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## RESEARCH ARTICLE

# ACHIEVEMENTS AND CHALLENGES OF IMPLEMENTING MATERNAL DEATH REVIEW (MDR) IN SUDAN 2010 - 2015

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**ABSTRACT**

**Background:** Despite the worldwide commitment to improving maternal health, measuring, monitoring and comparing mortality estimates remain a challenge.

**Objectives:** Implementing maternal death review (MDR) in Sudan, during 2010 -2015, to determine maternal mortality ratio (MMR), identify underlying causes and health system response for reducing maternal mortality.

**Methodology:** Hospital and community- based MDR was conducted during 2010-2015. National and states' maternal death review committees (NMDRC, SMDRC) were established, a focal person was nominated in each state, hospital and locality. Every maternal death was notified by the focal person using a telephone and notified deaths were reviewed using a structured format, discussed by SMDRC, generate recommendations and submitted to NMDRC. Data was collected by trained registrars, analyzed using microcomputer, SSPS, version 20.0.

**Results:** Out of 3686762 Live births (LB) reported over six years, 6055 maternal deaths were notified and reviewed, MMR was 164/ 100000 LB, with different variation between states. Hospital deaths were 5207 (86.0%), while community deaths were 848 (14.0%). Direct obstetric deaths were 3791 (62.6%), mainly from haemorrhage 1881(31.1%), hypertensive disorders 784 (12.9%) and sepsis 694 (11.5%), while indirect causes were 1699 (28.0%), mainly from hepatitis, complicated malaria & severe anemia. Most of hospital deaths 4401 (72.7%) were admitted late, 3051 (50.4%) died within first 24 hours from admission.

**Conclusion:** Poor antenatal care (ANC) and referral system, home delivery, late presentation and unavailability of blood are the main factors behind MD. Moving to maternal death surveillance and response (MDSR) requires strong commitment of the various stakeholders and responsive health system.



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## INTRODUCTION

Maternal mortality has been reported to be as a good indicator on the state of health system than any other indicators. Unacceptably high levels of preventable maternal mortality persist as a problem across sub-Saharan Africa, including Sudan and south Asia (WHO 2009). Variation in maternal mortality between developed and developing countries explain the gaps in access to good quality health services. Sudan still has a high maternal mortality ratio and poor maternal health outcomes which may be due to weak health information system (HIS), barriers to access health services, high turnover of health personnel and consequent low rates of service utilization especially in rural areas (Umbeli *et al*., 2012). However, there are improvements between 2009 and 2015, which demonstrate the measurable impact of the MDR program on maternal health outcomes through local communities and health care services (FMOH-NRHP, UNFPA, WHO, UNICEF, WORLD BANK: Maternal Death Reviews report 2014). In Sudan; efforts to reduce maternal mortality, have resulted in the development of road map for maternal mortality reduction. This strategy focus on; improvement of health system, trained staff, good infrastructure, quality of care and community mobilization. The key interventions were increasing access to functioning emergency obstetric care (EmONC), revitalization of family

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planning and increasing antenatal care (ANC) and skilled birth attendance (SBA). To avail reliable data, MDR was established since 2009 and the results of 2010 – 2015 were analyzed, discussed and disseminated to all states & stakeholders (Umbeli *et al*., 2012). Many efforts were taken to strengthen MDR & to utilize results for reducing MMR. During year 2014, two new states were extracted from previously available states (West Kurdofan and East Darfur). Their states' maternal death review committees were formed during 2015, and they have no regular notification or review of maternal deaths which affects the total number of notified maternal deaths during 2014 in the country. This study was done to count every maternal death at hospital and community, to determine maternal mortality ratio and to indentify the common causes of maternal deaths, associated socio-cultural factors and related delays behind maternal deaths. As well as assessing health system response to maternal death and its implementations for reducing maternal mortality.

## MATERIALS AND METHODS

This is a descriptive, hospital and community based study, conducted in Sudan, 2010- 2015. All notified maternal deaths in hospital or community from pregnancy related conditions were included according to WHO classification (WHO, 1992). A structured format was filled for every maternal death and a more detailed one related to specific conditions, including, haemorrhage, sepsis, hypertensive disorders, abortion and indirect causes was used to determine gaps and delays in management received (Umbeli *et al*., 2012). Data was collected by trained registrars and health care providers.

A one day workshop has been conducted, for care providers and stakeholders to endorse and disseminate the national proposal for maternal mortality reviews. National & states' maternal death review committees (NMDRC, SMDRC) were established, and a focal person was nominated in each state, hospital & locality. Every maternal death was notified daily by the focal person using a telephone, while all notified deaths were reviewed using a structured format, discussed by SMDRC then submitted to NMDRC. Reviewed maternal death formats, discussed in the state maternal death review committee meetings and generate response recommendation for improvement. Maternal deaths formats and LB have to be sent to central office on regular basis by electronic form. Received formats, indexed, edited and rechecked for accuracy, by picking 10% of the received formats. Data analyzed using SPSS version 20.0, results discussed with the national maternal death review committee (NMDRC) every three months and recommendations for national implementation were generated.

## RESULTS

Out of 3686762 Live births (LB) reported over six years, 6055 maternal deaths were notified and reviewed with maternal mortality ratio of 164/ 100000 LB, with different variation between states (Table 1). Maternal deaths at hospital were 5207 (86.0%), whereas maternal deaths in community were 848 (14.0%). Direct obstetric causes of maternal deaths were 3791 (62.6%), mainly from haemorrhage 1881(31.1%), hypertensive disorders 784 (12.9%) & sepsis 694 (11.5%) (Table 2). Indirect causes of maternal death were 1670 (27.6%), mainly from hepatitis 662 (10.9%), complicated malaria 286 (4.7%) & severe anemia 221 (3.6%), 23 cases (0.4%) died from anesthesia and 565 (09.4%) were unclassified maternal deaths.

**Table 1. Distribution of Maternal Mortality ratio by States and by years**

| State | MMR 2010 MD/ 100000LB | MMR 2011 MD/ 100000LB | MMR 2012 MD/ 100000LB | MMR 2013 MD/ 100000LB | MMR 2014 MD/ 100000LB | MMR 2015 MD/ 100000LB |
|---|---|---|---|---|---|---|
| Khartoum | 107 | 90 | 96 | 96 | 73 | 88 |
| River Nile | 89 | 94 | 96 | 104 | 105 | 129 |
| Gadarif | 121 | 75 | 118 | 110 | 114 | 105 |
| Gazira | 196 | 163 | 126 | 102 | 75 | 72 |
| Northern State | 245 | 85 | 154 | 117 | 108 | 116 |
| Sinnar | 214 | 263 | 214 | 274 | 276 | 102 |
| Kassala | 370 | 271 | 215 | 121 | 124 | 130 |
| White Nile | 219 | 194 | 225 | 172 | 175 | 189 |
| Blue Nile | 841 | 355 | 235 | 316 | 201 | 212 |
| S. Darfur | 380 | 437 | 239 | 169 | 97 | 131 |
| Red Sea | 634 | 290 | 280 | 306 | 378 | 408 |
| N Kurdofan | 206 | 537 | 392 | 496 | 287 | 273 |
| N.Darfur | 437 | 440 | 410 | 370 | 247 | 187 |
| S. Kurdofan | 367 | 524 | 415 | 411 | 345 | 179 |
| W. Darfur | 626 | 432 | 501 | 172 | 108 | 119 |
| C. Darfur | - | - | - | 332 | 153 | 172 |
| W. Kurdofan | - | - | - | - | - | 142 |
| E. Darfur | - | - | - | - | - | 290 |
| Sudan | 209 | 186 | 189 | 172 | 133 | 132 |

**Table 2. Distribution of Cause of Maternal Death in Sudan 2010-2015**

| Cause of Maternal Death | Frequency (N= 6055) | Percent |
|---|---|---|
| Obstetric Haemorrhage | 1881 | 31.1% |
| Hypertensive Disorder | 0784 | 12.9% |
| Sepsis( Obstructed Labour) | 0694 | 11.5% |
| Abortion(Haemorrhage, Sepsis) | 0289 | 04.8% |
| Embolism (PE & AFE) | 0139 | 02.3% |
| Other direct obstetric causes | 0023 | 00.4% |
| Indirect obstetric Causes | 1670 | 27.6% |
| Unclassified, (unknown) | 0565 | 09.4% |
| Total | 6055 | 100.0% |

**Table 3. Distribution of socio-demographic characteristics of Maternal Deaths in Sudan during 2010-2015**

| Age | Frequency (N=6055) | Percent |
|---|---|---|
| ≤ 20 Years | 1191 | 19.7% |
| 21-30 Years | 2865 | 47.3% |
| 31-40 Years | 1956 | 32.3% |
| > 40 Years | 0043 | 00.7% |
| Total | 6066 | 100.0% |
| Parity | Frequency(N=6055) | Percent |
| Primigravida | 1665 | 27.5% |
| Multipara (2-4) | 2767 | 45.7% |
| Grandmultipara (5 or more) | 1623 | 26.8% |
| Total | 6055 | 100.0% |
| Route of admission | Frequency(N=6055) | Percent |
| Elective Admission | 0509 | 08.4% |
| Em. Admission from Home | 4032 | 66.6% |
| Referred Emergency | 0666 | 11.0% |
| Not Admitted | 0848 | 14.0% |
| Total | 6055 | 100.0% |
| ANC follow up | Frequency(N=6055) | Percent |
| No ANC | 4014 | 66.3% |
| Irregular ANC (<4) | 1335 | 22.0% |
| Regular ANC (min. 4 visits) | 0706 | 11.7% |
| Total | 6055 | 100.0% |
| Condition on admission | Frequency(N=6055) | Percent |
| Critically ill | 4401 | 72.7% |
| Stable | 0806 | 13.3% |
| Not Admitted | 0848 | 14.0% |
| Total | 6055 | 100.0% |
| Areas of delay | Frequency(N=6055) | Percent |
| Delay at Home | 4515 | 74.6% |
| Delay in reaching hospital | 0989 | 16.3% |
| delay in hospital treatment | 0551 | 09.1% |
| Total | 6055 | 100.0% |

**Table 4. Distribution of indirect causes of maternal Death in Sudan during 2010-2015**

| Indirect causes of maternal Death | Frequency | Percent |
|---|---|---|
| Viral Hepatitis (A,B,C,D,E) | 662 | 39.6% |
| Malaria | 286 | 17.1% |
| Anemia Related Conditions | 221 | 13.2% |
| other febrile illness | 145 | 08.7% |
| Idiopathic cardiomyopathy (ICM) | 073 | 04.4% |
| Complications of RHD* | 070 | 04.2% |
| Un Known | 061 | 03.7% |
| Acute pulmonary edema | 030 | 01.8% |
| HIV | 028 | 01.7% |
| GIT bleeding or problems | 022 | 01.3% |
| Acute renal failure | 021 | 01.3% |
| Pulmonary TB | 020 | 01.2% |
| DKA- complication of diabetes | 019 | 01.1% |
| Atypical pneumonia | 012 | 00.7% |
| Total | 1670 | 100.0% |

*RHD = rheumatic heart disease.

**Table 5. Cause of Obstetric Haemorrhage during 2010-2015**

| Cause of Obstetric Haemorrhage | Frequency | Percent |
|---|---|---|
| Uterine atonia | 0778 | 41.3% |
| birth canal injuries | 0316 | 16.8% |
| ruptured uterus | 0314 | 16.7% |
| Placenta Praevia | 0178 | 09.5% |
| Abruptio Placenta | 0141 | 07.5% |
| retained placenta | 0126 | 06.7% |
| Blood disorder | 0028 | 01.5% |
| Total | 1881 | 100.0 |

Most of hospital maternal deaths 4401 (72.7%) were admitted late & critically ill, 4032 (66.6%) were admitted as emergency from home & 3051 (50.4%) died within first 24 hours from admission, teenagers were 1191 (19.7%), primigravidae were 1665 (27.5%), and 4014 (66.7%) had no antenatal care (ANC) (Table 3). The main delay was at home; 4515 (74.6%), 989 (16.3%) delay in reaching hospital and 551 (9.1%) delay in receiving appropriate health care service at hospital. Maternal deaths from obstetric haemorrhage were 1881 (31.1%); mainly post partum haemorrhage (PPH) 1396 (74.3%), 346 (18.4%)

ante partum haemorrhage (APH) and 139 (7.4%) intra partum haemorrhage. Mainly from uterine atonia, birth canal injuries, retained placenta or retained products, and ruptured uterus, (Table 5). Only 1012 (53.8%) of them presented with bleeding, the rest developed bleeding inside hospitals and 374 (19.7%) were admitted in a stable condition, 995 (52.9%) delivered at home, and 685 (36.4%) died at home. Only 545 (29.0%) were seen by senior, 690 (36.7%) received blood and 786 (41.8%) received utrotonics. Failure of transfusion was due to unavailability of blood 1207 (64.2%), 1098 (58.4%) due to absent donors. Maternal deaths from hypertensive disorders were 784 (12.9%), 444 (56.6%) ante partum, 209 (26.7%) post partum, 618 (78.8%) presented with convulsion, 99 (12.6%) developed convulsions in hospitals, 494 (63.0%) died within 24 hours from first fit in hospital. Two thirds 517 (65.9%) received anticonvulsants and only 422 (53.8%) were managed by senior. In 616 (78.6%) delay was attributed to lack of intensive care unit (ICU) or high dependency unit (HDU). Cerebro- vascular accidents (CVA) were the commonest reported causes of maternal death. Maternal deaths from sepsis were 694 (11.5%), 187 (26.9%) delivered at home, 270 (39.0%) delivered by EmC/S, 101 (14.5%) delivered by ELC/S. Two thirds had prolonged labour, 416 (60.0%) prolonged first stage and 448 (64.5%) prolonged 2nd stage, 370 (53.3%) were not discharged from hospital, already infected at time of admission. Main cause of death 664 (95.7%) was septicemia. Abortion resulted in 363 (06.0%) of MDs, 187 (51.5%) of them due to haemorrhage and 176 (48.5%) from sepsis. Unintentional pregnancy 329 (90.6%) and unwanted pregnancy was 34 (9.4%).

## DISCUSSION

Monitoring progress towards MDGs highlight the difficulties in measuring MMR, where many countries lack high quality data (Tappis *et al*., 2015). Despite the global progress in reducing MMR; reducing preventable maternal mortality and achieving Sustainable Development Goal (SDGs) targets for 2030 (having less than 70 MD / 100 000 LB globally), will require increased investment in improving access to quality health services in fragile and conflict-affected countries (Tappis *et al*., 2015). In Sudan; there are still gaps in implementation, where the slow response is centered on improving health at facility, limited intervention regarding delay at community or referral system and only focusing on late presentation, but not why. The year 2015; marked the end of MDGs era and the start of SDGs, and is the right time to reflect on the progress made towards achieving MDG5. Implementation of the MDR has led to local policy changes & improvement of maternal health in several countries (WHO 2009). In Sudan, MDR results triggered actions at both health system and community level, which contributed to improving maternal survival. Estimates of MMR over the last six years through MDR assessed the progress made in Sudan and suggest projections to show requirements for the sustainable development goals. Although this cumulative MMR, 164/100.000 LB is still high, with discrepancies between states, reflecting the complexities of health policy planning and resource allocation. It is relatively low compared to DHS, SMS, & SHHS (http://www.measuredhs.com/aboutsurveys/search/metadata.cfm?surv_id=29&ctry_id=38&SrvyTp=type 2008). It is even less than that reported from MDR 2010-2012 (Umbeli *et al*., 2014). It may be under reported, particularly for community MD in some states, e.g. Blue Nile, Kurdofan and Darfur states where notification & review may have been affected by war and social conflicts. 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. However, many states proved significant reduction in MMR compared to previous years and reports, depending on availability and utilization of resources and implementation of response (Umbeli *et al*., 2014).

In Sudan; we registered a decline in maternal mortality over the last decade and a reduction of MMR by 67.7% from 1990 - 2015, with a reduction rate of 1.4% per year. This reduction in MMR is influenced by midwifery improvement to provide safe delivery and comprehensive reproductive health services. There is significant improvement in the number of new intake of midwives, in-service training of practicing midwives and recruitment in health system, with relative improvement in availability of midwifery requirements and consumables for providing clean delivery, which is reflected by relative reduction in MM from sepsis. The evidence has shown that the availability of midwives among health care providers had the highest predictive effect on maternal death, reducing the case fatality by 40% (Mbonye *et al*., 2007). During 2015; a total of new intake and in-service midwives reached 19547, 4731 (24.2%) of them were recruited in health system. Out of those who were not recruited in health system, 10270 (69.3%) are receiving regular incentives from ministry of FMOH in collaboration with ministry of social affairs. The curriculum of midwives has been reformed to improve the skills of midwives and eventually improved skilled birth attendance, ANC, family planning and basic emergency obstetric care (BEMOC) which can reduce MMR. Magnesium sulfate has been used extensively for treatment and prevention of eclampsia in most of the states (90.0%), which has significant impact on MD from hypertensive disorders. Also in 2015 midwives were empowered to use magnesium sulfate and utrotonics under supervision for reducing maternal mortality from obstetric haemorrahe and hypertensive disorders. However, endorsement and implementation is still limited to piloting states. Obstetric hemorrhage is the leading cause of death in this survey (31.2%). It is mainly due to post partum hemorrhage (72.2%). Even after improvement in midwifery services, still obstetric haemorrhage remains the leading cause of death, which necessitates the implementation of protocols for reducing maternal mortality from direct obstetric causes (obstetric haemorrhage, hypertensive disorders and sepsis) and sustain availability of obstetric emergency requirements; including, logistics, supplies and retaining of trained personnel in management of obstetric emergencies. Some states proved significant reduction in maternal mortality from haemorrhage compared to national figure. During 2015, in Khartoum state, obstetric haemorrhage constituted only 13.1% of MD. Almost one third of MD from haemorrhage (35.8%) delivered at home, resulting in late presentation or late intervention, which need to be looked in for detailed associated causes. Proper and timely referral of emergency cases to the suitable health care centers is needed to avoid late presentation of critically ill patients. Accordingly; FMOH availed good number of well equipped ambulance cars for transferring of emergency obstetric cases for bigger hospitals. However: still a protocol for referring emergency cases is needed to be implemented, together with sustained running service for good utilization of ambulances by poor population. Even in developed countries, hemorrhage is still among the main causes of maternal mortality and morbidity (Bonnar, 2000). Globally, postpartum haemorrhage

(PPH) remains a leading cause of maternal deaths in low resource settings where effective methods for prevention and treatment of PPH are not accessible as many births occur at home (Pantoja *et al*., 2015). However in many low and middle income countries, there is limited information on magnitude and risk factors for PPH (Ononge *et al*., 2016). In both developed & developing countries, 60% of maternal mortality occurred in the post partum period, 45% occurred during the first day of delivery, 65% within the first week & 80% within two weeks (Melkert *et al*., 2015). More community awareness raising is needed to improve community maternal death notification as well as live birth.

**Conclusion**

This review of progress can accelerate actions, to remove existing obstacles which can make a significant change in the coming years to meet the ambicious SDGs targets. Poor antenatal care (ANC) and referral system, home delivery, late presentation and unavailability of blood are the main factors behind MD. Strengthening the response and moving to MDSR needs strong commitment of the various stakeholders, responsive health systems, financial support, capacity development and monitoring and evaluation.

**Challenges**

Incomplete notification of all MD at community or institutes, with incomplete identification of MD (unclassified); from missing medical records or poor documentation. Both require activation of the focal person's role at all levels and valid ascertainment by focal person and MDR committee at institutes and the state. MDR is not yet incorporated in the health system, with limited staff, frequent turnover, competing priorities & limited awareness on the importance of notification of MD.

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## REFERENCES

Bonnar-J. 2000. Massive obstetric hemorrhage. *Baillieres-Best-Pract-Res-Clin-Obstet-Gynaecol*., Feb; 14 (1): 1-18.

Department of Statistics, Ministry of Economics and National Planning and Institute for Resource Development/Macro International, Inc. *Sudan, Demographic and Health Survey 1989-1990*, Khartoum, Sudan, Ministry of Economics and National Planning and Institute and IRD/Macro, *Columbia Maryland,* http://www.measuredhs.com/aboutsurveys/search/metadata.cfm?surv_id=29&ctry_id=38&SrvyTp=type, accessed January 27, 2008.

FMOH-NRHP, UNFPA, WHO, UNICEF, WORLD BANK: Maternal Death Reviews report 2014, June 2015:1-72

Mbonye [a], A.K., M.G. Mutabazi [a], J.B. Asimwe [b], O. Sentumbwe [c], J. Kabarangira [d], G. Nanda e, V. Orinda [d]. 2007. Declining maternal mortality ratio in Uganda: Priority interventions to achieve the Millennium Development Goal. *International Journal of Gynecology and Obstetrics*, 98, 285–290

Melkert, P. *et al*. 2015. "Estimation of changes in maternal mortality in a rural district of northern Tanzania during the last 50 years." *Acta Obstet Gynecol Scand*., 94(4): 419-424.

Ononge, S., Mirembe, F., Wandabwa, J., & Campbell, O. M. 2016. Reproductive Health, 13(1): 1.

Pantoja T, Abalos E, Champan E, Vera C and Serrano V P. 2015. Oxytocin for preventing postpartum haemorrhage in non-facility birth setting. The Cochrane library.

Tappis, H., Koblinsky, M., Winch, P. J., Turkmani, S., & Bartlett, L. 2015. Context matters: Successes and challenges of intrapartum care scale-up in four districts of Afghanistan. *Global Public Health*, 1-20.

Umbeli T, Lamia Eltigani, Sawsan Eltahir, Salman Mirghani, Kunna AbdAlillah, Kidane G Abraha. 2012. Maternal death review for maternal mortality reduction in Sudan 2010. *Sudan Med J*., April; 48(1): 13-23.

Umbeli T1*, Eltahir S2, Mirghani SM3, Kunna A4, Hussein IMA5. 2014. Maternal Death Review in Sudan (2010 – 2012): Achievements and Challenges. Sudan JMS Vol. 9, No.1. Mar: 85-90.

WHO, International Statistical Classification of Diseases and Related Health Problems. Tenth Revision. Vol. 1: Tabular list. Vol. 2: Instruction manual. Geneva: WHO; 1992.

WHO, UNICEF and UNFPA. 2009. Maternal death review in Africa. *International l Journal of Gynecology and Obstetrics*, Vol 106, Issue 1:89-94.

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