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Determinants of High Neonatal Mortality Rates in Migori County Referral Hospital in Kenya

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Abstract

Background: Neonatal mortality is a significant public health problem worldwide. In Kenya, neonatal mortality rates are unacceptably high within the sub-Saharan region. In 2017 the country had 20.9 deaths per 1000 live births above the WHO target of 12 deaths per 1000 live births.

Purpose: The purpose of this study was to investigate the determinants of high neonatal mortality rates in Migori County, Kenya. The neonatal mortality cases were utilised as the target population to the study.

Method: A quantitative, descriptive, cross-sectional, non-experimental research design was used. A systematic sampling technique was employed to draw a sample of 201 archived neonatal cases out of 420 neonatal mortality medical records, which constituted the study population. Data were collected by means of a developed questionnaire. The Statistical Package for Social Sciences (SPSS) Version 21 was used to analyse data.

Results: The main findings revealed the leading determinants of neonatal mortality were early neonatal period, prematurity, low birth weight, neonates with intrapartum complications and poor 1st Apgar score. Obstetrical haemorrhage and HIV were the main maternal complications associated to neonatal mortalities, while the leading direct causes of death in this study were birth asphyxia and sepsis.

Conclusions: To reduce mortalities, a multifaceted approach is needed to establish quality improvement in neonatal intensive care and reduce preterm birth incidences in Migori County.

Keywords: *Determinants, Kenya, Migori County, neonatal mortality, neonates.*

Introduction

The first 28 days of life of a newborn baby is the neonatal period[1]. This period represents the most vulnerable time for a child's survival[2]. According to UNICEF[2], there were approximately 2.5 million neonatal deaths, or roughly 47% of all under-fives died globally in the year 2017. This translates to 7,000 newborn deaths every day[3]. The majority of the neonatal deaths are concentrated in the first day or first week after birth, with roughly 1 million dying on the first day and close to 1 million dying within the next six days of life [2].

UNICEF [4] reported that in 2017, the largest number of newborn deaths occurred in Southern Asia at 39%, followed by sub-Saharan Africa at 38%. This shows that the majority of deaths occur in low and middle-income countries[4]. Approximately 40,000 newborn babies die in Kenya within the first month of life annually[5]. In 2016, the neonatal mortality rate for Kenya was 22.6 per 1,000 live births [4]. The Neonatal Mortality Rate (NMR) has fallen gradually from 45.5 deaths per 1,000 live births in 1960, but the country is yet to achieve the Sustainable Development Goal (SDG) 3 target 2 of reducing neonatal mortality to 12 deaths per 1,000 live births [4]. Children who die within the first 28 days of life often do so as a result of diseases and conditions that are readily preventable or treatable with proven, cost-effective interventions [6].

This study adopted previously developed conceptual frameworks on neonatal determinants by Nisar [7] in Pakistan and Wuraola [8] in Nigeria. The model grouped the determinants into distal and proximal factors [7,8]. The distal factors include the mother's socioeconomic status, while proximal factors include the gender of the neonate, birth size, birth rank, birth interval, Antenatal care

visits, delivery complications, delivery mode, delivery place, illness/disorders of the neonate and maternal childbearing age; these factors are expected to influence the neonate survival and mortality chances[7, 8]. This study sought to explore and describe the determinants of high neonatal mortality in Kenya. The root causes, what the current interventions are, the gaps, and what could be done to help Migori County Referral Hospital reduce the risk to neonatal mortality were explored.

Method

Design and setting: This study utilised a hospital based descriptive, cross-sectional, non-experimental research design. The study was conducted at Migori County Referral Hospital in Kenya. Migori County is located in the Western part of Kenya in the former Nyanza Province.

Subjects: Approximately 420 neonatal mortality cases formed the total population size.

Sampling and sample size: A sample size of 201 cases was determined using Cochrane's [9] formula and 420 cases as the study population. A systematic sampling technique was used to select a sample of neonatal cases from the neonatal mortality register at the Migori County Referral Hospital's health records department on 21 November 2018.

Inclusion and exclusion criteria: The inclusion criteria for this study were: The neonates should have been born in the hospital or admitted in the institution while alive; The neonates should have died within 28 days of life in the hospital and death of the neonate should have occurred in the 3 years preceding the year of the study, that is, between 1 January 2015 and 31 December 2017.

The exclusion criteria in this study were: Babies dying 29 days after delivery; neonatal deaths occurring at home or on the way to the hospital, neonatal deaths (2 days) after hospital discharge and files on deceased neonates before 1 January 2015 or after 31 December 2017 were excluded.

Independent and dependent variable: The study's dependent variable was neonatal death as noted on the case file, while the independent variables were neonatal case characteristics: gestational age (calculated from last menstrual period), Apgar score, presenting complaint (the reason for admission), cause of death, gender, birth weight, birth order and respective case's maternal characteristics.

Data tool and Data Collection: Data were collected from 21 November 2018 to 26 December 2018 with the use of a questionnaire. This study adopted data collection tool of a previous Nigerian study, the tool was developed in English[10]. The mortality register in the hospital record department was reviewed first to establish a list of all neonatal deaths during the period 1 January 2015 to 31 December 2017 as this formed the study population. This was found to be 420 neonatal cases. The researchers administered the data collection tool to collect the necessary information from the identified files in the hospital records department.

Data analysis: Data were coded, and entered into the Statistical Package for Social Sciences (SPSS) Version 21, from 20 to 31 January 2019. Descriptive statistics analysis in the form of percentage distribution tables were used to describe and summarise data.

Results

Table 1 presents the deceased neonate's background characteristics. More deaths occurred in the early neonatal period compared to late neonatal period, and preterm neonates had lower survival chances compared to full term neonates. Other neonates that were more likely die were those who had low birth weight, males, firstborns and whose mothers were of age group 30-39 years.

Table 2 presents determinants of neonatal mortality to include; Apgar scoring, neonatal and maternal complications. The study revealed that neonates who were more inclined to die were those with poor 1st Apgar scores compared to 2nd Apgar score. Intrapartum complications were the leading reason for admission to their newborn intensive care unit (NICU). Lastly obstetrical haemorrhage was the most prevalent maternal complication, followed by HIV and malaria.

When it comes to the direct causes of death, Table 3 shows that the two top leading direct causes of death in Migori County Referral Hospital in this study were birth asphyxia and sepsis.

Discussion

The purpose of this study was to explore the determinants of high NMRs in Migori County Referral Hospital, Kenya. The study revealed that early neonatal

period, prematurity, low-birth weight and intrapartum complications were the major neonatal mortality determinants. In this study majority (84.6%) of the deceased neonates died during the first week of life. One can conclude that the highest neonatal deaths were likely to occur during the early neonatal period. This is supported by global study by Lawn et al [11], Brazilian [12] and Germany [13] study that associated early neonatal period to neonatal mortality. Neonatal deaths in the first 6 days are mainly caused by maternal factors, and pregnancy and childbirth complications [12].

The researchers found that majority (64.2%) of the deceased neonates were born below the gestational age of 37 weeks. This implies that the likelihood of dying during the neonatal period was higher for preterm neonates than for term- and post-term neonates combined. Approximately 1 million children die each year due to complications of preterm birth [14]an estimated 15 million babies are born preterm (before 37 completed weeks of gestation. Babies born early or preterm may develop conditions that place them at higher risk for short-term problems, long term neurological complications and even death [15].

This study shows that majority (56%) of the deceased neonates had birth weight below 2.5kg (low birth weight) in this study. This implies LBW neonates had the lowest survival chances in this study. Similar findings were noted in studies in Nigeria [16], Colombia [17] and South America [18]. These neonates required long stays in the NICUs in order to gain weight [18]. The latter could expose them to infections and other complications [18]. Globally LBW contributes to 60% to 80% of all neonatal deaths [19]. The current study supports the conclusion made Lederman et al [17], that reductions of neonatal mortality could be realised if the percentage of babies born at weights <3000g could be decreased.

This study connotes that obstetrical haemorrhage was the most prevalent maternal complication, followed by HIV and malaria. Although almost half (49.2%) of the mothers had no illnesses nor complications, their neonates died pointing to some causes of neonatal deaths at the level of the health facility. These findings were expected as they are found to be in line with studies conducted in Bangladesh [20], multi-country survey in 29 countries [21] and WHO studies [22] where the leading causes of maternal deaths were haemorrhage and hypertension, which together account for more than half of maternal deaths and increase neonatal mortality risk [22].

The study showed that the two leading causes of death in the Migori County Referral Hospital in this study were birth asphyxia and sepsis, followed by preterm births and RDS. This finding corroborates with other worldwide studies that the direct causes associated with neonatal mortality include preterm birth complications (34%), intrapartum-related complications (24%), sepsis/meningitis (12%), pneumonia (10%), congenital abnormalities (9%), tetanus (2%), diarrhoea (2%) and others accounting for 6% of the total deaths [23]. According to Gillam-Krakauer and Gowen [24], the incidence of birth asphyxia is higher in developing countries where there may be limited access to maternal and neonatal care; of those babies affected. Neonatal sepsis results in death or major disability for 39% of those affected, even with timely antimicrobial treatment [25]. Still, sepsis is one of the leading causes of deaths in developing countries, whereas extreme prematurity is the leading cause of death in developed countries [26].

Other determinants were those neonates scoring less than 7/10 in the 1st Apgar score faced greater risk of neonatal death compared to low 2nd Apgar scores. This simple Apgar score tool can accurately predict mortality and encephalopathy in the newborn and neonatal periods as noted in Zambian study [27]. The majority (41.8% and 21.4%) were firstborns and above fourth born child respectively. Previous studies suggested that this observation may be due to high risk of complications during delivery among nuliparous and grand-multiparous mothers [28]. Lastly, male neonates were more inclined to die than female neonates in this study. The protective factor of female sex was attributed to the faster maturation of the lungs and consequent fewer respiratory complications [29].

Conclusion

This study concludes that enabling neonates to graduate their early neonatal period and reducing preterm births could significantly reduce the neonatal mortalities in the Migori County Referral Hospital.

Limitations of the study: The shortcomings in this study were that it is retrospective in nature and the gathering of data was from a single county hospital.

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Table 1: Background of deceased neonates n=201

Background of deceased neonates		%
Age at Death (days)	1-7	84.6
	15-21	1.5
	22-28	1.0
	8--14	12.9
Gestational age	37-42	33.8
	Above42	2.0
	<37	64.2
Birth Weight	<2.5KG	55.7
	2.6-3.5KG	36.3
	Above3.6Kg	8.0
Gender	Male	53.2
	Female	46.8
Birth Order	1st born	41.8
	2nd born	10.4
	3rd born	14.4
	4th born	8.5
	Above 4th born	21.4
	Not recorded	3.5
Maternal Age (Years)	21-29	33.3
	30-39	35.3
	40-49	3.0
	Below 20	20.9
	Not recorded	7.5

Table 2: Determinants of neonatal mortality n=201

Determinants of neonatal mortality		%
1st Apgar	≤3/10	20.9
	4/10-6/10	34.8
	≥7/10	24.4
	Not recorded	19.9
2nd Apgar	≤3/10	7
	4/10-6/10	42.3
	≥7/10	30.8
	Not recorded	19.9
Neonatal Complications	intrapartum	44.8
	preterm	37.8
	sepsis	15.9
	congenital	1.5

Cont... **Table 2: Determinants of neonatal...**

Maternal Complications	obstetrical haemorrhage	18.4
	malaria	10.4
	puerperal sepsis	4.0
	pre-eclampsia	3.0
	diabetes	1.5
	heart disease	1.0
	others	8.0
	none	49.3
	not recorded	4.5
Maternal HIV status	Non reactive	68.2
	Reactive	18.4
	Not recorded	13.4

Table 3: Cause of Death n=201

Cause of Death	%
Birth Asphyxia	35.8
Sepsis	22.9
Preterm	19.9
Respiratory distress syndrome	19.4
Jaundice	1.0
Congenital anomalies	1
Total	**100.0**

Conflict of Interest: The authors declare that they have no competing interests

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Ethical Approval: The study was approved by UNISA Health Studies Research and Ethics Committee, Migori County Referral Hospital and the Ministry of Health Migori County.

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