BMJ Public Health

Special care baby unit neonatal disease outcomes in a tertiary hospital in Nigeria: 2-year retrospective cross-sectional analysis

Udochukwu Godswill Anosike ,[1] Ugochukwu Godson Amalahu,[1] Chijioke Amara Ezenyeaku,[2] Chika Florence Ubajaka,[2] Ifeanyi Osmond Anokwulu,[1] Chiamaka Sandra Nsude,[1] Joseph Moses Adenyi,[1] Chinemerem Okonkwo,[1] Uzoma Love Nwajinka,[1] Malachy Echezona DivineFavour,[1] Chukwuemelie Darlington Okeke,[1] Chidozie Valentine Akwiwu-Uzoma[1]

To cite: Anosike UG, Amalahu UG, Ezenyeaku CA, *et al*. Special care baby unit neonatal disease outcomes in a tertiary hospital in Nigeria: 2-year retrospective cross-sectional analysis. *BMJ Public Health* 2025;**3**:e002141. doi:10.1136/bmjph-2024-002141

► Additional supplemental material is published online only. To view, please visit the journal online (https://doi.org/10.1136/bmjph-2024-002141).

Received 3 October 2024
Accepted 21 March 2025

[1]Nnamdi Azikiwe University College of Health Sciences, Awka, Nigeria
[2]Department of Community Medicine, Nnamdi Azikiwe University, Awka, Nigeria

Correspondence to
Dr Udochukwu Godswill Anosike;
ug.anosike@stu.unizik.edu.ng

ABSTRACT

Background Neonatal diseases contribute significantly to global under-five mortality. The highest neonatal mortality rate in sub-Saharan Africa can be traced to Nigeria. This study aims to evaluate the outcomes of neonatal admissions in a select tertiary hospital in Nigeria.

Methods A retrospective analysis of data collected on 656 neonates admitted in the special care baby unit of Nnamdi Azikiwe University Teaching Hospital, Nigeria over a period of 2 years (January 2021 and December 2022). Descriptive analysis and inferential statistics were done at $p<0.05$ using SPSS V.25.

Results Median age at presentation was 4 hours (IQR 0.5, 24) hours. The median duration of hospital stay was 6 days (IQR 3, 11). The most common morbidities were perinatal asphyxia (n=295/656; 45.0%) and preterm (n=175/656; 26.7%); while congenital anomalies (n=22/47; 46.8%), perinatal asphyxia (n=73/295; 24.7%) and preterm (n=37/175; 21.1%) had the highest case fatality rates. Gestational age at birth, duration of hospital stay, place of delivery and mode of delivery were the variables determined to be statistically associated with the outcome of care.

Conclusion This study showed a mortality of 22.9% (n=150/656) in our study area with perinatal asphyxia (48.7%; n=73/150), preterm (24.7%; n=37/150), congenital anomalies (11.3%; n=22/150) and neonatal sepsis (6.7%; n=10/150) as the primary causes. This work highlights the need for emergency care of critically ill newborns through financing the transition from special care baby unit to neonatal intensive care unit across tertiary institutions in Nigeria.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Poor outcome of neonatal disease is associated with lack of quality care at birth or skilled care and treatment immediately after birth and in the first days of life.
⇒ Preterm birth, birth asphyxia, neonatal infections and congenital anomalies are the prominent causes of neonatal deaths.

WHAT THIS STUDY ADDS

⇒ It provides an insight into outcomes of level II neonatal care in a tertiary hospital located in the south-eastern region of Nigeria.
⇒ It pinpoints factors significantly associated with outcomes (gestational age, mode of delivery and place of delivery), highlighting the need for targeted interventions to improve survival rate.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our work informs the need for transition from special care baby unit (level II) to neonatal intensive care unit (level III) across most tertiary institutions in Nigeria to enable comprehensive care for critically ill neonates or neonates with severe neonatal morbidities.
⇒ Findings call for better access to specialised and intensive neonatal care, and cultural transition to facility-based childbirth practices.

INTRODUCTION

Neonatal diseases are a significant global health issue, particularly in high-risk populations, such as preterm babies, and low birth weight neonates. The leading causes of neonatal morbidity and mortality include preterm, perinatal asphyxia and sepsis.[1 2] Most of these deaths (almost 99%) occur in developing countries (low- and middle-income countries).[3] In sub-Saharan Africa, neonatal diseases contribute to 39% of under-five mortality.[4] Nigeria was ranked by WHO as the country with the second highest number of newborn deaths in 2020, averaging about 271 000 deaths annually.[5] According to Statista

2019, neonatal disorders (25.27%) were the major cause of under-five mortality in Nigeria.[6] Between 2016 and 2017, the neonatal mortality rate (NMR) in Nigeria was 37 per 1000 live births.[7] In other sub-Saharan African countries, NMR, as reported, are Kenya (2015): 22/1000 live births,[8] Ethiopia (2016): >35/1000 live births[9] and Cameroon (2017): 21/1000 live births.[10] The magnitude of neonatal mortality across tertiary hospitals in various regions and states in Nigeria is as follows— 12.2% in Rivers State[11] and 10.5% in North Central Nigeria (45/428).[12] This study, therefore, provides extensive insights into the distribution of neonatal diseases and the outcomes of admissions in a selected Nigerian hospital.

METHODS

Study area

This study was conducted in the special care baby unit of Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi. Nnewi is a commercial and industrial city in Anambra State, Southeastern Nigeria. The special care baby unit of NAUTH, Nnewi was established in May 1998.[13] It consists of 3 wards (for in-born babies, out-born/referred babies and isolation), and contains 17 cots, 1 infant radiant warmer, 5 incubators, 2 oxygen cylinders, 5 phototherapy units, 1 apnoea monitor and 4 resuscitation kits.

Study design

This study was a retrospective, descriptive cross-sectional study.

Study population

The study population was newborn babies admitted to the special care baby unit, NAUTH, Nnewi.

Inclusion criteria

All neonates between 0 and 28 days who presented between January 2021 and December 2022.

Exclusion criteria

Neonates with incomplete data on health records, and stable term neonates admitted to special care baby unit.

Sampling technique

All folders of neonates that met the inclusion criteria within the study period were retrieved for data collection.

Study instrument

A checklist (proforma) was used to extract data on the neonates. Neonatal data—sex, birth weight, gestational age at birth, age at presentation, diagnosis at presentation, duration of hospital stay and outcome; maternal data—mother's age, marital status, occupation, level of education and parity.

Training of research assistants

Ten medical students in their fifth year of study were recruited and trained for a day by the principal researchers as research assistants. They were trained on how to extract the required data from folders using the checklist. The success of the training was assessed with the preliminary data collected. To further ensure data quality, the principal researcher monitored the data collection. There were meetings of the data collection team at the end of each collection day to collate the data.

Duration of study

The study lasted for 3 months, starting from May to July 2023.

Data collection methods

With permission from the medical records department and special care baby unit NAUTH, the medical records of the neonates were identified, retrieved, studied and the required data were extracted from all that met the inclusion criteria using the checklist.

Data management

Measurement of variables

The main outcome variables for this study were—fatality rate of cases, NMR, duration of hospital stay.

Other variables that affected the outcomes include birth weight, gestational age at birth, place of and delivery.

Statistical data analysis

Data cleaning was done using Microsoft Office Excel, V.2021 (Microsoft Corporation). Duplicated and incomplete data were removed. Further analysis of data was done using SPSS V.25 (IBM Corp). The distributional properties of continuous variables were assessed using the Shapiro-Wilk test (α=0.05). The results indicated that all continuous variables deviated significantly from normality ($p<0.05$), suggesting non-normal distribution. Thus, median and IQRs were used as measures of central tendency for them. Quantitative variables were further divided into categories. Categorical variables were summarised using tables of frequencies and percentages. The Fisher's exact test with Bonferroni correction was used for testing the significance of associations between the outcome of hospital admissions and various variables. The level of significance was set at $p<0.05$.

RESULTS

The total number of neonatal admissions between 2021 and 2022 was 973. 32% of health records (n=312/973) were not assessed due to the missing health records and incompleteness of data as required by proforma. Five out of 661 assessed health records were excluded—stable term neonates (four) and infant of mother with sickle cell disease (one).

As shown in table 1, a higher percentage of neonates (56.1%) were males. 60.3% (n=396/656) were term neonates between 37 and 42 weeks. 50.0% (n=328/656) of neonates had their birth weight between 2500 and 4000 g. Most of the children were outborn (62.8%). A higher percentage presented at age less than 13 hours

Table 1 Characteristics of neonates admitted to special care baby unit Nnamdi Azikiwe University Teaching Hospital

	Frequency (n=656)	Percentage (%)
Sex of child		
Male	368	56.1
Female	288	43.9
Gestational age (weeks)		
<28	26	4.0
28 0/7 to 31 6/7	86	13.1
32 0/7 to 36 6/7	148	22.6
37 0/7 to 41 6/7	396	60.3
Mean=35.7 2±3.95		
Birth weight (g)		
<1000	22	3.4
1000–1499	79	12.0
1500–2499	183	27.9
2500–4000	328	50.0
>4000	44	6.7
Mean=2571.62±963.12		
Place of delivery		
Outborn	412	62.8
Inborn	238	36.3
Home	6	0.9
Age at presentation		
0–12 hours	389	59.3
13–24 hours	117	17.8
2–4 days	59	9.0
>4 days	91	13.9
Median (IQR)=4 (0.5, 24) hours		
Duration of hospital stay (days)		
<7	340	51.8
7–14	211	32.2
15–30	77	11.7
>30	28	4.3
Median (IQR)=6 (3, 11)		

(59.3%). Duration of hospital stay for most newborns was below 7 days (51.8%).

As shown in table 2, the age of the women ranged from 18 to 53 years with a median age of 29 years (IQR 25, 34).

As shown in table 3, the most common cases diagnosed were perinatal asphyxia (45.0%), preterm (26.7%), neonatal sepsis (9.6%), congenital anomalies (7.2%) and neonatal jaundice (5.2%).

As displayed in table 4, greater percentage of neonates admitted were discharged (69.2%). More than one-fifth died (22.9%).

DISCUSSION

Findings from this study showed a high burden of neonatal morbidity and mortality in hospitalised newborns (656)

Table 2 Maternal characteristics

	Frequency (n=656)	Percentage (%)
Age of mother (years)		
18–29	340	51.8
30–39	271	41.3
>39	45	6.9
Median (IR)=29 (25, 34) years		
Marital status		
Single	23	3.5
Married	633	96.5
Parity		
Primipara	223	34.0
Multipara	433	66.0
Educational level		
Tertiary	212	32.3
Secondary	388	59.1
Primary	37	5.6
No formal	19	2.9
Occupation		
Unemployed	50	7.6
Trader	366	55.8
Student	45	6.9
Professional	42	6.4
Housewife	91	13.9
Civil servant	56	8.5
Artisan	6	0.9
Religion		
Muslim	3	0.5
Christian	653	99.5
Ethnicity		
Igbo	653	99.5
Hausa	3	0.5
Mode of delivery		
Spontaneous vaginal delivery	388	59.1
Emergency caesarean section	204	31.1
Elective caesarean section	60	9.1
Assisted vaginal delivery	4	0.6
Premature rupture of membrane		
Yes	114	17.4
No	542	82.6
Peripartum fever		
Yes	162	24.7
No	494	75.3
Dexamethasone administration		
Yes	143	21.8
No	513	78.2

Table 3 Distribution of neonatal diseases in special care baby unit Nnamdi Azikiwe University Teaching Hospital

Diagnosis at presentation	Frequency (n=656)	Percentage (%)
Congenital anomalies	47	7.2
Macrosomia	26	4
Neonatal jaundice	34	5
Neonatal sepsis	63	9.6
Perinatal asphyxia	295	45
Preterm	175	26.7
Transient tachypnoea of the newborn	7	1.1
Vitamin K deficiency bleeding	9	1.4

admitted to special care baby unit in NAUTH, Anambra State with a mortality of 22.9% (n=150/656). This contrasts with a similar study carried out in our study area by Ezechukwu *et al* which reported a mortality of 19.4% (n=166/854).[13] This demonstrates a 15.2% increase in neonatal mortality since 2001. The COVID-19 pandemic likely worsened healthcare challenges, disrupting services like prenatal and emergency care, which contributed to higher mortality rates. Also, this observed increase may be attributed to a higher number of outborn neonates who had limited access to timely tertiary care, as this group exhibited higher mortality. Reports from other studies showed lower mortality in tertiary institutions in Rivers State (12.2%),[11] and 10.5% in North Central Nigeria.[12] This disparity in mortality rates may be due to a higher referral rate for severe cases and differences in study periods. The primary causes of mortality were perinatal asphyxia (48.7%; n=73/150), preterm (24.7%; n=37/150), congenital anomalies (11.3%; n=22/150) and neonatal sepsis (6.7%; n=10/150). These findings align with a study conducted at ESUTH, which also identified perinatal asphyxia as the predominant cause of mortality.[14]

The highest case fatality rate in this study (online supplemental table 1) was recorded among neonates with congenital anomalies (n=22/47; 46.8%), perinatal asphyxia (n=73/295; 24.7%) and preterm neonates (n=37/175; 21.1%). In contrast, other studies reported neonates with respiratory distress syndrome,[15] neonatal sepsis[11] as morbidities with the highest case fatality rate. Other neonatal morbidities mentioned in our study except transient tachypnoea of newborn and vitamin K deficiency bleeding were significantly less likely to cause death compared with congenital anomalies (online supplemental table 2). The risk of death associated with transient tachypnoea of newborn and vitamin K deficiency bleeding was non-existent and could not be compared as no mortality was reported as seen in online supplemental table 1. Neonates delivered through assisted vaginal delivery had higher fatality (50%) (online supplemental table 3).

Table 4 Outcome of admission for neonatal diseases in the special care baby unit Nnamdi Azikiwe University Teaching Hospital

Outcome of care	Frequency (n=656)	Percentage (%)
DAMA	32	4.9
Died	150	22.9
Discharged	454	69.2
Transferred	20	3.0

DAMA, discharged against medical advice.

Preterm, perinatal asphyxia, neonatal sepsis, neonatal jaundice, congenital anomalies as reported by Ezechukwu *et al*[13] have remained the prevalent disorders in NAUTH. Our study indicates that perinatal asphyxia was the leading cause of neonatal admissions, accounting for 45.0% of cases. Additionally, preterm, neonatal sepsis, congenital anomalies and neonatal jaundice contributed to 26.7%, 9.6%, 7.2% and 5.2% of admissions, respectively. These results are consistent with findings from other medical centres across Nigeria.[14 16 17] Congenital anomalies noted in our study area were gastroschisis, omphalocele, trachea-oesophageal fistula, encephalocele, VACTERL, spina bifida, Hirschsprung disease, jejunal atresia, pyloric stenosis, anorectal malformation and imperforate anus. The congenital anomalies consistent with those reported in a tertiary health facility in the Niger Delta region by Abolodje *et al*[15] are omphalocele, gastroschisis, spinal dysraphism, encephalocele and multiple congenital anomalies (VACTERL).

The distribution of neonatal diseases in our study area differs considerably with that reported in other study areas: neonatal sepsis—9.6% (NAUTH) versus 37.6% (Ahmadu Bello University Teaching Hospital (ABUTH)),[18] 38.95% (University of Benin Teaching Hospital (UNIBEN))[19]; neonatal jaundice—5.2% (NAUTH) versus 15% ((Ekiti State University Teaching Hospital (EKSUTH))[20] and 35.94% (Federal Medical Centre (FMC), Owo)[21]; preterm—26.7% (NAUTH) versus 16.9% (Lagos University Teaching Hospital (LUTH))[22]; perinatal asphyxia—45.0% (NAUTH) versus 11.1% (Benue State University Teaching Hospital, Makurdi (BSUTH))[23] and 29.4% (Braithewaite Memorial Specialist Hospital (currently known as Rivers State University Teaching Hospital (BMSH)).[24] This shows that other centres have higher burden of admissions for neonates with sepsis and jaundice except preterm and perinatal asphyxia. The reasons for these disparities could be alluded to the differences in diagnostic criteria across institutions, and incorporation of preventive measures after birth for at-risk neonates. In figure 1, the absence of admissions during the months of August and September 2021 was a consequence of strike action carried out by the National Association of Resident Doctors, which spanned from 2 August to 5 October 2021.

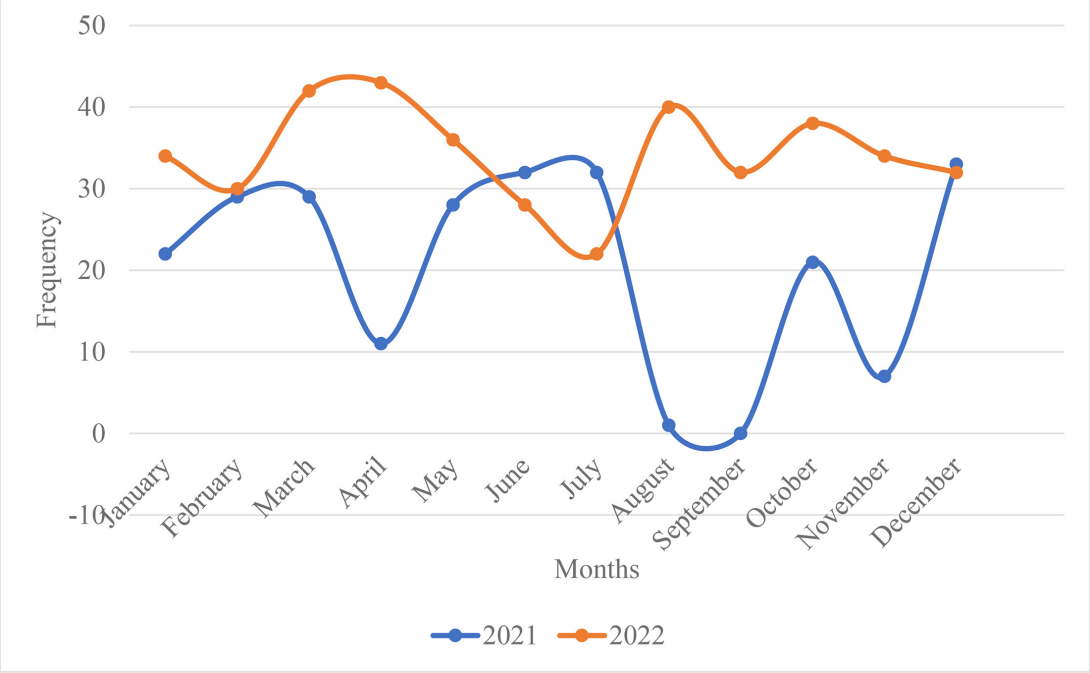

Figure 1 Monthly pattern of neonatal admissions for 2021 and 2022. The comparison of cases between the years 2021 and 2022. In the year 2021, a higher percentage of cases were seen in the months of June, July and December. Conversely, the year 2022 had a higher percentage of cases in the other months.

Higher proportion of admitted neonates (62.8%) were found to be outborn (online supplemental table 4). This trend can be linked to the prevailing preference for traditional birth attendants, local maternities and non-specialist hospitals, which are perceived as offering more cost-effective childbirth services.[25] Consequently, neonates are referred to NAUTH when complications arise during childbirth. This finding, however, differs from findings in other studies conducted at UBTH and ESUTH, where the majority of admitted neonates were inborn.[14 26] The implications of this finding are of considerable importance, as it sheds light on the regional disparities in neonatal care and underscores the influence of cultural beliefs on childbirth practices.

Findings from this study show a significant difference in mortality between outborn (n=116/412) and inborn (n=33/238)—with outborn neonates having two times higher risk of death than inborn neonates. This discrepancy is likely due to the advantages of deliveries by skilled health professionals, closer scrutiny provided to inborn babies by specialists and experienced doctors; enabling early detection of subtle signs of diseases in newborns. Also, the convenience of transferring sick babies delivered in the centre to specialised care units (special care baby units) may contribute to the lower mortality rate compared with those born outside the centre. The finding is consistent with similar studies conducted in other Nigerian centres, indicating a trend that spans across different locations.[16 26 27] Most neonatal deaths occurred within the first 24 hours in this study. The finding is consistent with similar studies conducted in other Nigerian centres.[14 28] This emphasises the benefits of skilled delivery and specialised care in the reduction of mortality.

As a tertiary institution, 69.2% discharge rate of admitted neonates in our study area poses a concern as to the adequacy of neonatal care efforts. This indicates the need for urgent improvement in the overall neonatal care outcome. Also, the rate of discharge against medical advice (DAMA) was observed to be 4.9% and was attributed to financial constraints and prolonged hospital stay. This finding demonstrates a notable difference when compared with a previous study conducted at UPTH, which reported a DAMA rate of 15%.[27] The higher DAMA rate observed in UPTH was caregivers' preference for complementary medicine over continuing hospital treatment due to financial constraints.

Statistically, gestational age at birth, mode of delivery, place of delivery and duration of hospital stay have shown significant association (online supplemental tables 3 and 4) with neonatal outcome in NAUTH. Our study showed mortality being more likely among premature neonates: <28 weeks as well as outborn neonates. Discharge was more likely among inborn neonates, those delivered by elective caesarean section, those with gestational age of 33–36 weeks and hospital duration between 7 and 30 days. Neonates with jaundice, as well as those delivered by assisted vaginal delivery, were more likely to DAMA. Consistent with findings by Nabwera *et al*,[29] inborn neonates were less likely to die compared with outborn neonates.

Study limitations

The availability of data in the health records was restricted, as only 661 of 973 admitted neonates had their records retrieved. Limited data for comprehensive analysis may have introduced outcome bias. Hence, the need for the introduction of the electronic health management system.

CONCLUSION

There is a wide distribution of neonatal diseases in our study area. This study highlights a significant burden of neonatal morbidity and mortality in hospitalised newborns at NAUTH with a mortality rate of 22.9% reflecting a 15.2% increase since 2001. Perinatal asphyxia remains the leading cause of mortality and admissions, followed by preterm, congenital anomalies and neonatal sepsis. A higher mortality rate was observed among outborn neonates, underscoring the need for improved access to skilled birth attendants and specialised neonatal care. The findings emphasise the critical importance of early interventions and addressing cultural and systemic barriers to enhance neonatal outcomes in the region.

X Chidozie Valentine Akwiwu-Uzoma @tSirValentino

Contributors All authors contributed substantially to the design of this work. Conceptualisation: UGAn, UGAm. Planning: UGAn, UGAm, CAE, CFU, IOA. Data collation: UGAn, UGAm, CSN, JMA, CO, ULN, CVA-U, CDO. Data analysis: IOA, MEDF, UGAn, UGAm. Reporting and editing: UGAn, UGAm, CAE, CFU, MEDF. UGAn accepts full responsibility for the finished work and conduct of the study, had access to the data and controlled the decision to publish.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval Approval was obtained from the Nnamdi Azikiwe University Teaching Hospital Health Research Ethics Committee (NAUTHHREC) NAUTH/CS/66/VOL.16/VER.3/282/2023/180. Permission was also obtained from the Pediatrics Head of Department, Special Care Baby Unit and Head of the Department of Medical Records. The data extracted from the case notes was treated with utmost confidentiality, and patient names and other details that could lead to their identification were excluded to maintain anonymity.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

ORCID iD

Udochukwu Godswill Anosike http://orcid.org/0000-0002-1421-8321

REFERENCES

1 Oza S, Lawn JE, Hogan DR, *et al*. Neonatal cause-of-death estimates for the early and late neonatal periods for 194 countries: 2000-2013. *Bull World Health Organ* 2015;93:19–28.
2 Lawn JE, Kerber K, Enweronu-Laryea C, *et al*. 3.6 million neonatal deaths--what is progressing and what is not? *Semin Perinatol* 2010;34:371–86.
3 Bryce J, Boschi-Pinto C, Shibuya K, *et al*. WHO estimates of the causes of death in children. *Lancet* 2005;365:1147–52.
4 UNICEF. Neonatal mortality. Available: https://data.unicef.org/topic/child-survival/neonatal-mortality [Accessed 18 Mar 2023].
5 World Health Organization. Newborn mortality. Available: https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-mortality-report-2021 [Accessed 18 Mar 2023].
6 Statista. Nigeria: main causes of infant mortality. Available: https://www.statista.com/statistics/1172807/main-causes-of-infant-mortality-in-nigeria [Accessed 2 Apr 2023].
7 UNICEF. World is failing newborn babies, says unicef. Available: https://www.unicef.org/nigeria/press-releases/world-failing-newborn-babies-says-unicef [Accessed 16 May 2023].
8 Gitobu CM, Gichangi PB, Mwanda WO. The effect of Kenya's free maternal health care policy on the utilization of health facility delivery services and maternal and neonatal mortality in public health facilities. *BMC Pregnancy Childbirth* 2018;18:77.
9 Tekleab AM, Amaru GM, Tefera YA. Reasons for admission and neonatal outcome in the neonatal care unit of a tertiary care hospital in Addis Ababa: a prospective study. *RRN* 2016;6:17.
10 Ndombo PK, Ekei QM, Tochie JN, *et al*. A cohort analysis of neonatal hospital mortality rate and predictors of neonatal mortality in a sub-urban hospital of Cameroon. *Ital J Pediatr* 2017;43:52.
11 West BA, Onubogu U, Arthur A. Pattern of Neonatal Mortality at a Special Care Baby Unit in Rivers State, Nigeria. *AJPR* 2022;10:15–25.
12 Abolodje EA. Neonatal mortality: morbidity pattern and risk factors in a resource-limited centre in North Central Nigeria. *Sri Lanka J Child Health* 2021;50:408.
13 Ezechukwu CC, Ugochukwu EF, Egbuonu I, *et al*. Risk factors for neonatal mortality in a regional tertiary hospital in Nigeria. *Niger J Clin Pract* 2004;7:50–2.
14 Ekwochi U, Ndu IK, Nwokoye IC, *et al*. Pattern of morbidity and mortality of newborns admitted into the sick and special care baby unit of Enugu State University Teaching Hospital, Enugu state. *Niger J Clin Pract* 2014;17:346–51.
15 Abolodje E, Ekpebe P, Onyeaso U, *et al*. Neonatal morbidity, and mortality pattern in a tertiary health facility in the Niger Delta region: a 2-year review. *Journal of Research in Basic and Clinical Sciences* 2021;2:25–31.
16 Mukhtar-Yola M, Iliyasu Z. A review of neonatal morbidity and mortality in Aminu Kano Teaching Hospital, northern Nigeria. *Trop Doct* 2007;37:130–2.
17 Okechukwu AA, Achonwa A. Morbidity and mortality patterns of admissions into the Special Care Baby Unit of University of Abuja Teaching Hospital, Gwagwalada, Nigeria. *Niger J Clin Pract* 2009;12:389–94.
18 Olorukooba AA, Ifusemu WR, Ibrahim MS, *et al*. Prevalence and Factors Associated with Neonatal Sepsis in a Tertiary Hospital, North West Nigeria. *Niger Med J* 2020;61:60–6.
19 Omoregie R, Egbe CA, Dirisu J, *et al*. Microbiology of neonatal septicemia in a tertiary hospital in Benin City, Nigeria. *Biomarkers and Genomic Medicine* 2013;5:142–6.
20 Awe OO, Olawade DB, Afolalu TD, *et al*. Prevalence of jaundice among neonates admitted in a tertiary hospital in southwestern Nigeria. *Advances in Pediatrics and Neonatal Care* 2021;3:121.
21 Olatubi MI, Ibitoye OF, Sadibo O, *et al*. Prevalence of neonatal jaundice at a tertiary health institution in Ondo state, Nigeria. *J Pre Clin Clin Res* 2019;13:114–7.
22 Butali A, Ezeaka C, Ekhaguere O, *et al*. Characteristics and risk factors of preterm births in a tertiary center in Lagos, Nigeria. *Pan Afr Med J* 2016;24:1.
23 Ochoga MO, Ejeliogu EU, Michael A, *et al*. Prevalence, Risk Factors and Outcome of Perinatal Asphyxia in Newborns at Benue State University Teaching Hospital Makurdi. *J Res Bas Clin Sci* 2021;2:17–24.
24 West B, Opara P. Perinatal asphyxia in a specialist hospital in Port Harcourt, Nigeria. *Niger J Paediatr* 2013;40:206–10.

25 Ebuehi OM, Akintujoye I. Perception and utilization of traditional birth attendants by pregnant women attending primary health care clinics in a rural Local Government Area in Ogun State, Nigeria. *Int J Womens Health* 2012;4:25–34.
26 Omoigberale AI, Sadoh WE, Nwaneri DU. A 4 year review of neonatal outcome at the University of Benin Teaching Hospital, Benin City. *Niger J Clin Pract* 2010;13:321–5.
27 Okagua J, Obikwu U. Morbidity and mortality pattern of neonates admitted into the special care baby unit of University of Port Harcourt Teaching Hospital, Nigeria. *East Afr Med J* 2017;94:259–65.
28 Toma B, Ige O, Abok I, *et al*. Pattern of neonatal admissions and outcome in a tertiary institution in north central Nigeria. *J Med Trop* 2013;15:121.
29 Nabwera HM, Wang D, Tongo OO, *et al*. Burden of disease and risk factors for mortality amongst hospitalized newborns in Nigeria and Kenya. *PLoS One* 2021;16:e0244109.