Author's response to reviews

Title: Maternal mortality in Kassala State - eastern Sudan: Community-based study using Reproductive age mortality survey (RAMOS).

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Author's response to reviews:

To: Mr Arnold Bongcayao

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Ref. MS: 4774241295798968 - Maternal mortality in Kassala State - eastern Sudan: Community-based study using Reproductive age mortality survey (RAMOS)

Thank you for your letter.

Here is my response to reviewer comments on our manuscript.

Formatting changes were done according to your directions.

Reviewer 1:

Comment:" The discussion is appropriate but rather short as far as recommendations are concerned. The authors could elaborate more on the actions to be taken based on their observations, and formulate more recommendations towards the Ministry of Health as well as towards the health services and the communities. Eg Could maternal shelters contribute to reducing maternal mortality in remote areas?"

Response: These changes were made as they appear in the revised manuscript.

Comment: Page 7, text related to Table 6: should be "70% of who died" instead of 70% who delivered postpartum

Response: changes was made.

Reviewer 2:

Comment: Some abbreviations were used without using the long forms first; examples are on page 11 Amoc and SHHS.

Response: the following changes were made:

World Health Organization (WHO)
Acquired immune deficiency syndrome or acquired immunodeficiency syndrome (HIV/AIDS).

emergency obstetric care (Emoc)
Sudan Household Health Survey (SHHS)

1.0 Major Compulsory Revision

Comment:
1.1 The study setting is not given in detail in the methods. It comes up in the discussion but in patches. There is need to describe in detail the health services provision in the primary health facilities and the referral hospitals so that the reader can understand the context under which the study was done, and be able to understand the circumstances deaths occurred.

Response:

The following paragraph was added to methodology section: "Reproductive health services were delivered through primary health care system that composed of primary health care units, health centers and rural hospitals. There were three tertiary hospitals. The majority of health centers and rural hospitals were poorly staffed, and cannot deliver emergency obstetric care (Emoc). Deliveries were conducted by certified village midwifes at home and the majority of deliveries in the rural areas were conducted by traditional birth attendants."

Comment:
1.2 In the methods section, the key informants were used to identify women who died in the community:

Were the duty of these informants to collect data on deaths in the community? How sure that they knew all deaths occurring in the community?

Response:

"The key informants were asked by field investigators to recall women deaths in their surroundings". This depends on memory recall over the period of the study. To minimize this, field investigators ask independently different key informants in the same location and generate a single list of female deaths.

A change was done in the revised manuscript.

Comment:
1.3 Results section, Paragraph 3, which describes table 4. The total number of indirect causes of maternal deaths is 29 (Severe anaemia 13, acute febrile illness 6, jaundice 4, and miscellaneous 6) and not 26 as stated in the paragraph. The direct causes are 35 and not 38. Clarification is needed.

Response: Three of miscellaneous were direct obstetric cause. This also applied
to the direct causes which are 35 plus three from the miscellaneous.

Comment:

1.4 There is need to expand on the analysis of the narratives of the interviewed individuals as some results are not presented in the results section but to be found in the discussion section paragraph 5

Response: the following paragraph was added to result section.

"The first phase delay: (delay in seeking medical care): In forty eight cases (75.0%) the respondents recognized a medical problem at the same time there was a delay in seeking medical care in 73.4%. They mentioned that there was no service available in the nearby health facilities, including the hospitals and they cannot afford to go to the tertiary hospital. The decision to seek medical care usually made by the husband or male household leader, who is usually away during the day; therefore, the woman has to wait until his returns at the evening to seek medical care. In one case, a woman with postpartum hemorrhage due to retained placenta bled for seven hours while waiting for her husband to return home. She died while being taken to the hospital.

The second phase delay: (Delay in reaching health facility): there were few paved roads in the State, beside some seasonal rivers that delay reaching to health facilities. Rural hospital were not equipped with ambulances. We found transportation problems in 54.7% of cases.

The third phase delay: forty four (68.8%) of them reported delay in receiving medical care at the level of primary health facility. Respondents mentioned unavailability of emergency drugs, absence of health workers and late referral to higher level."

Comment:

1.5 Abortion to account for a small percentage of the deaths can be due to other reasons not limited to culture on revealing pregnancy early and circumstances surrounding the abortions including the influence of abortion law. This part needs more explanation.

Response: the following paragraph was added to revised manuscript in the result section.

"This is primarily because the respondents have difficulty recognizing the early menstrual history of the deceased. Also induced abortion for unwanted and out of wedlock pregnancy usually not be revealed due to influence of culture and abortion law."

2.0 Minor Essential Revision

Comment:

2.1 The background is well written except the last part “… identified any discrepancies between different regions of the state” which needs to be changed and state clearly that “to compare the maternal deaths in rural and urban areas”.
Response: the following sentence was added to revised manuscript in background section.

"It also looked at the rates and contributing factors of maternal deaths and compare the maternal deaths between urban and rural areas in the State."

Comment:
2.2 The results section, paragraph 2, it is better to give the median age than the mean age.
Response: The following sentence was added to revised manuscript in result section.

"The deceased age ranged from 16-43 years, with median age of 26.5 years and a standard deviation of 6.3 years."

Comment:
2.3 Table 4, the direct and indirect causes of maternal mortality can be separated to improve easy reading and understanding of the table. This also can help to know the miscellaneous causes of death (See 1.3 above) are in which category.
Response: Changes done in table 4 (table 3) in the revised manuscript.

Comment:
2.4 Table 5, in the timing of death, early pregnancy has to be clearly defined as some women may have died at 28 weeks of pregnancy but had not started antenatal care.
Response: The three deaths appeared in table 5 as early pregnancy were abortion cases. Table 5 was omitted according to comment 2.5 below and relevant change was done in the result section.

Comment:
2.5 Tables 2, 5 and 8 can be presented as texts in the results section without the tables. More so table 8's presentation of yes and no is unnecessary duplication of information. There is a need in this table to give the details of the specific causes of delays in the phases as provided in the discussion section paragraph 5.
Response: Changes were done accordingly. Table 2 was omitted and the following paragraph was added to the result section: "One hundred forty eight (88.1%) households of these women were visited, and respondents were interviewed. The reproductive age mortality rate was calculated as 188/100,000 WRA. Sixty four cases were classified as maternal deaths, that represent the proportion of maternal deaths among female of reproductive age (PMDF) of (43.2%). Maternal mortality rate and ratio were found to be 80.6/100,000 WRA & 713.6/100,000 live births (LB). Maternal mortality ratio in rural and urban areas were 872 and 369/100,000 LB respectively."
Table 5 was omitted and the following was added to the result section:
"forty three cases (67.2%) died at home with small number (04.7%) died on their
way to health facility. Forty five (70.3%) died in the postnatal period, 25% died
undelivered and only three (04.7%) in early weeks of pregnancy from
complications of abortion."

Table 8 was omitted and a paragraph that mentioned in my response to
comment 1.4 was added to the result section.

3.0 Discretionary Revision

Comment:
3.1 Table 7, the difference between illiterate and non-formal education has to be
made clear. The variables source of water, having a pit latrine and electricity
could better be presented in a combined form with other variables to determine
the wealth quintiles of the deceased.

Response:
To clarify the difference between illiterate and non-formal education, the following
sentence was added to the result section: "Of the deceased, 90.6% and 82.2% of
their husbands were either illiterate or had non-formal education i.e that they are
able to write and read without formal schooling."

For the other part of the comment, the authors found difficulty in formulating
quintiles wealth for this study.

Comment:
3.2 The recommendation is rather flat and completely derived from the last
paragraph of the discussion. It should be derived from the study findings and be
more specific on policy implications.

Response:
This paragraph was added to discussion section:

"This high percentage of maternal deaths could be effectively reduced by
improving the availability and use of Emoc in all health facilities. There is a need
to expand midwifery coverage by availability of a certified midwife in every
village. We recommend expansion of midwifery training by opening midwifery
schools in remote areas. Establishing maternity waiting home near the tertiary
hospitals will enable patients from rural areas with obstetric complications to stay
in the town and avoid long cost hospitalization. To overcome transportation
problems, rural hospital needs to be equipped with ambulances. Furthermore,
improving non-health sector factors such as poverty, female education and
infrastructure is important to reduce maternal mortality in the state."

Also conclusion section was changed:

"Maternal mortality rates and ratios were found to be high, with a wide variation
between urban and rural populations. The proportion of maternal deaths among
female deaths (PMDF) was higher than expected. Indirect causes of maternal death were high, and anemia was the major cause of indirect maternal death. Direct causes of maternal death were similar to those in developing countries. To reduce this high maternal mortality rate we recommend improving provision of Emoc in all health facilities, expanding midwifery training and coverage especially in rural areas. To overcome transportation problems, rural hospital needs to be equipped with ambulances. Furthermore, improving non-health sector factors such as poverty, female education and infrastructure is important to reduce maternal mortality in the state."

At the end, authors would like to thank both reviewers for their valuable efforts to revised the manuscript. We hope our response has fulfilled the reviewers comments.

Yours Sincerely
Abdalla Ali Mohammed