Morbidity patterns and risk factors associated with neonatal mortality in Abs General Hospital, Yemen

S. Chua[1], S. Lim[2], Isah Mohammed[3], A. M. Al-Ashwal[4], Y. Vazquez[2], P. Urawagiye[1], C. Roman[2]

[1]MSF, Sana'a, Yemen; [2]MSF, Amman, Jordan; [3]MSF, Abs, Yemen; [4]Ministry of Public Health and Population, Abs, Yemen

Background

MSF (OCBA) has been supporting Abs General Hospital in Yemen since 2015.

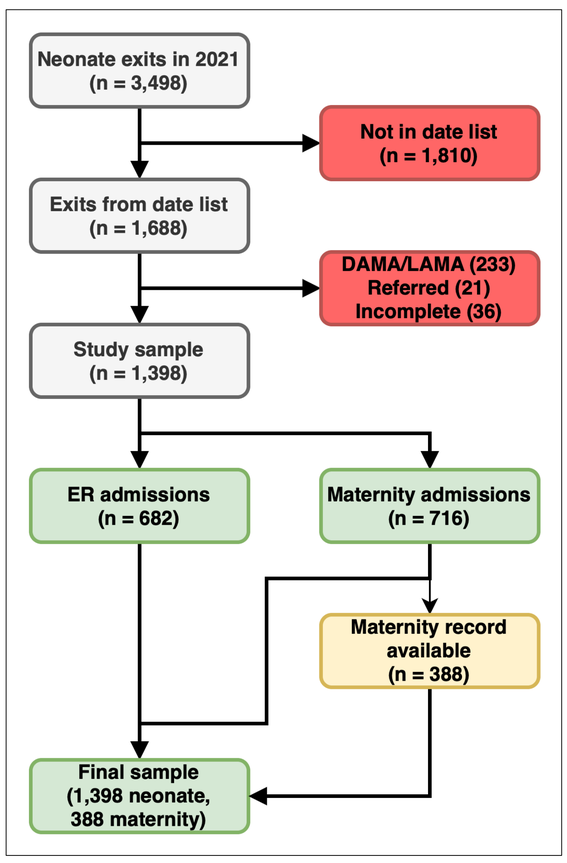
- Abs hospital serves a catchment population of >1 million people.
- The neonatal unit (NNU) is a Level I facility: able to provide resuscitation at delivery and stabilize ill and premature neonates, but unable to provide support for mechanical ventilation.
- In 2021, the NNU had between 55 and 107 cots.

Objective

Describe morbidity patterns of neonates and to investigate linkages between maternal and neonatal risk factors and their associations with mortality.

Methods

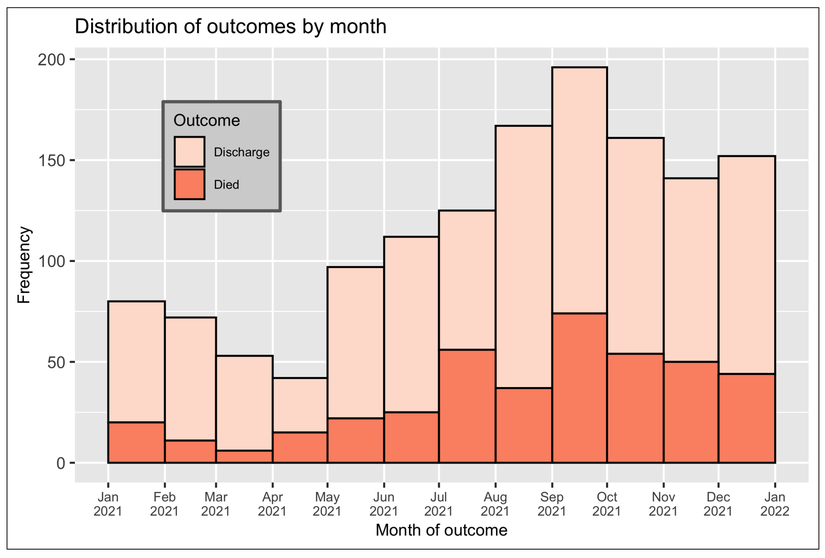
- Facility-based retrospective study using clinical records of admitted neonates who were later **discharged** or **died** between 1 January and 31 December 2021.
- **Sampling** was conducted using a list of 180 random dates in 2021. Clinical records (neonatal and maternity) from these dates were selected for possible inclusion.



- **Data collected** from clinical records and entered into REDCap.
- **Data analysis** included multivariable regression to estimate odds ratios (OR) and 95% confidence intervals of the association between risk factors and mortality.
- **Ethics statement**: This study fulfilled the exemption criteria set by the MSF Ethics Review Board for a posteriori analyses of routinely-collected clinical data and was approved by hospital authorities.

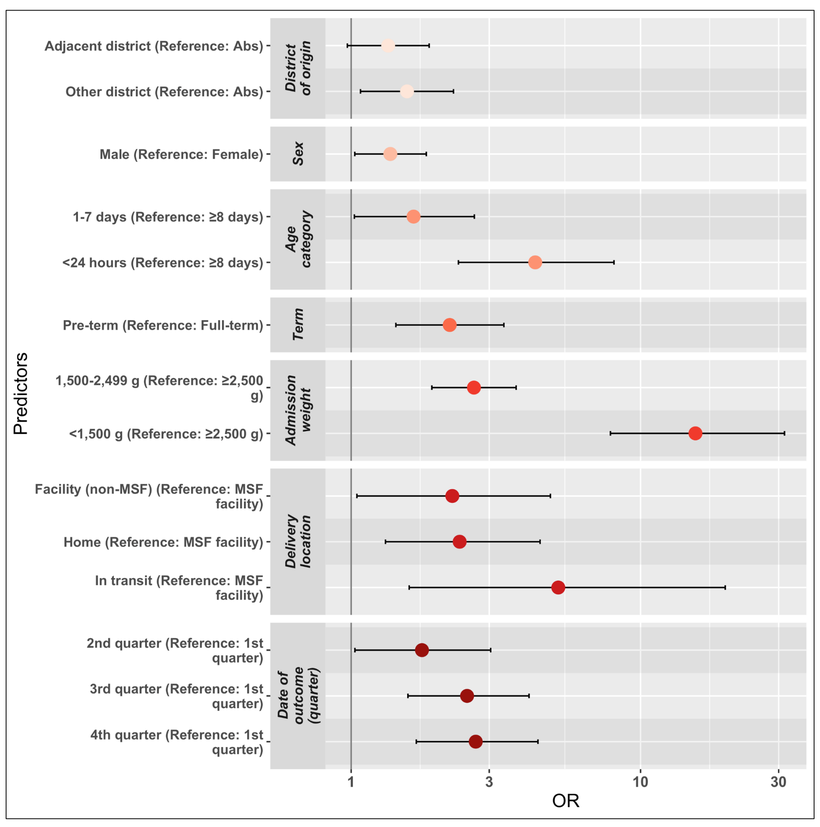
Results

- 57% male neonates; 56% admitted <24 hours of birth
- 79% were term/post-term
- 45% weighed <2,500g on admission
- 30% died during hospitalization
- 93% received antibiotics, all empirical



Distribution of outcome of hospitalized neonates, by month.

Risk factors



Forest plot of mortality predictors (related to neonatal admission factors). Significant predictors at p<0.05 illustrated here. Factors adjusted for include admission source, district of origin, sex of neonate, age of neonate, term, admission weight, delivery location, delivery method, multiple gestation, length of stay, and date of outcome.

Mortality predictors

Neonatal risk factors:

- Residing further away from Abs district
- Male
- Younger age at admission
- Delivered outside of Abs hospital
- Pre-term
- Low admission weight
- Hospitalized in latter parts of year

Maternal risk factors (not illustrated):

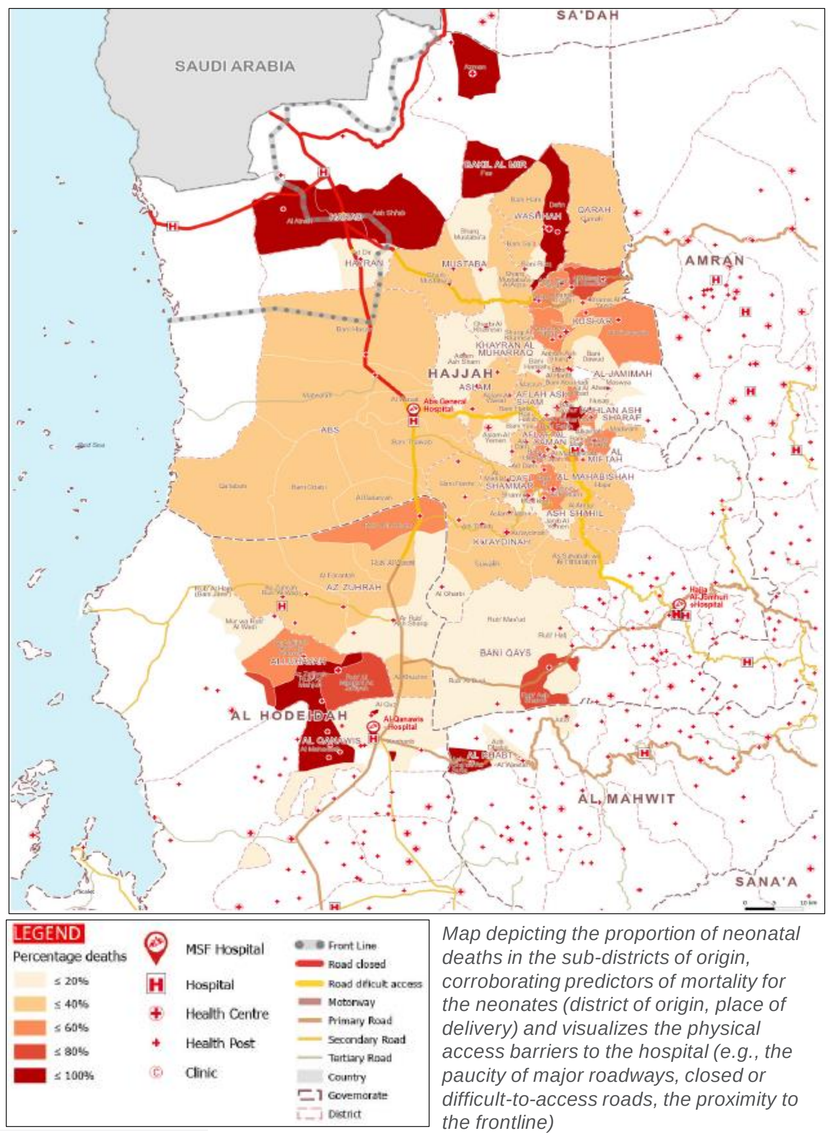
- Delivered by mothers with complications
- Mother referred to Abs hospital

Considerations

Some risk factors were biological (sex, age) and/or related to neonatal condition at birth (APGAR) and less modifiable.

Access issues (residence, delivery location, being referred for care) reflect a strained health system. Few mothers had antenatal care; and more than half were malnourished and/or anemic.

A significant predictor, date of outcome highlights the impact on quality of care when patient volume increases but staffing and resources did not.



Map depicting the proportion of neonatal deaths in the sub-districts of origin, corroborating predictors of mortality for the neonates (district of origin, place of delivery) and visualizes the physical access barriers to the hospital (e.g., the paucity of major roadways, closed or difficult-to-access roads, the proximity to the frontline)

Recommendations

1. Restore basic primary health care services, particularly antenatal care, in areas furthest from Abs hospital.
2. Develop plans to prepare for seasonal peaks (e.g., staffing increases and temporary overflow wards).
3. Consider limiting admissions if nurse-to-patient ratio cannot be maintained to ensure acceptable quality of care.

Interventions taken

1. Advocating with the Ministry of Public Health and Population (MoPHP) to increase primary health care services, supported by MSF-OCBA for sexual and reproductive health packages (2-6 facilities planned for 2023).
2. Adjusted staffing (nurse:patient ratio reduced to 1:5 from 1:10) and increased training on infection prevention and control.
3. Reinforce limit on patient capacity, in discussion with the MoPHP, ensuring appropriate distance between beds.

Conclusion

This study highlights the difficulties in delivering quality neonatal care in a context where access to basic health services is severely impaired, and where almost no community-based interventions are available. The seasonal peaks in the last two quarters of the year impose a severe strain on already-limited staff capacity and material resources, which inadvertently impacts service delivery and by extension, neonatal survival.

Acknowledgements

Sampling, translation, data extraction: Soad Fariqah, Ahmed Dabaj, Bahi Hezam Hussein, Nuha Saleh Al-Alaya, Qaid Hashragi, Yasmeen Yahia, Sadik Abu Hadi

Technical advisory: Ana Valori, Raquel Vives, Luisa Suarez, Manuel Pece, Laura Moreto, Ana de la Osada, Marie Poupard, Riham Albubaiee, and Augusto Llosa

Coordination: Anni Fjord, Marina Pomares, Maria Simon