

Risk Factors for Preterm Delivery among Neonates Accessing Care at a Tertiary Hospital in Southeast, Nigeria

Clement Chukwudorue Ezechukwu^{1,2}, Chijioko Elias Ezeudu^{1,2}, Nkechinyere Godsgift Obichukwu², Sunday Christian Ameh² and Amara Maryjane Egbuogu²

¹ Department of Paediatrics, Nnamdi Azikiwe University Awka, Anambra State, Nigeria. ² Department of Paediatrics, Nnamdi Azikiwe University Teaching Hospital Nnewi, Anambra State, Nigeria

ABSTRACT

Background: Neonatal death contributes about 62.5% of the infant mortality rate in Nigeria. Most of these neonatal deaths were from complications of preterm delivery. Preterm birth, being any delivery before 37 completed weeks of gestation results from many implicated preventable risk factors. **Objectives:** To determine the prevalence and associated risk factors for pre-term delivery among neonates accessing care at Nnamdi Azikiwe University Teaching Hospital, (NAUTH) Nnewi. **Materials and Methods:** This was a cross sectional observational study. Recruitment of neonates that satisfied the inclusion criteria was done consecutively during the one year study period. Structured interviewer administered questionnaire was used to obtain maternal socio-demographics and antenatal variables during the gestational period of the participants (neonates). Data was analyzed using SPSS version 21.0 and level of significance was set at P-value < 0.05. **Results:** Of the 636 neonates recruited, 324(50.9%) were males, 164 (25.8%) had preterm delivery. The prevalence of preterm delivery was 25.8%. The identified determinants of preterm delivery were: maternal trauma/drainage of liquor (P < 0.001; OR = 16.65; 95% CI = 9.60-28.17), maternal eclampsia (P < 0.001; OR = 7.52; 95% CI = 4.33-13.08), multiple delivery (P < 0.001; OR = 7.93; 95% CI = 4.34-14.49), maternal DM (P = 0.002; OR = 1.12; 95% CI = 0.59-2.14). Other risk factors significantly associated with preterm delivery includes Low birth weight(LBW), low SEC, caesarean section, multiple pregnancy. **Conclusion:** Intervention on these risk factors can reduce the high prevalence of preterm delivery.

Keywords: Neonates, Preterm delivery, Risk factors, Tertiary hospital, Nnewi.

INTRODUCTION

Preterm birth is defined as any delivery before 37 completed weeks of gestation.[1] Preterm babies are prone to many life threatening complications.[2] Globally, about 1.1 million new born babies die every year from complications of preterm birth before the age of five years.[3] The burden of pre-term birth is high in low and middle income countries,[4] especially in Sub-Sahara Africa.[3] Studies in Nigeria noted high prevalence of preterm delivery ranging from 8.5% in Calabar, [5] 11.8%

OPEN ACCESS

*Correspondence:

Nkechinyere Godsgift Obichukwu, Department of Paediatrics NAUTH, PMB 5025, Nnewi Anambra State. Tel: +234-8036736347, Fax: +234-8163590464,

Email:

giftedkechi@yahoo.com

Specialty Section:

This article was submitted to Medicine, a section of TJMR

Received: 27 April 2022

Accepted: 11 November 2022

Published: 15 November 2022

Citation:

CC Ezechukwu, CE Ezeudu, NG Obichukwu, SC Ameh and AM Egbuogu. Risk Factors for Preterm Delivery among Neonates Accessing Care at a Tertiary Hospital in Southeast, Nigeria. *Trop J Med Res.* 2022;21(2):49-55. DOI: 10.5281/zenodo.7794785

Access Code



<http://tjmr.org.ng>

in Ilorin, [6] 16.8% - 19.9% in Lagos, [7, 8] 16.9% in Enugu, [9] to as high as 32.9% in Maiduguri. [2] The implication is that the prevalence of preterm births is still high in Nigeria and are seen more among the lower socio economic class mothers. This may be because Nigeria being a developing country, still has limited technology and equipment necessary to sustain life of a preterm neonate. Therefore, identifying the risk factors—and implementing preventive measures seems to be the major interventional measure for reducing the incidence and burden of preterm birth in the developing countries. Many factors have been associated with preterm delivery in some series such as maternal low socio-economic class, [2,10] multiple delivery, previous history of preterm delivery [11] maternal infections, poor booking condition [12] maternal trauma with concomitant drainage of liquor, [8] and maternal DM. [13] This study was aimed to determine the prevalence of preterm birth and the significantly implicated risk factors in NAUTH Nnewi, Southeast Nigeria. This will aid in surveillance, advocacy, prevention and improvement in quality of care to pregnant mothers and preterm neonates in the study area.

MATERIALS AND METHODS

This was a cross sectional observational study of six hundred and thirty-six (636) newborns that presented for care at NAUTH Nnewi over a period of 12 months.

Setting: NAUTH is one of the tertiary institutions in the state that serves as a major referral Center for hospitals in Anambra State and other neighboring States like Imo, Abia and Delta. The SCBU is a 25 bed unit that run a 24 hours services and is headed by Neonatologists.

Ethical Approval: Institutional ethical approval was obtained from the Ethics Committee NAUTH Nnewi.

Procedure: All the subjects (preterm/term neonates) for this study who met the inclusion

criteria were recruited consecutively using non-probability sampling method as they presented for care at SCBU, CHER and CHOP over the study period in NAUTH, Nnewi. The total number of babies that were recruited over the one year study period made up the sample size which was used to calculate the prevalence of preterm babies during the study period in NAUTH, Nnewi. Data was collected using a pre-tested interviewer administered questionnaire. The information obtained from the participants includes: Gender, gestational age, birth weight and mode of delivery (Vaginal delivery or Caesarean section). Furthermore, information on maternal socio-biological and antenatal variables during the gestational period of the participants (neonates) like marital status, socio-economic class, maternal infection/sexually transmitted infection; history of multiple pregnancy, maternal diabetes mellitus (DM), drug abuse, trauma with drainage of liquor and history of preeclampsia/eclampsia were collected. Neonates were weighed naked within 24 hours after birth using an infant weighing scale (bassinet) The birth weight was recorded to the nearest 0.1kg. Social class was determined using the socioeconomic indices of the parents as described by Oyedeji [14]

Data Analysis

The data was analyzed using the statistical package for the social sciences (SPSS) software version 25.0 for windows. Descriptive statistics was used to describe the frequency, mean, median (where appropriate) and standard deviations of continuous variables like birth weight and gestational age. Categorical variables such as gender, birth weight, socioeconomic class, mode of delivery, maternal marital status, preeclampsia/eclampsia, multiple pregnancy, were tested for association with gestational age (preterm and term ages) using Pearson's Chi-square (and Fisher's exact test where appropriate) Binary logistic regression for multivariate analysis of the categorical variables to know the odds for each of the variables, while taking care of the confounders. The most implicated risk

factor for preterm delivery was determined by the categorical variable with the highest odds ratio after the binary logistic regression analysis was applied and P-value of <0.05 was considered as significant.

RESULTS

A total of 636 term/preterm babies were recruited into the study during the study period (one year), of these, 324(50.9%) were males, while 312(49.1%) were females giving a male; female ratio of 1.04:1. Four hundred and seventy two(74.2%) were term babies, while 164 were preterm babies, making the prevalence of preterm birth to be 25.8%. Five hundred and forty (84.9%) babies were born by married mothers, while

96(15.1%) were from single mothers. Four hundred and sixty-eight (73.6%) babies were delivered vaginally while 168(26.4%) were delivered through caesarean section (C/S). Two hundred and sixteen (34.0%) participants were from high SEC, while 212(33.3%) were from middle SEC and 208(32.7%) from low SEC. Table 1 shows the basic characteristics of all the recruited babies. The prevalence of preterm was higher among neonates delivered through caesarean section 92(56.1%) than those delivered vaginally 72(43.9%). This was statistically significant. (P,<0.001). The prevalence of preterm delivery was more among the female 84(51.2) than the male 80(48.8%) The prevalence

of preterm delivery was highest among Low SEC 80(48.8); while 56(34.1%) preterm babies were from middle SEC and 28(17.1%) preterm babies were from high SEC. Low SEC was significantly associated with preterm delivery. (P = 0.001). The prevalence of preterm delivery was higher among low birth weight babies 157(95.7%) than babies with normal weight 7(4.3%). Low birth weight accounted for 90.8% of preterm delivery 157(95.7%) when compared with normal term babies 16(3.4%) and P-value <0.001. The prevalence of preterm delivery was higher among married mothers 140(85.4%) than the single mothers 24(14.7%) but this was not statistically significant (P=0.87)

The history of pre-eclampsia/eclampsia was noted among 64(39.0%) preterm neonates. This accounted for 25.4% preterm delivery when compared with term neonates 72(15.3%), and this was statistically significant, P<0.001. Multiple pregnancy occurred among 60(36.6%) preterm neonates and this accounted for 33.8% preterm births when compared with term babies, which was statistically significant with P<0.001.

Maternal trauma/drainage of liquor was observed among 112(68.3%) preterm neonates and was statistically significant (P<0.001) Table 3 shows the various risk factors of preterm delivery as compared with term births.

On binary logistic regression of all the risk factors of

Table1: Sociodemographics of the Study Population

Characteristics	Frequency = 636	Percentage (%)
Gender		
Male	324	50.9
Female	312	49.1
Socio-Economic Class		
High	216	34.0
Middle	212	33.3
Low	208	32.7
Marital Status		
Married	540	84.9
Single	96	15.1
Delivery Mode		
Vaginally	468	73.6
Caesarean Section	168	26.4

Table 2: Association of Preterm Delivery to Gender, SEC, and Birth Weight, Marital Status, Mode of Delivery and implicated factors.

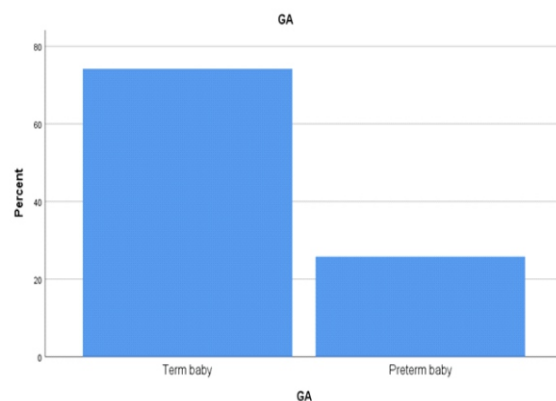
Variables	Term Delivery N=472(%)	Preterm Delivery N=164(%)	χ^2 (value)	P- value
Gender			0.41	0.52
Male	244(51.7)	80(48.8)		
Female	228(48.3)	84(51.2)		
SEC			36.1	<0.001?
High	188(39.8)	28(17.1)		
Middle	156(33.1)	56(34.1)		
Low	128(27.1)	80(48.8)		
Birth Weight (BW)			524.0	<0.001?
Low BW	16(3.4)	157(95.7)		
Normal BW	456(96.6)	7(4.3)		
Marital Status			0.25	0.87
Married	400(84.7)	140(85)		
Social	72(15.3)	24(14.6)		
Delivery Mode			100.2	<0.001?
Vaginal	396(83.9)	72(43.9)		
Caesarean section	76(16.1)	92(56.1)		
Pre-Eclampsia/E			40.91	0.001?
Yes	72(15.3)	64(39.0)		
No	400(84.7)	100(61.0)		
Multiple Birth			72.58	<0.001?
Yes	40(8.5)	60(36.6)		
No	432(91.5)	104(63.4)		
Maternal (M) Trauma/Liquor			133.04	<0.001?
Yes	92(19.5)	112(68.3)		
No	380(80.5)	52(31.7)		
M Sepsis /STI			0.55	0.48
Yes	124(26.3)	48(29.3)		
No	348(73.7)	116(70.7)		
Maternal Dm			4.5	0.04?
Yes	24(5.1)	16(9.8)		
No	448(94.9)	148(90.2)		
Maternal Drug Abuse			2.08	0.17
Yes	80(16.9)	20(12.2)		
No	392(83.1)	144(87.8)		

Table 3: Adjusted Odds Ratio of Various Risk Factors for Preterm Delivery

Variables	Odds Ratio	95% Ci	P-Value
Pre-eclapsia	7.52	4.33-13.08	<0.001?
Multiple Delivery	7.93	4.34-14.49	<0.001?
Maternal trauma/Liquor	16.65	9.60-28.17	<0.001?
Maternal Sepsis/STI	1.05	0.63-1.76	0.855
Maternal DM	3.71	1.61-8.57	0.002?
Maternal Drug Abuse	1.12	0.59-2.14	0.721

preterm delivery, the odds was highest for maternal trauma/drainage of liquor (OR=16.65, P= 0.001) to occurrence of preterm delivery while taking care of other confounders.

This means that maternal trauma with drainage of liquor is 16.65 times more likely to result in preterm delivery than term birth at P= 0.001.



DISCUSSION

The prevalence of preterm delivery in NAUTH Nnewi was found to be 25.8%. This finding is similar to World Health Organization (WHO) estimated prevalence of 15% or more in Nigeria. [15]. This is also similar to high preterm birth rate noted by Mustapha *et al.*[2] The prevalence of preterm birth from this study is higher than the findings by Azeez *et al* [7] in a similar study done in Lagos, Nigeria. This may be because neonates who were product of multiple gestation were included in our study, but were excluded by Azeez *et al.*[7] More so the index study setting was tertiary hospital which serves as a major referral center for high risk pregnancies and critically ill neonates. This may have accounted for the high preterm birth rate documented in this study. Low socioeconomic class was significantly associated with preterm delivery in this study, this is similar to findings by Ferrero *et al.*[10] Olusanya BO,[8] and Mokuoluet *al.*[6]

Mothers from low socioeconomic class usually have limited resources to assess proper antenatal care. Some studies have also noted that there is increase preterm birth rate among mothers with poor antenatal care.[2,8] Preeclampsia/ eclampsia was significantly associated with high rate of preterm birth in this study. This is similar to the findings documented by Olusanya *et al.*[8] Azeez *et al.*, [7] and Mustapha *et al.*[2] The condition of anoxia in the fetus of mothers with preeclampsia could explain this. More so, persistence of reduced blood flow to the placenta in uncontrolled hypertensive pregnant mothers, can lead to preterm labor and subsequent preterm delivery. We observed that multiple birth pregnancy was significantly associated with preterm delivery. This was similar to the findings by Mustapha *et al* [2] and Refuerzo JS.[11]

The possible effect of the weight of the multiple babies on the uterus could induce premature rupture of membrane (PROM) and ultimately preterm delivery of the babies. Maternal trauma with PROM was significantly associated with preterm birth in

this study. This is similar to the finding from studies [6, 7, 8, 9,] in the past. The higher rate of maternal trauma/PROM reported from this study may be associated with the predominance of lower socioeconomic class participants who are more prone to trauma due to the possibility of the use of bicycle and tricycle as a means of transport. Furthermore, domestic violence is known to be commoner in households of low socio economic class.[16]

The combined effect of Covid 19 and consequent lock down that occurred during the study period, may have contributed to economic hardship on these women hence making them more liable to domestic violence/trauma. Maternal sepsis/sexually transmitted infections were not significantly associated with occurrence of preterm birth in this study. Although similar studies noted that maternal infection/STI is significantly associated with preterm delivery.[12,17,18] Some of these studies also found that PROM with drainage of liquor was seen more among pregnant mothers with infection/STI and or urinary tract infection.[17,18] This finding may suggest that PROM with drainage of liquor as noted in this study may be due to maternal trauma in pregnancy since maternal sepsis/STI was not associated with preterm delivery in this study. Maternal DM was an associated risk factor of preterm delivery, a finding similar to that reported by Kapustin *et al* [19] and Deryabina *et al.*[20] This is because chronic hyperglycemia, especially in a pregnant mother with uncontrolled DM, predisposes to fetal macrosomia and hence increased tendency of preterm delivery.

Strengths and limitations of the study: The strength of this study is the fact that it revealed the high prevalence of preterm delivery and the implicated factors in the study area. The limitation of this study stems from the fact that it is a cross sectional descriptive study done within a short period of one year. An experimental study design for a longer period will yield more conclusions and

inferences for interventional strategy in reducing the burden of preterm delivery in the study area.

CONCLUSION

This study shows that the prevalence of preterm birth in NAUTH Nnewi is high at 25.8%. It also showed that low socioeconomic class, multiple birth, maternal DM, maternal preeclampsia/eclampsia, maternal trauma with drainage of liquor was significantly associated with preterm birth. Improving the socio-economic status of mothers and reduction of stressful conditions among pregnant mothers may help in reducing the prevalence of preterm births in our environment.

Acknowledgement

The authors wish to appreciate the health workers-House officers, the nurses and nurse assistant working in CHER, CHOP, SCBU for their assistance during the data collection. We also appreciate the assistance of Statisticians in NAUTH, Nnewi for their input in statistical analysis of this work.

Authors Contribution: CCE, CEE and NGO conceptualized and designed the study. AME, NGO and SCA contributed in implementation and data collection. CCE and CEE proof read and revised the manuscript. All authors were involved in the writing and revision of the manuscript. The authors read, approved the final manuscript and agreed to be accountable for all aspect of the work.

Data Availability: The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Funding: No funding sources.

Conflict of interest: None declared.

Ethical approval: The study was approved by the institutional Ethics Committee.

REFERENCES

1. Preterm birth-Definition and statistic.[Internet](Cited 2021 November) Available from : Ad.<https://www.inha.ie/pregnancy/complication>.
2. Mustapha B, Simon P AB. Prevalance and Associated morbidities of Preterm neonatal admissions at the University of Maiduguri Teaching Hospital, NorthEastern Nigeria. Niger J Pediatr. 2020;47:264–269.
3. Blencowe H, Cousens S, Chou D, Oestergaard M, Say L, Moller AB. Born too soon: The global epidemiology of 15million preterm births. Reproductive Health 2013;10:S2
4. Ruiz M, Goldblatt P, Morrison J, Kukla L, Svancara J, Riitta-Jarvelin M, et al. Mothers education and the risk of preterm and small for gestational age birth. A Drivers meta-analysis of 12 European Cohorts. J Epidemiol commun Heal. 2015;69:826-833.
5. Etuk SJ, Etuk IS, Oyo-Ita AE. Factors influencing the incidence of preterm Birth in Calabar, Nigeria. Niger J physiolo sci. 2005;20:63-68.
6. Mokuolu OA, Suleiman B, Adesiyun O, Adeniyi A. Prevalence and determinants of preterm deliveries in the University of Ilorin Teaching hospital ilorin. Niger pediater rep. 2010;2:3.
7. Azeez B, Ezeaka C, Ekhaguere O, Weathers N, Ladd J, Fajolu I, et al. Characteristics and risk factors of preterm births in a tertiary center in Lagos, Nigeria. Pan Africa Med Journal. 2016;24:1.
8. Olusanya BO and Ofovwe GE. Predictors of preterm births and low birth weight in an inner-city hospital in sub-Saharan Africa. Matern Child Heal J. 2010;14:978–86.
9. Iyoke CA, Lawani LO, Ezugwu EC, Ilechukwu G, Nkwo PO, Mba. et al Prevalence and perinatal mortality associated with preterm births in a tertiary medical center in Southeast Nigeria. int J women Heal. 2014;6:881–8.
10. Ferrero DM, Larson J, Jacobsson B, Renzo GC,

- Norman JE, Martin Jr JN, et al. Cross Country individual participants analysis of 4.1 million singleton births in 5 countries with very high human development index confirms known associations but provides no Biologic explanation for 2/3 of all preterm births. *PLoS One*. 2016;11:e0162506.
11. Refuerzo JS. Impact of multiple births on late and moderate prematurity. *Semin fetal Neonatal med*. 2012;17:143–5.
 12. Kazemier BM, Koningstein FN, Schneeberger C, Ott A, Bossuyt MP, Miranda ED et al. Maternal and neonatal consequences of treated and untreated asymptomatic bacteriuria in pregnancy; a prospective Cohort study with an embedded randomized controlled trials. *Lancet infect Dis*. 2015;15:1324–33.
 13. Cobo T, Kacerovsky M, Jacobsson BO. Risk factors for spontaneous preterm delivery. *Int J Gynecol Obs*. 2020;150:17–23.
 14. Oyedeji G. Socio-economic and Cultural Background of Hospitalised Children in Ilesha. *Niger J Paediatr*. 1985;12:111–7.
 15. Blencowe H, Cousens S, Chou D, Oestergaard M, Say Lale, Moller AB, et al. Born Too soon: The global epidemiology of 15 million preterm births. *Reprod Heal*. 2013;10:S1-S2.
 16. Osuorah D, Antai D, Ezeudu C, Chukwujekwu E. Effect of maternal exposure to intimate partner violence on under-five mortality in Nigeria. *Niger J Paed*. 2012;39:97–104.
 17. Romero R, Miranda J, Chaemsaitong P, Chaiworapongsa T, Kusanovic JP, Dong Z, et al. Sterile and microbial associated intra-amniotic inflammation in preterm prelabour rupture of membranes. *J Matern fetal Neonatal med*. 2015;28:1394–409.
 18. Rodriguez-Trujillo A, Cobo T, Vives I, Bosch CV, Marian K, Posadas DE, et al. Gestational age is more important for short term neonatal outcome than microbial invasion of the amniotic cavity or intra-amniotic inflammation in preterm prelabour rupture of membrane. *Acta Obs Gynecol scand*. 2016;95:926–933.
 19. Kapustin RV, Alekseyenkova EN, Arzhanova ON, Petyaeva AV, Atayeva MG, Yusenko SR. Preterm birth in women with diabetes mellitus. *J Obs women's Dis*. 2020;69:17–26.
 20. Deryabina EG, Yakovnova GV, Pestryaeva LA, Sandyreva ND. Perinatal outcome in pregnancies complicated with gestational diabetes mellitus and very preterm birth: case-control study. *gynaecol Endocrinol*. 32:52–55.