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Neonatal Mortality And Its Associated Factors Among Neonates Admitted At Kibilizi District Hospital, Rwanda

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Abstract
Background: *Neonatal mortality, defined as death within the first 28 days of life, remains a significant public health issue in low- and middle-income regions despite modest improvements in newborn survival rates. Epidemiologic data on neonatal mortality rates and associated risk factors in Rwanda's rural areas are scarce. This study aimed to determine the prevalence and associated factors of neonatal mortality at Kibilizi District Hospital.*
Methods: *This cross-sectional study included all newborns admitted to the neonatology unit at Kibilizi District Hospital from January 2020 to December 2022. Data were collected from medical records using a structured checklist. Analysis was conducted using Stata version 13, with data organized, cleaned, and entered electronically into Epidata 3.1 before exportation. Descriptive statistics were presented using frequencies, percentages, means, and medians. Binary and multivariable logistic regression analyses identified variables associated with neonatal mortality, with p≤0.05 considered statistically significant.*
Results: *The study included 400 neonates, with a male predominance (58.12%). Most deliveries occurred in hospitals (66.2%), with 30.28% in health centers. The mean maternal age was 28 years (range 17-44), with 73% married and 97.5% having completed primary school. Spontaneous vaginal delivery was the most common delivery method (77.7%). Favorable APGAR scores (>7) were recorded for 73.7% at 1 minute and 86.6% at 5 minutes. Most neonates were born at term (66.35%), and 65.26% were admitted on the day of birth. Neonatal mortality prevalence was 9.1%. Significant factors associated with neonatal mortality included an APGAR score at 5 minutes less than 7 (AOR: 8.67; 95% CI: 1.45-51.60), prematurity (AOR: 2.32; 95% CI: 0.77-6.98), and resuscitation at birth (AOR: 34.07; 95% CI: 10.58-109.70).*
Conclusion: *To reduce neonatal mortality, the study recommends enhancing prenatal and perinatal care, improving neonatal resuscitation training, and ensuring pediatric consultations for all premature babies.*
Key Words: *Neonate, Mortality, Kibilizi, Rwanda*

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I. Introduction

Neonatal mortality is defined as infant death that occurs during the first 28 days of life (Kolola et al.,2016). One of the main global public health issues, particularly in developing nations, is neonatal mortality even though it is still under-estimated and under-reported resulting in continuously persistent neonatal mortality despite different interventions set in place (Mats, 2011; Woday et al., 2021). There is high mortality and mortality in the neonatal period which is considered a most vulnerable period of time where the neonate needs different life adjustments to adapt to the external environment of the uterus (Abayneh et al.,2017; Fikaden et al., 2020). It is reported that by 2016, around 73% of all under-five deaths were only from Africa (48%) and South-Est Asia (25%) (Hategeka et al., 2019).

Worldwide, the trends in neonatal and perinatal mortality rates are declining slowly compared to the under-five and infant mortality rate which can bring much attention to improve the neonatal management to decrease the rate of newborn deaths worldwide especially in developing countries (Abayneh et al., 2017).

The neonatal mortality rate in developing countries is estimated between 23.4 to 44 per thousand live births[2]. While neonatal deaths constituted 47% of all under-five deaths worldwide in 2021, they still account for 38% of under-five deaths in SSA, which is still on top once it comes to under five mortalities. It was reported that children born in high-income countries have high mortality rate compared to children born in developing countries where for example children born in Sub-Saharan Africa (SSA) had mortality rate of over 10 times higher as those born in developed nations in 2021 (Fikaden et al., 2020; Tewabe et al 2018; Woday et al., 2021). Prematurity and low birth weight were significant risk factors for neonatal death and those with congenital anomalies had a higher mortality rate compared to people without congenital deformities [9].

In Rwanda, there has been a gradual decrease in rate of newborn death from 60.3 deaths per a thousand live births in 1971, 37 neonatal deaths out of 1,000 live-births between 2005and 17.9 deaths per thousand live births as for 2020 year[3], [10]This tremendous improvement in neonatal mortality was the result of different governmental and non-governmental initiatives and programs which improved the management of neonates in Rwanda for example community health insurance program, increased access to vaccination services, increased reduction of mother to child HIV transmission, increased health professional including specialists, community health workers programs and sustainability, and so forth [11]. Another program "Babies Count program" which was launched in 2013 by Partners in Health in Rwanda and this program reduced the neonatal mortality by around 35% in rural districts that it was operating from where the mortality among the preterm and low-birth-weight newborns, which are at high-risk, dropped even to more than 49% [11], [12]. It was estimated that in 2000, twenty-two per cent of less than five deaths happened within neonatal period which increased to 34% in 2010[13].

In order to fulfill the SDGs framework by 2030, deaths that can be prevented must be eradicated and newborn mortality should be decreased to < 12/1000 live births [5], [11].

Globally, it is estimated that every year, 6.6 million infants die before their 5th anniversaries, with 5 million of those deaths taking place within the first twenty-eight days of life. Above 98% of neonatal deaths occur in underdeveloped nations, On the top we have SSA [8], [14].The Sustainable Development Goal 3 focused on ensuring healthy lives and the development of wellbeing for all individuals at all steps by 2030, for this , there is still long to reduce the biggest number of newborn deaths to ≤ 12 deaths per a thousand [15]. Though significant decrease of neonatal mortality rate has been achieved in Rwanda from 1970 up to 2023, neonatal mortality remains high, as it is in many other nations that are developing and there are little data on the neonatal mortality rate in Rwandan rural areas like the catchment area of Kibilizi. The overall estimated neonatal mortality according to data routinely collected from Kibilizi Hospital from 2018 to 2022 was 10% which is very high according to global estimates. Thus, assessing the factors associated to the neonatal mortality will help in focusing much attention on the magnitude and burden caused by high neonatal mortality rate by improving the conditions of management of neonates[8].Despite the fact that many studies have been conducted in Rwanda looking at rates of infant mortality and risk factors, few studies have been done in rural areas Rwanda. Due to the scarcity of epidemiologic data in rural areas, it is difficult for us to prioritize evidence-based programming in this high-risk area based on our understanding of the factors contributing to newborn death.

Urban regions have a lower under-5 mortality rate (35 out of a 1,000) than rural areas (48/1,000) [13]. The study findings will inform the current rates of neonatal mortality at Kibilizi DH. Additionally, it will evaluate the many risk factors linked to newborn deaths. The population in the catchment area of Kibilizi and of Rwanda in general will benefit from the findings of this study in providing baseline data to the hospital administration and policy maker from different NGOs and governmental entities for future measures and plan to reduce neonatal mortality at the hospital level and in Rwanda in general.

II. Material And Methods

This study is designed as a retrospective cross-sectional study. The study assessed the neonatal mortality and associated factors at Kibilizi District Hospital from January 2020 to December 2022. The study was conducted in the neonatology department. Kibilizi District Hospital is a secondary level hospital with capacity of 102 beds and the hospital is situated in rural area of the southern province of Rwanda. The target population of this study was all neonates admitted to Kibilizi District Hospital after birth and their mothers' files from January 2020 to December 2022.The total population was newborns who were hospitalized in Neonatology service of Kibilizi in from 2020 to 2022 was 1770 newborns. Participants of this study were files of neonates who were born at Kibilizi District Hospital or who were admitted from other health facilities in their neonatal periods were recruited. Neonates who have been admitted for observation, with incomplete files, neonates who have been transferred to other health facilities for continuation of care and those who died right before being admitted were excluded from the study. A simple random sampling methodology was employed to choose a representative subset of patient records for inclusion in this investigation, ensuring equitable opportunity for all subjects within the

study. Each neonate admitted to the neonatology unit of Kibilizi Hospital during the designated study period was assigned a numerical identifier (1, 2, 3, 4, …), and only those with odd-numbered identifiers were included in the study.

The sample size for this study is calculated using the Fisher's formula, which Fisher et al. (2016) utilized and is as follows:

In this study the prevalence is estimated at 50% as the prevalence of neonatal mortality was not assessed in Rwanda or in the region.

$N = \frac{Z^2(p)(1-p)}{d^2}$

Z=Standard normal variate at 5% type I error P<0.05, it is 1.96.

P= 50% as prevalence of neonatal mortality is unknown.

d= absolute error or precision 5%

N= sample size

$N = \frac{1.96^2(0.5)(1-05)}{0.05^2}$= 384 patients' files

The minimum required sample from our population was 422 patients' files (calculated 384 plus 10% of estimated non-response). The checklist was used to extract the necessary information. The data were retrieved from electronic and book registers; namely admission registers, hospitalization file which were accessed from in-service or from the archives of Kibilizi District Hospital, from the discharge form and from the death certificates/registers and from HMIS. Data were collected by the principal investigator after introducing himself to Kibilizi Hospital staffs specifically Hospital administration and neonatology departments. The researcher used the registers (Electronic and hard copies) and the Archives of Kibilizi District Hospital using the investigator's recording format, data extraction checklist, on which the necessary information was gathered. In order to ensure Reliability of the data instrument tool, the pilot study was done on 26 participants. As measure of instrument reliability, scale reliability coefficient was calculated. The Cronbach's alpha was used to test the reliability of our data collection tool. Internal consistency was assessed by using Cronbach's alpha ($\alpha = 0.7$) and above was found to be acceptable. In this study (α=0.776)

Entered data from the medical files were exported from Epidata 3.1 to Stata version 13 for statistical analysis. Descriptive analysis was done using frequencies and percentages that were either in tables or charts for categorical variables and in mean or median values for continuous variables. Binary logistic regression analysis producing the crude odds ratios (CORs) was run to study the association between newborn deaths and possible predictors. Statistically significant predictors (p<0.05) in binary logistic regression namely rupture of membranes >24 hours, APGAR score at 0-minute, APGAR score at 5th minute, gestational age at birth, resuscitation done at birth, birth asphyxia, vitamin K given at birth and place of delivery were further analyzed in multivariable logistic regression analysis to produce adjusted odds ratios (AORs). APGAR score at 5th minute, gestational age at birth and resuscitation done at birth made the final model of independent predictors of neonatal mortality. The multivariable logistic regression analysis was done using the backward selection where all the factors that were statistically significant in the binary logistic regression analysis were at once tested for their association with neonatal mortality and the factors with highest p values were eliminated one by one by considering the Likelihood ratio (RL) and the pseudo-R-square at each level. The final model was tested for fitness using Hosmer-Lameshow goodness-of-fit test and we found that the model fits very well with the Hosmer-LemeshowX^2=7.77 and p =0.1005. The ethical approval was received from ethics committee of Kibilizi District Hospital before accessing the data. The investigators assured the confidentiality and anonymity of the study participants where participants were assigned with the unique code numbers. No consent form was needed as the study was done retrospectively.

III. Results

The majority of mothers of the recruited neonates were in their late twenties with the mean age = of 28 years (SD = 6.5) which was ranging from 17 to 44 years old, with varying educational backgrounds, primarily identifying as Catholic (66.43%) or Protestant (31.46%). The three-quarter (75.35%) mothers had completed primary education, (73.47%) were married, and had one or two to four children (41.41% and 45.18%, respectively). Singleton pregnancies were prevalent (97.14%), with spontaneous vaginal delivery being the most common mode of delivery (77.7%). A notable portion of participants reported the use of traditional medicine during pregnancy (14.32%), and some had a history of rupture of membranes lasting more than 24 hours (25.65%) [Table 1].

Table 1: Sociodemographic characteristics of the mothers

Characteristics	n	%
Age of the mother in years		
Mean ± SD	28 ± 6.5	
Religion		

Catholic	283	66.43
Protestants	134	31.46
Muslim	1	0.23
None	8	1.88
Education		
None	35	8.22
Primary	321	75.35
Secondary	65	15.26
University	5	1.17
Marital status		
Single	111	26.06
Married	313	73.47
Divorced	1	0.23
Widowed	1	0.23
Parity		
1	176	41.41
2 to 4	192	45.18
>4	57	13.41
Type of pregnancy		
Singleton	408	97.14
Multiple	12	2.86
Mode of delivery		
SVD	331	77.7
C/S with labor	85	19.95
Elective cesarean	10	2.35
Use of traditional medicine		
Yes	61	14.32
No	365	85.68
History of rupture of membranes >24 hours		
Yes	109	25.65
No	316	74.35

The study population consisted of newborns with a nearly equal distribution of males (58.12%) and females (41.88%). The majority of infants had favorable APGAR scores, with 73.77% scoring above 7 at 0 minutes and 86.61% scoring similarly at 5 minutes. In terms of gestational age, most babies were born at term (66.35%), while 32.69% were preterm. The age at admission was primarily on the day of birth (DOL 0) for 65.26% of infants, and only a small population required admission beyond the first week of life and the minimum admission age was at day 0 of life while the maximum age at admission was at 28th day of life. A small percentage had HIV exposure (2.12%), and resuscitation was performed at birth for 14.55% of newborns. The majority of deliveries took place in hospitals (66.2%), with a smaller proportion in health centers (30.28%). Almost all infants received vitamin K (97.18%), while corticosteroids were administered to 7.29% of them (Table 2).

Table 2: Sociodemographic and clinical characteristics of the neonates

Characteristics	n	%
Sex of the baby		
Male	247	58.12
Female	178	41.88
APGAR score at 0 minute		
≥7	270	73.77
<7	96	26.23
APGAR score at 5th minute		
≥7	317	86.61
<7	49	13.39
Gestational age at birth		
Preterm	136	32.69
Term	276	66.35
Post-term	4	0.96
Age at admission		
DOL 0	278	65.26
DOL 1-6	109	25.59
DOL >7	39	9.15
HIV exposure		
Exposed	9	2.12
Non-exposed	415	97.88

Resuscitation done at birth		
Yes	62	14.55
No	364	85.45
Place of delivery		
Hospital	282	66.2
HC	129	30.28
Home	12	2.82
Unknown	3	0.7
Vitamin K given		
Yes	413	97.18
Not documented	12	2.82
Corticosteroids given		
Yes	31	7.29
No	394	92.71

Of the number of participants of the study, 9.1% of the admitted neonates in the study period died; equivalent to the neonatal mortality rate of 91/1,000 live births (Figure 1).

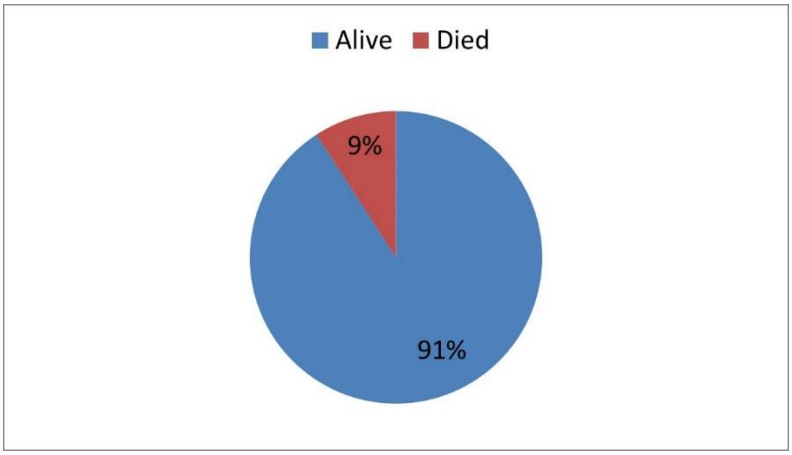

Figure 1:Neonatal outcome among admitted in Kibilizi Hospital from 2020 to 2022

Low birth weight was the most prevalent diagnosis, affecting 36.9% of the patients, followed closely by sepsis at 36.2%, indicating a significant burden of infectious diseases. Prematurity was also common, with 28.9% of admissions attributed to it. Perinatal asphyxia affected 24.6% of patients, while respiratory distress syndrome was diagnosed in 8.0%. Neonatal infection risk (6.8%), hypothermia (3.1%), and neonatal jaundice (1.9%) were among the less common diagnoses. Hypoglycemia and congenital malformation each accounted for 1.6% of cases, while anemia was observed in 0.5% of admissions. Severe birth trauma was the least frequent diagnosis, affecting only 0.2% of patients (Figure 2).

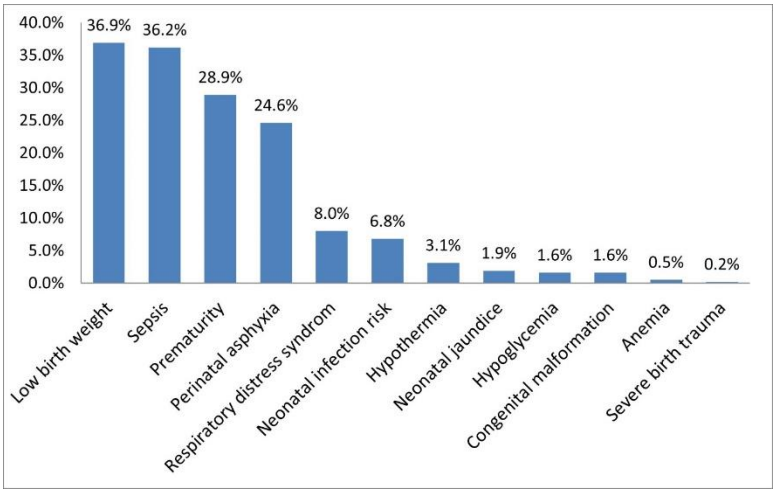

Figure 2: Causes of admission among neonates admitted in Kibilizi Hospital, 2020-2022

Neonates with a history of rupture of membranes lasting more than 24 hours had higher odds of mortality in the binary analysis (OR = 0.07, 95% CI = 0.009-0.51, p = 0.009).

In the binary analysis, the sex of the baby did not show a statistically significant association with neonatal survival (OR = 1.69, 95% CI = 0.83-3.45, p = 0.144). Lower APGAR scores at 0 minute, less than 7 were significantly associated with higher odds of neonatal mortality (OR = 3.15, 95% CI = 1.35-7.34, p =0.008). Similar to the 0-minute scores, lower APGAR scores at 5 minutes/ less than 7 were significantly associated with higher odds of neonatal mortality (OR = 7.41, 95% CI = 3.28-16.75, p < 0.001). Preterm neonates had higher odds of mortality in both the binary (OR = 1.98, 95% CI = 1.01-3.88, p = 0.046). Neonates who required resuscitation at birth had significantly higher odds of mortality in both the binary (OR = 22.62, 95% CI = 10.54-48.56, p < 0.001). Neonates with birth asphyxia had significantly higher odds of mortality in both the binary (OR = 5.33, 95% CI = 2.69-10.55, p < 0.001). The place of delivery was associated with neonatal mortality. In the binary analysis, neonates born at home had higher odds of mortality compared to those born in a hospital (OR = 8.31, 95% CI = 2.26-30.56, p = 0.001). Additionally, neonates with unknown place of delivery had significantly higher odds of mortality in both the binary (OR = 33.25, 95% CI = 2.86-386.4, p = 0.005). Neonates who did not receive vitamin K had significantly higher odds of mortality in both the binary (OR = 8.22, 95% CI = 2.47-27.35, p = 0.001) [Table 3].

Table 3: Factors associated with mortality among neonates admitted at Kibilizi Hospital

Predictors	Outcome		OR (95% CI)	P value
	Alive	Died		
Use of traditional medicine				
Yes	57 (93.44%)	4 (6.56%)	0.66 (0.22-1.93)	0.45
No	330 (90.41%)	35 (9.59%)	Ref	
History of rupture of membranes >24 hours				
Yes	10 (99.08%)	1 (0.92%)	0.07 (0.009-0.51)	0.009
No	279 (88.29%)	37 (11.71%)	Ref	
Sex of the baby				
Male	220 (89.07%)	27 (10.93%)	1.69 (0.83-3.45)	0.144
Female	166 (93.26%)	12 (6.74%)	Ref	
APGAR score at 0 minute				
≥7	257 (95.19%)	13 (4.81%)	Ref	
<7	77 (80.2%)	19 (19.8%)	3.15 (1.35-7.34)	0.008
APGAR score at 5th minute				
≥7	301 (94.95%)	16 (5.05%)	Ref	
<7	33 (67.34%)	16 (32.65%)	7.41 (3.28-16.75)	<0.001
Gestational age at birth				
Preterm	118 (86.76%)	18 (13.24%)	1.98 (1.01-3.88)	0.046
Term	260 (92.87%)	20 (7.13%)	Ref	
Resuscitation done at birth				
Yes	35 (56.45%)	27 (43.55%)	22.62 (10.54-48.6)	<0.001
No	352 (96.70%)	12 (3.30%)	Ref	
Birth asphyxia				
Yes	82 (78.10%)	23 (21.90%)	5.33 (2.69-10.55)	<0.001
No	304 (95.00%)	16 (5.00%)	Ref	
Place of delivery				
Home	8 (66.67%)	4 (33.33%)	8.31 (2.26-30.56)	0.001
Health Center	112 (86.82%)	17 (13.18%)	2.52 (1.23-5.17)	0.011
Hospital	266 (94.33%)	16 (5.67%)	Ref	
Unknown	1 (33.33%)	2 (66.67%)	33.25 (2.86-386.4)	0.005
Vitamin K given				
Yes	380 (92.01%)	33 (7.99%)	Ref	
No	7 (58.33%)	5 (41.67%)	8.22 (2.47-27.35)	0.001

Ref: Reference category; OR: Odds ratios; CI: Confidence interval

In the final model of predictors of mortality among neonates admitted in the hospital, APGAR score at 5th minute, gestational age at birth and a resuscitation done at birth were the real independent predictors of

mortality among neonates admitted at Kibilizi District Hospital. The neonates with APGAR score of <7 at 5th minute were more likely to die as those with APGAR sore of ≥7 with a significant difference (AOR = 3.89, 95% CI = 1.44-10.5, p = 0.007). Preterm neonates still had higher odds of mortality in multivariable analyses (AOR = 2.91, 95% CI = 1.06-7.95, p = 0.037). Neonates who required resuscitation at birth had significantly higher odds of mortality in multivariable analyses (AOR = 25.82, 95% CI = 9.3-71.5, p < 0.001) [Table 4].

Table 4:Factors associated with mortality among neonates admitted at Kibilizi Hospital

Predictors	AOR	95% CI		P value
APGAR score at 5th minute				
≥7	Ref			
<7	3.89	1.44-10.52		0.007
Gestation age at birth				
Term	Ref			
Preterm	2.91	1.06-7.95		0.037
Resuscitation done at birth				
Yes	25.82	9.32-71.50		<0.001
No	Ref			

Ref: Reference category; AOR: Adjusted odds ratios; CI: Confidence interval

IV. Discussion And Conclusion

This study was conducted to investigate neonatal mortality and associated factors among neonates admitted at Kibilizi District Hospital in Rwanda provides crucial insights into the healthcare landscape and the challenges faced in ensuring the survival and well-being of newborns. The results of the current study showed that the mortality rate of 9.1% among neonates admitted in the neonatology of Kibilizi District hospital. The neonatal mortality rate in the current study was low compared to the findings reported from the study done previously in Rwanda by Gupta et al. who reported that the mortality rate was 28.2% in Rwanda among neonates in a matched case-control study of under 5 mortality in the eastern province of Rwanda [11]. The mortality rate is also low compared to the rate reported by Fikaden et al. who reported the neonatal mortality rate of 18.7% where the most cases of neonatal mortality were observed in the seven day of life[6]. Other studies like the study done by in Ethiopia by Woday et al. (2021) who reported an overall newborn mortality rate of 14.6%, Abayneh et al. who reported 14.3% of neonatal mortality rate in the Northwest of Ethiopia with 62.7% of deaths occurring in 24 hours of age [5] and the study by Twabe et al. (2018) from Ethiopia who also reported a prevalence of neonatal mortality of 13.3%.The difference can be related to the improvement of neonatology service at Kibirizi with baby warmers and incubators and currently there is a pediatrician providing mentorship on regular basis. The neonatal mortality rate in the current study was high compared to the findings reported by Souza et al. who reported the neonatal mortality rate of 10.9/1,000[16] and it was also high compared to the neonatal mortality reported from East African region with a mean of 28.0/1,000 [17]. These Differences in neonatal mortality rates between our finding from Rwanda and those from other African countries, such as Ethiopia, and other East African nations, can be attributed to a range of factors, including disparities in healthcare infrastructure, maternal healthcare access, education and awareness, socio-economic conditions, cultural practices, environmental factors, healthcare policies, and data collection methods.

An intriguing aspect highlighted in the study is the use of traditional medicine during pregnancy, reported by a notable proportion of participants. While this finding warrants further investigation to understand the specific practices and their potential impacts, it underscores the importance of considering traditional healthcare alongside modern medical interventions in maternal and neonatal care. Furthermore, neonates with a history of prolonged rupture of membranes exhibited significantly higher odds of mortality. This highlights the critical importance of monitoring and timely intervention in cases of prolonged rupture, as it is a known risk factor for neonatal infections and other adverse outcomes to the newborns.

The heart of the current study lies in the analysis of predictors of neonatal mortality. The results of binary and multivariable logistic regression analyses offer critical insights into factors that significantly impact neonatal survival. These include a history of prolonged rupture of membranes, lower APGAR scores at birth (at 5th minute), preterm birth, the need for resuscitation at birth, birth asphyxia, and home births. Lower APGAR score at 5th minute was significantly associated with higher odds of neonatal mortality with significant difference where neonates with APGAR score <7 were 4 times more likely to die compared to neonates with APGAR score ≥7. Similar findings were reported by previous researchers namely Souza et al. from Brazil [16] and Andegiorgish et al. from Eritrea [9]. Preterm neonates were almost 2 times more likely to die compared to term neonates and neonates with birth asphyxia had significantly higher odds of mortality where they were 5.3 times more likely to

die than those without birth asphyxia in the current study which is in accordance with the findings reported from different previously done studies [2], [6], [8], [11], [16], [18].

The binary analysis findings of the current study showed that the place of delivery was associated with neonatal mortality where neonates born at home had higher odds of mortality compared to those born in a hospital where neonates who were born at home were 2.8 times more likely to die as those born from hospital. Our finding is in accordance with the findings from other researchers [1], [11], [18], [19]. These findings underscore the urgent need for improved prenatal and perinatal care, particularly for high-risk pregnancies, and advocate for the availability of trained healthcare professionals during home deliveries. Furthermore, the importance of vitamin K administration in neonatal care is underscored by its association with improved survival. The sex of the baby was not statistically associated with neonatal mortality in the current study which is different from the findings of the study done by Paudel et al. who reported that sociodemographic features like child sex and residence were associated with neonatal mortality [20].

Education level was not statistically associated with neonatal mortality in the current study which is contrary to what was reported from the study done by Singh et al. [21]reported education level to be a substantial predictor of neonatal deaths where neonates born from women with secondary education and above had lower odds of neonatal deaths as those born from illiterate mothers. The same conclusion had been found in Rwanda in analysis of 2000-2010 Rwanda DHS[13]. Other researchers also reported that the neonates born from mother with high education were not prone to death as those born from non-educated mothers[22].

The prevalence of neonatal mortality at Kibilizi District Hospital was found to be 9.1%. Factors such as low APGAR scores, preterm birth, need for resuscitation atbirth, birth asphyxia, and home deliveries were significantly associated with neonatal mortality. Furthermore, the absence of vitamin K administration was associated with higher mortality rates. This study was a single setting study that was conducted from Kibilizi District Hospital, which makes the findings of this study not to be generalized to the entire Rwandan community.

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