

Original Research

An Audit of Mortality Pattern in the Neonatology Unit of the University of Uyo Teaching Hospital, Uyo, Nigeria: A Seven-Year Review.

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Abstract

Background: Most neonatal deaths occur in low and middle-income countries (LMICs). These deaths can be prevented through universal access to basic high-quality in-patient health services. Prematurity, neonatal sepsis, and perinatal asphyxia have been reported as the leading causes of in-patient neonatal deaths. This study aimed to assess the trend of neonatal mortality in our hospital, determine the pattern and causes of neonatal mortality, and evaluate the factors associated with neonatal mortality in our facility.

Methodology: This was a retrospective cross-sectional descriptive study conducted in the Special Care Babies Unit (SCBU) and Sick Babies Unit (SBU) of the University of Uyo Teaching Hospital, over seven years (2015-2021). Demographic, clinical, and mortality data was extracted from the case record files of patients into a structured proforma and analysed.

Results: There was a total of 228 deaths comprising 130 males (57.02%) and 98 (42.98%) females. The median age at demise was 4.00 (IQR = 1.00 – 12.00) days for both genders. The majority (71.50%) of deaths occurred in the Sick Babies Unit. More males died than females (57% vs 43%). The three leading causes of death were: prematurity (38.60%), neonatal sepsis (38.16%), and birth asphyxia (13.60%).

Conclusion: The leading causes of neonatal mortality in our environment are prematurity and neonatal sepsis. There is a need for increased community education on antenatal care, training of traditional birth attendants, improved newborn transportation facilities, and provision of neonatal intensive care facilities.

Keywords: Neonatal Mortality; Audit; UUTH; Nigeria.

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Introduction:

Despite notable decreases in mortality among children under the age of five in recent years, neonatal mortality continues to persist at high levels in developing countries.^{1,2} Therefore, periodic evaluation of the causes of mortality is essential to develop effective strategies to reduce neonatal mortality. Globally, studies have shown that neonatal deaths account for about 40% of under-five mortalities with 40% of these occurring within the first 24 hours of life and 75% within the first seven days of life.^{2,4,5} The survival of an infant is largely dependent on incidents during the neonatal period. Reports have shown that 98% of neonatal deaths occurring in low and middle-income countries (LMICs) can be prevented through universal access to basic high-quality health services including essential facility-based inpatient care.^{4,5}

In 2012, Liu, L. *et al*⁵ performed a ten-year (2000-2010) review that examined the global, regional, and national factors contributing to childhood mortality. They reported that approximately 40% of under-five deaths occurred during the neonatal period. The leading causes were preterm birth complications (14.1%), intrapartum-related complications (9.4%), and neonatal sepsis or meningitis (5.2%). Other significant contributors were injury, causing 4.6% of the deaths, and congenital abnormalities (3.5%).⁵

India, Nigeria, the Democratic Republic of Congo, Pakistan, and China contributed about half (49.3%) of the total global deaths in children under 5 years. These nations also contributed to half of the global deaths from infections and neonatal deaths.⁵

Perin *et al*⁶ reported that in 2019, an estimated 5.30 million children died before reaching their fifth birthday of which 46.0% were neonates. They posited that the leading causes of death among children younger than 5 years were preterm birth complications (17.7%), lower respiratory infections (13.9%), and intrapartum-related events (11.6%).⁶

Nannan *et al*⁷, also reviewed the mortality trends and causes of death in South Africa between 1997 to 2012 emphasizing the importance of a national burden of diseases study. In that study, Under-5 mortality per 1000 live births increased from 65 in 1997 to 79 in 2004 as a result of HIV/AIDS, before dropping to 40 by 2012. The study showed that by 2012, neonatal deaths accounted for 27% of child deaths in South Africa, with conditions associated with prematurity, birth asphyxia and severe infections being the main contributors. Nannan and colleagues emphasized the importance of ensuring equitable implementation of measures such as preventing mother-to-child transmission of HIV, the Expanded Programme on Immunisation, and initiatives targeting neonatal mortality across the entire country.⁷

In a multicentre study in Kenya Irimu *et al*¹⁵, examining neonatal mortality, reported that the highest deaths were among inborn neonates with multiple diagnoses and over 95% were associated with five diagnoses: intrapartum-related complications, uncomplicated prematurity/Low Birth Weight, Respiratory Distress Syndrome (RDS), neonatal sepsis and jaundice.¹⁵

In Southwestern Nigeria, John *et al*¹⁴ in a five-year retrospective cross-sectional study reported that 54.8% of neonatal deaths occurred within the first 24 hours with the leading causes being birth asphyxia (46.6%), prematurity (23.1%), and sepsis (17.8%).

Charles *et al*¹⁰ in 2014 in Southeast Nigeria, reported the common causes of neonatal death to include birth asphyxia (34%), prematurity (24%), and neonatal sepsis (24%).¹⁰

In 2016, Ijezie *et al*¹³ reported a neonatal mortality prevalence of 56.9% among all childhood deaths within five years (2009-2015) in the University of Uyo Teaching Hospital (UUTH). However, due to the improvement of neonatal practice in this facility, it has become necessary to do another audit of neonatal mortality to assess the impact of improved services on neonatal survival.

This study therefore aimed at assessing the trend of neonatal mortality in our hospital, determining the pattern and causes of neonatal mortality, and evaluating the factors associated with neonatal mortality in our facility. This will facilitate a heightened focus on pertinent aspects in averting neonatal mortality within our facility and consequently contribute to the mitigation of neonatal mortality within our community. Hopefully, this will provide a rational framework for decision-making among health policymakers and planners.

Materials and Methods

This retrospective cross-sectional descriptive study was conducted in the Special Care Babies Unit (SCBU) and Sick Babies Unit (SBU) of the University of Uyo Teaching Hospital, (UUTH) Uyo, Akwa Ibom State, Southern Nigeria. The Centre is a major referral centre for patients from within Akwa Ibom State and the surrounding states of Abia and Cross River. The newborn babies are referred in-house from the Department of Obstetrics and Gynaecology admitted into the SCBU and out-born patients are admitted into the SBU. The segregation is to reduce cross-infection between babies born within the hospital and those delivered outside the hospital. This study was a hospital-based audit analysis of neonatal admissions outcomes. Data on newborns that died during the period under review (1st January 2015 to 31st December 2021) were extracted from the admissions/mortality register. Data extracted from the case record files included: age on admission, gender, place of delivery, diagnosis(es) at presentation, cause of death, duration of hospitalization and age at death, and final diagnosis at demise.

The inclusion criteria were all live births admitted in the SCBU and SBU, with definitive symptomatology and diagnosis. Data on neonates brought dead to the neonatal unit were excluded from the study. The diagnosis was clinical and based on WHO criteria. Diagnostic support from the laboratory and radiology was available and used to confirm diagnosis. The primary disease was considered the final diagnosis even if the baby developed complications of the primary disease. WHO definitions were used for prematurity, low birth weight (LBW), very low birth weight (VLBW), and extreme low birth weight (ELBW).¹⁹ Perinatal asphyxia was diagnosed clinically including APGAR score. Sepsis evaluation was based on clinical and laboratory indices like complete blood counts (CBC), and blood cultures.

Data Analysis

The data was retrieved using a structured proforma and entered into Microsoft Excel. Data was analysed using SPSS Version 23. Data were arranged in contingency tables and associations were evaluated for statistical significance using chi-square. The level of significance was set at 5%. Results were presented as tables, charts, and graphs.

Results

Within the period under review, there were 228 deaths in the neonatal unit of the University of Uyo Teaching Hospital, 130 males (57.02%) and 98 females (42.98%). (Table I). There was no significant difference in the age distribution and duration of hospital stay between the male and female neonates ($p=0.291$ and 0.746 respectively). (Table II).

Table I: Age and Gender distribution of subjects

VARIABLE	n=228	f(%)
Age(days)		
Median [IQR]	0.21(0.00-4.00)	
Sex		
Females	98	43.0

Males	130	57.0
Hospitalization period (days)		
Median [IQR]	4.0(1.4-12.0)	

Table II: Comparison of Age and Duration of stay among Gender.

Variables	Females, n=98	Males, n=130	Tests/Statistic
Age(days)			
Median] IQR]	0.13[0.00-2.55]	0.40[0.00-5.00]	p=0.291**
Duration of Hospital stay(days)			
Median [IQR]	4.00[1.68-12.35]	4.00[1.30-11.30]	p=0.746**

**=Mann Whitney U tests

The highest mortality (23%) occurred in 2017 and the mortality steadily declined to 7.5% in 2021. (Figure 1)

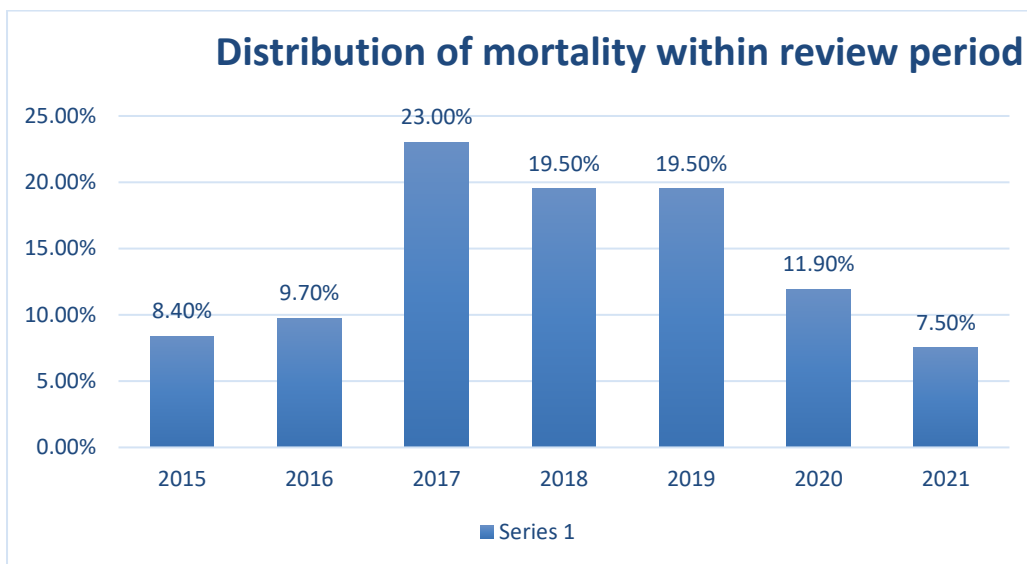


Figure Figure1: Distribution of mortality between 2015 - 2021.

There were more male deaths than female deaths in all the years except for 2017 where there were more female deaths than male deaths (51.9% vs 48.1%). (Figure 2)

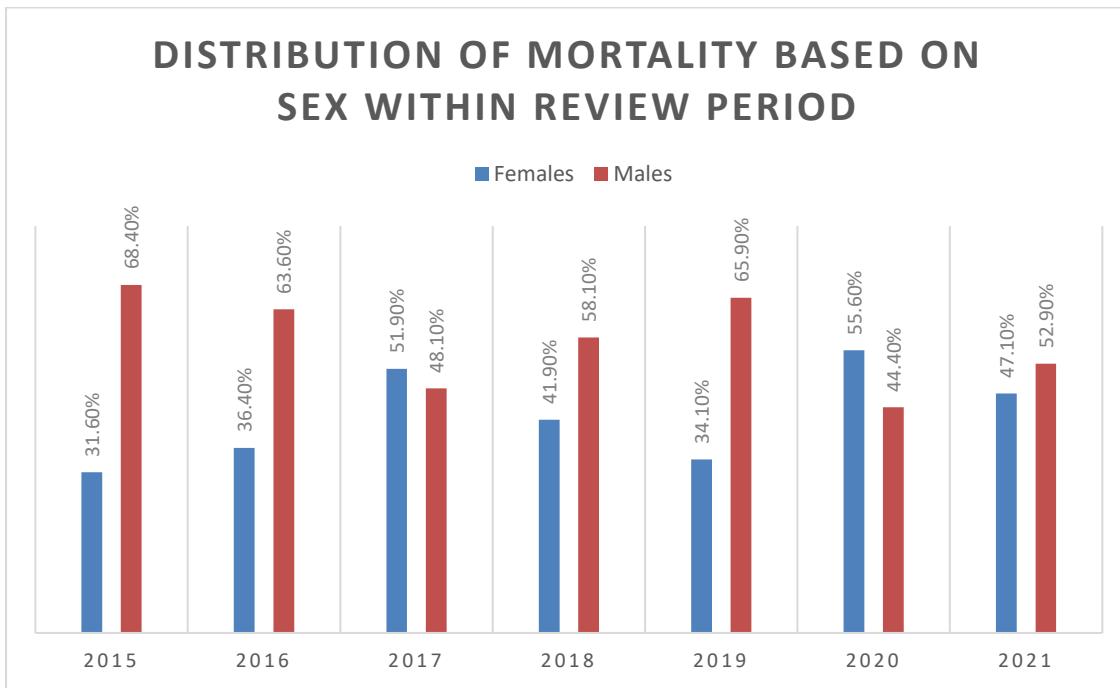


Figure 2: Distribution of mortality based on Sex.

The three most common causes of mortality were prematurity (38.60%), neonatal sepsis (38.16%), and birth asphyxia (13.60%). (Figure 3)

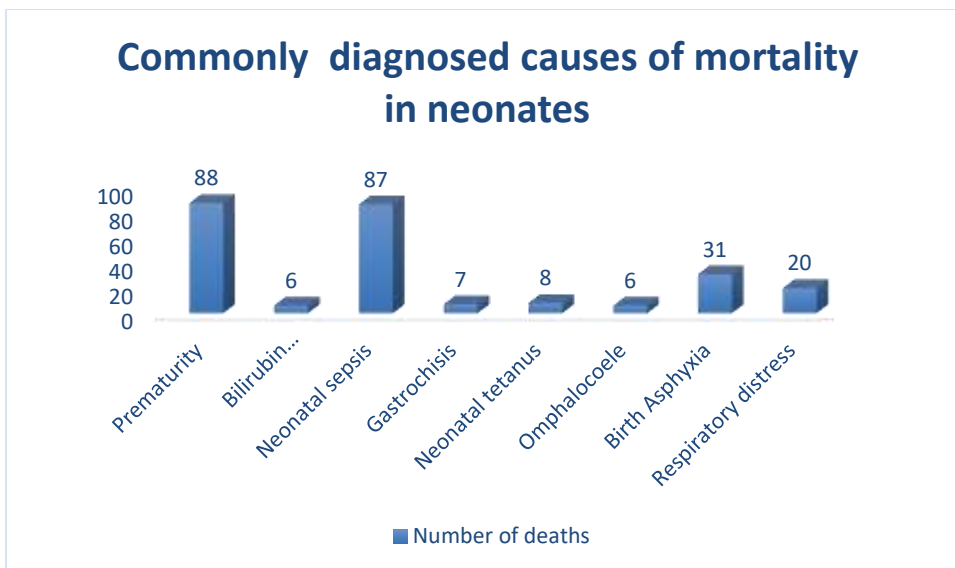


Figure 3: Common causes of mortality in neonates

Deaths from birth asphyxia and PTVLB peaked between 2019 to 2020. While the deaths from sepsis and neonatal tetanus peaked in 2017. (Figure 4). There were more neonatal deaths in the sick baby unit than in the special care baby unit. (Figure 5)

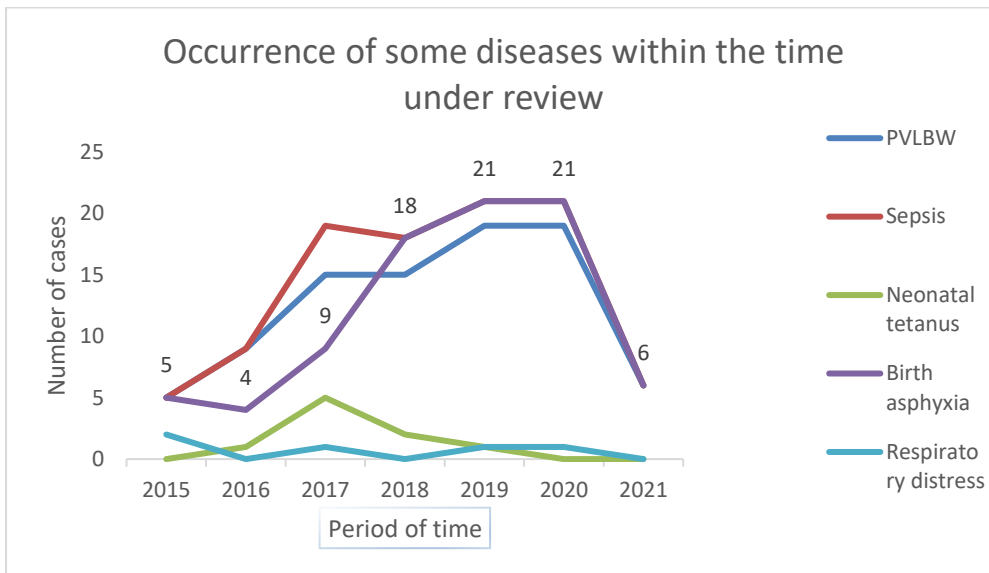


Figure 4: Occurrence of some diseases within the time under review

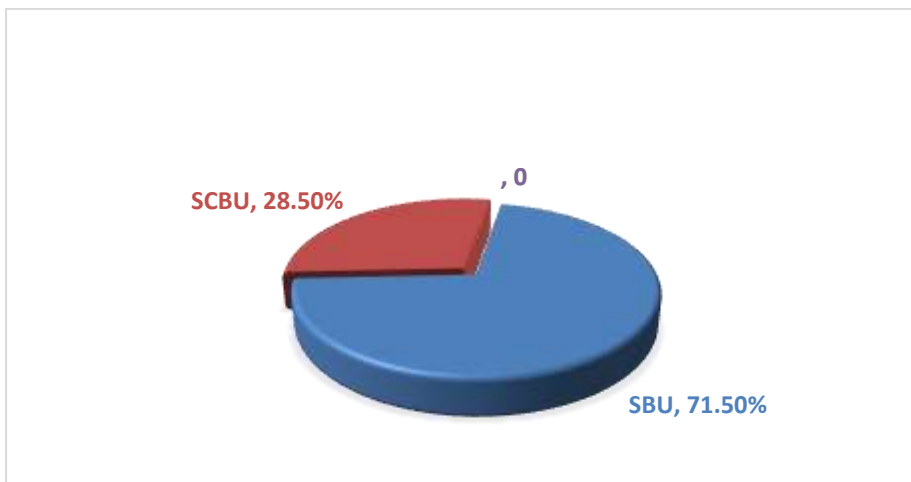


Figure 5: Mortality in the SBU compared to SCBU.

Discussion

This study shows that two hundred and twenty-eight neonates died within the period under review. More males died in the newborn than females (130:98). The median number of days on admission was four days and patients spent 0.21 days on admission on the average before demise showing that more neonates died within the first 24 hours of admission. The high number of neonatal deaths in this study is corroborated by many other studies as seen by Charles *et al*¹⁰ in 2014 in Umuahia, John *et al*¹⁴ in 2020 in Owo, and Irimuet *et al*¹⁵ in Kenya in 2021. This study also agrees with other findings that neonatal death occurs more within the first 24 hours of admission as seen by Irimu *et al*¹⁵. The study in Umuahia by Eke *et al*¹⁶ in 2020 also showed that neonatal mortality was highest in the first 24 hours of admission. The reasons may be that most of these babies were transferred from their place of birth to the hospital with attendant problems of early onset neonatal infections, hypothermia, and hypoglycemia. This pattern shows the need for more training at the referring hospitals including the use of transport ambulances with accompanying health personnel and more attention to probable causes of early mortality at the referral hospital to reduce these mortalities. More male neonates died throughout the period of review than

female neonates. This is in keeping with other studies Ijezie *et al*¹³, Eke *et al*,¹⁶Odejimi *et al*¹²and Irimi *et al*.¹⁵ More males mortality occurs than females all over the world due to the genetic makeup of males and the ease at which males acquire infections and genital tract abnormalities. The gene coding for males (XY) adapts differently to adverse in-utero and environmental conditions than the gene coding for females (XX) showing reduced growth and perinatal survival in the phase of maternal insults than males.²⁰Our study has shown a decrease in neonatal deaths in our facility compared to the study by Ijezie *et al* (228 vs 439).¹³

The present study shows a steady decline in neonatal mortality from 23% in 2017 to 7.5% in 2021. This may be due to the increased capacity building of health personnel through routine training in neonatal resuscitation and the availability of equipment such as apnoea monitors, incubators, CPAP, and other basic resuscitation equipment. In addition, there has been an increased attention to infection control in the neonatal units and antibiotic stewardship. These factors have culminated in an improved healthcare delivery system at the hospital with an attendant decline in neonatal mortality over the years.

The commonest cause of mortality in neonates in UUTH is prematurity as shown in this review. Other common causes of neonatal mortality in descending order of importance are neonatal sepsis, birth asphyxia, respiratory distress, neonatal tetanus, gastroschisis, omphalocele and bilirubin encephalopathy. This observation is similar to the study by Ijezie *et al*¹³in 2016 in the same hospital where prematurity was the commonest cause of neonatal mortality followed by birth asphyxia and neonatal sepsis. This finding is also similar to the findings in a study by Lui *et al*⁵ in 2012, Perin *et al*⁶ in 2021, Irimu *et al*¹⁵ in 2021, Charles *et al*¹⁰ in 2014, and John *et al*¹⁴ in 2020. These findings show that in Africa and Nigeria, prematurity has been noted to be the most common cause of neonatal mortality. The absence of neonatal intensive care units in many Nigerian health facilities leading to suboptimal care of premature neonates may have contributed to this observation. This finding is contrary to the findings of Charles *et al*¹⁰ in Umuahia in 2014 and John *et al*¹⁴ in Owo in 2020 where birth asphyxia was the leading cause of neonatal mortality followed by prematurity and neonatal sepsis. Infection is also prevalent in developing countries contributing to neonatal mortality as shown in this study. Infection prevention and control measures when applied carefully in the newborn unit can reduce neonatal mortality. As of 2021 which is the last year of this review, neonatal sepsis as a cause of neonatal mortality decreased drastically along with other causes of mortality. This may have been due to the several Infection Prevention and Control (IPC) training at our centre. It was worrisome to see neonatal tetanus as a prominent cause of mortality in this review. Neonatal tetanus has been identified as a disease of poverty, the uneducated and adverse social and environmental circumstances. Notable risk factors associated with neonatal tetanus as outlined by Nyong *et al*¹⁸ 2020 are: place of birth and bad cultural practices in cord care like the use of cow dung and saliva. Globally, neonatal tetanus accounts for 7% of neonatal deaths but accounts for up to 20% in Nigeria, one of the 27 countries that contribute to 90% of the global burden of the disease.¹⁷ The provision of comprehensive training and re-training of communities, healthcare workers and traditional birth attendants on the prevention of neonatal tetanus is expedient.

The Sick Babies Unit (SBU) recorded more than 70% of neonatal deaths occurring in UUTH. This unit admits neonates born outside our hospital with obvious consequences ranging from reduced quality of neonatal care at referring hospitals or homes, poor infection prevention and control, poor means of transporting neonates, lack of respiratory support and hypoglycemia.

Conclusion

This study shows that prematurity, neonatal sepsis, and perinatal asphyxia are still the leading causes of neonatal mortality in this centre. These causes are preventable and treatable. We therefore recommend increased health education for parents and caregivers and training of traditional birth attendants in our community. In addition, the improvement of neonatal treatment facilities, the establishment of neonatal intensive units, and strict adherence to infection control measures would ensure a further decline in neonatal mortality.

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