Mean birth weight of the preterm was 1.79±0.58 kg.

DISCUSSION

The prevalence of preterm birth in Nasarawa state is 1.5%, this is lower than the 5.7% reported in other study [29]. The higher numbers of newborn deliveries in the present study and the differences in duration of study may explain the observation. Temu *et al* [30] reported 14.2% among their cohorts in Tanzania, this may be adduce to the higher delivety rate and preterm admissions in their study lasting only two months. Bekele *et al* [31] found 25.9% among South-West Ethiopia. The 109 per thousand deliveries in DASH (when considered in isolation) is however comparable to the 120 per thousand deliveries reported at the University of Ilorin Teaching Hospital [20]. This finding may be attributed to the similarity in the rate of deliveries and the geopolitical zone. The prevalence of preterm admission in the current study is 10.8%, which is lower than the 24.0% reported by Onankpa and Isezuo in Sokoto [32]. Similarly, it is lower than the 32.9% found by Bello *et al* [33] in Maiduguri. The observed disparity may be due to the difference in study duration and site. It may also be attributed to a lower neonatal admission rate in the current study compared with the above two studies. Also, our special care baby unit had lesser capacity to manage preterm during the period of this study when compared with Sokoto (an already well established training institution).

The finding that four out of every five preterm in Nasarawa state was managed at DASH is understandably so as it is the only state owned tertiary institution with specialist clinicians, state of the art facilities and situated in Lafia, the state capital. Most mothers (63.3%) in this study have had at least either primary or secondary level of education. This is comparable to the 63.7% reported by Bako *et al* [34] in Maiduguri. The similarity may be adduced to the socio-cultural and religious semblance between the regions. The mean age of mothers of preterm in this study (26.5±5.7 years) is smaller compared with the (30.2±4.9 years) reported by lyoke *et al* [35] in Enugu. The possible reason for the observed difference may be due to the varied educational background where less than 4% had post secondary level of education as against 57.1% in the Enugu study. The socio-cultural and religious reasons which encourages early marriage is another possible explanation for this finding. Three out of every four deliveries in the current study was through the vagina, this is in sharp contrast to the report from Enugu where it is 50:50. The age and educational difference as highlighted above may account for the observation.

Although, female preterm were slightly more (51.3%) in this study (M:F is 0.9:1), this is in contrast with other findings that reported more males than females [30, 31]. The reason for the difference though without significant import is not fully clear.

The common risk factors of preterm deliveries in the present study were multiple gestation, premature rupture of membrane, antepartum haemorrhage (placenta previa) and previous delivery of preterm. This finding is similar to earlier report by some authors [32-36]. Death recorded among preterm in this study is 11%, which is much lower compared with the 14.5% reported by Akintayo in Ekiti, 30.1% by Onankpa and Isezuo in Sokoto [29,32]. The difference may be attributed to the variation in the study durations, with the possibility of a better care in this study which is more recent. However, a study by Chiabi *et al* [37] in Cameroun reported 36.6% deaths among preterm in a study covering an eight year period.

CONCLUSIONS

There is a low burden of preterm delivery / admissions in Masarawa State. Gestational type (multiple gestation), premature rupture of membrane, antepartum haemorrhage (placenta previa) and previous preterm delivery were the leading risk factors for preterm birth in this study. One out of every nine preterm deliveries died on admission.

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Conflict of interest

Nil

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