Causes and risk factors of maternal deaths in Namibia

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Abstract

The main purpose of this paper was to identify causes of maternal deaths in all districts and referral hospitals, and to assess risk factors and determine underlying contributory factors to maternal deaths in Namibia. The study proposed strategies for midwifery practice in order to prevent maternal deaths. A retrospective audit of maternal records was conducted with detailed analysis of the 154 maternal deaths recorded during the period 2008-2012. Of the 154 maternal deaths reviewed, 58.4% were from direct maternal deaths and 41.6% were from indirect maternal deaths. Hemorrhage (37.8%), eclampsia (24.4%) and puerperal sepsis (23.3%) were the leading causes for direct maternal deaths. About 65% of the hemorrhage cases; 64% of the eclampsia cases and 53% of the puerperal sepsis occurred to women who lived in rural areas. The predominant recognizable indirect causes were HIV (45.3%); pneumonia (23.4%) and Tuberculosis (17.2%). Women who live in rural areas were more likely to experience a maternal death due to pneumonia (60%) as compared to those in urban areas. Most women who died due to HIV were aged between 30-39 years (75.9%) while maternal deaths due to eclampsia were most common among the younger women (15-29 years). Maternal deaths are less likely to occur to women living together with their partner than those who are not living together (OR = 0.53). This descriptive study identified a range of socio demographic, clinical and health system factors as possible contributors to maternal deaths in Namibia.

Introduction

Globally, there has been extensive improvement in maternal health, with a decline of worldwide maternal deaths by 47% in the last decade from an estimated 543 000 to 287 000 (WHO, 2010). Nonetheless, maternal health remains a significant problem in many countries, and overall progress still remains far short of the Millennium Development Goal (MDG) #5 target of reducing maternal deaths by 75% by 2015. The Millennium Development Goals report has recognized that the improvement of maternal health and the decrease of maternal mortality are two of their most important targets to improve health in the developing countries (United Nations, 2012). Maternal death is usually associated with both a poor health environment and serious lack of health resources. Sub-Saharan Africa continues to have the highest burden of maternal deaths (58% of global maternal deaths) as well as the highest proportion of maternal deaths due to HIV/AIDS (WHO, 2010).

The most recently available World Health Organization (WHO) estimate of the maternal mortality ratio (MMR) for Namibia in 2010 is 200 maternal deaths per 100 000 live births, placing Namibia in the category of moderate MMR countries (defined as an MMR between 100 - 200/100 000 live births). This represents a decline from estimates in recent years. According to WHO estimates, the Namibian MMR peaked in 2005 at 310 maternal deaths/100 000 live births. Data from the Namibian Demographic and Health Survey (DHS) in 2006 – 2007 produced even higher estimates of 449 maternal deaths/100 000 live births, a significant increase from the prior 2000 DHS report of 271 deaths/100 000 live births (MoHSS, 2008).

The burden of maternal mortality frequently falls on the rural poor who have many hurdles to overcome to access timely care: lack of transport infrastructure, distance to health facilities, misinformation on available services, lack of basic services, perceived negative attitude of health providers, lack of means to pay for transport or the services at the health centres and sometimes due to reliance on traditional measures (Kongnyuy et al. 2009, p.13). Communication to the outside world is sometimes limited to those families that are living in far remote areas where telecommunication signals are not available, and this contributes to the delay of getting transport on time and most women will deliver in the presence of female relatives and in few cases with traditional birth attendants, and most of these women are only taken to health facilities when complications occurs (Warren and Tekleab, 2009, p.6). A study done in Ethiopia by Samuel and Habtamu (2004) found out that the risk of maternal mortality was between 8-16 times high among women attending the hospital from outside the town where the hospital was situated compared to those who live in town while the one conducted in Argentina showed that place of delivery can divulge the disparity between the death of a woman outside and within health facility as it is an underlying factor for place of death (Ramos et al. 2007, p.620).

Namibia is one among a number of sub-Saharan African countries in which the HIV epidemic has had an enormous impact on maternal health and maternal deaths. In 2010, WHO estimated that 59.4% of maternal deaths in Namibia were attributable to HIV/AIDS, and the 2010 National HIV Sentinel Survey concluded that 18.8% of pregnant women in Namibia were HIV-positive (MoHSS, 2010a). This represents a significant contribution to the increased MMR of the last decade. Studies done in Tanzania, Malawi and South Africa have also found HIV to be the leading indirect cause of maternal deaths (Kongnyuy et al. 2009, p.19; Urassa et al. 1995, p.246). As antiretroviral (ARV) drugs become increasingly available, maternal deaths due to HIV/AIDS is expected to significantly decline. Over the 1990 – 2010 period, however, the progress towards reduction of the

national MMR was only 2% overall (average annual reduction of 0.1%), making Namibia one of 14 sub-Saharan countries designated as having made insufficient progress towards MDG#5 and it is said to be unlikely to be met by the year 2015. Other important maternal health statistics include WHO's 2010 estimate of the lifetime risk of maternal death in Namibia (1:160) and the proportion of maternal deaths to females of reproductive age (PMDF) (3%).
The Namibian Millennium Development Goals Third Report produced in August 2010 reiterates the issues surrounding maternal health (Namibia, 2010). Although the coverage of antenatal care, delivery by skilled attendance, and contraceptive prevalence rates have all improved in the last decade, the increase in the maternal mortality rate – even if largely attributable to HIV – is concerning and demands significant and timely investment. Lack of good antenatal care, delivery and postpartum care, maternal malnutrition and anemia, high parity and septic abortion were also reported by researchers as contributing significantly to the high rate of maternal mortality in many African countries (Namibia 2010).

According to the 2006-07 Namibia Demographic and Health survey, more than 70% of births were assisted by Skilled Birth Attendants (SBA's), and more than 10% of babies were delivered by caesarean section. More than 20% of caesarean section deliveries were in urban areas, while in rural areas this number is only 7%, this is mainly due to lack of CEmOC facilities and staff such as aesthetics (MoHSS, 2008). Comprehensive emergency obstetric care (CEmoC) facilities are unevenly distributed in Namibia, the three health facilities providing all the eight signal functions are in the central regions – two in Windhoek, one in Otjiwarogo and only one in the far northern regions in Oshakati State hospital. The DHS of 2006/2007 indicates that 65% of Namibian mothers received a postnatal check-up within two days for her last live birth. Of these, most women had their check-up within four hours after birth. Coverage of ARV prophylaxis was less than 10%. Considering that 18.8% of pregnant women are HIV positive, the ARV coverage is rather low.

The risks factors that most researchers have found to be significantly associated with maternal mortality are maternal age, marital status, and education, it is presumed that women with higher education may have some awareness about the effect of illness and treatment; and they may have higher demand for contraceptives, prenatal care and a higher likelihood to have a partner with high education. Both Okonofau et al. (1992, p.322) and Chowdhury et al. (2007, p.1325) found that increases in education reduce maternal mortality.

The main policies governing maternal and newborn health in Namibia are the National Policy on Infant and Young Child Feeding 2007, and National Policy for

Reproductive Health, 2001. Efforts are being made to build capacity and skills of health workers to provide quality essential services to mothers during pregnancy and after delivery. The 2011-2015 Strategic Plan for Nutrition includes strategic priorities to improve maternal nutrition and contribute to improved maternal health, as well as reductions in neo-natal and infant mortality rates. A Road Map for Accelerating the Reduction of Maternal and Neonatal Morbidity and Mortality (MoHSS, 2010b) was developed to guide Government and partners in achieving universal access to comprehensive quality maternal and neonatal health care, and accelerate progress towards achieving the health MDGs.

In order to develop, implement and evaluate policy, understanding of why women are dying from pregnancy complications is more important than waiting to establish the level of maternal mortality. It is with this reason that, this paper reports on the causes of maternal deaths in all districts and referral hospitals, assess risk factors and determine underlying contributory factors to maternal deaths in Namibia. The paper also aims to propose strategies for midwifery practice in order to prevent maternal deaths.

Data and Methods

All public health facilities providing maternity care services were expected to complete a process of maternal death review within seven days of maternal death, with the review carried out by the health workers involved at the institution where the death occurred. Each maternal death is entered on a confidential maternal death review form, which is given a unique number and maintained at the institution for review as well as reviewed by a Regional Maternal and Peri/Neonatal Death review committee within one month of the death. Data collectors reviewed all maternal deaths recorded in each of the facilities during the period under retrospective study (January 1, 2008 – June 30, 2012) and collected pertinent data from the confidential maternal death review form as well as other supporting clinical documentation (e.g., case notes, operating theatre registers, death records). Data collectors cross-checked the maternal death records with additional institutional death registers from the given time period. After data collectors completed the clinical audit of maternal deaths tool. Death registers, outpatient and inpatient registers, death notification books and other hospital records such as, nurses and doctors' reports, post mortem records and operating theatre records pertaining to deaths of all women of child-bearing age were reviewed to determine the cause of deaths. Causes of maternal deaths were classified as direct or indirect and attempt was also made to determine levels of delay according to the three delay model in which the first delay is in deciding to seek professional care, second delay is identifying and reaching an

appropriate health facility and the third delay is receiving adequate and appropriate treatment at the facility.

A case-control study design was used to assess risk factors for maternal mortality. All 154 maternal deaths identified from the audit were considered as cases. Controls were selected from women of child-bearing age who survived during the same study period. We randomly selected five controls per case from among this group. The total number of controls selected through this procedure was 770. The risk factors for the case-control analysis were classified to include women's status indicators as education, marital status, employment and biological factors such as age, gravidity and obstetric history. For those factors which were time-dependent such as age, marital status or pregnancy related, the data used for the cases and controls were those reported at the time of the fatal pregnancy and death.

Descriptive, bivariate and multivariable analyses were carried out to determine the association between variables of interest and maternal death. Logistic regression model was fitted and unadjusted odds ratio (OR) and confidence intervals (CI) were estimated. Significant variables in the regression model were identified using stepwise selection criterion at a 0.05 level of significance. Possible interactions were fitted and tested for significance. The goodness of fit of fitted model was evaluated by the chi-squared test for the overall model. Three delays leading to deaths were also identified and analysed.

The research had strengths and limitations. Districts and referral hospitals allowed access to individual patient records. This provided a means of describing the characteristics and circumstances surrounding maternal deaths. Importantly this study provides a platform for identifying a range of issues that can be addressed in future efforts to reduce maternal deaths in other similar hospitals. The fact that detailed hospital level data were analysed also makes it possible to suggest changes in hospital policies, practices and procedures that may ultimately reduce maternal mortality.

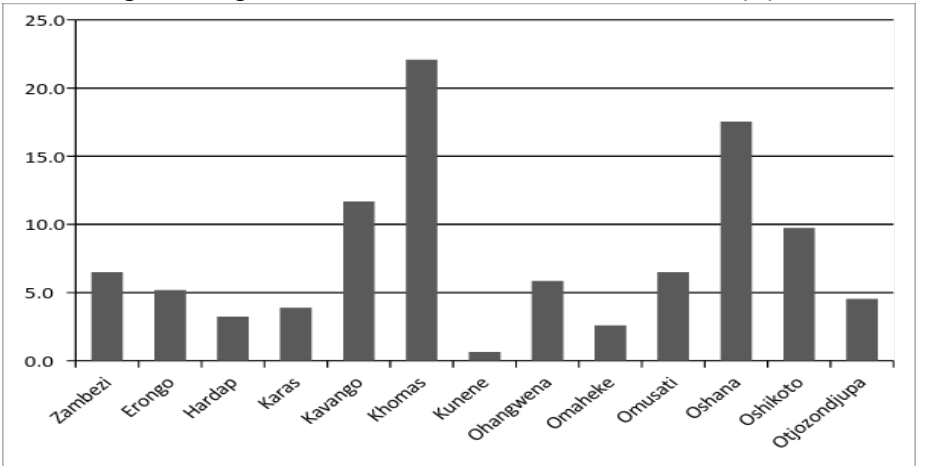
A possible limitation was the difficulty in estimating the MMR due to small numbers in the denominators. A further limitation is that a high proportion of the medical records collected for the study were incomplete or had missing data and it is not known to what extent the missing data may have biased results.

Findings

A total of 154 maternal deaths were reviewed in the 35 district and referral hospitals during the period 2008 to 2012. The majority of maternal death cases

were recorded in Khomas region followed by Oshana and Kavango regions. There were few maternal death cases recorded in Kunene region (figure 1).

Figure 1: Regional distribution of maternal deaths audited (%)



The majority of maternal deaths occurred to women in mid-reproductive ages (20-39) and 48.7% occurred to women who are married. About 59% of maternal deaths occur to women who live in rural areas. The proportion of maternal deaths increases with education level, whereby 40.3% of maternal deaths occurred to women with secondary or higher education.

WHO (2005) groups the causes of maternal death in two broad categories: direct and indirect. The direct causes can come from both pregnancy complications and malpractice, while common indirect causes of maternal death in developing countries are HIV, malaria and tuberculosis (Evance et al., 2013, p.126). The prevalence of these health conditions and the capacity of these conditions to cause morbidity and mortality usually have a deep root in socioeconomic characteristic of the community (Okonofua et al., 1992, p.320). Of the 154 maternal deaths reviewed for the study, 58.4% were from direct maternal deaths and 41.6% were from indirect maternal deaths. Out of 154 maternal deaths, 96 women delivered their babies, and out of these 96 women, 67 delivered naturally while 29 delivered through cesarean section. Among these deliveries 17.7% were delivered at home, while 83.3% of the deliveries happened at the health facilities.

Causes of maternal deaths

Causes of maternal deaths are numerous and vary from one place to another depending on prevailing factors. Research conducted by Ramos et al. (2007) in Argentina found that the most common causes of maternal death were abortion complications, haemorrhage, sepsis and hypertensive disorders. The causes were not the same for the southern part of Africa where Kongnyuy et al. (2009) found that the leading causes of maternal death in Malawi were postpartum haemorrhage, postpartum sepsis, and HIV/AIDS accounting for direct and indirect maternal causes. However, studies conducted in Senegal, Guinea Bissau and Nigeria showed that the leading causes of maternal death were puerperal sepsis, haemorrhage, eclampsia and abortion complications which took the heaviest toll on the women of reproductive age. Table 1 illustrates the clinical causes of direct and indirect maternal deaths in Namibia. The results for this study concurred with findings of earlier researchers as outline above. Hemorrhage (37.8%), eclampsia (24.4%) and puerperal sepsis (23.3%) were the leading causes for direct maternal deaths. About 65% of the hemorrhage cases; 64% of the eclampsia cases and 53% of the puerperal sepsis occurred to women who lived in rural areas. The predominant recognizable indirect causes were HIV (45.3%); pneumonia (23.4%) and Tuberculosis (17.2%). Women who live in rural areas were more likely to experience a maternal death due to pneumonia (60%) as compared to those in urban areas. Most women who died due to HIV were aged between 30-39 years (75.9%) while maternal deaths due to eclampsia were most common among the younger women (15-29 years). World Health Organization report (1999) showed that obstetric causes of maternal death are similar across the world where haemorrhage accounts for one fourth of all maternal deaths. This is because the complication occurs suddenly and is in most cases unpredictable. Rizvi et al. (2004) in Ireland, found that to reduce massive postpartum haemorrhage, we need to revise practice guidelines, disseminate them to staff and finally conduct practical skills training. This would enhance prompt and appropriate life-saving care which includes standard management of haemorrhagic shock by transfusion of blood or other volume expanders, administration of uterotonic drugs, delivery of placenta or other products of conception and massage of the uterus to stimulate uterine contractions.

Table 1: Frequency distribution of causes of maternal deaths

Clinical cause	n	%
Direct Maternal cause	**90**	**58.4**
Post-partum haemorrhage	26	28.9
Antepartum haemorrhage	8	8.9

Eclampsia	10	11.1
Pre-Eclampsia	12	13.3
Puerperal sepsis	21	23.3
Abortion	5	5.6
Obstructed labour	6	6.7
Indirect maternal cause	**64**	**41.6**
HIV	29	45.3
Tuberculosis	11	17.2
Pneumonia	15	23.4

The hospital based records may underestimate or overestimate the actual level of maternal mortality in the general population, depending on the characteristics of women admitted and the quality of available records. However, estimates may at least provide an idea of the magnitude of the problem and to spell out that a problem exist. Figure 1 shows the regional differentials in number of maternal deaths in Namibia.

Risk factors for maternal deaths

A study conducted by Christian et al. (2008) in Nepal found that maternal age and parity were contributing risk factors for maternal mortality; maternal age greater than 35 years was associated with a three- to four-fold increase in mortality, whereas increased parity conferred increasing protection. Jahromi et al. (2008) also found that maternal complications increased in women aged 40 years and above whereas Garenne et al. (2003) found that the risk factors associated with maternal mortality are parity, lack of antenatal visit, low level of maternal education and marital status.

Table 2 shows the distribution, unadjusted ORs and their 95% CIs for selected "background" characteristics among 154 maternal deaths (cases) and 770 surviving women (controls). The study found that maternal deaths occurred more among younger and middle aged women. There were few cases of maternal deaths among women aged 40 years and above. This could be attributed to the fact that women who fall pregnant in their 40s become more cautions and make regular maternal checkups because of the known associated risk of giving birth at that age. The maximum and minimum risk of maternal deaths was observed for women younger than 25 years (OR= 1.85 ; CI=1.05-3.28) and those aged 40 and above (OR =0.09 ; CI =0.03-0.21) respectively, as compared to women aged 25-39 years. The association of maternal age with higher maternal mortality risk

has been clearly demonstrated in other studies including this study (Urassa et al. 1995; Mbizvo et al. 1993).

Table 2: Background factors, unadjusted odds ratio (OR) and 95% confidence intervals (CI) of cases (maternal cases)

Background factors	Cases n=154	Controls n=770	OR	95% C.I	
Age					
15-24	34	54	1.85**	1.05	3.28
25-39 (ref)	111	411	1.00		
40+	9	305	0.09**	0.03	0.21
Marital status					
Not living together (ref)	82	347	1.00		
Living together	55	423	0.57**	0.36	0.88
Highest education					
No formal education (ref)	10	130	1.00		
Primary education	58	297	3.21**	1.38	7.50
Secondary or higher	62	335	2.35*	1.01	5.47
Place of residence					
Rural (ref)	91	418	1.00		
Urban	47	352	0.52**	0.33	0.81

The results also show that maternal deaths are less likely to occur to women living together with their partner than those who are not living together (OR = 0.53). Mbizvo et al. (1993, p.2002) similarly argued that women who are not living together with their partners had a significantly higher risk of maternal mortality as compared to those living as married. There is also evidence that women in urban areas are less likely to experience a maternal death than those in rural areas (OR =0.52). With regard to education level of a woman the results revealed a somewhat different pattern. Although education level has been shown to be positively associated with maternal mortality, there is evidence that women with some level of education become hesitant to be proactive in responding to pregnancy complications. In addition, the high prevalence of literacy among cases and controls results in minimal disparities on maternal deaths between those with some level of education and those with no formal education. We suggest that other social dynamics play a more important role than education in our study.

Contributing factors to maternal deaths

Contributing factors draw on the Three Delays Model which recognizes the different barriers women face in achieving the timely and effective medical care needed to prevent deaths occurring in pregnancy and childbirth. The three delays are defined as:

First delay: Delay in decision to seek care

- Low status of women
- Poor understanding of complications and risk factors in pregnancy and of when medical interventions are needed
- Previous poor experience of health care
- Acceptance of maternal death
- Financial implications

Second delay: Delay in reaching care

- Distance to health centres and hospitals
- Availability of and cost of transportation
- Poor roads

Third delay: Delay in receiving adequate health care

- Poor facilities and lack of medical supplies
- Inadequately trained and poorly motivated medical staff
- Inadequate referral systems

Most women experienced first (51.3%) and third delays (51.9%). Only few women experienced a second delay (12.9%) (Table 3). However it is important to note that some women experienced more than one delay and in some cases all delays were experienced. Regional differentials in delays experienced were observed, with women from Oshana, Kavango and Khomas regions experiencing the highest of all three delays. It is important to note that women in Kavango region are more likely to experience a second delay compared to any other region and those in Khomas are more likely to experience a third delay. Women from Kunene and Omaheke regions have reported the lowest level of all the delays. Further analysis was also done, that showed that age was not a significantly associated to delay experienced. With respect to education level of a woman and her place of residence the results indicated that of the 79 women who experienced the first delay, 41% had primary education and 35.4% had secondary education. About 69% of women who experienced the first delay lives in rural areas, and 75% and 49% of them experienced the second and third delays respectively. For those who lives in urban areas, their experience with all delays is far below compared to those in rural areas, with those in urban areas recording the highest of 27.5% women experienced the third delay. About 46% of women who experienced a second delay delivered at home and 95% of those

who experienced a third delay delivered at hospital. Furthermore, 30% of women who experienced a third delay delivered through caesarian section.

Table 3: Distribution of delay experienced by background characteristics of deceased

	First Delay (N=79)		Second Delay (N=20)		Third Delay (N=80)	
Region						
Caprivi	7	8.9	0	0	8	10
Erongo	4	5.1	1	0.5	2	2.5
Hardap	4	5.1	0	0	1	1.2
Karas	2	2.5	0	0	2	2.5
Kavango	11	13.9	8	40	13	16.2
Khomas	10	12.7	3	15	17	21.2
Kunene	1	1.3	0	0	1	1.2
Ohangwena	9	11.4	2	10	3	3.8
Omaheke	2	2.5	0	0	1	1.2
Omusati	7	8.9	1	5	5	6.5
Oshana	13	16.5	3	15	15	18.8
Oshikoto	9	11.4	1	5	5	6.2
Otjozondjupa	0	0	1	5	7	8.8
Place of residence						
Rural	54	68.4	15	75	49	61.3
Urban	22	27.8	5	25	22	27.5
Education level						
No formal education	9	11.3	0	0	5	6.25
Primary education	33	41.7	10	50	32	40
Secondary education	28	35.4	8	40	27	33.8
Higher education	0	0	0	0	4	5

Some of the reasons cited among women who experienced the first delays were; deceased did not attend antenatal care, the deceased delivered at home and waited for the traditional birth attendant to remove the placenta, while others were trying to induce abortion using herbs. The reasons cited for those who experience the second delay are the hospitals being kilometers away, bad roads with lack of transport and lack of transport and facility fare. For the third delay, some of the cited reasons were nurses being too slow to attend to a patient,

failure to manage postpartum bleeding, delay for operation due to lack of adequate medical equipment and wrong diagnosis.

Conclusion

The clinical causes of deaths from our study are consistent with those reported from studies of other developing countries, with hemorrhage being the leading cause, followed by eclampsia and puerperal sepsis. Overall, nearly 60% of maternal deaths in our study were due to direct causes and therefore preventable. Risk factors such as maternal age, place of residence and living together with partner have an effect on maternal mortality.

It is evident that women in Namibia do seek maternal health care services although not at an appropriate time. However, even those who manage to reach to the health facilities, they neither receive quality maternal health care services nor prompt maternal health care services and hence the majority of women died as a result of direct maternal death causes. We need to work towards preventative causes of maternal deaths during child birth, for instance bleeding during labour is a case that can be dealt with and prevent death. Diseases like HIV, tuberculosis and pneumonia incidences are major indirect causes of maternal mortality. These points out the importance of providing support to pregnant women in communities in rural areas with high incidence of HIV and tuberculosis.

The burden of maternal mortality can be reduced if we prevent the direct causes that are easily avoidable with good obstetric care. The high proportion of haemorrhage should be addressed especially postpartum haemorrhage which is unpredictable and more dangerous if a woman is anaemic. This loss of blood can easily lead to death, therefore prompt and appropriate life saving measures need to be in place, which should include proper management of the third stage of labour, universal availability of safe blood for transfusion and proper medical facilities with skilled staffs to minimise third delays.

To conclude, the study identified a range of socio demographic, clinical and health system factors as possible contributors to maternal deaths in Namibia. The care needs of HIV-positive pregnant women should be addressed to assure compliance with HAART and safe and respectful childbirth practices for women with HIV/AIDS. Reviewing and discussing cases is an important step to improve future care-giving. Effective maternal audits are associated with improved quality of care and reduction of severe adverse outcomes. Thus, clinical audits are rewarding for both patients and providers. Information from district hospitals is limited and detailed analysis is made difficult by problems of isolation, poor communications, staff shortages and often, incomplete record keeping. Com-

plete records allow data to be used for assessment and quality improvement initiatives that will be meaningful to the staff directly involved in the care of women. Further research is needed in order to understand other possible contributors, such as those found in the community, and factors associated with quality of care.

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