Maternal health in Namibia: Lessons learned from obstetric surveillance

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Part III.

Discussion and summary

Chapter 8.

General discussion

Aims of this thesis were to enhance implementation of a national obstetric surveillance system and assess requirements to improve maternal health in Namibia. The findings of chapters 2-7 provided insight into several important drivers of severe maternal outcome. Obstetric surveillance played a crucial role in obtaining these insights. Based on these, targeted recommendations could be formulated.

Understanding the poor maternal outcome in Namibia

In Namibia, the incidence of severe maternal outcome was much higher than expected for an upper middle-income country.[1] For example, in 2017 the reported maternal mortality ratio (MMR) was three times higher than the average reported MMR for upper middle-income countries.[2,3] This thesis showed that the two most important contributors to severe maternal outcome were challenges in timely access to care for some women, and poor quality of facility-based care. Access was hampered particularly among vulnerable women. This disparity results from gross inequities present in Namibia, impacting all three elements of the system supposed to support women in terms of their reproductive health needs, Figure 1. The poor-quality care provided within facilities can be summarized as 'too little, too late' and was the result of the combination of health workers having insufficient knowledge and skills to timely diagnose and manage complications, an inconsistent supply of basic and essential resources, and high levels of understaffing.

The structure of this general discussion is based on the conceptual framework (Figure 1), with the identified challenges impacting the support structure for the woman discussed first, followed by that for the health worker.

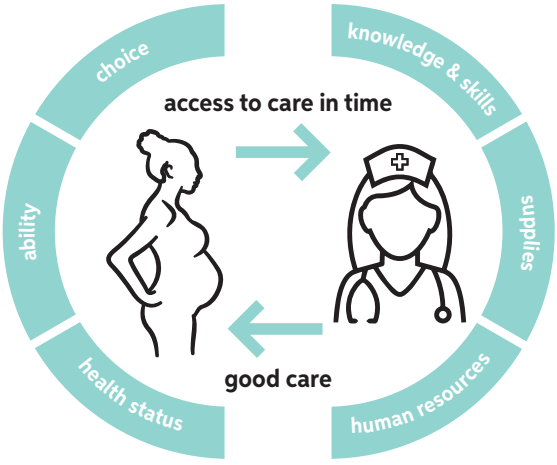

Figure 1. Framework mapping the requirements for functioning support systems for women to ensure they can access care in time and the requirements for health workers to ensure they can provide high-quality care.

Inadequate support for (some) women

Namibia has one of the largest socioeconomic inequalities in the world.[4] Unsurprisingly, there are large differences in access to reproductive health services and outcomes. For example, while contraceptives are supposed to be freely available, the alarmingly high teenage pregnancy rate of 18% and the high rate of unintended pregnancies among women with cardiac disease identified in this thesis clearly indicate that there is a large unmet need of family planning (choice, chapter 2, 6). A school-based sexual and reproductive health educational approach or a focus on increased use of long-acting reversible contraception, interventions proven to be effective elsewhere, could assist in the reduction of unintended pregnancies among teenagers in Namibia.[5,6] Several modern long-acting contraceptive methods, such as hormonal implants, recently became available in public health facilities through donations by the United Nations Population Fund to the Ministry of Health.[7] As described in chapter 6, an integrated approach with the provision of reliable contraception at the cardiology department increased access to contraception for women with cardiac disease. This approach should be implemented across other departments to reach all women with high-risk pre-existing medical conditions such as HIV or tuberculosis.[8]

The socioeconomic inequalities also affect the ability of girls and women to access care. For example, the caesarean section rate was only 6% among the poorest quintile of the population compared to 35% among the richest, one of the widest disparities in sub-Saharan Africa.[9] As identified in chapter 4, several rural district hospitals were unable to provide access to basic surgery, such as caesarean section or laparotomy for ectopic pregnancy, due to a lack of resources. For several women, especially those living in rural areas, lack of access to basic surgery was the main underlying cause of maternal near-misses, particularly when uterine rupture or shock requiring prompt surgery occurred during transport to a referral hospital. Findings of chapters 2 and 4 were shared with decision makers at the Ministry of Health and Social Services and immediate steps were taken to improve availability of basic surgery in all district hospitals. At last, also among women with cardiac disease more complications were seen in those with delayed access to care (chapter 6). The ability of these women to access care in time could be improved through enhanced implementation of high-quality counselling, ideally starting prior to conception, to increase knowledge on danger signs (chapter 5, 6).[10]

Communicable diseases were mainly found among women of lower socioeconomic status, and these conditions had considerable impact on women's health status and, thereby, pregnancy outcome. Hepatitis E was the leading cause of maternal deaths, mainly seen among the poorest women living in the least serviced informal

settlements without access to sanitation or safe drinking water (chapter 7). Other examples are tuberculosis, HIV and rheumatic heart disease, which are all more prevalent among women of lower socioeconomic status and as well associated with severe maternal outcome in Namibia (chapters 2, 5, 6).[11,12] To improve the health status, ideally these diseases are prevented through primary prevention. However, this is not easy to attain given the fact that complex interventions, such as better housing conditions or universal test and treat strategies, are needed.[13,14] Several effective interventions are available for secondary prevention, such as the provision of isoniazid preventive therapy to prevent tuberculosis co-infection among HIV-positive women, improved detection of mild cardiac disease among women of reproductive age or secondary antibiotic prophylaxis for women with mild rheumatic heart disease (chapter 5,6).[11,15]

The unequal outcomes that we identified are not unique to Namibia. Even though around the globe an overall reduction in maternal mortality has been observed over the past decades, health disparities between the (moderately) rich and the poor only seem to have increased, both between and within countries.[16] Although access to care improved for some, vulnerable populations are lagging behind.[16] Of women accessing health facilities, the poor and disadvantaged are the ones most likely to reach precisely those grossly overburdened and severely understaffed facilities that provide low-quality care.[17]

Addressing maternal health inequities is a complex undertaking and a multisectoral approach is needed. Most of the origins of inequity lie outside the health sector and the differences in health outcome are just another symptom of such inequity.[16] The importance of reducing health disparities has been recognized by authors of many authoritative papers and is a key item of the 2030 Agenda of Sustainable Development.[18,19] Also from within the health sector significant progress is required. Health systems will need to be strengthened, to enable health workers to provide universal coverage of good health care to all women.[17] The specific requirements to strengthen the Namibian maternity care system will be discussed in the following section.

Inadequate support for health workers

The combination of insufficient **knowledge and skills** of attending health workers, inconsistent **supplies** of essential medication and medical equipment, and understaffing (**human resources**) had considerable impact on maternal outcome in Namibia. As a result, conditions such as septic shock or cardiac disease were diagnosed or managed with substantial delay (chapter 2, 6). These delays contributed considerably to maternal deaths and near-misses (chapter 2-4).

Insufficient knowledge and skills of the attending health workers is likely to be predominantly the result of lack of availability of continuous postgraduate training as well as lack of senior staff.[20,21] In high-income countries lifelong learning is ensured through mandatory and optional courses. Furthermore, freshly graduated doctors and nurses receive extensive on-the-job guidance from senior colleagues before they get the ultimate responsibility for the care of individual patients.

Personal example: during my specialty training as a medical doctor in Global Health and Tropical Medicine I performed 60 caesarean sections under close supervision of a consultant obstetrician-gynaecologist and completed a compulsory basic surgical skills course before I was allowed to do this procedure independently, which I could do only when it was anticipated to be an uncomplicated one. My Namibian colleague medical officers would do about fifteen caesarean sections under supervision of a more senior medical officer. Subsequently, they had to do most procedures independently, regardless of the anticipated difficulty of the surgery.

In Namibia, it is common that a newly graduated doctor or nurse works independently, with very limited postgraduate training or supervision by more senior peers. Also, locally adapted guidelines that could support them in providing clinical care were hardly present. Not seldom, junior staff had to take decisions or perform procedures beyond their competency level (chapter 2). In such situations, the occurrence of 'too little, too late' was a logical consequence.

To increase the knowledge and skills of health workers in Namibia, a continuous training program needs to become available. It is essential that such efforts would take the form of a 'low-dose high frequency' program: low-dose to ensure it can be combined with clinical duties without causing staff shortages for the duration of the training, and high-frequency to ensure lifelong learning, training of future staff and that it is incorporated into the clinical routine. In Ghana and Uganda it was feasible to implement such programs in busy facilities, contributing to improved maternal and perinatal outcomes.[22-24] Importantly, participating health workers appeared to prefer this training method over traditional once-off trainings. In Tanzania, the development of context-specific guidelines was combined with ongoing low-dose high-frequency training, which was associated with marked improvements in quality of care and perinatal outcome.[25,26] In Namibia, all hospitals have well-functioning equipment in place to facilitate video conferencing, which was used successfully to feedback findings of maternal death surveillance to health workers throughout the country (chapter 2). Considering the long distances between Namibian facilities, this is an

ideal set-up for a monthly or weekly national clinical meeting, which could be part of a routine continuous training program, as health workers can remain in their facility. These meetings could be used to implement new guidelines, or discuss feedback of obstetric surveillance. Through case discussion, medical officers from district hospitals can receive guidance from consultant obstetrician-gynaecologists in referral hospitals.

To further achieve better on-the-job guidance, a balanced mixed of skills needs to be present among available staff, and policy makers should focus on retaining more experienced personnel (chapter 2).[17] A system of career progression could stimulate staff retainment.[27] A mentorship program could help to facilitate coaching of junior peers by senior staff.[28,29] Such a program was implemented successfully in the obstetric department of the national referral hospital and the Ministry of Health should ensure that similar efforts are undertaken around the country.[29] Last, national guidelines based on the Namibian setting need to become available.

There was inconsistent **supply** of essential medical resources (chapter 2, 4). While magnesium sulphate should be routinely available, delays in the supply chain resulted in temporary unavailability in some facilities. A critically ill woman had to be transferred more than 100 kilometres to the nearest hospital to access treatment. Another example, in several district hospitals there was a lack of sufficient equipment to monitor vital signs, which resulted in delayed monitoring. Subsequently, for several women a severe complication, such as shock or raised blood pressure, was only noticed at a late stage. These and other findings of obstetric surveillance were used for advocacy and several steps were taken by the Ministry of Health and Social Services to resolve these issues.

In addition to the need for training and context-specific guidance, the need for higher numbers of staff (**human resources**) also remains unquestionable, as illustrated by the following story.

Story of a woman who died

A 38-year old G3P2, with two previous vaginal births, was admitted in active labour. There were signs of fetal distress when her cervix was fully dilated. She was prepared for emergency caesarean section but in theatre the head was crowning and doctor John, a medical officer, assisted vaginal birth with a vacuum pump. Directly after birth the woman lost a lot of blood and it was noted she looked very pale. Oxytocin was given to make the uterus contract. She received one unit of blood and the bleeding stopped. After a few hours she was doing better, and was breastfeeding her baby. There was no record of ongoing vaginal bleeding, and she was moved to the postnatal ward at 18:30 hours. Her vital parameters were obtained and her blood pressure was 60/43 mmHg. The blood pressure was repeated with another machine since the machine was thought to be malfunctioning. The second recording was documented as 118/63 mmHg. Both the labour ward and postnatal ward were busy that afternoon. Nurse-midwife Mary, recently graduated, was the only member of staff on duty in the high-risk postnatal ward caring for up to 24 postpartum women. During her 12-hour shift Mary had to provide medication and intravenous fluids to all women at least twice. Moreover, she was supposed to check their general condition at least three times during her shift, assess whether or not they were bleeding, and obtain their parameters. Doctor John, who had started as a medical officer four months earlier, was busy in theatre. Due to the staff shortage, the woman was monitored infrequently on the high-risk postnatal ward. She suddenly died at 20:30. Autopsy revealed a ruptured uterus with retroperitoneal bleeding, as well as signs of severe hypovolaemic shock.

As this story shows, it is unrealistic to expect good care being consistently provided by health workers working in severely understaffed and overburdened facilities. Currently, most Namibian health workers encounter one or more similar situations in the beginning of their careers. Not surprisingly, the consequences of understaffing may negatively impact their mental wellbeing and contribute to the high turnover of staff. Many health workers opt for other settings with better working conditions, such as private health facilities or other departments with fewer emergencies and the devastations pertaining to young patients in critical conditions.[30] The consequences of pregnancy-related calamities on staff wellbeing were seen in two recent studies among doctors and nurses working in the obstetric department in Windhoek, which showed that more than half of participating doctors frequently experienced physical and mental exhaustion and among nurse-midwives high levels of stress and anxiety were seen.[29,31] Both studies developed support structures to improve the mental

wellbeing of health workers, which should be implemented nationally to benefit all health workers involved in maternity care.

While health workers in low- and middle-income countries are used to working in a situation of critical staff shortages, many health workers in high-income settings had their first experience with working in an overburdened facility during the COVID-pandemic. Some hospitals were extremely overwhelmed, whereby elective care had to be postponed and the availability of ventilatory support could not be guaranteed.[32] Worldwide, there were several initiatives to thank and support health workers. Youtube exploded with movies of people clapping their hands for health workers.[33] Banners with supportive notes were placed on hospital walls and free food and gifts were handed out.[34,35]

Personal reflection: I found myself wondering: where was the global applause for health workers before, particularly for those working in facilities in low- and middle income countries who are permanently overburdened, day in day out, without any prospect of improvement within the near future? As described in chapter 2, even the opposite was happening in Namibia: individual health workers sometimes received the blame when a woman died, rather than the failing health system.

Also in Namibia health workers, involved in care of COVID-patients, were overwhelmed with thank-you notes from patients, hospital management and policy makers.[36,37] Although a positive development, it should be ensured that not only during a disease outbreak, but routinely, health workers receive such recognition. A culture change is needed in the maternity care system, exchanging blame culture for continuous support and recognition (chapter 2).[29,31,38] Such recognition and support may not change the day-to-day working conditions, but will have a positive impact on the work experience, as described in chapter 4. Both recognition and support for mental wellbeing can have a positive effect on staff shortages by preventing burn-out and reducing high turnover rates.[29,30] Moreover, health workers who received recognition from their seniors are more likely to deliver respectful maternity care.[38]

Needs for Namibia to improve maternal health

Improving maternal health in Namibia is not an easy task, given the complexity and diversity of the underlying problems. To achieve significant impact and reduce adverse health outcomes, all elements of both support systems need to function. For example, a well-trained health worker will still not be able to provide good care when

she does not have the appropriate resources or when she works in an understaffed facility. Proposed interventions to improve the maternity care system, based on findings of this thesis, are summarized in Figure 2.

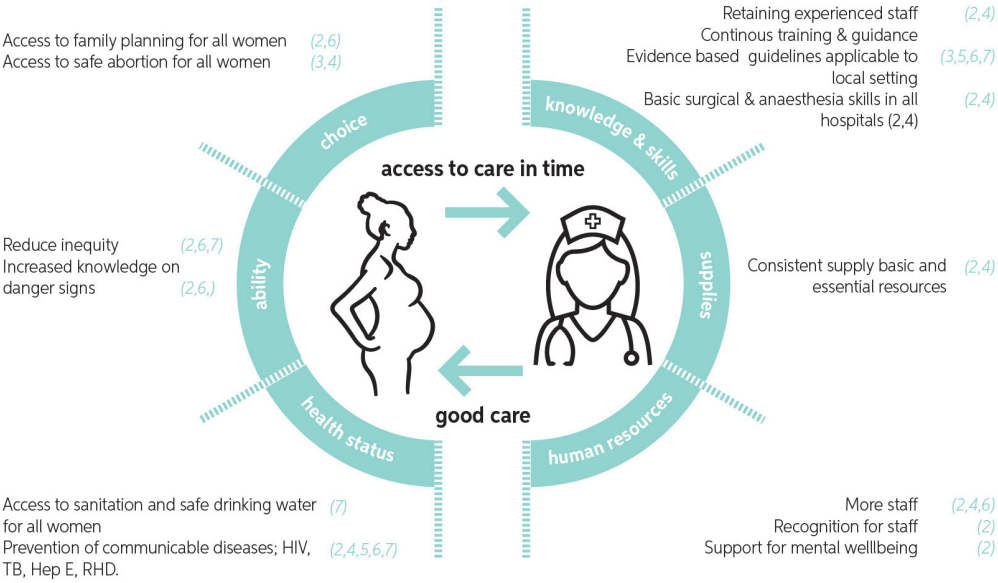

Figure 2. Framework mapping the requirements to improve maternal health in Namibia
Numbers in brackets refer to the chapters of this thesis.
HIV, human immunodeficiency virus; TB, tuberculosis; Hep E, hepatitis E; RHD, rheumatic heart disease.

The added value of obstetric surveillance

In this thesis obstetric surveillance including maternal near-miss was used to assess the maternity care system, instead of maternal death surveillance only. This approach had several advantages. For example, through collection of morbidity data, staff could take more pride in their jobs by acknowledging the number of women they had saved, rather than only reporting numbers of those lost (chapter 3, 4). Furthermore, obstetric surveillance provided insight into local drivers of severe maternal outcome, making it possible to propose context-specific interventions as presented in Figure 2. These insights will contribute to successful implementation, as for any intervention, it is key it addresses a local need in a context-specific manner.[27]

Local needs

In addition to national surveillance of maternal death and near-miss, obstetric surveillance included two facility-based studies into specific potentially life threatening conditions. These two studies provided insight into the outcomes of pregnant women with cardiac disease and those with acute hepatitis E. Women with a delayed diagnosis of cardiac disease appeared to be at higher risk of cardiac complications, while HIV-infected women receiving antiretroviral therapy appeared to be less likely to develop acute liver failure due to hepatitis E (chapter 6,7). National maternal near-miss surveillance provided better insight into the challenges of smaller health facilities, such as lack of access to surgery and essential resources (chapter 3,4).

With near-miss surveillance it was possible to better map the burden of severe maternal complications in Namibia. Maternal deaths are only the tip of the iceberg, while underneath there is a much larger burden of maternal morbidity.[16] When the near-miss approach was introduced by the World Health Organization, it was stated that maternal near-misses and deaths have similar underlying causes and characteristics.[39] However, we remarkably identified in the Namibian setting that the underlying causes differed between maternal deaths and near-misses. Near-misses were mainly caused by direct obstetric complications, while this was the case in only half of the maternal deaths, the other half of which were caused by medical conditions (chapter 2,4).

A similar pattern was seen in high-income countries, such as Scotland and the Nordic countries, and middle-income countries such as Brazil, South Africa, China and Suriname.[40-46] In Ethiopia and Nigeria, countries with high MMRs estimated at 401 and 917 per 100 000 live births respectively, obstetric complications were the main underlying cause of both maternal near-misses and deaths.[47,48] This is in line with the obstetric transition: as obstetric care improves, deaths from obstetric complications are increasingly avoided. As a result, the proportion of maternal deaths caused by medical conditions increases. Even though deaths due to obstetric complications are avoided, these are still the most common causes of maternal near-miss, even in high-income settings. This is important, as maternal near-miss occur far more frequently than maternal deaths. Therefore, the largest burden of severe maternal outcome will still be caused by obstetric complications. As most low- and middle-income countries only have some sort of maternal death review system in place, maternal near-miss goes unreported. When progress is achieved and maternal deaths due to obstetric complications are reduced, focus may incorrectly shift towards non-obstetric causes.

Context-specific

An intervention shown to be effective in a given setting to improve maternal outcome may not work elsewhere. Three examples are found in this thesis. First, rather than simply implementing a national confidential enquiry into maternal deaths in Namibia, for it to be successful, fear of being blamed among health workers had to be addressed first (chapter 2). Second, for maternal near-miss surveillance, the World Health Organization recommends a set identification criteria, that were postulated to be implementable across all settings, but chapter 3 showed that adaptations of these criteria to the local context were essential to avoid underreporting. Lastly, guidelines for the management of pregnancies of women with cardiac disease were only available from high-income settings (chapter 5).[10] Implementation of these guidelines were a challenge in the Namibian setting due to differences in (severity of) the underlying cardiac disease and in availability of resources and staff (chapter 6).

Globally, the adaptation of interventions to the local context is hampered by limited availability of data from lower-income settings and vulnerable populations such as poor and/or pregnant women. There are many examples of interventions that appeared less effective in these understudied populations. For example, in the past two decades it became clear that outcome of hypertension-related complications was worse among African Americans when applying standard management guidelines.[49] These guidelines, based on studies performed primarily in white men, were only assessed in this part of the population after being implemented in routine practice. Even today, the effectiveness of many interventions remains unclear for pregnant women, as they are commonly excluded from clinical trials out of fear of potential side effects on the fetus.[50] For instance, pregnant women were excluded from most COVID-19, Ebola and hepatitis E vaccine trials, despite being at higher risk of complications.[51-53] Fear of side effects on the fetus was one of the major reasons a hepatitis E vaccine trial was not initiated in Namibia, which could have resulted in a decline in maternal and perinatal mortality (chapter 7).[54] The exclusion of pregnant women from most COVID-19 vaccine trials resulted in low vaccination uptake as, unsurprisingly, pregnant women tended to perceive the vaccine as being unsafe.[55,56] The low vaccination rate impacted negatively on maternal outcome.[57]

The implementation of interventions in low- and middle-income countries, whereby only efficacy data from high-income settings is available, may have negative consequences for health outcomes in these lower income settings. An illustrative example is the provision of corticosteroids to pregnant women at risk of premature birth to reduce neonatal mortality. Only recently its effectiveness was assessed in two large randomized trials performed in several low- and middle-income countries.[58,59] The effects on neonatal outcome were inconsistent in these settings, but especially in

rural settings corticosteroids seemed to be associated with worse outcomes among women and babies, due to the increased risks of infection.[60] Another example is the available guidance for routine intrapartum monitoring.[61] Although recommended to be implemented globally, intensive monitoring appeared to be unrealistic when assessed within the day-to-day reality of an understaffed referral hospital in Tanzania.[62] Worrisome is the impact of the Term Breech Trial, published in 2000, which resulted in increased rates of caesarean section for women presenting with a baby in breech presentation around the world.[63] In the trial, birth by caesarean section was associated with a reduction in perinatal mortality. Even though the study population included women from several middle-income countries and one low-income country, this finding may not be applicable to such settings in general, since participating facilities were generally the more advanced within these countries. Of concern are the high maternal and perinatal complication rates of caesarean sections in low- and middle-income countries.[64] Moreover, the Term Breech Trial did not assess the increased risks of mortality for woman and baby in subsequent pregnancies in presence of a scarred uterus. This is especially important for countries like Namibia, where timely access to caesarean section is not guaranteed for all women (chapter 4).

It is clear that locally performed research is urgently needed, representing both the local setting and local populations in settings like Namibia. Only then it will be possible to establish evidence-based guidance, applicable to the local context, which may lead to improved maternity care.

Conclusion

This thesis showed a high incidence of maternal mortality and morbidity in Namibia. A large contributor was poor quality of facility-based care and particularly vulnerable women appeared to be at higher risk of severe maternal outcome. Or, as phrased in a Dutch proverb, the risk of poor maternal outcome mostly depended on 'the location of the crib of the woman herself' at the time she was born. Equal and better maternal health outcomes for all Namibian women can be achieved by focusing on more support for these vulnerable women. Access to family planning needs to be improved, to ensure that women get pregnant when they choose to be **(choice)**. Their **ability** to access care in time must be improved. Thirdly, to reduce the risks of complications, women's general **health status** needs to improve, for example, through better prevention and management of HIV, tuberculosis, RHD and hepatitis E. Besides more support for women, to achieve a significant positive impact on maternal outcome, it is crucial to simultaneously address the poor quality of facility-based care. Health workers will be able to improve the quality of the care they provide, when they

are adequately supported themselves. Therefore, guidance and continuous post-graduate training programs are needed, to increase their knowledge and skills. Also, there is a need of a consistent supply of essential resources (supplies). At last, more staff is needed and experienced staff needs to be retained (human resources), by improved recognition of staff and support for their mental wellbeing.

To improve maternal health, obstetric surveillance holds promise as a useful tool for a country like Namibia, by enabling identification of key drivers of severe maternal outcome as well as local opportunities to address these. Nevertheless, obstetric surveillance is not the silver bullet to improve maternal health. It all depends on that crucial next step, namely acting on recommendations coming out of surveillance. With the insights obtained, targeted, context-specific interventions can be implemented. If we follow track, it will be possible for Namibia to progress towards maternal health for all.

Future perspectives

Although it should be the next step, acting on the recommendations from surveillance, often referred to as 'the response', was difficult to achieve in many countries.[65,66] The failure to respond, commonly referred to as the 'knowledge-act' gap, can be addressed by strong leadership and supportive systems.[27,65,66]

For Namibia, to overcome the 'knowledge-act' gap, first and foremost strong leadership is needed to ensure all relevant stakeholders collaborate and recommended interventions are implemented. Unfortunately, there is currently no national association uniting obstetricians, which could contribute to such leadership. There is a small Independent Midwife Association of Namibia, uniting the midwives, who are trained abroad. The obstetric surveillance system was implemented by a national committee, appointed by the Ministry of Health and Social Services. Either the midwifery association or the national committee should take leadership and set up a team tasked with the response. All stakeholders should be represented within this team. Inclusion of women representatives will be crucial for successful implementation of recommendations related to choice, ability and women's health status, as depicted in the framework. This team should work in close collaboration with the Ministry of Health and Social Services of Namibia, ensuring integration of interventions into routine services. To ensure the executing team can implement an effective response, members must be made available fulltime or parttime and receive an appropriate salary.

As previously described, to achieve significant impact several interventions will need to be implemented simultaneously. Therefore, adequate human resources, both in numbers and skills, are needed to create local capacity for a sustainable response. In the past two decades, the Namibian government successfully managed to increase the number of locally trained doctors and nurses.[67,68] This motivated young generation of health workers will need to be guided and trained by local experts. If local expertise is not available, assistance of international experts, who implemented similar interventions elsewhere, could be invited to fulfil this task. Guided by the executing team, the following interventions should be implemented:

- Improved access for teenagers to reliable contraception, including long-acting reversible contraceptives, through a school-based approach.
- The provision of reliable contraception to women with high-risk pre-existing medical conditions such as tuberculosis or HIV, through an integrated approach.
- Implementation of (preconception) counselling, to increase knowledge on danger signs, especially for high-risk women.
- Enhanced provision of isoniazid preventive therapy to prevent tuberculosis co-infection among HIV-positive women.
- Improved detection of mild cardiac disease among women of reproductive age by increasing knowledge and skills of health workers to pick up cardiac symptoms.
- Development of a continuous postgraduate training program for all health workers working in the maternity care system. This should be developed in close collaboration with the Health Professions Councils of Namibia, the institute responsible for the registration of health workers as well as the monitoring of their development and education.
- Nationwide implementation of a mentorship program, to ensure senior colleagues provide guidance to junior staff.[36]
- Development of context-specific guidelines, implemented through a 'low-dose high-frequency' program including regular meetings through video conferencing.
- Availability of basic surgery in all hospitals, through increased training of medical officers in basic surgical and anaesthesia skills, as well as the provision of all the required equipment and medication for functioning operating theatres in all hospitals.
- Employment of more staff, to ensure all facilities have a more appropriate number of doctors and nurse-midwives, based on the current workload.[69]
- More recognition of health workers by hospital management and policy makers.
- Support for mental wellbeing of health workers through the nationwide implementation of two available Namibian programs.[29,31]

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