

*Original Article***Maternal Death Review in Sudan (2010 – 2012):
Achievements and Challenges**Umbeli T^{1*}, Eltahir S², Mirghani SM³, Kunna A⁴, Hussein IMA⁵**ABSTRACT**

Background: Despite the worldwide commitment to improving maternal health, measuring, monitoring and comparing mortality estimates remain a challenge. Maternal death review (MDR) is a tool used to measure maternal mortality ratio (MMR) and to improve quality of obstetric care.

Objectives: This study was done to assess maternal mortality and to identify underlying causes during 2010-2013.

Materials and Methods: Facility and community- based maternal death review was conducted during three years in Sudan to study maternal mortality. National and states' maternal death review committees were established. A focal person for each state, health facility and locality was nominated. Notification of maternal deaths was done by telephone, followed by review of all notified maternal deaths using a structured format. Data was analyzed using microcomputer, with SSPS, version 18.0.

Results: Over three years, 2933 maternal deaths were notified, out of 1509354 Live births (LB). MMR was 194/ 100000 LB, with different variation between states. Facility maternal deaths were 2503 (85.3%) and community deaths were 430 (14.7%), reviewed formats were 2859 (97.5%). Direct obstetric deaths were 1845 (64.5%), mainly due to haemorrhage 884 (30.9%), eclampsia 383 (13.4%) and sepsis 321 (11.2%). Indirect causes were 1014 (35.5%), 363 (12.7%) due to hepatitis and 197 (6.9%) to anemia. Most of hospital deaths 1947 (77.9%); admitted late from home, 2462 (73.4%) were critically ill and 1484 (60.3%) died within 24 hours.

Conclusion: Home delivery, late presentation, unavailability of blood and poor referral system, are the main factors behind maternal deaths. Maternal death review has to be integrated within the health management information system (HMIS) with strong commitment of various stakeholders.

Key words: Maternal mortality, maternal death review, Sudan.

Maternal mortality (MM), is defined as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes”¹. Every year, about eight million women suffer pregnancy-related complications and over half a million die, with 99% in developing countries.

Sub-Saharan Africa accounts for 50% of all maternal deaths, 70-80 % due to direct causes². Disparities in maternal mortality between developed and developing countries, explain the gaps in access to quality healthcare services. More than 80% of maternal deaths could be prevented or avoided through effective and affordable interventions, even in resource limited countries³⁻⁵. In Sudan, latest house-hold survey (SHHS) 2006 revealed MMR, of 638/100000 LB for Northern Sudan and MMR of 216/ 100000 LB in SHHS 2010⁶.

A major challenge to the achievement of the millennium development goals 5(MDG5) by developing countries is the lack of reliable data on maternal deaths and disabilities to measure progress made. Knowing the level of maternal mortality and understanding the

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underlying factors that led to the deaths can provide practical ways of addressing the problem¹. Different strategies and tools have been developed to help find out why mothers die. They include verbal autopsies; facility-based case reviews; confidential enquiries into maternal deaths (CEMD); clinical audit against agreed criteria or standards and the Near-miss reviews⁷. MDR is widely used and many countries adopted the WHO recommendation of combining community-based and facility-based maternal death reviews. It is a useful tool to assess current situation, interventions used and progress made in reducing maternal mortality, however; it may give underestimates, when many cases are not reported⁸. This study was to count maternal death in health facilities and community to identify common causes and associated socio-cultural and economic factors for maternal death and to investigate first and second delays.

MATERIALS AND METHODS:

This is a descriptive, facility and community – based study, conducted in Sudan, 2010-2012. All women died in hospital or community from pregnancy related conditions were included. A structured questionnaire was used and a more detailed questionnaire related to specific condition, including, haemorrhage, sepsis, eclampsia and hepatitis was used to determine gaps and delay in management received⁹. Data was collected by trained registrars and health care providers. A one day workshop has been conducted, attended by obstetricians, registrars in obstetrics and gynaecology and administrative personnel to endorse and disseminate the national proposal for maternal mortality reviews.

National and states' MDR committees were formulated in all states. A focal person was nominated for each state, health facility and locality. Notification was done by phone for all maternal deaths in facility or community. The notification information included; demised name, date, place of death and the notifying person. The MDR form must be filled in for every maternal death, by the facility focal person or state focal person with

the help of locality focal person and presented in the state committee meetings. In hospitals with maternity department, a maternal mortality committee was formulated to review all maternal deaths before submitted to state committee. Reviewed maternal death forms and LB have to be sent to central office on regular basis by electronic form. Received formats, indexed, reviewed, classified into avoidable and non- avoidable and edited by trained person. Edited data was rechecked for accuracy, by picking 10% of the received formats. Data analyzed using SPSS version 18.0 results discussed with the national maternal death review committee (NMDRC).

Implementation of MDR system in Sudan:

Series of national population based surveys in Sudan revealed multiple challenges related to health system. High MM necessitates quality improvement of care and institutionalization of MDR¹⁰. The ministry of health developed and revised various policy documents, strategies and guidelines with identified priority interventions. A higher decree was issued rendering all maternal deaths notifiable. National MDR committee (NMDRC) was established, including various stakeholders and partners to ensure availability of reliable estimates on maternal deaths and generate appropriate recommendations to enhance the implementation of road map and accelerate achievement of MDG5¹¹. MDR started in June 2009; results of 2010- 2012, approved by NMDRC and disseminated to all stakeholders¹².

RESULTS:

Over three years, 2933 maternal deaths were notified, among 1509354 LB, with MMR 194/ 100000 LB, with different variation between states (Table 1). Facility maternal deaths were 2503 (85.3%) and community deaths were 430 (14.7%). Maternal death (MD) confirmed clinically, postmortem was requested for only 21 medico-legal cases (0.7%). Classified avoidable deaths 2007 (70.2%) and unavoidable were 852 (29.8%). Among hospital deaths, 1949 (77.9%) were

Table (1): Distribution of MD and MMR in Sudan according to state 2010-2012.

State	MD 2010	Live Birth	MMR 2010	MD 2011	Live Birth	MMR 2011	MD 2012	Live Birth	MMR 2012
Khartoum	184	171,385	107	149	165,757	90	165	171,976	96
River Nile	20	22,526	89	14	14,925	94	27	28,055	96
Gadaref	52	43,152	121	35	46,950	75	58	49,251	118
Gazira	122	62,167	196	106	64,989	163	102	80,740	126
N. State	23	9,382	245	10	11,767	85	19	12,337	154
Sennar	36	16,805	214	36	13,716	263	54	25,262	214
Kasala	76	20,544	370	83	30,636	271	91	42,310	215
W. Nile	56	25,609	219	54	27,805	194	71	31,506	225
Blue Nile	95	11,301	841	67	18,886	355	54	22,952	235
S. Darfur	30	7,887	380	63	14,429	437	33	13,823	239
Red Sea	69	10,891	634	52	17,942	290	44	15,691	280
N Kurdof	40	19,400	206	94	17,494	537	103	26,246	392
N. Darfur	51	11,663	437	39	8,857	440	76	18,557	410
S Kurdof	74	20,148	367	49	9,360	524	85	20,462	415
W Darfur	29	4,631	626	20	4,631	432	123	24,551	501
Sudan	957	457,491	209	871	468,144	186	1105	583,719	189

admitted critically ill, 1484 (60.3%), died within 24 hours after admission. Direct MDs were 1845 (64.5%), mainly due to; haemorrhage 884 (30.9%), eclampsia 383 (13.4%) and sepsis 321 (11.2%). Indirect MDs were 1014 (35.5%), 363(12.7%) due to hepatitis and 197 (6.9%) due to anemia. Notified deaths from obstetric haemorrhage were 884 (30.9%), post-partum haemorrhage (PPH) was 576 (66.2%), rupture uterus 146 (16.8%), ante-partum haemorrhage (APH) 105 (12.1%) and 43 (4.9%) due to abortion. Uterine atonia was the main cause of PPH; 279 (48.4%), followed by; retained placenta 140 (24.3%), birth canal injuries 138 (24.0%) and blood disorders 19 (3.3%). Out of these 277 (48.1%) delivered at home and

Table (2): Distribution of MD in Sudan 2010-2012 according to Cause of Death.

Cause of death	Frequency	Percent
Obstetric haemorrhage	884	30.9%
Eclampsia	383	13.4%
Hepatitis	363	12.7%
Sepsis	321	11.2%
Anemia related conditions	197	06.9%
Abortion	126	04.4%
Anesthesia	081	02.8%
Malaria	082	02.9%
Unclassified	422	14.8%
Total	2859	100.0%

229 (51.9%) delivered in hospital. One hundred and two (14.1%) died at home, 622 (85.9%) died in hospital and 413 (66.4%) of them died within six hours from admission. Only 145 (23.3%) received blood transfusion due to absence of donors in 304 (63.7%) or unavailability of either blood bank, testing reagents or blood bags in 173 (36.3%) of cases of obstetric haemorrhage.

Notified MDs from eclampsia were 383 (13.4%), 236 (62.8%) ante partum, 109 (29.0%) post-partum, 31 (8.2%) intra-partum and in 293 (77.9%), the first fit started at home. MDs within two hours of admission were 95 (28.0%), two-six hours, 87 (25.7%), and seven, twenty four hours 71 (20.9%). Cerebro-vascular accidents (CVA) was the commonest reported cause of maternal death, 162 (43.1%), followed by acute pulmonary edema 72 (19.1%), acute renal failure 57 (15.2%), airway obstruction 45 (12.0%), and haemorrhage 40 (10.6%). Two hundred twenty seven (67.0%) received magnesium sulfate and 141 (41.6%) received antihypertensive drugs. Notified MDs from sepsis were 321 (11.2%); majority delivered by emergency cesarean section (Em C/S) 141 (44.9%), vaginal delivery at home 94 (29.9%), incomplete miscarriage 42 (13.4%), instrumental vaginal delivery 26 (8.3%) and elective C/S eleven (3.5%). Notified deaths from hepatitis were 363 (12.7%); 320 (90.1%) presented with jaundice, 141 (39.7%) had fever in addition to jaundice. Cause was undiagnosed in 206 (58.1%), 59 (16.6%) hepatitis B and 44 (12.4%) hepatitis A, liver failure was the main cause of death 291 (82.0%) and 293 (82.5%) presented too late.

DISCUSSION:

Maternal deaths and disabilities remain a major public health problem in the developing countries, in spite of the efforts of many international and developmental health agencies. United Nations progress report 2005 stated that “Maternal mortality ratios remained unacceptably high across much of the developing world”¹³. Measuring maternal mortality accurately is extremely difficult, except in countries where there is comprehensive registration of deaths¹⁴. This

MMR, 194/100000 LB is relatively low compared to demographic health survey (DHS), safe motherhood survey (SMS) and Sudan house hold survey SHHS; however, it is still higher than our target MDG5, 124/100000 LB¹⁵. It is even lower than that reported 2009, in Yemen, 365 /100000 LB¹⁶. Regional or states variation may be due to implementation of interventions and concentration of obstetric services in certain states, with socio-demographic factors adversely affecting MMR in others.

Hemorrhage is the leading direct cause of death in this study (30.9%), mainly due to post-partum hemorrhage (66.2%); this is consistent with that found by WHO 2005, where in Africa alone it is estimated at 13.3-43.6% of all MD³. Even in developed countries, hemorrhage is still among the main causes of maternal mortality^{17,18}. Nagaya et al found that, hemorrhage constitutes 39% of maternal deaths in Japan¹⁹. Indirect causes are relatively high, which may be due to epidemic of tropical fever in some states. Usually, indirect causes have a varying spectrum of MD from 4% in Latin America up to 13% in Asia and 17% in Africa³. In both developed and developing countries, 60% of maternal mortality occurred after delivery, 45% during the first day, and up to 65% within the first week²⁰. MD is a tragedy worsened by fetal death; this study showed perinatal mortality of 59.3% and this is consistent with that found in Jamaica 2007²¹.

CONCLUSION:

Home delivery, late presentation, unavailability of blood and poor referral system, are the main factors behind MD. Institutionalization of MDR requires strong commitment of the various stakeholders, financial support, capacity development and regular supportive follow up and to be integrated within HMIS.

Achievements:

MDR has gained momentum; with regular annual report identifying the causes of maternal deaths and areas of delay. Many interventions are now implemented to reduce MMR, including; training and recruitment of village midwives (VMW), training of medical

officers and other health care providers on EmONC, availing of essential requirements for EmONC with improvement in obstetric care in most states.

Challenges:

Challenges are provider, administrative and community related with inadequate resources. MDR is still a vertical program and not incorporated in the health system. Slow implementation of suitable interventions at country level to utilize MDR recommendations for reducing MMR and lack of operational plans and suitable framework for monitoring and evaluation of MDR progress.

Conflict of interest:

We declare that, this research had been done without any conflict of interest. We guarantee; this article has not been published or being considered for publication elsewhere

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