

Preterm neonatal mortality and associated factors among preterm neonates admitted to Jigjiga University Sheikh Hassan Yabare Comprehensive Specialized Hospital, Ethiopia: A retrospective cross-sectional study

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Abstract

Background

Globally one out of ten babies born are preterm. Preterm neonates have many morbidities and high risk of mortality. Although modifiable risk factors and cost-effective interventions exist, data on preterm neonatal mortality in Somali region is lacking. The study aimed to assess preterm neonatal mortality and associated factors among preterm neonates admitted to Jigjiga University Sheikh Hassan Yabare Comprehensive Specialized Hospital, Somali, Eastern Ethiopia.

Methods

A retrospective cross-sectional study was conducted from February 09, 2024 to February 07, 2026 at Jigjiga University Sheikh Hassan Yabare Comprehensive Specialized Hospital. Among 440 preterm neonates, 192 neonates were selected using systematic random sampling technique. Data was entered into epidata 7.2.7.0 and analyzed using SPSS version 25.0. Multicollinearity was assessed by variation inflation factor and it was < 5 . The model fitness was evaluated using hosmer lemeshow test and its P-value was 0.65. Statistical significance was declared with a P-value < 0.05 .

Results

The magnitude of preterm neonatal mortality was 29.0% (95% CI: 22.3 to 35.7). Hypothermia (AOR = 6.18; 95% CI: 1.78–21.51), birth weight (AOR = 4.54; 95% CI :1.53–13.44), feeding initiation within 24 hours (AOR = 0.14; 95% CI: 0.05–0.42), kangaroo mother care (AOR = 0.09; 95% CI:0.03–0.26) and preeclampsia (AOR = 0.19;95%CI: 0.06–0.66) were significantly associated factors.

Conclusion

In this study, mortality among preterm neonates was high. Therefore, major interventions on the identified factors have to be implemented. In addition prospective, multicenter studies with larger sample sizes shall be conducted and further studies shall be conducted on effect of preeclampsia on preterm neonatal mortality.

INTRODUCTION

A live-born baby born before 37 full weeks of gestation, determined from the first day of the last normal menstrual period (LNMP), is referred to as a preterm neonate (1). Worldwide, an estimated 15 million babies are delivered prematurely every year, majority of them being in low- and middle-income countries (LMICs) (2, 3). Complications related to prematurity account for a substantial proportion of neonatal deaths and continue to pose major challenges to achieve global child survival targets (4).

Numerous complications, such as hyaline membrane disease(HMD) ,episodes of apnea, persistent patent ductus arteriosus (PDA), necrotizing enterocolitis (NEC), hyperbilirubinemia, hypoglycemia, hypothermia, retinopathy of prematurity, abnormalities in electrolyte balance and neonatal sepsis are common in preterm infants due to biologic immaturity of organ systems (5) .

The highest neonatal mortality rate in the world is found in sub-saharan Africa, where newborns are ten times more likely to die within the first 28 days of life than those born in wealthy countries (6).

In terms of global newborn mortality, Ethiopia is among the countries with high neonatal mortality (7). Ethiopia had planned to lower the neonatal mortality rate to 21 per 1,000 live births by 2025 as part of its Health Sector Transformation Plan II (8); yet, it persisted at a high rate 25 per 1,000 live births (9). Preterm delivery problems and other preventable causes account for almost 80% of newborn deaths in Ethiopia (10).

Various studies have identified that premature neonatal death is pertaining to factors related to the mother and newborn socio-demographic characteristics, maternal medical conditions, obstetric & gynecological factors, as well as aspects of treatment and healthcare facility provision (11–13).

However, evidence from the Somali region of Eastern Ethiopia remains limited. Identifying locally relevant determinants of mortality among preterm neonates is important for improving neonatal intensive care practices and guiding targeted interventions.

Therefore, this study aimed to assess the magnitude of preterm neonatal mortality and identify associated factors among preterm neonates admitted to the NICU of Jigjiga University Sheikh Hassan Yabare Comprehensive Specialized Hospital, Eastern Ethiopia.

METHODS

Study Area and Period

The study was conducted at Jigjiga University Sheikh Hassan Yabare Comprehensive Specialized Hospital (JJUSHYCSH), located in Jigjiga town, Somali region, Eastern Ethiopia. The hospital serves as a major referral and teaching hospital for the region and surrounding areas. The study was conducted retrospectively from February 09, 2024 to February 07, 2026.

Study Design

An institution-based retrospective cross-sectional study design was employed.

Source and study Population

All preterm neonates admitted to the NICU of JJUSHYCSH constituted the source population. All preterm neonates admitted to the NICU of JJUSHYCSH from February 09, 2024 to February 07, 2026 were the study population.

Inclusion & Exclusion Criteria

Preterm neonates with gestational age <37 weeks, neonates with documented outcomes, neonates with complete medical records were included. On the other hand neonates with incomplete charts, neonates who were referred out, neonates discharged against medical advice and neonates admitted only for observation were excluded.

Sample Size and Sampling Technique

The sample size was determined using a single population proportion formula based on a previous study CI of 95%, $\alpha=0.05$, and $p=14.6\%$ taken from a study conducted in Tigray region, Ethiopia (14). Accordingly, the sample size was determined using the following formula.

$$n = \frac{Z(\frac{\alpha}{2})^2 * P(1-p)}{d^2} \quad \text{Where,}$$

n - Sample size

z- Standard normal value(at 95% CI which is 1.96)

p- Estimated population proportion is 0.286

d- Possible margin of error tolerated which is 5%.

$$n = \frac{(1.96)^2 * 0.146(1-0.146)}{(0.05)^2}$$

$$n = 192$$

A systematic random sampling technique was used to select study participants from NICU registration records. All 440 patients were listed in the notebook based on their medical record numbers.

Totally, 192 preterm neonates were included in this research. Study participants were selected from the JUSHYCSH neonatal registration log using a **simple random sampling technique**. The first participant was chosen based on a calculated sampling interval (K-value), and subsequent participants were selected systematically according to this interval. That is

$$K = N/n = \frac{\text{Total preterm neonates admitted at pediatric ward from Feb 2024-Feb 2026}}{192}$$

Sample size

$$K = 440 / 192$$

$$= 2.29$$

The first participant was randomly chosen as either 1 or 2 using the **lottery method** based on the calculated sampling interval (K-value).

Data Collection Methods

Pre-tested and organized data collection tool which was adapted from previous comparable studies (11, 15, 16, 17) and prepared in English was used to collect data. The tool was comprised of sociodemographic characteristics, maternal and obstetric factors, neonatal factors, and health care related factors. Before data collection begins recruitment of qualified data collectors was done and was regularly supervised by the principal investigator. Data was collected by reviewing the registration records of the NICU at JJUSHYCSH.

Data quality control

The investigator supervised the data collection process. The completeness of collected data was reviewed and any missing or inconsistent information was addressed and corrected prior to entry into the database. One week ahead of the actual survey, pretest was carried out at Karamara General hospital taking 5% of calculated sample size and necessary modifications were carried out before actual data collection on the study.

Data Processing and Analysis

Data was cleaned, coded and imported into epiData and then was exported to SPSS version 25.0 for analysis. The study variables were summarized by descriptive statistics. Frequencies and percentages **were used to present categorical variables**, whereas **continuous variables** were summarized using either the mean with standard deviation or the median with interquartile range, depending on the distribution of the data .

The variance inflation factor (VIF) was used to assess multicollinearity among the independent variables. Multicollinearity was not shown and value of VIF was less than 5. The association between each independent variable and newborn mortality was investigated using bivariable binary logistic regression. In order to find factors independently linked to neonatal mortality, variables having a P-value < 0.25 in the bivariable analysis were included as candidates in the multivariable logistic regression analysis.

To identify the independent factors linked to newborn mortality after controlling for relevant confounders, a multi-variable binary logistic regression analysis was used. Adjusted odds ratios with 95% confidence interval (CI) was used to illustrate how strong these associations were. Variables were stated statistically significant if their P-value were less than 0.05. Model fitness was evaluated using the hosmer-lemeshow test, where a P-value was 0.65, which was acceptable model fitness. Tables and figures were used to display the results.

RESULTS

Among 192 preterm neonates, 176(91.7%) were included in the study. Eight charts were incomplete, three were referred out and five discharged against medical advice.

Maternal socio-demographic, medical and Obstetric Characteristics

The mean maternal age was 26.44 years (SD $\pm$ 5.74). More than half of them (61.4%) were singleton pregnancies and 59.7% of mothers had ANC follow-up. 61.4% of mothers delivered through SVD, while 38.6% delivered via cesarean section (Table 1).

Table 1
Maternal factors of preterm neonates admitted at NICU JJUSHYCSH, 2026(n = 176).

Variables	Category	Frequency(n)	Percent (%)
Maternal age	< 20	19	10.8
	20–34	135	76.7
	≥ 35	22	12.5
Maternal residence	Jigjiga city	108	61.4
	Outside Jigjiga city	68	38.6
Type of pregnancy	Singleton	108	61.4
	Multiple	68	38.6
Parity	1	65	36.9
	2–4	64	36.4
	≥5	47	26.7
ANC Follow Up	0	71	40.3
	1–3	80	45.5
	≥ 4	25	14.2
Duration of labor(hours)	no	21	11.9
	< 8	84	47.7
	8–24	56	31.8
	≥ 24	15	8.5
Mode of delivery	SVD	108	61.4
	Cesarean Section	68	38.6
Place of delivery	Home	8	4.5
	Health center	16	9.1
	Hospital	152	86,4
PROM(in hours)	no	135	76.7
	< 18	16	9.1
	≥ 18	25	14.2
Maternal triple I	no	170	96.6
ANC,antenatal care; PROM,premature rupture of membrane; SVD, spontaneous vaginal delivery			

Variables	Category	Frequency(n)	Percent (%)
Antepartum Hemorrhage	yes	6	3.4
	no	149	84.7
Preeclampsia	yes	27	15.3
	no	124	70.5
	yes	52	29.5
ANC,antenatal care; PROM,premature rupture of membrane; SVD, spontaneous vaginal delivery			

Neonatal Characteristics

Among the neonates, 60.8% were female. Most neonates (62.5%) were moderate to late preterm. Low birth weight (1500–2500 g) accounted for 58.0% of the neonates. Respiratory distress syndrome was diagnosed in 53.4% of neonates, neonatal sepsis in 86.9%, and hypothermia in 68.8%(Table 2).

Table 2
Characteristics of preterm neonates admitted at NICU of JJUSHYCSH, 2026(n = 176).

Variables	Category	Frequency(n)	Percent(%)
Sex of the neonate	Female	107	60.8
	Male	69	39.2
Age of the neonate at admission (in hours)	< 24	164	93.2
	≥ 24	12	6.8
Gestational age (in weeks)	< 28	9	5.1
	28–31 ⁶ / ₇	57	32.4
	32–33 ⁶ / ₇	47	26.7
	34–36 ⁶ / ₇	63	35.8
Birth weight(in grams):	< 1000	8	4.5
	1000–1499	66	37.5
	1500–2500	102	58.0
APGAR score at 1st minute	< 7	100	59.5
	≥ 7	68	40.5
APGAR score at 5th minute	< 7	43	25.6
	≥ 7	125	74.4
Respiratory distress syndrome (RDS)	no	82	46.6
	yes	94	53.4
Neonatal sepsis	no	23	13.1
	yes	153	86.9
Hypothermia	no	55	31.3
	yes	121	68.8
Hypoglycemia	no	160	90.9
	yes	16	9.1
Neonatal Hyperbilirubinemia (NHB)	no	142	80.7
	yes	34	19.3
Necrotizing enterocolitis(NEC)	no	157	89.2
APGAR=Appearance, Pulse, Grimace, Activity, Respiration			

Variables	Category	Frequency(n)	Percent(%)
	yes	19	10.8
APGAR=Appearance, Pulse, Grimace, Activity, Respiration			

Health Service-Related Factors

More than half (64.8%) of neonates were managed with oxygen therapy, while 51.7% received kangaroo mother care. Feeding within 24 hours was initiated for 55.7% of neonates (Table 3).

Table 3
Preterm neonates health service related factors admitted at NICU of JJUSHYCSH, 2026(n = 176).

Variables	Category	Frequency(n)	Percent (%)
Resuscitation at birth	no	136	81
	yes	32	19
Oxygen therapy	no	62	35.2
	yes	114	64.8
Antibiotic therapy initiated	no	16	9.2
	yes	158	90.8
KMC	no	85	48.3
	yes	91	51.7
Feeding initiated within 24 hours	no	78	44.3
	yes	98	55.7
Antenatal corticosteroid administration	no	162	92.0
	yes	14	8.0
Antenatal antibiotics administration	no	165	93.8
	yes	11	6.2
Antenatal magnesium sulfate administration	no	132	75
	yes	44	25
Length of hospital stay (in days)	< 1	10	5.7
	1–7	76	43.2
	≥ 7	90	51.1
Outcome of the neonate	survived	125	71.0
	died	51	29.0
KMC, kangaroo mother care; NICU, neonatal intensive care unit			

Magnitude of Preterm Neonatal Mortality

The magnitude of preterm neonatal mortality was 29.0% (95% CI: 22.3–35.7). Among them 58.8% were < 32 weeks and 72.5% were < 1500 grams (Fig. 1).

Factors Associated with Preterm Neonatal Mortality

After bivariable binary logistic regression analysis, variables with a P-value < 0.25 were imported to multivariable binary logistic regression analysis.

In the multivariable binary logistic analysis preeclampsia, birth weight, hypothermia, kangaroo mother care (KMC), feeding initiation within 24 hours were statistically significant factors.

The odds of preterm neonatal mortality was 86% lower (adjusted odd ratio (AOR) = 0.14; 95% CI 0.05–0.42) among neonates whose feeding was initiated within 24 hours as compared to those whose initiation was more than 24 hours. In the meantime, the odds of preterm neonatal mortality was 91% lower (AOR = 0.09; 95% CI: 0.03–0.26) among neonates KMC given as compared to those who had not given KMC.

The odds of preterm neonatal mortality was 81% lower (AOR = 0.19 ;95%CI: 0.06–0.66) among neonates born from preeclampsia mothers compared to those born from mothers with no preeclampsia.

The odds of preterm neonatal mortality was 6.2 times higher (AOR = 6.18; 95% CI: 1.78–21.51) among hypothermic neonates as compared to normothermic babies.

The odds of preterm neonatal mortality was 4.5 times higher (AOR = 4.54; 95% CI: 1.53–13.44) among neonates whose birth weight was less than 1500grams compared to those $\geq$ 1500grams (Table 4).

Table 4
Bivariable and multivariable analysis of factors associated with preterm neonatal mortality at NICU of
JJUSHYCSH, Jigjiga, Ethiopia, 2026 (n = 176).

Variables	Category	Outcome		COR(95%CI)	AOR(95%CI)	P-value
		Survived (%)	Died (%)			
Maternal age	< 20	15(12.0)	4(7.8)	1	1	
	20–34	98(78.4)	37(72.6)	1.42(0.44–4.54)	0.62(0.08–5.13)	0.66
	≥ 35	12(9.6)	10(19.6)	3.13(0.78–12.50)	1.33(0.09–20.25)	0.84
Pregnancy type	singleton	83(66.4)	25(49)	1	1	
	multiple	42(33.6)	26(51)	2.06(1.06–3.99)	1.42(0.44–4.61)	0.56
Parity	1	50(40)	15(29.4)	1	1	
	2–4	45(36)	19(37.3)	1.41(0.64–3.09)	4.05(1.05–15.55)	0.04
	≥ 5	30(24)	17(33.3)	1.89(0.83–4.33)	1.24(0.34–4.55)	0.75
ANC visits	0	58(46.4)	13(25.5)	1	1	
	1–3	51(40.8)	29(56.9)	2.54(1.19–5.40)	1.95(0.23–16.69)	0.61
	≥ 4	16(12.8)	9(17.6)	2.50(0.91–6.92)	0.96(0.11–8.15)	0.97
Preeclampsia	Yes	44(35.2)	8(15.7)	0.34(0.15–0.79)	0.19(0.06–0.66)	0.01
	No	81(64.8)	43(84.3)	1	1	
GA(weeks)	< 32	36(28.8)	30(58.8)	1	1	
	≥ 32	89(71.2)	21(41.2)	0.28(0.14–0.56)	1.39(0.23–8.32)	0.72
Birth weight(grams)	< 1500	37(29.6)	37(72.5)	6.29(3.04–12.98)	4.54(1.53–13.44)	0.01
	≥ 1500	88(70.4)	14(27.5)	1	1	
5th minute APGAR	< 7	22(18.6)	21(42)	3.16(1.53–6.54)	2.93(0.81–10.65)	0.10
AOR,adjusted odds ratio; COR,crude odds ratio; GA,gestational age; hrs,hours; KMC,kangaroo mother care ; MgSO4,magnesium sulfate ;NEC,necrotizing enterocolitis; RDS,respiratory distress syndrome						

	≥ 7	96(81.4)	29(58)	1	1	
RDS	yes	56(44.8)	38(74.5)	0.28(0.14–0.57)	1.35(0.25–7.26)	0.72
	no	69(55.2)	13(25.5)	1	1	
Hypothermia	Yes	76(60.8)	45(88.2)	4.84(1.92–12.19)	6.18(1.78–21.51)	0.00
	No	49(39.2)	6(11.8)	1	1	
NEC	yes	8(6.4)	11(21.6)	4.02(1.51–10.70)	4.02(0.92–17.48)	0.06
	no	117(93.6)	40(78.4)	1	1	
Resuscitation at birth	yes	18(15.3)	14(28)		0.19(0.02–1.51)	0.12
	no	100(84.7)	36(72)	1	1	
Oxygen therapy	yes	73(58.4)	41(80.4)	3.25(1.45–7.25)	0.64(0.14–2.89)	0.56
	no	52(41.2)	10(19.6)	1	1	
KMC	Yes	82(65.6)	9(17.6)	0.11(0.05–0.25)	0.09(0.03–0.26)	0.00
	No	43(34.4)	42(82.4)	1	1	
Feeding within 24 hrs	yes	89(71.2)	9(17.6)	0.09(0.04–0.20)	0.14(0.05–0.42)	0.00
	no	36(28.8)	42(82.4)	1	1	
Antenatal MgSO4	yes	37(29.6)	44(86.3)	0.38(0.16–0.92)	1.89(0.19–19.24)	0.59
	no	88(70.4)	7(13.7)	1	1	
AOR,adjusted odds ratio; COR,crude odds ratio; GA,gestational age; hrs,hours; KMC,kangaroo mother care ; MgSO4,magnesium sulfate ;NEC,necrotizing enterocolitis; RDS,respiratory distress syndrome						

DISCUSSION

The magnitude of preterm neonatal mortality in this study was 29.0%(95% CI: 22.3 to 35.7), which is consistent to studies done in Uganda [31.6%] (18), Nigeria [31.5%] (19), and Ethiopia[30%, 29.31%, 29%] (20, 21, 22).This may be due to the studies were cross sectional studies, study settings were in tertiary health care institutions and studies were in LMICs .

It was high compared with studies done in Iran [9.1%] (23), Gabon [18.7%](24), study on global prevalence of preterm neonatal mortality [8%](25) and Ethiopia(Wolayita Sodo [10.9%] (17)). The

possible reason for the discrepancy with studies done in Iran and Gabon might be sociodemographic, economic variation, availability of basic interventions, especially surfactant and quality of care provided between the two countries and Ethiopia. Discrepancy from remaining one could be due to variation in the study design.

However, it was low compared with studies done in Ethiopia (Mizan Tepi [35%] (12), Bahir Dar [36.1%] (13), multicenter study in Amhara region [37.8%] (26) and Jordan [40%] (27). This might be due to the improvement in care in recent years due to access to healthcare service, the accessibility of trained healthcare professionals and the behaviour of the community toward the search and utilization of health in Ethiopia (8).

In the present study, KMC had a protective effect on preterm neonatal mortality. This finding was in line with a systematic review and meta-analysis conducted in LMICs (28), study done in Kenya (29), Ethiopia (Hosaena (30), Keffa zone (31), Axum (32)). This might be due to the fact that KMC has the benefit of protecting the neonate from infection by more likely helping to be colonized by the mother's protective microbiome and less handling of the newborn by other individuals, encouraging breast feeding, effectively treating hypothermia and improving cardiorespiratory stability and gastrointestinal function (2).

Preterm neonates who had initiation of feeding within 24hrs have a low risk of mortality. The current finding was supported by studies conducted in Ethiopia (33, 34, 35). This can be explained by an effect of colostrum on reducing the risk of neonatal infections such as gastro intestinal and respiratory infections and can also reduce the risk of hypothermia and hypoglycemia (5).

Preterm neonates born from preeclamptic mothers were less likely to die compared with their counterparts. This finding seems against the truth; hence preeclampsia is a risk for morbidity and mortality of neonates. However, in this study, it was found to be a protective factor. This might be because the stress due to preeclampsia increases endogenous fetal corticosteroids which leads to accelerated lung maturation. In addition high risk mothers including preeclampsia had frequent follow up during antenatal and intrapartum period. This will help to prevent the anticipated complications either by early diagnosis or timely intervention which brings a positive outcome.

Preterm neonates with birth weight less than 1500grams had higher risk of mortality as compared to those 1500grams and above. This finding was supported by findings in Bahir Dar (13) and Tigray (14) and Addis Ababa (36). This may be due to the fact that low birth weight preterm neonates have low levels of brown fat that predisposes them to hypothermia and hypoglycemia thereby increasing their risk of mortality. Physiologically, these neonates have immature organ development (especially the lungs), metabolic dysregulation, poor feeding ability, and higher risk of infections, all of which could increase susceptibility for various preterm morbidities and death.

Preterm neonates with hypothermia are at substantial risk of death compared to those with normothermia. This study is supported by studies in Uganda (18), Ethiopia (16, 37). Due to less

subcutaneous fat and large body surface area preterm neonates are prone to hypothermia. Since it relates to hypoglycemia, inhibition of surfactant production, hypoxia, respiratory and metabolic acidosis, the risk of death in preterm neonates increases.

LIMITATIONS OF THE STUDY

The study has the following limitations. Since data was obtained from secondary source some important variables such as maternal education level, marital status, occupation, monthly household income were not available in the medical records and their association on preterm neonatal mortality was not investigated.

The study did not address some health service related variables of mortality among preterm neonates due to the nature of the study design. The wide confidence interval indicates variability and reduced precision of estimate, which may limit the generalizability of the findings. This could be due to the relatively small sample size and limited number of outcome events. In addition, the study covers only JJUSHYCSH which limits generalizability to other settings found in the Somali region and Ethiopia.

CONCLUSION AND RECOMMENDATIONS

In this study preeclampsia, birth weight, hypothermia, kangaroo mother care (KMC), feeding initiation within 24 hours were significantly associated with preterm neonatal mortality. Preeclampsia was the factor identified as a protective variable.

Therefore, to decrease the burden of this problem, major interventions on the identified factors have to be implemented. It is good to encourage initiating feeding early and KMC implementation. It is also necessary to give attention on hypothermia prevention and treatment.

Furthermore, we recommend prospective studies to identify effects of those variables not included in the study and multicenter studies and studies with larger sample sizes to solve limits of generalizability. In addition further studies on preterm neonatal mortality and preeclampsia shall be conducted.

Abbreviations

ANC Antenatal Care

CI Confidence Interval

COR Crude Odds Ratio

GA Gestational Age

HMD Hyaline Membrane Disease

IHRC Institution of Health Research Review Committee

JJUSHYCSH Jigjiga University Sheikh Hassan Yabare Comprehensive Specialized Hospital

KMC Kangaroo Mother Care

LMICs Low and Middle Income Countries

LNMP Last Normal Menstrual Period

NEC Necrotizing Enterocolitis

NHB Neonatal Hyperbilirubinemia

NICU Neonatal Intensive Care Unit

PDA Patent Ductus Arteriosus

PROM Premature Rupture Of Membrane

RDS Respiratory Distress Syndrome

SD Standard Deviation

SPSS Statistical Package for the Social Sciences

SVD Spontaneous Vaginal Delivery

VIF Variance Inflation Factor

Declarations

Ethics approval and consent to participate

A letter of ethical approval was obtained from the Institution of Health Research Review Committee (IHRRC) of the Institute of Health Sciences, Jigjiga University, Ethiopia (Reference Number IHRRC 043/2026). Following ethical approval, a formal letter of cooperation was obtained from IHRRC and submitted to JJUSHYCSH to facilitate data collection. Institutional permission was obtained from JJUSHYCSH.

As this was a retrospective cross-sectional study based on review of medical records, the requirement for informed consent of participants (neonates), who are under the age of 16, for whom consent to participate must be obtained from their parents or legal guardians was waived by IHRRC. The study was conducted in accordance with the Declaration of Helsinki and relevant national and institutional guidelines. Confidentiality of patient information was maintained throughout the study.

Consent for publication

Not Applicable

Availability of data and materials

The datasets used and/or analyzed in this study are available from the corresponding author upon a reasonable request.

Competing interests

The authors declare that they have no competing interests.

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No funding was received for this study.

Authors' contributions

AF conceived and designed the study. AF, AI, BG and AK contributed to the study design, data collection, data entry, data analysis and interpretation. AF drafted the manuscript. AI, BG, AK, MA, AA, MS and HG critically revised the manuscript. All authors read and approved the final manuscript.

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Figures

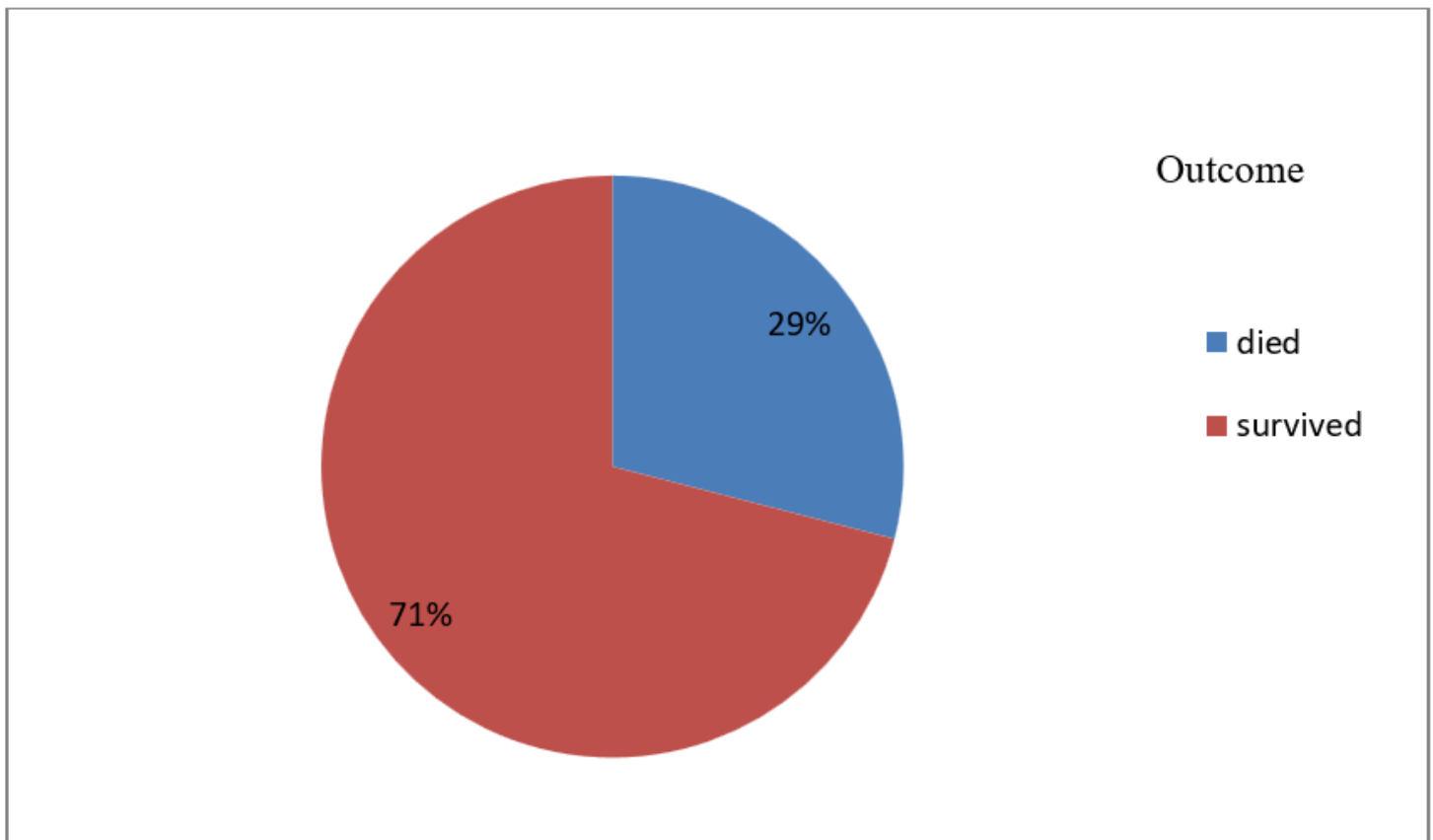


Figure 1

