



RESEARCH ARTICLE

IMPLEMENTING MATERNAL DEATH SURVEILLANCE AND RESPONSE (MDSR) IN
SUDAN 2014-2017: ACHIEVEMENTS AND CHALLENGES

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ABSTRACT

Objectives: To assess the results of implementing maternal death surveillance and response (MDSR) in Sudan, during 2014 -2017; and identify causes of maternal death (MD) and health system response for reducing maternal mortality (MM).

Methodology: Hospital and community maternal death review (MDR) started in Sudan since 2009, where causes of maternal deaths MDs and areas of delays were identified after regular reporting and reviewing through focal persons' networks; using a coordinated approach involving both notional and states' stakeholders. MDs were discussed at state' maternal death review committees (SMDRCs) and recommendations for reducing maternal mortality ratio (MMR) were generated for action. In 2014 MDSR was introduced using WHO guidance.

Results: Over four years; a total of 4454 MDs were notified and reviewed, out of 3502540 Live births (LB), MMR was 127/ 100000 LB, with different variation between states. The MMR was declining from 209/ 100000 LB in 2010 to 115/100000 LB in 2017, with significant drop after implementing MDRS in 2014. Direct obstetric MDs were 72.9%, mainly from haemorrhage 32.6%, hypertensive disorders 15.7% and sepsis 12.7%, while indirect causes were 24.4%. National response included; improved coverage of midwives with recruitment in health system, availing of clean delivery requirements, management protocols, distribution of delivery and operating tables and ambulances for rural hospitals.

Conclusion: - late presentation, home delivery, poor antenatal care (ANC) and referral system, non adherence to protocols, inadequate blood transfusion and lack of intensive care units (ICU) are related causes of MD. Strengthening the response requires commitment of various stakeholders, with clear accountability and budgets.

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INTRODUCTION

In spite of the global significant reduction of MMR between 1990 and 2015, still many women are dying of pregnancy and or childbirth related complications (WHO, 2016). The first target of the sustainable development goals (SDGs); is to reduce MMR to less than 70/ 100000 LB by 2030 (WHO, 2013).

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However, accurate measurement of maternal mortality (MM) remains challenging for obtaining this target, particularly in developing countries (Alkema et al., 2016). Knowing the number of MD alone is not enough to reach SDGs, it is important to identify causes of MD and implement intervention to prevent further MD. In Sudan; due to suboptimal vital registration' MDR has been the standard method for determining maternal mortality, establishing the clinical causes of maternal death and identifying areas of delay since 2009. The leading causes of MDs during 2010-2015 were; haemorrhage, hypertensive disorders and its complications and sepsis (Umbeli et al., 2017). As many of the obstetric illnesses

are dealt with outside the health facilities, with differences in environmental, socio-economic and cultural contexts, there is a great need for social autopsy to link families, community and health system to identify the non-clinical causes of maternal deaths (Preeti Mahato *et al.*, 2018). MDSR was launched by WHO and its associated agencies in 2012 for more accurate monitoring of progress in MM reduction (Danel *et al.*, 2011). As completeness of MD recording, is the key for effective MDSR, it is facing many challenges, particularly insufficient and incomplete notification system, lack of legal framework and resources (Marge Koblinsky, 2017). This article aimed at accessing the implementation of MDSR in Sudan 2014-2017, showing experiences and challenges faced the implementation with history of MDR in Sudan since 2009.

MATERIALS AND METHODS

In Sudan; MDR started since 2009, where clinical causes of MD were identified and areas of delays were determined after regular reporting and reviewing of MD through focal persons' networks and discussion at SMDRC (Umbeli *et al.*, 2017). According to WHO classification, all MDs from pregnancy related and or child birth at hospital or community were notified and reviewed using a structured format (WHO, 1992). National & states' maternal death review committees (NMDRC, SMDRC) were established; including all stakeholders and partners working on women health. A focal person was nominated in each state, hospital & locality for daily notification of every MD by the focal using a telephone, and reviewing it using a structured format to be discussed by SMDRC, generate response recommendation for improvement then submitted to NMDRC (Umbeli *et al.*, 2017). Maternal deaths formats and LB have to be sent to central office on regular basis by electronic form. Many recommendations for reducing MMR were generated from these reports and in 2014 MDSR was introduced using WHO guidance. Hoping that with regular review of MD and analysis of causes of death; recommendations could be made and implemented to reduce maternal mortality at states and country level. Both NMDRC and SMDRCs terms of references were used. However, no legal mandate was implemented to review MD, all process is based on goodwill. Data was collected by trained resident registrars in obstetrics and gynaecology, edited, reviewed by the authors and analyzed using microcomputer SPSS version 21. During the regular supportive supervision visits, a significant under reporting of MD in health information system or hospital registration was observed compared to the active MDSR notification by the focal persons' network. Also there is lack of accurate LB registry at community and health facilities, where we used estimates provided by MOH at federal and state levels for calculating of MMR.

RESULTS

In this structured analysis of MD in facility & community based set up in Sudan, the total number of notified MD over four years (2014-2017) was 4454, out of 3502450 LB. and MMR of 127/ 100.000 LB. with different variation between states and years as seen in Table (1). Health facility MDs were 86.7% and community MD were 13.3%. Avoidable MDs were 73.3%, non-avoidable were 26.7%, direct MDs were 72.9% and indirect MDs were 27.1%. Teenagers were 17.4%, late presentation (brought dead or critically ill) 71.9%, 67.9% of MD had no ANC and the main delay was at home 66.7%.

Table 1 Distribution of Maternal Deaths in Sudan 2014-2017 by States

State	MD	L.B	MMR
Khartoum	665	828,121	080
Gazira	335	387,898	086
Sinnar	188	133,724	141
Gadarif	268	242,572	110
Northern State	72	061,514	117
W. Darfur	191	128,930	148
River Nile	64	101,134	063
Kassala	288	224,434	128
S. Darfur	309	287,062	108
W. Kurdofan	290	224,813	129
C. Darfur	192	153,346	125
S. Kurdofan	200	093,626	214
White Nile	218	154,981	141
N. Darfur	224	103,742	216
Blue Nile	219	142,566	154
N.Kurdofan	342	131,379	260
E. Darfur	132	030,837	428
Red Sea	257	071,864	358
Sudan	4454	3,502,540	127

Table 2. Distribution of Causes of maternal deaths in Sudan during 2014-2017

	Frequency	percent
Obstetric Haemorrhage	1432	32.2
Hypertensive Disorder	0689	15.5
Sepsis(Obstructed Labour)	0558	12.5
Abortion(Haemorrhage, Sepsis)	0189	04.2
Embolism (PE & AFE)	0082	01.8
Other direct obstetric causes	0128	02.9
Indirect obstetric Causes	1070	24.0
Unclassified ,(unknown)	0306	06.9
Total	4454	100.0

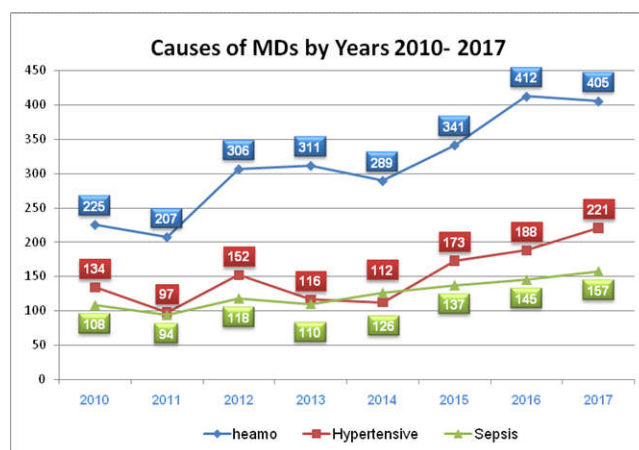
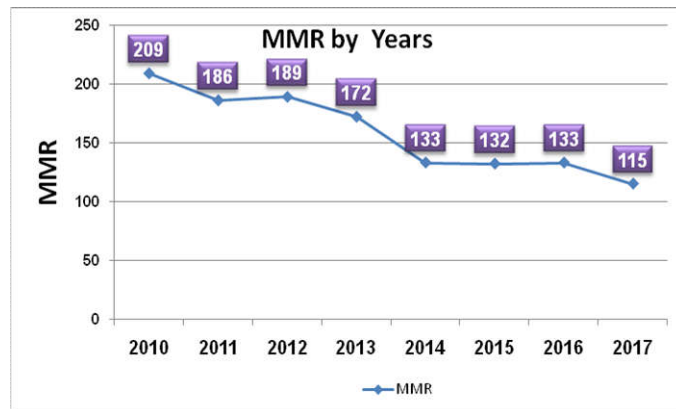


Fig. 1. Distribution of MMR according to MDSR in Sudan during (2010- 2017)

Table (2) shows the distribution of causes of MD, where haemorrhage, hypertensive disorders and sepsis are the main direct causes, viral hepatitis, malaria & anemia related conditions are the main indirect causes. Maternal deaths from obstetric haemorrhage were (32.6%); mainly PPH 72.6%, due to; uterine atonia 40.8%, retained placenta or retained products 14.8% and ruptured uterus 16.0%. One third (33.1%) died at home, 28.1% received blood. Maternal deaths from hypertensive disorders were 18.0%, 55.2% ante partum, 30.3% post partum, 51.6% died within 24 hours, 59.7% received anticonvulsants. In 67.4% delay was attributed to lack of ICU or HDU. Maternal deaths from sepsis were 12.8%, 31.2% delivered at home, main cause of death 91.7% was septicemia. Abortion caused 03.8% of MD, 53.2% due to haemorrhage and 46.8% from sepsis. Unintentional pregnancy was 64.5%, and unwanted pregnancy was 25.5%.

DISCUSSION

Effectively implemented MDSR with good utilization of available resources will allow stakeholders to focus on the known drivers of MM. Even in low or middle income countries (LMICs) with high MM, optimal utilization of the limited resources through good intervention has led to effective reduction in MMR, where there is proper coordination between national and states' stakeholders (Marge Koblinsky, 2017). In this report, all notified MD were reviewed including both facility and community MD, however, under reporting cannot be denied especially in states with conflicts and war. At the national level there was a strong leadership through the MDSR office resulting in regular meeting of NMDRC at least twice a year for discussing MD and addressing the main causes of MD with particular recommendations, as well as regular supportive supervision visits. SMDRCs in most of states do not function as required to implement MDSR properly, with inadequate monitoring and delayed response actions, as effective MDSR needs timely reporting and review of each MD and actions taken to prevent similar MD in the future. The supportive supervision visits reported many gaps between national recommendations by NMDRC and implementation of MDSR at state levels. During the last four years great efforts have been made to design, approve, print and disseminate management protocols for emergency obstetric problems (haemorrhage, hypertensive disorders and its complications and sepsis). However, their implementation and adherence to is so deficient in almost all health facilities (Umbeli *et al.*, 2017). There is poor live birth registration in health facilities and home deliveries. Most of the statistical records are incomplete or not available. The SMDRCs do not regularly meet to discuss their maternal deaths to timely generate recommendations and implement interventions for reducing MDs. This is consistent with that found by Helen Smith *et al* in Kenya 2017 (Helen Smith *et al.*, 2017). In spite of these gaps; findings from MDSR reports, provided good understanding of causes of MD, and identification of delays and has generated actions at NMDRC for both health system and community level, which contributed to improving maternal survival and progress has been made with slow response and only centered on improving health at facility, without considering interventions regarding first and second delays, which is similar to that found in Nigeria 2017 (Kana *et al.*, 2015). Although this MMR, 127/100.000 LB is still high, with discrepancies between states, it is less than that reported over the last seven years since establishing of MDR system and that reported by DHS, SMS & SHHS 2010 (Umbeli *et al.*, 2014). It may have been under reported in some states;

however, it is more reliable than HIMS records, which is similar to that found by Horon 2005. Live birth reporting is even more under reported, as have been observed in supervision visits, where hospital birth and MD records are quite deficient to affect reliability of HIMS. Training and supervision on birth registry will be more useful through regular meeting with midwifery coordinators. A method for motivation of VMW to improve reporting of live birth is important for improving calculated MMR. Intimate coordination between RH at states and hospitals will improve reporting of both LB and MDs. Regional or states variation may be due to concentration of obstetric services in certain states, with many socio-demographic factors adversely affecting implementation of intervention and MMR reduction. This is consistent with found by Leena 2018 in 34 African countries (Leena Merdad, 2018). Many states demonstrated good reduction in MMR compared to previous reports, which might be due to managerial commitment and personal interest in reducing MMR.

Maternal mortality has been reduced by 73.7% from 1990 - 2015, with a reduction rate of 1.5% per year, although, we have not reached our target MDG5. MMR declined from 135/100000 LB in 2013 to 115/100000 LB in 2017, which indicates that maternal health care system focused to address the common causes of MD, with gaps in quality and equity of care in rural states. This reduction was achieved through progressive efforts addressing direct causes of MD (obstetric haemorrhage, hypertensive disorders and its complications and sepsis). This reduction in MMR is influenced by improvement in midwifery services and management of emergency obstetric problems. There is increased coverage in midwifery services during the last four years, where by the year 2018 villages covered by midwives reached 97.9%. The total intake reached 29218, already 23585 are now providing service, 5337 midwives are not yet graduated and only 296 are not selected to join midwifery schools due to socio-cultural barriers. Only 11479 (48.7%) were recruited in health system and 10261(43.5%) are receiving regular incentives from FMOH in collaboration with ministry of social affairs. Unfortunately only 2731 (11.6%) received in-service training. Availability of consumables and requirements for clean delivery is limited with wide variations between states. The curriculum of midwives has been reformed to improve the skills of midwives and eventually improved skilled birth attendance, which can reduce MMR, through clean delivery and task shifting by accelerating; ANC coverage, providing of family planning, skilled birth and reducing the harmful traditional practices, particularly female genital mutilation (FGM). Although magnesium sulfate is now available in most of the institutes but it is not well utilized for treatment and prevention of severe preeclampsia and eclampsia in most of the states, and only (55.7%) received magnesium sulfate in this report. Since 2015; midwives were empowered to use magnesium sulfate and utrotonics under supervision for reducing maternal mortality from obstetric haemorrhage and hypertensive disorders. However, implementation is still limited to two piloting states and the results are not yet implemented into other states. It is important to strengthen adoption and adherence of management protocols at all level of care provision. The evidence has shown that; availability of trained MWs had the highest protective effect on MD, reducing case fatality by 80% (Mbonye *et al.*, 2007). Obstetric hemorrhage is the leading cause of death in this survey (32.9%). It is mainly due to post partum hemorrhage (72.6%). Even after improvement in

midwifery services, obstetric haemorrhage remains the leading cause of death, which necessitates the implementation of management protocols for reducing maternal mortality from obstetric haemorrhage, hypertensive disorders and sepsis with sustained availability of obstetric emergency requirements; including, logistics, supplies and retaining of trained personnel in management of obstetric emergencies. Although during the last four years, a lot of invest had been made to reduce MMR from haemorrhage, hypertensive disorders and sepsis. Such investments include; theater requirements, delivery table, clean delivery kits and ambulances. But there is no clear referral system to be adopted for referring obstetric cases.

Conclusion

Late presentation, home delivery, poor antenatal care (ANC) and referral system, non adherence to protocols, inadequate blood transfusion, lack of functioning intensive care units (ICU), and high turnover of trained personnel are the associated causes of MD. Increasing access to skilled attendance at birth (SAB) by midwives could have reduced maternal mortality. Response component of MDSR should be properly implemented and monitored to assess progress in reducing MMR. This requires strong leadership at national and state levels, capacity building, with clear accountability and budgets.

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Conflict of interest: Authors declare that they have financial or non-financial competing interest.

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