

## Research Article

## Etiological Factors of Neonatal Mortality in a Large Rural Hospital- St. Mary's Hospital Lacor

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**Abstract:** *Purpose:* The aim of the study was to identify the gaps for further improvement of neonatal survival at St. Mary's Hospital Lacor, Gulu city Uganda. *Objective:* To determine the etiological factors associated with neonatal deaths in St. Mary's Hospital Lacor and examine neonatal mortality attributable to maternal conditions. *Method:* With the aid of a pre-coded and pretested data collection tool, a consecutive sampling technique was applied to the neonates admitted searching for all records of dead neonates from October 2020 to September 2021 and used it to retrieve all medical records of neonates including: the total admissions, number of deaths or recurrences of neonatal deaths, age at death, sex and diagnoses and analyzed using SPSS version 23. *Result:* The majority of all neonatal deaths occur within the first 7 days of life (82.7%) followed by those who are 8-28 days old (17.3%). Amongst the dead neonates, the male tended to predominate (60.6%) compared to their female counterparts (39.4%). Prematurity was the significantly leading cause of neonatal mortality in St Mary's Hospital (60.6%), followed by birth asphyxia (23.6%), neonatal sepsis (7.9%) and congenital abnormalities (5.5%); P value = 0.0001. Maternal age and conditions like premature rupture of membrane, pre-eclampsia, obstructed labor formed important contributors to neonatal outcomes. *Conclusion:* Neonatal mortality could be significantly reduced by focusing efforts on premature neonatal management and its prevention

**Keywords:** etiological, asphyxia, neonatal sepsis, eclampsia.

### INTRODUCTION

Neonatal mortality is death occurring within the first 28 days of life (WHO, 2015). It is a core indicator for neonatal health and wellbeing and a prominent component of under-five mortality (Andegiogish & Andemarian, 2020). The frame work of Sustainable Development Goals for reducing neonatal mortality aims to lower newborn deaths to 12/1000 live births by 2030 (World Health Organization, 2017). Globally, 2.7 million neonates die annually during their first month of life (WHO, 2015). These deaths remain underreported due to lack of registration systems, births and deaths occurring outside health facilities, cultural beliefs and stigma (Kujala *et al.*, 2017). It is estimated that neonatal mortality rates are either highest in sub-Saharan Africa or have decreased at a markedly slower pace in the region than the rest of the world (Oza *et al.*, 2014).

Uganda has the highest number of neonatal deaths in sub-Saharan Africa with annual rate of decrease of 1.8% for neonatal mortality (Kujala *et al.*, 2017). This decrease has been the result of highly effective specific

interventions such as intensive care unit establishment at hospital (Harrison & Goodman, 2015). According to UDHS (2016), neonatal mortality decreased slightly from 33 deaths per 1,000 live births in 2000-01 to 27 deaths per 1,000 live births in 2006 and has stagnated at 27 deaths per 1000 live births.

In Northern Uganda and specifically Acholi sub region, neonatal mortality was reported to be 32/1000 live births over the past ten years (UDHS, 2016). Achieving significant reduction is unlikely without major investments into research. In St. Mary's Hospital Lacor, there was average of 20% deaths per general admission from the two established neonatal wards. However, there was no available literature for this kind of study from St. Mary's Hospital Lacor. This study therefore aimed to identify the gaps for further improvement of neonatal survival at St. Mary's Hospital Lacor, Gulu city Uganda.

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**Specific Objectives**

- (i) To determine the etiological factors associated with neonatal deaths in St. Mary’s Hospital Lacor from October 2020 to September 2021.
- (ii) To examine neonatal mortality attributable to maternal conditions

**METHODS**

Quantitative data was collected using retrospective descriptive review of records of all neonates who died in neonatal wards using the neonatal registers and neonatal audits records at St. Mary’s Hospital lacor after seeking ethical approval. This gives an accurate account of the characteristics of particular phenomenon or situation, community or person (Westenholz-Bless & Achola, 1988) to meet the objectives of the study. St. Mary’s Hospital Lacor is a Private not for profit Hospital (PNFP) under the Uganda Catholic Medical Bureau (UCMB) from which Pediatric services offered include-General pediatrics and Child health services, nutrition, Pediatric hematology and Pediatric surgery. The hospital is located in Northern Uganda along Gulu-Nimule Road, approximately 6 kilometers, west of Gulu

City in Bardege Division, Obiya west village at coordinates of 2° 46' 3.00"N, 32° 15' 11.00"E (Latitude:2.767500; Longitude:32.253056). Each day the hospital hosts an average of 600 inpatients and their attendants, as well as 500 outpatients totaling to about 2,000 individuals. The hospital has average monthly deliveries of 495 giving annual total delivery of approximately 5936.

Using precoded and pretested data collection tool, a consecutive sampling technique was applied to the neonates admitted searching for all records of dead neonates from October 2020 to September 2021 and used to retrieve all medical records of neonates including: the total admissions, number of deaths or recurrences of neonatal deaths, age at death, sex and diagnoses

**RESULTS**

Within the study period (October 2020 to September 2021), 127 records of all neonate who died were retrieved and reviewed.

**Table 1 Age and Sex Distribution of Neonatal Mortalities**

Age of neonate	Sex of neonate		Total
	Female	Male	
0 to 7 days	40 (38.1%)	65 (61.9%)	105 (82.7%)
8 to 28 days	10 (45.5%)	12 (54.5%)	22 (17.3%)
Total	50 (39.4%)	77 (60.6%)	127 (100%)

From table 1, the majority of all neonatal deaths occur within the first 7days of life (82.7%) followed by those who are 8-28days old (17.3%). Therefore, the first 7days is very important in determining whether a neonate dies or live. On the other hand, amongst the dead neonates, male ones tended to predominate

(60.6%) compared to their female counterparts (39.4%). Furthermore, for every age group the male neonate tend to die more than the females of the same age category. However these findings were not statistically significant (Chi square 0.413, P value > 0.05).

**Table 2: Cause of Neonatal death**

Diagnosis at admission	Frequency	Percent
Prematurity	77	60.6
Birth asphyxia	30	23.6
Neonatal sepsis	10	7.9
Congenital abnormality	7	5.5
Others	3	2.4
Total	127	100

According to table 2, the majority of neonates who died were those who suffered premature birth. Thus prematurity was significantly the leading cause of neonatal mortality in St Mary’s Hospital (60.6%) and this was followed by birth asphyxia (23.6%), neonatal sepsis (7.9%) and congenital abnormalities (5.5%); P

value = 0.0001. Therefore all pregnant mothers should start attending antenatal care (ANC) early after missing only one period in order to closely monitor the fetal growth and intervene timely. Furthermore, early and regular ANC helps to identify complication and treat them before manifesting as premature delivery.

**Table 3 Antecedent Maternal factors in Neonatal mortality**

Category	Frequency	Percent
<b>Age of mother (Yrs)</b>		
<19	17	13.4
19 to 25	29	22.8
26 to 45	26	20.5
>45	1	0.8
<b>Maternal complication</b>		
pre-eclampsia	6	4.7
obstructed labor	4	3.1
PROM	8	6.3
prolonged labor	2	1.6

From table 3, a few antecedent maternal factors were discernable from the records of the dead neonate which included maternal age, events occurring prior to delivery. The prevalence of neonatal death amongst mothers who are above 19yrs was 44.1% compared to those below 19yrs which was only 13.4%. In regards to maternal age, neonatal mortality, congenital abnormality and maternal risk of pregnancy complications tend to increase with increasing age.

Generally, the rate of neonatal death is lower in mothers who suffer prolonged labor (1.6%) compared to the other complications of pregnancy/ delivery: PROM (6.3%), Pre-eclampsia (4.7%) and obstructed labor (3.1%). Premature rupture of membrane tend to predispose the neonate to ominous outcomes like sepsis, respiratory distress, hemorrhage and death. Prolonged labor on the other hand puts the mother at risk of early placental separation, hemorrhages, shock, perineal tear and rupture of membrane. Therefore besides maternal age, other factors contribute to neonatal mortality.

**Table 4 Relationship between cause of death and neonatal and maternal factor**

Variable	Cause of death					X <sup>2</sup>	P-value
	Birth asphyxia	Prematurity	Neonatal sepsis	Congenital abnormality	Others		
<b>Age/days</b>							
0 - 7	29(26.6%)	61(58.1%)	8(7.6%)	5(4.8%)	2(1.9%)	4	0.203
8 - 28	1 (4.5%)	16(72.7%)	2(9.1%)	2(9.1%)	1(4.5%)		
<b>Sex</b>						4	0.650
Female	12(24.0%)	30(60.0%)	5(10.0%)	3(6.0%)	0(0.0%)		
Male	18(23.4%)	47(61.0%)	5(6.5%)	4(5.2%)	3(3.9%)		
<b>Maternal Age/yrs</b>						12	0.908
<19	5(29.4%)	10(58.8%)	0(0.0%)	1(5.9%)	1(5.9%)		
19 to 25	7(24.1%)	19(65.5%)	2(6.9%)	1(3.4%)	0(0.0%)		
26 to 45	5(19.2%)	18(69.2%)	1(3.8%)	2(7.7%)	0(0.0%)		
>45	0(0.0)	1(100.0)	0(0.0%)	0(0.0%)	0(0.0%)		
<b>Maternal complications</b>						8	0.203
Pre-eclampsia	2(33.3%)	4(66.7%)	-	0(0.0%)	-		
Obstructed labour	1(12.5%)	1(25.0%)	-	2(50.0%)	-		
PPROM	1(12.5%)	7(87.5%)	-	0(0.0%)	-		
Prolonged labour	0(0.0%)	1(100.0%)	-	0(0.0%)	-		

According to table 4, most neonatal death in the 0-7days old was attributable to prematurity (58.1%)

followed by birth asphyxia (26. 6%). Neonatal death amongst 8-28days old was predominant in those who

suffered premature birth. However a relatively bigger proportion of neonates who died due to, neonatal sepsis, congenital abnormalities were also within the 8-28days age group. Regarding maternal age, most deaths due to birth asphyxia, prematurity, Sepsis, congenital abnormality tended to be more prevalent in mothers who are above 19years compared to the 19yrs and below. Death due to prematurity was more common in mothers with Pre-eclampsia, obstructed labor, Pre-mature Rapture of Membrane (PROM), prolonged labor. The least cause of neonatal death associated with maternal condition was congenital abnormality.

## DISCUSSION:

Generally 60% of early neonatal deaths are not linked to any maternal condition thus highlighting the importance of identifying at-risk pregnancies (Kujala *et al.*, 2017). This study found the majority (82.7%) of the neonatal death occur between 0 to 7 days of neonatal life thus as the days of neonatal life go on, mortality decreased. This finding is similar with the report of UNICEF (September 2020), majority (three quarters) of the neonatal deaths occur in the first week of life. At early stages of extra-uterine life, neonates are still adapting to the new environment and if proper care is not given, they are likely not to survive. The above findings were consistent with the report of Arach *et al* (2021) thus, perinatal mortality rate are higher than early neonatal death: 43/1,000 births and 23 deaths/1,000 live births respectively. Abdullah *et al* (2013), found neonatal mortality was associated with neonatal complications and maternal complications and further that high proportion of neonatal deaths occurred in first week of life.

The study identified both neonatal and maternal factors that contribute towards neonatal mortality. The leading etiological factors of neonatal deaths were; prematurity n=77(60.6%) followed by Birth Asphyxia n=30 (23.6%), neonatal sepsis n=10 (7.9%), congenital abnormality n=7(5.4%) and others 3(2.4%). The majority of premature deaths tend to occur if the neonate is less than 1500gms as their lungs surfactants is immature therefore, unable to establish spontaneous respiration. A study by Tadesse, Negussie and Aychiluhm (2021), also found Prematurity, birth asphyxia, neonatal sepsis were among the most common risk factors associated with neonatal mortality respectively. However, Arach *et al* (2021), reported that birth asphyxia, respiratory failure, infections and intra-partum events were the major probable contributors to perinatal deaths. Another study on the other hand reported that several factors such as birth asphyxia, prematurity, neonatal sepsis, congenital abnormalities and low birth weight were linked to these deaths (Watson *et al.*, 2020). Generally, birth asphyxia and prematurity tend to be the most commonly implicated cause of neonatal death by most researchers in different research designs and setting.

Maternal related conditions such as preeclampsia, obstructed labor, pre-term premature ruptured of membrane and prolonged labor were some of the probable contributors to neonatal mortality but maternal age less than 19yrs tend to have less neonatal death. These findings showed that neonatal health is affected by maternal status and wellbeing. The findings is consistent with the finding of a study conducted by Tadesse, Negussie & Aychiluhm (2021), which elucidates that various maternal factors are associated with neonatal mortality. However, some factors like maternal education level, multiple births, lack of antenatal cares, maternal infections during pregnancy could also contribute the poor neonatal outcomes. A separate study found that consistent significant factors associated with increased neonatal mortality included; delayed breastfeeding after birth and multiple maternal risk factors (UDHS, August 2019). According to Arach *et al* (2021), the risk factors for perinatal is maternal age >30 years. Another study found that the main maternal conditions that were attributed to these deaths are complications of the placenta and cord, complications of pregnancy, and medical and surgical conditions (Nihaya *et al* 2020). A study by Gelila *et al* (2022) reported that premature rupture of the membrane and pregnancy complications are significantly associated with neonatal mortality. Many studies have therefore concluded that older maternal age, premature rupture of membrane and pregnancy complication are amongst the maternal conditions that to could lead to death of the neonate.

## CONCLUSION

Neonatal mortality could be significantly reduced by focusing efforts to manage and prevent prematurity and birth asphyxia during antenatal visit and delivery. Improving maternal wellbeing and prevention of pregnancy complication could improve neonatal outcome

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