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Maternal health in Namibia: Lessons learned from obstetric surveillance

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Part I.

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Maternal death and near-miss surveillance

Chapter 2.

Confidential enquiry into maternal deaths in Namibia, 2018-2019: findings and lessons learned from implementation

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Submitted

Abstract

Objective

Successful implementation of a national maternal death review was hampered by several challenges, including fear of blame among healthcare providers. First objective was to improve implementation by focussing on gaining trust of healthcare providers. Second objective was to describe findings of the review.

Methods

Confidential Enquiry into Maternal Deaths methodology was used to review maternal deaths. Reported maternal deaths, that occurred between 1 April 2018 and 31st of March 2019 in Namibia, were included. To improve implementation there was a focus on addressing fear of blame, dissemination of findings, and acting on recommendations.

Results

Seventy maternal deaths were reported; for 69 (98.6%) medical records were available, compared to 80/119 (67.2%) in 2012-2015. Reported maternal mortality ratio was 92/100 000 live births compared to 62/100 000 in 2012-2015 (OR 1.5, 95% CI 1.1-2.0). Obstetric haemorrhage and hepatitis E were leading causes of death. The “no name, no blame” policy, aiming to identify health system failures, rather than mistakes of individuals, was repeatedly explained to healthcare providers during facility visits. Recommendations based on findings of the review, such as retaining experienced staff, continuous in-service training and guidance, were shared with decision makers at regional and national levels. Healthcare providers received training based on lessons learned, which resulted in improved management of similar cases.

Conclusion

Nationwide implementation of Confidential Enquiry into Maternal Deaths was possible in a middle-income country. Focussing on obtaining trust of healthcare providers and feeding back findings, resulted in better reporting and prevention of potential maternal deaths.

Introduction

Namibia, an upper-middle income country in sub-Saharan Africa, has a high maternal mortality ratio (MMR) of an estimated 385/100,000 live births in 2013.¹ The Namibian government has been committed to reducing this MMR and reaching the target of 70/100,000 livebirths in 2030, as set by the sustainable development goals (SDG3).² Namibia is one of the least densely populated countries in the world with 2.8 people per square kilometre.³ Key indicators suggest high access to maternity care, with 96.6% of women having at least one antenatal visit and 87.4% giving birth in a health facility in 2013.¹ However, these figures do not indicate whether women reached the facility in time, nor do they provide information about quality of care.

To analyse and improve the quality of care, a national maternal death review committee has analysed all maternal deaths since 2010, using the Confidential Enquiry into Maternal Deaths (CEMD) methodology.^{4,5} There have been several challenges with successful implementation. With the confidential enquiry of 2012-2015 members of the national committee were informed by their clinical colleagues that they feared being blamed for the woman's death. This contributed to deaths not being reported and medical notes not being submitted for the review. This fear was exacerbated by media reports, accusing healthcare providers of bad attitudes, providing poor quality care or even holding them responsible for the death of a woman or baby.⁶⁻⁹

Around the world, healthcare providers are frequently blamed by leaders or decision makers when a woman dies.¹⁰⁻¹² When a healthcare provider does make a mistake, the challenging working conditions and failures of the health system are often not taken into consideration, nor addressed in order to prevent similar incidents in the future.^{11,13} The unsupportive environment can result in lack of trust by healthcare providers, leading to a counterproductive effect on the performance of confidential enquires.¹⁰⁻¹⁴

During the review period of 1st of April 2018 up to the 31st of March 2019 the national committee focused on increasing trust of healthcare providers to improve the implementation of CEMD in Namibia. Here are described findings of the review, underlying causes of maternal death and lessons learned, as well as the process of gaining the trust of healthcare providers in Namibia.

Methods

The division of Quality Assurance of the Ministry of Health and Social Services (MoHSS) was responsible for the CEMD process.¹⁵ Committee members did not receive any remuneration as improving quality of care is seen as one of the responsibilities of all staff. Members were appointed by the MoHSS.

It is a legal requirement to notify every maternal death to MoHSS.¹⁵ Relatives of deceased women in Namibia reported home deaths either to a health facility or police station. For each home death, community health workers performed a verbal autopsy. The findings of this autopsy, and if available, medical records and the woman's health passport were reviewed at the nearest health facility.

Facility deaths were initially reviewed at facility level by the midwifery and medical staff working in obstetrics to identify and address lessons learned without delay. From facility level, matrons reported to the regional CEMD committee, which consisted of the regional medical director, an obstetrician when available or otherwise at least one experienced medical officer, and one or more nurse-midwives. At regional level, all documents were anonymized by administrative staff. All deaths were reviewed, and a summary report was written for each mortality meeting describing causes of death, identified lessons learned and proposed interventions. These reports were sent to national level, including copies of all medical records.

At national level, all deaths were reviewed by an expert committee. For this review, the national committee consisted of four obstetricians working in both the national referral hospital, the medical school and/or a private hospital, a medical doctor working in an Obstetrics and Gynaecology department in a public hospital, senior nurses and midwives from both public and private facilities, representatives of the Independent Midwives Association of Namibia and senior lecturers of all nursing-midwifery training institutions. A quorate meeting was when at least two medical doctors of which one was an obstetrician and at least two nurse/midwives were present.

A single underlying cause of death was identified by the national committee, defined as the cause which initiated the chain of events leading to death. Direct and indirect causes were defined according to the ICD-MM definitions.¹⁶ Factors related to quality of care were categorized into either patient, administrative (e.g. lack of equipment, medical supplies, transport or supervision) or healthcare provider related. In conclusion, the received care by the woman was assessed as either 'good care', 'improvements to care would not have prevented the death', or 'improvements to care which may have prevented the death'.

To increase trust of healthcare providers in the review process the committee focussed on; addressing fear of being blamed, dissemination of findings at all levels and acting on the recommendations forthcoming from the enquiry. Whenever a committee member visited a facility, e.g. for data collection, provision of feedback or other quality improvement projects, the anonymous and confidential aspect of the review was explained. The staffing, working conditions, hospital facilities and equipment were noted. The importance of MD reporting and the CEMD as a tool to address these issues was emphasized.

Findings and recommendations were shared with all relevant stakeholders to improve implementation of the recommendations and the committee acted upon several recommendations themselves. All recommendations were shared with decision makers at Ministry level in a meeting with all relevant divisions present. Management staff and healthcare providers were visited in all 14 regions to discuss that regions' specific cases as well as to feedback important lessons learned at national level, and to follow up on implementation of previous recommendations. For healthcare providers, feedback was provided through a video conference and a two-day conference, which was attended by over 200 doctors and nurses, representing nearly all hospitals. Lastly, instantaneous feedback was provided throughout the review, meaning that if a review at national level identified findings of educational value, these findings were shared in a blame-free manner with healthcare providers at the facility where the death had occurred. Representatives of the medical and nursing/midwifery training institutions were part of the national committee. These members were tasked with the incorporation of adequate training in the identification and management of the commonest conditions contributing to maternal deaths into the respective nursing and medical curricula to prepare future staff appropriately. Lastly, the most recent CEMD guidelines included a paragraph stating that the findings of CEMD could not be used for any medico-legal or disciplinary procedure and, if needed, MoHSS would provide legal support to ensure this.¹⁵

For each maternal death, data were extracted from medical records using a structured data collection tool, including socio-demographic characteristics, general and obstetric history, antenatal care history, laboratory and bacteriological results, pathology and autopsy reports.¹⁵ Data were entered electronically, using Excel and Epidata v4.6.

Background data for number of live births (LB), maternal age, mode of birth, and HIV status were collected through the National Health Information Systems of Namibia. Findings were compared with the review of 2008-2012, of which the report was published, and the review of 2012-2015.⁵ Possible associated factors for maternal

deaths were compared to the general pregnant population of Namibia and odds ratio (OR) and 95% confidence interval (CI) calculated. There were no national background data available to perform these calculations for potential risk factors such as parity, ANC attendance, or previous birth by caesarean section. Data analysis was performed with SPSS version 22 (IBM, Armonk, NY, USA).

Results

There were 76498 live births and 70 maternal deaths reported between 1 April 2018 and 31st of March 2019 giving an MMR of 92/100000 live births (LB). This is a statistically significant rise compared with the MMR of 62/100 000 LB in 2012-2015 (OR 1.5, 95% CI 1.1-2.0). There was no MMR available for the review of 2008-2012.⁵ For 69/70 (98.6%) deaths medical records and reporting forms, filled in at facility level, were available and reviewed by the national committee, compared to 80/119 (67.2%) reviewed MD in the previous review. The current review included eight MD which occurred at home, compared to none in the previous reports.

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Table 1 presents baseline characteristics of the reviewed deaths and Table 2 causes of maternal deaths. Most maternal deaths were from direct causes, 35/70 (50%), compared to 28/70 (40%) deaths from indirect causes. Obstetric haemorrhage and hepatitis E were the leading causes of death (both 11/70, 15.7%), followed by hypertensive disorders (9/70, 12.9%). There were no maternal deaths due to hepatitis E in previous reviews.

Table 1. Characteristics of all maternal deaths		
Characteristics	(N = 70)	%
Age		
< 20	5	7.1%
20-34	48	68.6%
≥ 35	16	22.9%
Unknown	1	1.4%
Parity		
Para 0	10	14.3%
Para 1-3	42	60.0%
≥ 4	13	18.6%
Unknown	5	7.1%
ANC attendance		
Yes	49	70.0%
No ANC	12	17.1%
Not applicable, pregnancy < 20 weeks	4	5.7%
Unknown	5	7.1%
Previous birth by caesarean section		
Yes	10	14.3%
No	58	82.9%
Unknown	2	2.9%
HIV status		
Positive	22	31.4%
Negative	38	54.3%
Unknown	10	14.3%
Mode of birth ^a		
Normal vaginal birth	31	62.0%
Instrumental birth	1	2.0%
Caesarean section	17	34.0%
Laparotomy uterine rupture	1	2.0%
Facility for birth		
Home	8	11.4%
Health centre	2	2.9%
Hospital	45	64.3%
Unknown	2	2.9%
Pregnant at time of death	13	18.6%
ANC, antenatal care.		

^a Percentages given for 50 MD as 7 women had a miscarriage 13 women died antepartum.

Table 2. Causes of maternal deaths		
Causes of maternal death	(N = 70)	%
Direct deaths	35	50.0%
Obstetric haemorrhage	11	15.7%
Uterine atony	5	7.1%
Retained placenta	2	2.9%
Uterine rupture with previous scar	1	1.4%
Uterine rupture without previous scar	1	1.4%
Placental abruption with hypertension	1	1.4%
Abruptio without hypertension	1	1.4%
Hypertensive disorder	9	12.9%
Eclampsia	3	4.3%
Stroke	3	4.3%
HELLP	1	1.4%
Pre-eclampsia	1	1.4%
Pulmonary oedema	1	1.4%
Pregnancy with abortive outcome	6	8.6%
Septic miscarriage	4	5.7%
Ectopic pregnancy	1	1.4%
Abortion related haemorrhage	1	1.4%
Pregnancy related infection	5	7.1%
Puerperal sepsis after NVB	2	2.9%
Puerperal sepsis after caesarean section	2	2.9%
Puerperal sepsis due to bladder injury with caesarean section	1	1.4%
Other obstetric complications	2	2.9%
Pulmonary embolism	2	2.9%
Anaesthetic death	2	2.9%
Indirect deaths	28	40.0%
Hepatitis E	11	15.7%
Tuberculosis	7	10.0%
Cardiac disease	7	10.0%
Other infection	2	2.9%
Pneumonia	1	1.4%
Multi-organ failure, unclear cause	1	1.4%
Gastro-intestinal tract	1	1.4%
Unknown cause of death	7	10.0%
Lack of information	6	8.6%
Died at home	1	1.4%

HELLP, haemolysis elevated liver enzymes and low platelets; NVB, normal vaginal birth.

Table 3. Avoidable factors classified according to patient, health system and healthcare provider related and conclusion national committee		
Patient related factors	(N = 69)	%
No antenatal care	16	23.2%
Infrequent antenatal care	5	7.2%
Delay in woman seeking care	20	29.0%
Refusal of treatment or admission	8	11.6%
Unsafe abortion	4	5.8%
Health system related factors	(N = 69)	%
Lack of transport from home to health care facility	2	2.9%
Lack of transport between health care facilities	9	13.0%
Lack of accessibility	3	4.3%
Delay initiating critical care (overburdened facility)	37	53.6%
Communication breakdown between healthcare providers	13	18.8%
Lack of facilities, equipment or consumables	22	31.9%
Lack of human resources (doctors/nurses)	29	42.0%
Lack of expertise, training or education	43	62.3%
Lack of specialist	8	11.6%
Healthcare provider related factor	(N = 69)	%
Problem with recognition/diagnosis	40	58.0%
Delay in referring patient	38	55.1%
Managed at inappropriate level	34	49.3%
Incorrect management (incorrect diagnosis)	30	43.5%
Sub-standard management (correct diagnosis)	33	47.8%
Not monitored / infrequently monitored	30	43.5%
Prolonged abnormal monitoring with no action taken	33	47.8%
Conclusion substandard care	(N = 70)	%
Yes, it was a preventable death, improvements to care may have made a difference to outcome	40	57.1%
Substandard care, but improvements to care would have made no difference to outcome	17	24.3%
No, good care	10	14.3%
Unknown, lack of information	3	4.3%

For 69/70 maternal deaths, the file was available for assessment of avoidable factors by the national committee.

Most avoidable factors were related to healthcare providers and administrative factors, Table 3. The commonest avoidable factors were 'lack of expertise, training or education' (62.3%), 'problems with recognition and/or diagnosis' (58.0%), 'delay in referring the patient' (55.1%) and 'delay in initiating critical care due to overburdened facility' (53.6%). For example, for several maternal deaths, the healthcare providers did not recognize the woman had signs of hypovolemic or septic shock. Some critically ill women could not be admitted to an intensive care unit because no intensive care beds were available. For 22 cases, it was noted that there was lack of access to basic but essential services such as emergency blood or magnesium sulphate. There were patient related factors in some cases, of which delay in seeking care was most common (20/69, 29.0%). There were eight women who defaulted their tuberculosis or antiretroviral treatment for HIV. The committee concluded that in 40 (57.1%) of cases, maternal death may have been prevented if improved care had been provided, Table 3. For three deaths the committee could not determine whether the death could have been prevented: for two deaths the medical records were incomplete and for one death no records were available.

Possible associated factors for maternal death are presented in Table 4. Home birth (OR 7.48, 95% CI 3.18-17.58), birth by caesarean section (OR 3.17, 95% CI 1.76-5.68), and being HIV positive (OR 2.56 95% CI 1.55-4.24) were associated with maternal death, whereas age <20 years appeared to be protective against maternal death (OR 0.34, 95% CI 0.14-0.85). There were 22 HIV-positive women, of whom seven died of an AIDS-defining illness; five due to tuberculosis, two had stage 4 HIV-related illness and died of a lower respiratory tract infection and complications of a septic miscarriage respectively. Five women defaulted antiretroviral treatment. None of the HIV-positive women were given isoniazid preventive therapy as recommended in the Namibian HIV guidelines.¹⁷

Risk factor	MD (N=70)	Namibia (N = 76 428)	OR (95% CI)
Age <20 years	7,1%	18,4%	0.34 (0.14-0.85)
Age ≥ 35 years	22,9%	15,1%	1.67 (0.95-2.91)
Home birth	12,0%	1,8%	7.48 (3.18-17.58)
Instrumental birth	2,0%	0,4%	5.57 (0.77-40.50)
Birth by caesarean section	34,0%	14,0%	3.17 (1.76-5.68)
HIV-positive	31,4%	15,2%	2.56 (1.55-4.24)

MD, maternal death; OR, odds ratio; CI, confidence interval.

On several occasions instantaneous feedback was provided. For example, after review of a maternal death related to failed intubation, in-service anaesthetic refresher training was provided. A similar event occurred one week later in the same facility and both the woman and her baby were saved. On another occasion, training was provided to a facility where poor management of hypertension was observed. The following month a similar case was observed to be appropriately managed.

During a writing meeting, key findings and recommendations for the annual report were identified. Most of the key findings and recommendations were similar to those of previous reviews, and mainly related to healthcare providers and administrative factors. After the previous review, one of the most important interventions had been to provide Emergency Obstetric Care training to several doctors and nurses in each hospital, including an instructor course to facilitate continuous training of local colleagues. The continued provision of training locally was compromised by rotation of trained staff to other departments.

During facility visits it also appeared that several deaths were not reported to national level. Cases were expected to be reported after completion of the complete review cycle, and reporting documents had to include notes of an audit meeting and an autopsy report. Due to a variety of reasons, such as high workload of staff or missing documents, the review cycle was not always completed and, subsequently, the death not reported. To improve reporting the national committee amended the reporting system.¹⁵ A brief rapid notification form was introduced, whereby the attending healthcare provider, involved in the care for a woman who died, was expected to report the death within 24 hours to national level, even if very scarce details pertaining to the death were available at that time.

During the meeting with decision makers at Ministry level, several issues, such as lack of experienced staff, continuous in-service training and guidance and the availability of essential medication and equipment were discussed. The MoHSS human resources department took immediate steps to retain experienced staff in obstetric departments.

Discussion

The national committee aimed to further improve implementation of the CEMD in Namibia, by increasing trust of healthcare providers in the review process, which appears to have resulted in improved reporting and availability of nearly all medical records. Obstetric haemorrhage and hepatitis E were the leading causes of death and most avoidable factors were related to the healthcare providers and administrative factors.

The national CEMD committee of Namibia used several interventions that are not part of standard CEMD methods applied elsewhere.⁴ For instance, instead of waiting for the annual report, the national committee addressed important issues immediately after review of a maternal death. Using such timely feedback to facilities, potential deaths were avoided in the short term.

Secondly, during the review period members of the national committee visited nearly all hospitals at least once to enhance implementation of the CEMD. Also, these visits provided useful information for the establishment of key findings and recommendations, in addition to review of medical records only. Common challenges such as shortages of staff or equipment were often not mentioned in a woman's file as staff consider this the normal situation at the facility. For example, in one district hospital there happened to be only one blood pressure machine, which had to be shared between several wards. In this hospital there was a maternal death, with lack of blood pressure monitoring being a contributing factor.

Furthermore, due to these visits and the personal contact, committee members became more approachable to staff of the facilities. Availability of supervision and guidance by experienced doctors and nurse-midwives was previously limited in most health centers and smaller district hospitals. During improved CEMD implementation, committee members were contacted more frequently for clinical advice, which resulted in more timely referrals of critically ill women, which directly improved quality of care for individual women.

Lastly, in order to increase emphasis on the achievements of healthcare providers, the national committee also implemented 'Maternal Near-Miss' surveillance; a nationwide registry collecting quantitative data regarding such severe maternal morbidity, since this provided acknowledgement to the number of women that had been saved, rather than putting emphasis on maternal deaths only.¹⁸

Several challenges remained. All data pertaining to maternal deaths had to be entered manually in an electronic database at national level. This was done by

administrative staff, who were supported by several committee members. Such a system is difficult to sustain. Possibilities for electronic data collection at facility or regional level are currently being explored.

The committee has not yet addressed the media and their negative reporting on healthcare providers. During the meeting at ministry level, it was attempted to increase recognition of achievements of healthcare providers by politicians and high government officials. Recognition by supervisors and higher-level officials is important for several reasons. It has a positive effect on the performance of CEMD and the provided quality of care.^{11,13} Furthermore, a study performed in Namibia indicated that lack of recognition was associated with the provision of disrespectful maternity care.¹⁹

Currently, due to severe staff shortages, junior staff are forced to make decisions and perform procedures above their level of competency and senior staff are unable to provide enough supportive supervision. In several cases this affected the quality of provided care, which may have contributed to the death of the woman. These experiences may be demotivating, may cause psychological distress or even make healthcare providers leave their jobs.²⁰⁻²² One of the key recommendations was therefore employment of more staff and retaining experienced staff. The MoHSS has an active programme of training Namibian specialists and it is anticipated that the number of Specialist obstetricians employed in public hospitals will increase over the next few years.

A reliable MMR is crucial for monitoring progress over time. However, the identified MMR in the current review is still far lower than estimated by the demographic health survey or WHO, suggesting underreporting is still present.^{1,23} Half of the reported home deaths occurred within the same region whereas other regions with rural communities reported no home deaths. A survey performed in the five southern regions identified an underreporting of more than 70 percent through national reporting in 2010-2012.⁹ The identified rise in the current review may suggest better reporting. However, there may have been an actual rise due to the nationwide hepatitis E outbreak since December 2017. Hepatitis E during pregnancy has an estimated case fatality rate of 20% and it was one of the leading causes of death in the current review.^{24,25} Large discrepancies between MMRs based on national reporting and vital statistics, as identified in Namibia, were also found in other low and- middle-income countries such as South Africa, Ethiopia and Malawi.^{12,26,27} Enhanced implementation of CEMD will enable Namibia to produce a more accurate MMR, as in the United Kingdom, France and the Netherlands, countries with a low MMR and well-functioning surveillance system, CEMD is the most accurate method for maternal mortality surveillance in comparison to vital statistics.²⁸

Namibia has a high teenage pregnancy rate of 18.0%. Surprisingly, we found that teenagers are less likely to have a maternal death compared to all other ages. Possibly, the risk for poor outcome of teenagers differs per complication. Due to our small numbers we cannot analyse this finding in further detail. The CEMD in South Africa showed that teenagers are at higher risk of death from anaesthetic complications, hypertension and pregnancy-related infections but less likely from other causes.²⁹

The high proportion of preventable deaths, challenges with reporting and failed implementation of recommendations from previous reviews were discouraging findings. But looking at other countries, these experiences are not unique. South Africa, which started with CEMD in 1998, had similar recommendations until 2007 and only started to see a reduction in maternal deaths from 2011.²⁷ In 2014, 57% of the reviewed deaths in South Africa were classified as preventable.³⁰ But also countries with a low MMR, such as the United Kingdom or the Netherlands identified substandard care in more than half of their reviewed deaths.^{31,32}

Conclusion

This Namibian CEMD review of 2018-2019 indicates that 'in-facility' delays contribute most to substandard care in Namibia. Within the five-step 'obstetric transition' as described by the World Health Organization, Namibia is now in stage III, where women are reaching the health facility, and improving quality of maternity care becomes the critical step to achieve a reduction of maternal mortality.³³ CEMD is designed to assess and improve quality of care, but successful implementation is key. In Namibia several challenges with implementation were overcome by focussing on gaining trust of healthcare providers and the provision of guidance and support. However, MD reporting needs to improve, as only with a reliable MMR can the impact of interventions be monitored. We recommend other countries performing CEMD to implement instantaneous feedback before the end of the review period to avoid preventable deaths as soon as possible.

References

1. Ministry of Health and Social Services. Demographic and Health Survey Namibia 2013. Ministry of Health and Social Services: Windhoek, 2014.
2. Geingob H. Harambee Prosperity Plan; 2016. (Available from: http://www.nied.edu.na/assets/documents/08Governments/13HPP_page_70-71.pdf) [19-01-2020]
3. Namibia Statistics Agency. Namibia Inter-censal Demographic Survey 2016. Namibia Statistics Agency: Windhoek, 2017.
4. World Health Organization. Beyond the Numbers. Reviewing maternal deaths and complications to make pregnancy safer. World Health Organization: Geneva, 2004.
5. Lihongeni M, Indongo N. Causes and risk factors of maternal deaths in Namibia. University of Namibia: Journal for Studies in Humanities and Social Sciences. 2012;3(3):239-252.
6. Kangootui N. Nurses guilty of Kleopas' death. The Namibian, 22-05-2014.
7. Kooper L. Woman dies after nurses refuse to help. The Namibian, 08-12-2016.
8. Shinana K. No care, no empathy. Namibian Sun, 22-08-2015.
9. Ministry of Health and Social Services. Report of the Prevalence and Contributing Factors of Facility-Based Maternal and Neonatal Deaths in Five Regions of Namibia (Erongo, Hardap, //Karas, Khomas, Omaheke) during 2010–2012. Hardap Regional Health Directorate: Mariental, 2014.
10. Hodorogea S, Friptu V. The Moldovan experience of maternal death reviews. Br J Obstet Gynaecol. 2014;121 Suppl 4):81-85.
11. Lewis G. The cultural environment behind successful maternal death and morbidity reviews. BJOG. 2014;121 Suppl 4):24-31.
12. Melberg A, Mirkuzie AH, Sisay TA, Sisay MM, Moland KM. 'Maternal deaths should simply be 0': politicization of maternal death reporting and review processes in Ethiopia. Health Policy Plan. 2019;34(7):492-498.
13. Rousseva C, Kammath V, Tancred T, Smith H. Health workers' views on audit in maternal and newborn healthcare in LMICs: a qualitative evidence synthesis. Trop Med Int Health. 2020;25(5):525-539.
14. Smith H, Ameh C, Roos N, Mathai M, Broek NVD. Implementing maternal death surveillance and response: a review of lessons from country case studies. BMC Pregnancy Childbirth. 2017;17(1):233.
15. Ministry of Health and Social Services Division Quality Assurance. National Guidelines for Review and Response to Maternal Deaths, Near Misses, Stillbirths and Neonatal Deaths. Windhoek, 2019.
16. World Health Organization. The WHO Application of ICD-10 to deaths during pregnancy, childbirth and the puerperium: ICD-MM. Geneva, 2012.
17. Directorate of Special Programmes Ministry of Health and Social Services. Namibian HIV Guidelines Fifth Edition. Ministry of Health and Social Services: Windhoek, 2016.
18. Heemelaar S, Josef M, Diener Z, et al. Maternal near-miss surveillance, Namibia. Bull World Health Organ. 2020;98(8):548-557.
19. Wesson J, Hamunime N, Viadro C, et al. Provider and client perspectives on maternity care in Namibia: results from two cross-sectional studies. BMC Pregnancy Childbirth. 2018;18(1):363.
20. Chimwaza W, Chipeta E, Ngwira A, et al. What makes staff consider leaving the health service in Malawi? Hum Resour Health. 2014;12):17.
21. Muliira RS, Bezuidenhout MC. Occupational exposure to maternal death: psychological outcomes and coping methods used by midwives working in rural areas. Midwifery. 2015;31(1):184-190.
22. Pezaro S, Clyne W, Fulton EA. A systematic mixed-methods review of interventions, outcomes and experiences for midwives and student midwives in work-related psychological distress. Midwifery. 2017;50):163-173.
23. Maternal Mortality Estimation Inter-Agency Group. Maternal mortality in 2000-2017. Internationally comparable MMR estimates by the Maternal Mortality Estimation Inter-Agency Group (MMEIG), Namibia. World Health Organisation: Geneva, 2017.
24. Jin H, Zhao Y, Zhang X, Wang B, Liu P. Case-fatality risk of pregnant women with acute viral hepatitis type E: a systematic review and meta-analysis. Epidemiol Infect. 2016;144(10):2098-2106.
25. Outbreak of Hepatitis E Virus (HEV) in Namibia, Situation Report (SITREP No. 64); 2019. (Available from: <https://www.afro.who.int/sites/default/files/2019-08/National%20SITREP%2064%20on%20Hepatitis%20E%20%20%20outbreak%20Final.pdf>) [19-01-2020]
26. Mataya R, Kachale F, Chiudzu G, Kwaitaine, Oyeyipo C, Dube Q, et al. Report on the Confidential Enquiry into Maternal Deaths in Malawi (2008-2012). Ministry of Health Republic of Malawi: Blantyre, 2014.

27. Moodley J, Pattinson RC, Fawcus S, et al. The Confidential Enquiry into Maternal Deaths in South Africa: a case study. *BJOG*. 2014;121(Suppl 4):53-60.
28. Creanga A. Maternal mortality in the developed world: a review of surveillance methods, levels and causes of maternal deaths during 2006-2010. *Minerva Ginecol*. 2017;69(6):608-617.
29. National Committee for Confidential Enquiry into Maternal Deaths. Saving Mothers 2011-2013: Sixth report on the Confidential Enquiries into Maternal Deaths in South Africa. Department Health: Republic of South Africa: Pretoria, 2015.
30. National Committee for Confidential Enquiry into Maternal Deaths. Saving Mothers 2014, Annual report and detailed analysis of maternal deaths due to non-pregnancy related infections. Department Health: Republic of South Africa: Pretoria, 2015.
31. Schutte JM, Steegers EA, Schuitemaker NW, et al. Rise in maternal mortality in the Netherlands. *BJOG*. 2010;117(4):399-406.
32. M. Knight, K. Bunch, D. Tuffnell, J. Shakespeare, R. Kotnis, S. Kenyon, et al. Saving Lives, Improving Mothers' Care - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2015-17. University of Oxford National Perinatal Epidemiology Unit: Oxford 2019.
33. Souza JP, Tuncalp O, Vogel JP, et al. Obstetric transition: the pathway towards ending preventable maternal deaths. *BJOG*. 2014;121(Suppl 1):1-4.

