NEO FOR NAMIBIA
HELPING BABIES SURVIVE

MISSION REPORT

Mission 2021–1

April 16, 2021 to May 16, 2021

AUTHORS
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1. INTRODUCTION

The 11th mission of NEO FOR NAMIBIA – Helping Babies Survive lasted from April 16 to May 16, 2021. Because of the ongoing Corona pandemic, a negative Covid-19 PCR test was required to enter the country, but there were no additional quarantine requirements or travel restrictions.

Prof. Berger was accompanied by Sarah Noemi Knoll, MD, one of two neonatology fellows from the University Children's Hospital in Basel who had expressed an interest to become involved in the work of our NGO. Her colleague, Salome Waldvogel, MD, planned to join the team together with Katharina Mäder, a neonatology nurse, on the upcoming 12th mission in July/August 2021.

Sarah rapidly adapted to the local work conditions, and her enthusiastic support was most welcome and highly appreciated. Complemented by the driver, Brenton Titus, the team traveled north to Rundu and Katima Mulilo to continue the work of NEO FOR NAMIBIA – Helping Babies Survive at both hospitals.

Before returning to Switzerland, Prof. Berger and Dr. Knoll also visited the hospitals of Mariental and Rehoboth in the Hardap region south of Windhoek (Fig. 1). The purpose of these visits was to assess whether these institutions could benefit from interventions that have previously proven effective in the Kavango East and Zambezi regions of the country. Obviously, this decision would also depend on the success of additional funding efforts (see below).

Finally, they met with representatives of the Ministry of Health and Social Services in Windhoek. The purpose of the meeting was to provide feed-back and strengthen our collaboration with the key stake holders of the ministry.

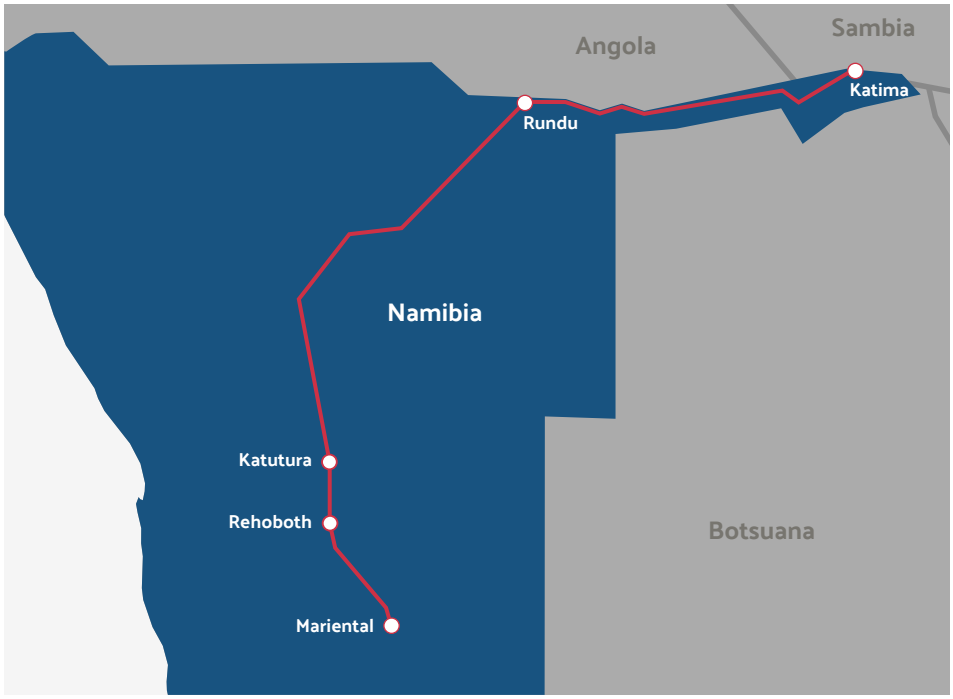

Fig. 1. The 11th mission led to hospitals in Rundu, Katima, Mariental, Rehoboth and Katutura.

2. MAIN MISSION GOALS

The goals of the 11th mission were:

- To introduce the first neonatology fellow (Sarah Noemi Knoll, MD) from the University Children's Hospital in Basel, Switzerland to neonatology in a resource-limited setting
- To better understand the obstacles that prevented the move to the new Prem Unit at Rundu State Hospital after a failed attempt in December 2020
- To review progress made at Katima Hospital following our first two visits in December 2019 and December 2020
- To meet with officials of the MHSS to discuss future directions for NEO FOR NAMIBIA – Helping Babies Survive
- To visit hospitals in the Hardap region (Marienthal and Rehoboth) for baseline assessments and training of local health care professionals (Marienthal hospital only)

3. EQUIPMENT

As usual, various pieces of equipment and consumables were brought along directly by the team members, including 6 Massimo® Rad-8 pulse oximeters (Katima: 2, Katutura: 4), 280 pulse oximetry sensors (Rundu: 100, Katima: 80 (30 of which were donations of used ones), Katutura: 100), 1 Bilimeter with consumables (Katima: 1), as well as various kinds of dressing and tape (Fig. 2). Stock management remains a challenge and must be improved urgently to avoid "out of stock" situations. Many times, items get ordered in time from the central stores but then appear not to be processed in time.

Fig. 2. Equipment brought to Rundu, Katima and Katutura hospitals.

4. 4. HOSPITALS VISITED

4.1 Rundu State Hospital

Prof. Berger and Dr. Knoll were able to work in the Prem Unit at Rundu State Hospital for almost 2 weeks straight (from April 18 to 30, 2021). As on previous missions, we were warmly welcome by the local staff. Sarah was rapidly respected by the nurses as a valuable resource and hard worker.

4.1.1 Overall impression

The unit was extremely busy with 82 and 79 admissions for the months of April and May 2021, respectively. Therefore, their support during ward rounds and admissions of new patients was most welcome (Fig. 3–5).

Fig. 3. Busy labor and delivery ward at the Rundu State Hospital.

Fig. 4. Living quarters of the mothers whose babies had been admitted to the Prem Unit at Rundu State Hospital.

Fig. 5. MTTS Dolphin® CPAP devices have two main advantages over the Pumani® bubbleCPAP machine: first, the inspiratory gas is heated and humidified, second, its patient interface allows prone positioning (left); intermittent airway humidification with a nebulizer device is used in small patients with longer Pumani® CPAP runs (right).

4.1.2 Statistics

As outlined above, the Prem Unit at Rundu State Hospital was very busy. From December 2020 to April 2021, there was an average of 89 admissions per month (range 73–111). Inevitably, given the restricted space available, physicians and nurses had to improvise to admit all the sick babies. During peak periods, the Prem Unit had to accommodate up to 35 babies at the same time.

Unfortunately, the new Prem Unit was still not functional. Most importantly, there was still no reliable oxygen supply. According to Thomas Mbeeli, the responsible person at the MHSS, a new oxygen system had been ordered in South Africa and was scheduled to be delivered in June 2021. Consequently, the safety of the babies was compromised, and mothers continued to live under disgraceful conditions (e.g., three mothers were placed on one mattress in the corridor of the labor and delivery ward).

Despite the increased workload, the local health care professionals managed to avoid an increase in mortality rates. In fact, from December 2020 to April 2021, the mortality rate of inborn infants averaged 7.9 % (i.e., 28 deaths among 356 admissions), comparable to mortality rates in 2020. As could be expected, mortality rates for outborn infants were higher, averaging 14.9 % (i.e., 13 deaths among 87 admissions) (Fig. 6). When compared with previous years, mortality rates of outborn patients have even improved.

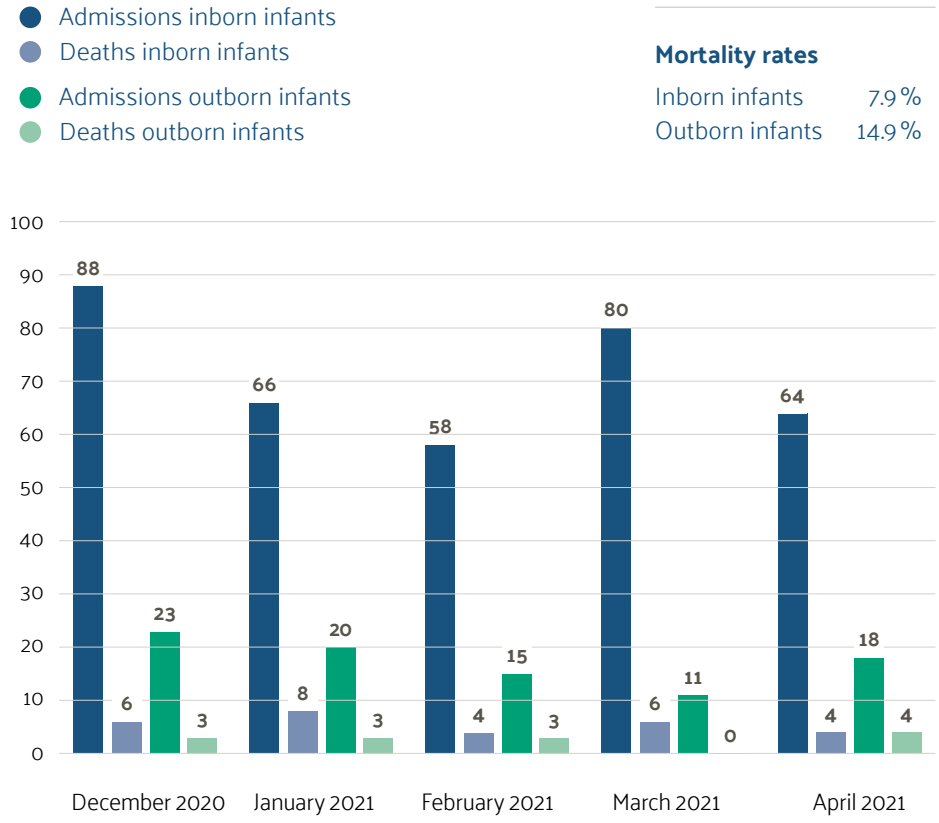

Fig. 6. Number of admissions and number of deaths in the Prem Unit at Rundu State Hospital from February 1, 2020, to January 24, 2021; note the higher mortality rates of outborn infants (14.9 %) versus inborn infants (7.9 %).

4.1.3 HIE epidemic

Unfortunately, many babies – both inborn and outborn – were admitted with a diagnosis of hypoxic-ischemic encephalopathy (HIE). This prompted Prof. Berger to review unit statistics for the past 12 months with a focus on HIE (Fig. 7).

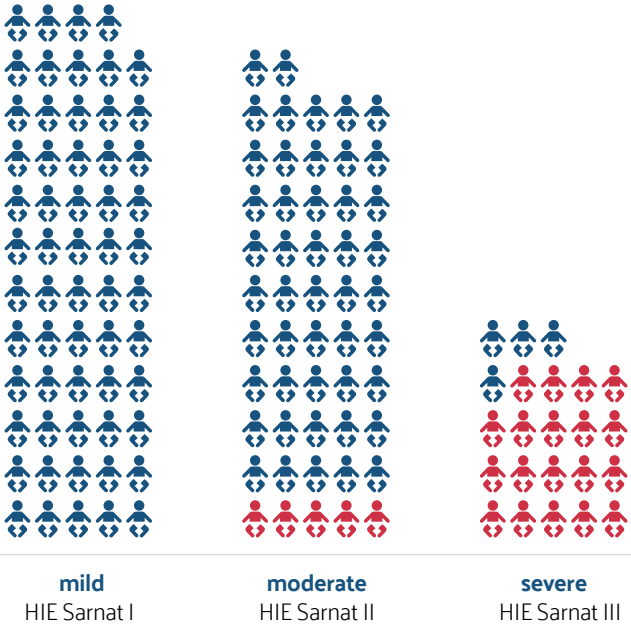

Fig. 7. Incidence and mortality of infants with hypoxic ischemic encephalopathy (HIE) at Rundu State Hospital from February 1, 2020, to January 24, 2021 (Note that the HIE I group also includes "HIE not specified" and "birth asphyxia")

Between February 1, 2020, and January 24, 2021, 134 patients had been admitted with a diagnosis of either HIE I, HIE II, HIE III, HIE not specified or birth asphyxia. More severe forms (HIE II, HIE III) accounted for 75 of these cases (56 %). While there were no deaths among babies with a diagnosis of HIE I, HIE not specified and birth asphyxia, the mortality rate of HIE II–III patients was 32 % (24 out of 75). The mortality rates of infants with HIE II–III did not differ significantly between inborn and outborn patients (31 % versus 36 %).

This observation is very concerning: every month, an average of 5 babies born at Rundu State Hospital sustain severe brain injury from birth asphyxia, and 1–2 die (Fig. 8).

Fig. 8. Infants with severe hypoxic ischemic encephalopathy (HIE III) almost always die: the pulse oximeter displays a very low oxygen saturation (38%) and a low heart rate (71 beats per minute).

Prof. Berger discussed this problem with Dr. Christian Luboya, the head of Obstetrics and Gynecology. Dr. Luboya was aware of these figures and equally concerned. He offered some potential explanations for the high incidence of perinatal asphyxia:

- The maternity unit at Rundu State Hospital has 32 beds
- On average 70–80 pregnant women are seen every day
- Of these, 20–25 are in active labor
- Midwife staffing: 4 in the morning (2 working in the delivery rooms, 2 working in antenatal and postnatal care), 2 in the afternoon (1 working in the delivery room, 1 working in antenatal and postnatal care)
- Physician staffing: 4 medical officers (one of whom is usually off)
- There are 2 functioning CTG (cardiotocogram) monitors, however, continuous monitoring is not possible
- Only 1 operating room is available for (emergency) Cesarean sections
- Referrals of pregnant women with obstructed labor, cord prolapse or uterine rupture from Nankudu (115 km from Rundu), Nyangana (108 km from Rundu) and Andara (191 km from Rundu) often occur too late

In addition, the Covid-19 pandemic has had an enormous impact: a system that had been labile before, virtually crashed. The number of deliveries increased from 450–500 per month to 700 per month (i.e., more than 8'000 per year). Dr. Luboya believed that the lockdown, lack of contraceptives because of interrupted supply chains and increasing numbers of referrals from other hospitals and health centers are responsible for this dramatic increase in deliveries.

4.1.4 Staffing (Prem Unit)

While nurse staffing has improved over time (both quantity and quality), physician staffing remains critically low. In addition, knowledge, skills, and work ethics vary greatly among doctors. Consequently, the quality of care provided varies also and very likely impacts on the observed mortality rates. Prof. Berger informed the hospital leadership about these sensitive and complex issues and strongly advised that in the interest of the babies and their mothers these problems must be addressed urgently.

4.1.5 Equipment maintenance

Medical equipment is not serviced on a regular basis and often cannot be repaired by local medical technicians. During our visit, it was noticed that only one out of three Dolphin CPAP devices was fully functional. Because of failure of the internal battery, the only ventilator could no longer be used. Fortunately, NEO FOR NAMIBIA – Helping Babies Survive was able to buy a second EVE neo ventilator and a new humidifier (Fisher-Paykel). Plans were made to purchase a replacement battery for the first EVE neo and a second humidifier.

During discussions with the hospital leadership, it was made clear that NEO FOR NAMIBIA – Helping Babies Survive would not be willing to replace expensive equipment if servicing and repair could not be guaranteed. Mediated by Cecilia Ndepavali, the head nurse of the Prem Unit, Prof. Berger was able to contact John Namwira (NewMed™ Holding), a medical technician. Together, they drafted a one-year-contract that should ensure proper maintenance and teaching of local technicians (Fig. 9)

Fig. 9. Proper equipment maintenance will be crucial: damaged humidifier chambers of MTTS Dolphin® CPAP machines (left); malfunctioning internal battery of the EVE® neo ventilator (right).

4.1.6 Feed-back session

On April 27, 2021, Prof. Berger and Dr. Knoll were able to provide detailed feedbacks of observations made during their 2-week-stay. The hospital was represented by the Chief Medical Officer, Dr. Joseph Mukerenge, his deputy, Dr. Medson Chibwe, the Head of Nursing, Mrs. Martina Hausiku, and Dr. Isha Kamara from the Department of Pediatrics.

The urgency of finishing the new Maternity Unit and the new Prem Unit was emphasized. The importance of improving physician staffing was also discussed. The poor reliability of the NIP laboratory services was once again criticized. Finally, fragile supply chains and irregular maintenance of medical equipment were discussed.

4.2 Katima Hospital

4.2.1 Overall impression

This was the 3rd visit of Katima Hospital by NEO FOR NAMIBIA – Helping Babies Survive. There was recognizable, albeit slow progress in the organization of the neonatology unit. The nurses keep the place clean and in good order (Fig. 10–11). The use of pulse oximetry and the warming tables work well. On the other hand, the Pumani CPAP machines are not yet used as they should: the strategy of early CPAP has not yet become routine. Physician support remains substandard, this will have to be addressed very soon. Of interest, Dr. Cristy Victor expressed an interest to become more involved in pediatrics. She approached Prof. Berger with a proposal for "Active continuing medical education presentations by medical officers on neonatal care. Quality improvement of premature neonatal care in Katima Mulilo district hospital, Zambezi region." Obviously, such efforts by local physicians should be supported.

Fig. 10. Neonatology unit at Katima Hospital: Sarah Knoll, MD, instructs a nurse during ward rounds.

Fig. 11. Neonatology unit at Katima Hospital: Pulse oximeters help to monitor babies and allow to properly dose oxygen therapy.

4.2.2 Bilimeter

NEO FOR NAMIBIA – Helping Babies Survive was able to supply a point of care testing device (POCT) to measure serum bilirubin concentrations. The Bilimeter® had been proven to be reliable in Rundu and Onandjokwe previously. Bilirubin POCT is very valuable because it requires only a few drops of blood (4 µl), is available around the clock, and the results can be obtained within 5 minutes. This is in stark contrast of what the state-run laboratory of the hospital (NIP: National Institute of Pathology) can provide.

The centrifuge, the measuring device (photospectrometer), the calibration probe, as well as the consumables (capillaries, sealing putty) were set up in a designated space and Sarah Knoll instructed all nurses on its proper use (Fig. 12, 13).

Fig. 12. Point of care testing (POCT) of serum bilirubin values, now available in the neonatology unit at Katima Hospital.

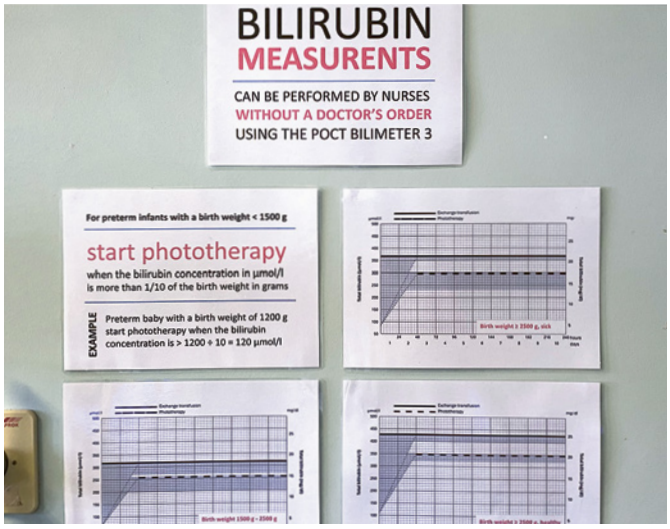

Fig. 13. Laminated reminders are mounted on the walls in the neonatology unit at Katima Hospital; nurses should be allowed to measure bilirubin concentrations and start phototherapy without specific orders from a doctor.

4.2.3 Teaching sessions

During our visit, both lectures (fluid and nutrition therapy, physiology and patho-physiology of neonatal adaptation) and practical sessions (writing fluid and nutrition orders, neonatal resuscitation) were offered.

4.2.4 Statistics

From December 2020 to April 2021, there was an average of 36 admissions per month (range 28–45). Following an initial decline from around 33 % in 2019 to 20.4 % (we first visited the hospital in December 2019) the mortality rate remained high at 21.7 % over the most recent 5-month-period (Fig. 14).

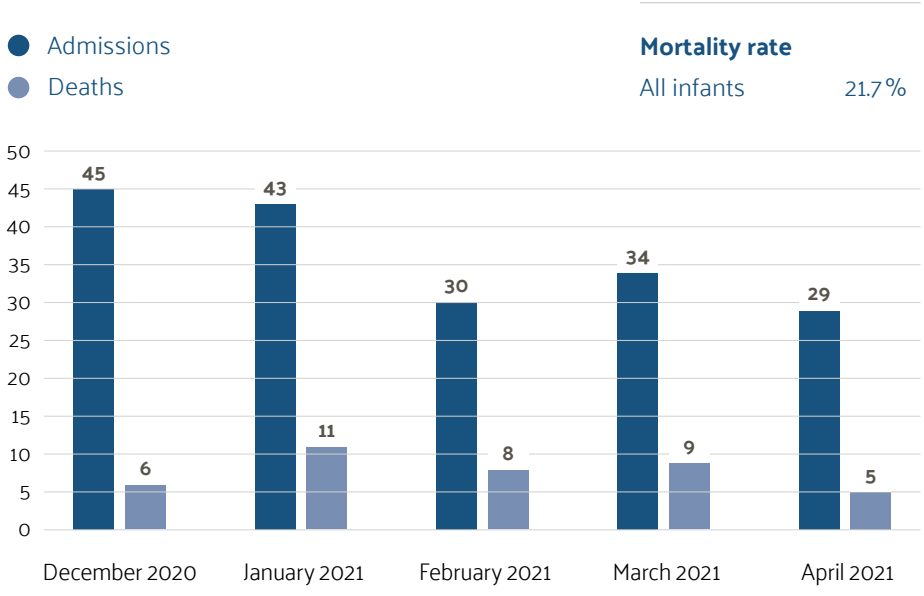

Fig. 14. Number of admissions and number of deaths in the neonatology unit at Katima Hospital from December 1, 2020, to April 30, 2021; mortality rates remain high (average 21.7 %, range 13.3 %–26.7 %).

4.2.5 New neonatal unit

Work in the new neonatal unit at Katima Hospital had made nice progress (Fig. 15). However, its power supply remained inadequate and will have to be adapted to the needs of an intermediate care unit. Even more relevant, its gas supply (oxygen, compressed air, vacuum) was still completely lacking. These issues were discussed with the hospital leadership (Dr. Kabidiku, Dr. Siame, Mrs. Mwilima).

Fig. 15. The new neonatology unit at Katima Hospital: before babies can be moved into the newly renovated rooms, additional power sockets and gas supply must be installed.

4.2.6 Miracle – a very special patient

This female infant was admitted to the hospital in Katima on day of life 26. Her name was Miracle. The girl had been born near term in Onandjokwe (approximately 1'100 km east of Katima). In her health passport, a birth weight of 2'150 g was recorded. On admission, her weight was 1'700 g, corresponding to a weight loss of 21 % over the first four weeks of life.

Despite her critical condition, she was admitted to the pediatric ward. No laboratory investigations were ordered, but she was started on antibiotics. Unfortunately, the admitting physician did not write adequate fluid and nutrition orders, and her weight was not followed over the next few days.

On day of life 29, the visiting team of NEO FOR NAMIBIA – Helping Babies Survive was asked to review the patient. Miracle was found in the arms of her mother, wrapped in several blankets. She was severely emaciated and dehydrated with standing skin folds, had a dry cough, and appeared to be cyanotic (Fig. 16). She was immediately transferred to the neonatal unit. On arrival, she was hypothermic (35.0 °C) and in mild respiratory distress with an oxygen saturation of 78 % in room air. Her weight had decreased even further to 1'580 g, that is 570 g (27 %) below birth weight (Fig. 17).

Fig. 16. Miracle, a severely dehydrated and emaciated infant.

Fig. 17. On day of life 29, Miracle had lost 570 g from birth weight (i.e., a weight loss of 27%).

Unfortunately, her respiratory status continued to deteriorate, and she was put on CPAP (Fig. 18). A trial of furosemide had no effect on oxygenation, and she became increasingly hypoxemic despite an FiO_2 of 1.0. Apnea spells were noted but could not be treated because caffeine citrate had been out of stock for more than a month. Finally, Miracle died five days after her admission to the neonatology unit.

Fig. 18. Miracle's respiratory status continued to deteriorate, and she was put on CPAP.

4.3 Hospitals in Mariental and Rehoboth

For the first time, the neonatology facilities at the hospitals in Mariental (Mariental District Hospital, 268 km south of Windhoek) and Rehoboth (St. Mary's Hospital, 93 km south of Windhoek) in the Hardap Region of Namibia were visited for baseline assessments.

There was a very warm welcome at the Mariental District Hospital by Dr. Platt and his team. According to the Head Nurse, the hospital has approximately 2'500 deliveries per year. All babies (well babies and sick babies) are cared for in the 12-bed-maternity ward (Fig. 19, 20). A mortality rate of 7.58/1'000 live births was mentioned, resulting in about 20 deaths per year. More detailed statistical information was not readily available.

Fig. 19. New incubator in the neonatal ward at Mariental District Hospital: the local health care professional had never been instructed in its use, and the only available manual is written in Chinese.

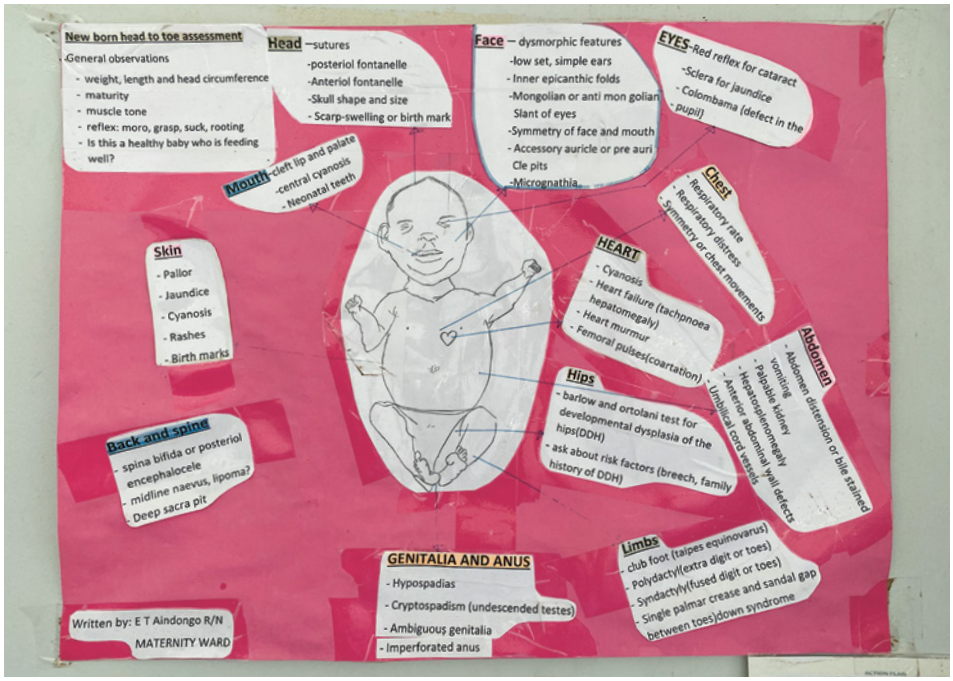

Fig. 20. Newborn head to toe assessment: a poster mounted on the wall of the neonatal unit at Mariental District Hospital.

St. Mary's Hospital in Rehoboth is a 120-bed-facility with around 1'600 deliveries per year. There are three functioning incubators. Approximately 10 – 15 babies are admitted to their neonatal unit per month; on average, 4 of these babies die (estimated mortality rate 30 %). Other than nasal cannula oxygen, there are no other ways to support neonates with respiratory distress. Referrals to Windhoek Central Hospital cannot always be guaranteed. Transport of sick infants are only accompanied by nurses in ill-equipped ambulances, and all too often babies either die on transport or arrive in Windhoek in a very critical condition.

Obviously, both Hospitals could potentially benefit from interventions and support by NEO FOR NAMIBIA – Helping Babies Survive. However, this would require more funding, more team members, and close collaboration with Windhoek Central Hospital.

4.4 Katutura Hospital

Before returning to Switzerland, the NEO FOR NAMIBIA – Helping Babies Survive team was able to visit the neonatology unit at Katutura Hospital. Donation of urgently needed equipment was more than welcome.

Most pieces of equipment in this unit are in a very poor condition (Fig. 21). Improving neonatal care at this facility will require significant investments. NEO FOR NAMIBIA – Helping Babies Survive would be interested to support such efforts, provided that sufficient funding can be obtained.

Fig. 21. . Incubators at Katutura Hospital in Windhoek are virtually falling apart; replacement with simple and robust equipment is urgently needed.

5. MEETING WITH REPRESENTATIVES OF THE MHSS

Before returning to Switzerland, Prof. Berger and Dr. Sarah Knoll were given the opportunity to inform representatives of the Ministry of Health and Social Services about the main observations made during their mission (Fig. 22). Once again, NEO FOR NAMIBIA–Helping Babies Survive was assured that the organization's efforts were highly valued by the MHSS. The ministry was very interested in continuing its collaboration and to provide administrative support.

Fig. 22. .Slides presented during a feedback session at the Ministry of Health and Social Services (MHSS).

6. FUTURE DIRECTIONS

6.1 Mission 2021–2

The 12th mission of NEO FOR NAMIBIA – Helping Babies Survive will take place in July and August 2021. If all goes well, there will be two teams: Prof. Berger and his wife Sabine, as well as two neonatology fellows (Sarah Knoll, Salome Waldvogel) and a neonatology nurse (Katharina Mäder) from the University Children's Hospital in Basel, Switzerland.

6.2 Fundraising efforts

After more than 5 years, it is gratifying to see that what had started as a pilot project in 2016, has since been proven to be effective and sustainable. This motivates NEO FOR NAMIBIA – Helping Babies Survive to continue and expand their efforts. The team is growing, and hopefully, the University Children's Hospital of Basel, Switzerland, will continue to offer to its neonatology fellows to become involved in projects that help develop neonatal care in LMICs. Such efforts, however, will depend on ongoing and hopefully increasingly successful funding.

7. NAMIBIA – AN AMAZING COUNTRY

Finally, we would like to share some images of the country's amazing beauty and the smiles of its people (Fig. 23–26). More than anything, the latter is what will always bring us back!

Prof. Thomas M. Berger, MD
NEO FOR NAMIBIA
Helping Babies Survive

Sarah Noemi Knoll, MD
Neonatology fellow
University Children's Hospital of Basel

Fig. 23. .During the 11th mission, the team traveled more than 3'000 km across Namibia.

Fig. 24. Namibia's beautiful nature is often breathtaking (top: sunrise at the Kavango river near Divundu; bottom: Kwando River, 140 km west of Katima).

Fig. 25. During our missions, we meet many locals: they always seem to have a smile for us (left: children at Kaisosi Village near Rundu; right: Eleotelia Hamutenya (data collector) and her daughter Nicoteh, a former 1'150 g very low birth weight infant).

Fig. 26. Members of the NEO FOR NAMIBIA – Helping Babies Survive team (from left to right): Ottilia Hamutenya (sister of Eleotelia), Nicoteh, Sarah Knoll (neonatology fellow), Prof. Berger, Eleotelia Hamutenya (data collector for NEO FOR NAMIBIA), Brenton Titus (driver).

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