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Predictors of Neonatal Mortality at a Tertiary Level Neonatal Intensive Care Unit in Mogadishu, Somalia

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Building Resilient Health Systems in Somalia: Confronting challenges and Fostering Collaborative Solutions.

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Background

The death of a child within the first 28 days of life remains a critical public health challenge in developing countries in the world. Neonatal deaths account for a significant proportion of under-five mortality globally.

Understanding neonatal mortality's prevalence and associated factors in a national referral hospital within Somalia is crucial for developing effective strategies and interventions

This study aims to identify the root causes and contributing factors to neonatal deaths within the hospital setting, providing critical insights to inform evidence-based practices and policies.

Background

The first few days and weeks after birth are critical in terms of mortality risk. The risk of death is highest during the first week of life, with a significant number of deaths occurring within the first 24 hours after birth. Several challenges and vulnerabilities, including complications during childbirth, prematurity, low birth weight, infections, and asphyxia, mark this early period. While global and regional efforts have shown progress in reducing child mortality,

Somalia still faces significant challenges, and its neonatal mortality rate remains among the highest in the world at 37 deaths per 1000 live births. The under-five mortality rate is also high at 117 deaths per 1000 live births

Methods

This retrospective cohort study was conducted from August 2017 to September 2019, and it investigated the medical records of neonates admitted to the NICU at Mogadishu Somali Turkish Training and Research Hospital in Benadir, Somalia.

The study analyzed complete medical records of 1,043 neonates (0-28 days old) admitted to the NICU, focusing on neonatal mortality rate (the number of deaths within the first 28 days of life per 1,000 live births in each population or region.

Data from all NICU neonates admitted to the hospital were extracted from their electronic medical records (EMRs), which included admission details, demographics, gestational age, birth weight, diagnoses, interventions, treatments, and maternal information. A uniform extraction format to ensure data completeness and consistency. Diagnoses were classified by experienced physicians using ICD-10-WHO (2019) codes for standardized categorization.

Bivariable logistic regression analysis was performed, and variables with a p-value of less than 0.25 were considered for inclusion in the multivariable logistic regression analysis. In the final multivariable analysis, variables with a p-value of less than 0.05 were deemed significant

Inclusion & Exclusion criteria

- ✓ Only complete records of survivors (848) and non-survivors (195) were included. Admitted neonates with incomplete data were excluded with no other exclusion criteria. Simple random sampling ensured representativeness. All personal identifiers were removed from the data before analysis using Microsoft Excel to ensure patient confidentiality. The study aimed to identify Neonatal Mortality rates and factors associated with neonatal mortality.
- ✓ The ethical approval for this study was granted by the Mogadishu Somali Turkish Training and Research Hospital (MSTH/3391).
- ✓ **Limitations**

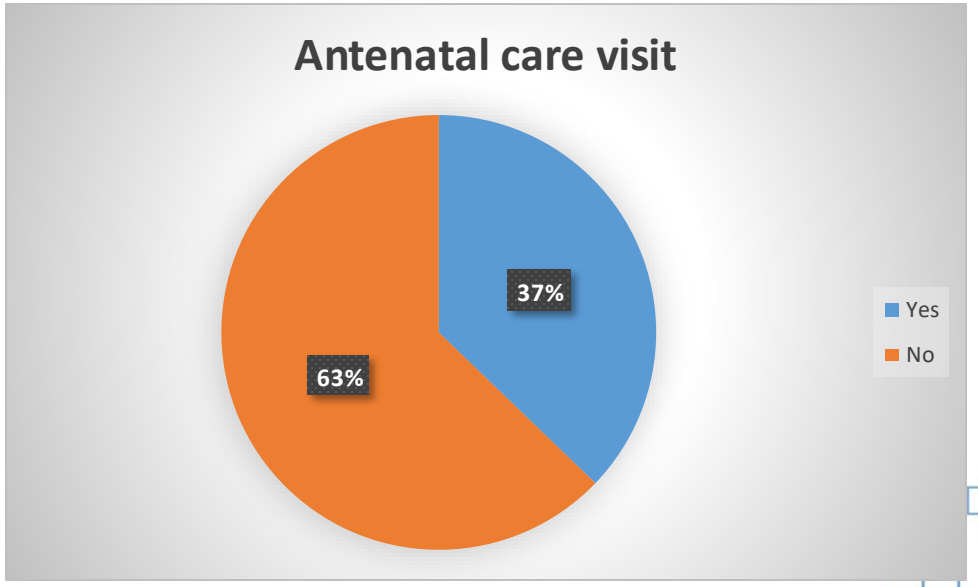
  Although the study was limited to a single-center design, it provides preliminary information that will help guide future multicenter research and enhance its generalizability.

Results

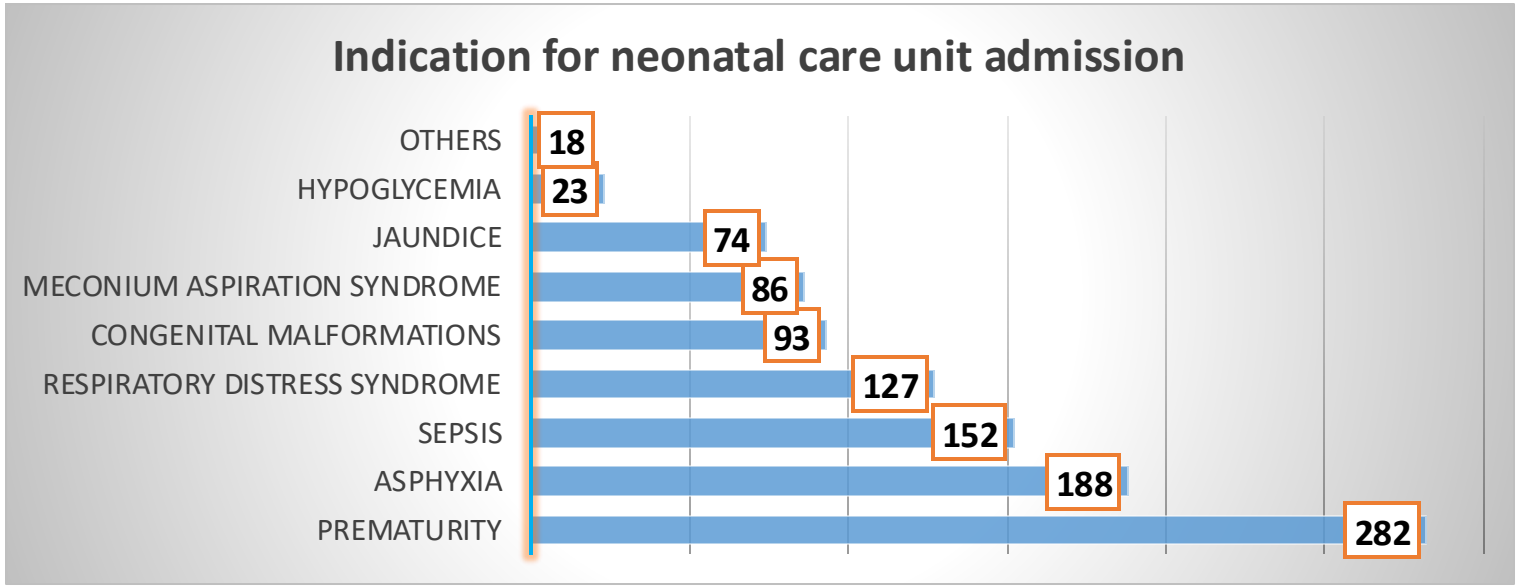
1,043 eligible participants, with a mean age of 1.48 ±0.50 days, and 665 (63.8%) males were enrolled. The average length of stay in NICU was 7.38 ± 7.9 days, Neonates were almost evenly distributed between those 0-7 days (52.3%, 545 cases) and those aged 8-28 days (47.8%, 498

Maternal and Delivery -related characteristics

In this study, around two-thirds of the 655 cases (62.8%) had no ANC visits during their pregnancy of the current neonate, spontaneous vaginal delivery was the primary mod of birth 686 cases (65.8%),with cesarean sections 357 cases(34.2%).



Indication for neonatal care unit admission



The description of neonatal related characteristics

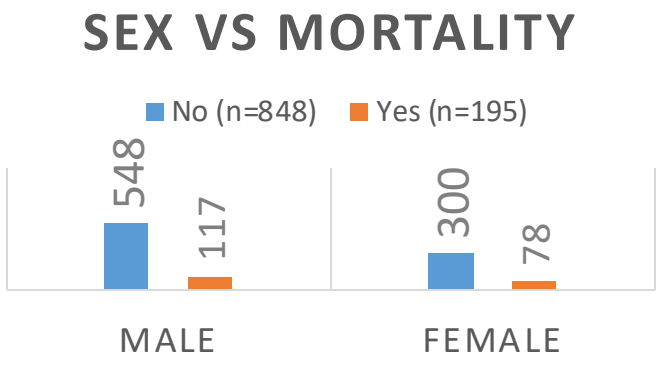
✓ The gestational age distribution of neonates was full-term (38-42 weeks) with 55.3% (577 cases), preterm (<32 weeks) with 25.8% (269 cases), late preterm (33-37 weeks) with 11.9%(124 cases), and post-term (>42 weeks) with 7.1% (73 cases). Birth weight classifications reveal that 53.2% (555 cases) are within the normal range (2500-4000 grams), while minimal birth weight (<1500 grams), lower weights (1500-2500 grams), and higher weight (>4000 grams) neonates account for 25.5% (266 cases), 15.1% (157 cases), and 6.2% (65 cases), respectively.

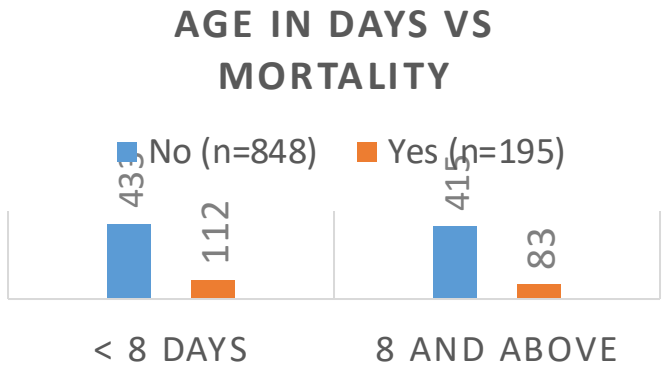
✓the prevalent diagnosis is preterm birth, affecting 27.0% (282 cases), followed by birth asphyxia at 18.0% (188 cases), neonatal sepsis at 14.6% (152 cases), and Respiratory Distress at 12.2% (127 cases). Congenital malformation is noted in 8.9% (93 cases), meconium aspiration syndrome in 8.3% (86 cases), and clinical jaundice in 7.1% (74 cases), while hypoglycemia and other conditions are less common at 2.2% (23 cases) and 1.7% (18 cases), respectively.

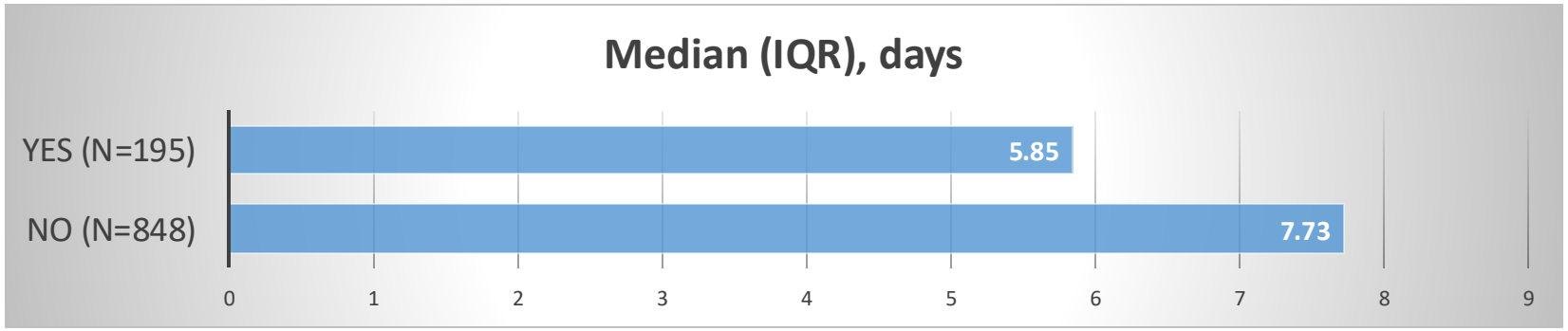
Determinants associated with neonatal mortality

The survival and mortality proportion among the neonates, with a notable overall mortality rate of 18.7%, 195 of the cases died during their hospitalization course There is a clear correlation between staying in the hospital for a longer duration and a reduced probability of death, Similarly, infants born through spontaneous vaginal delivery and those whose mothers receive antenatal care (ANC) had a reduced risk of mortality (Figure 3). The study indicated that gestational age below 32 weeks was associated with a significantly increased risk of mortality (p=0.002) compared to full-term infants, and infants weighing less than 1500 grams had a higher mortality risk (<0.001)

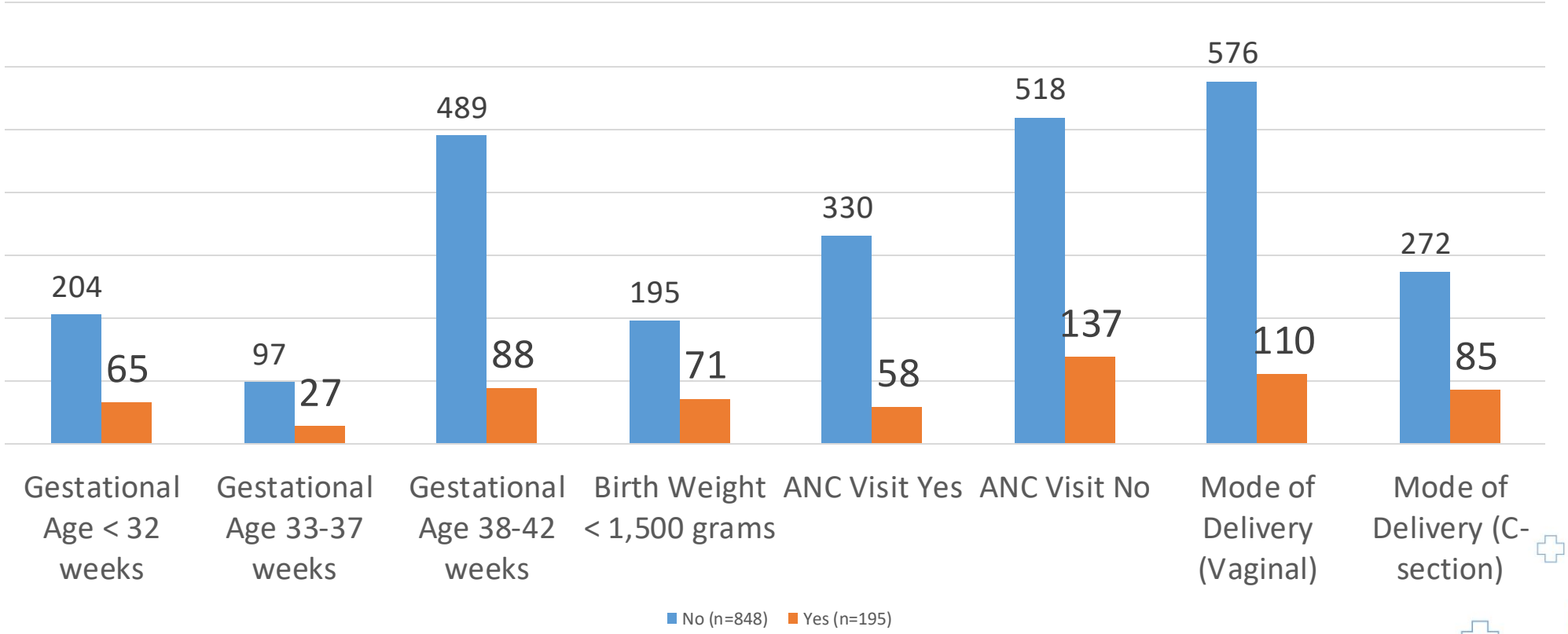
Significant factors





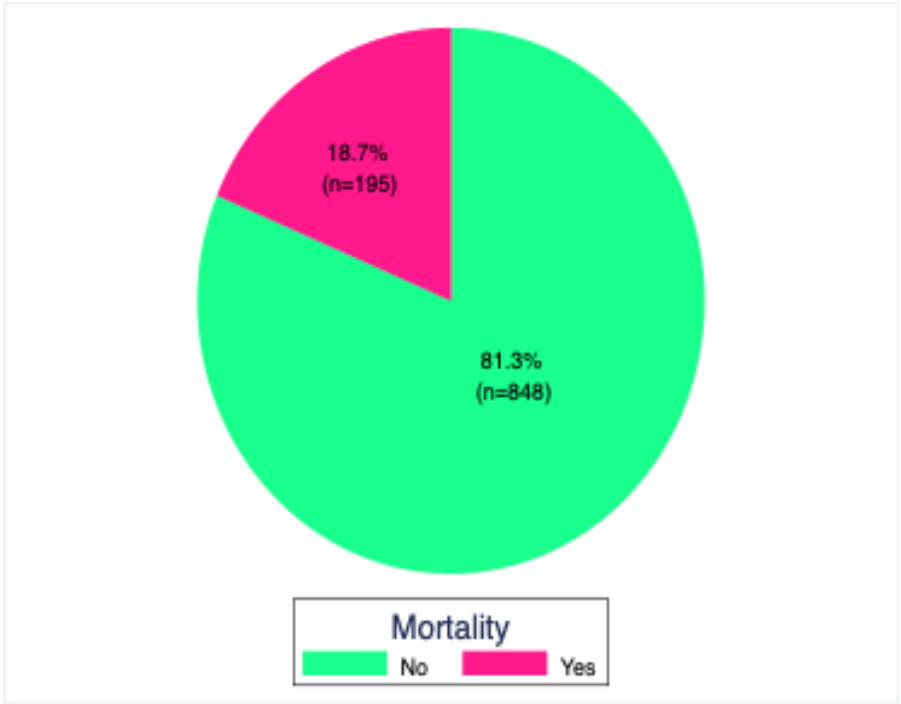


Other significant variables



Neonatal mortality

Overall, 195 (18.7%) participants died



Proportion of neonates who survived or died at the Neonatal Intensive Care Unit of the Mogadishu Somali Turkish Training and Research Hospital, Somalia, between August 2017 and September 2019

Discussions

- Regarding the overall neonatal mortality rate of 18.69% at the Mogadishu Somali Turkish Training and Research Hospital, it's notably lower than national available estimates, which are around 37 deaths per 1,000 live births [5]. The region of Somaliland is estimated to have an NMR of 42 per 1000 live births. [19] Bosaso, Puntland state of Somalia 67.6 deaths per 1000 live births. [20] A multicenter hospital-based cross-sectional study in Mogadishu found that the prevalence of neonatal mortality was 26.5%.[11] This achievement is particularly impressive given the hospital's focus on serving high-risk patients and complex pregnancies.

Cont.

- Several factors were significantly associated with neonatal mortality in this study. Newborns whose mothers did not undergo Antenatal Care follow- up faced a substantially higher risk. Similarly, infants delivered via cesarean section showed an increased risk of neonatal mortality. Birth asphyxia was identified as a notable contributor to neonatal mortality [24] Somali Regional State, Eastern Ethiopia data from a separate facility-based study conducted between 2011 and 2018 The study identifies prematurity, low birth weight, birth asphyxia, and infections as significant contributors to neonatal mortality, overall, neonatal mortality was 18.6%per 1000 live birth. [25]

- The WHO classification focuses on urgency, with emergency cesareans often associated with poorer neonatal outcomes due to underlying conditions, reduced preparation time, and stress. Emergency deliveries have higher risks, and individual cases vary

Cont.

- Additionally, postnatal care is essential for monitoring the mother's and newborn's health and well-being after delivery. Regular check-ups and screenings allow healthcare providers to identify any postpartum complications or issues that may arise. By providing appropriate care and support, healthcare professionals can ensure the optimal health and development of both the mother and the newborn. Overall, comprehensive prenatal and postnatal care, along with skilled birth attendance, play a crucial role in promoting positive outcomes for high-risk pregnancies and ensuring the well-being of both mother and baby. Efforts to improve access to quality prenatal care and promote skilled birth attendance are vital in countries with limited resources, like Somalia. [29,30] Kangaroo mother care is a cost-effective intervention that involves close skin-to-skin contact between the mother and the newborn. It provides warmth, promotes breastfeeding, and reduces the risk of infection. Kangaroo mother care is particularly beneficial for preterm and low birth weight infants, helping to improve survival rates. Other factors, such as postnatal care, breastfeeding support, immunizations, and community-based interventions, reduce neonatal mortality rates.

- **Conclusion**

The study found that the mortality rate for neonates is low compared to the national and that preterm birth and birth asphyxia are the most common diagnoses. The study also found that a low percentage of mothers received antenatal care and that there is a positive association between Cesarian sections and mortality. The study highlights the need for targeted interventions to improve neonatal survival in Somalia, such as increasing access to high-quality antenatal care, improving neonatal care through specialized units, and addressing risk factors like preterm birth and birth asphyxia, the addressing challenges of neonatal mortality in Somalia is the importance of the study findings.

Recommendations to Address Neonatal Mortality in Somalia

Based on the study findings

- Strengthen antenatal care services, improve neonatal care through specialized units and trained healthcare professionals, enhance maternal health services with safe deliveries and skilled attendants, address risk factors like preterm birth and birth asphyxia, and increase access to effective health services while improving resource efficiency to reduce neonatal mortality in Somalia.