

Maternal Death Surveillance and Response in Tanzania: Comprehensiveness of Maternal Deaths Narrative Summaries and Action Points from Death Reviews

Ali Said (✉ ali.saidi@kbh.uu.se)

Muhimbili University of Health and Allied Sciences School of Medicine <https://orcid.org/0000-0002-9989-8273>

Andrea B. Pembe

Muhimbili University of Health and Allied Sciences

Siriel Massawe

Muhimbili University of Health and Allied Sciences

Claudia Hanson

Karolinska Institutet

Mats Malqvist

Uppsala Universitet

Research article

Keywords: Maternal mortality, Three phases of delays, Action plans, SMART, Maternal Death Surveillance and Response (MDSR), Death review, Narrative summary

Posted Date: August 31st, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-66168/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published on January 11th, 2021. See the published version at <https://doi.org/10.1186/s12913-020-06036-1>.

Abstract

Background

Review of maternal deaths relies on comprehensive documentation of medical records that can reveal sequence of events that led to death. Maternal Death and Surveillance (MDSR) system recommends the use of narrative summaries during maternal death reviews to discuss the case and categorize medical causes of death, identify gaps in care and recommend action plans to prevent deaths. Suggested action plans are recommended to be Specific, Measurable, Attainable, Relevant and Time bound (SMART). To identify gaps in documenting information and planning recommendations, comprehensiveness of written narrative summaries and adequacy of action plans according the MDSR guideline were assessed.

Methods

A total of 76 facility maternal deaths that occurred in two regions in Southern Tanzania in 2018 were included for analysis. We assessed the comprehensiveness of narrative summaries and action plans using a prepared checklist from MDSR guideline of 2015. Presence or absence of items in four domains each with several attributes was recorded on the checklist. The domains were socio-demographic characteristics, antenatal care, referral information and events that occurred after admission. Less than 75% completeness of attributes in all domains was considered *poor* while >94% was *good/comprehensive*. Action plans were assessed by application of SMART criteria and according to place of planned implementation (community, facility or higher level of health system).

Results

Two-thirds of summaries (66%) scored *poor*, and none were scored as *good/comprehensive*. Summaries missed key information such as demographic characteristics, information of events that occurred in community (16%), time between diagnosis of complication and commencing treatment (65%), investigation results (47%), summary of case evolution (51%) and referral information (47%). A total of 285 action plans were analysed. Most action plans 242(85%) were allocated to health facilities for implementation and they were mostly 42(42%) on service delivery. Only 42% (32/76) of the action plans were deemed to be SMART.

Conclusions

Abstraction of information to prepare narrative summaries used in MDSR system is inadequately done. Action plans and recommendations in MDSR system are mostly for facility sub standards of care and are not specific on the issues to be addressed.

Background

Worldwide, maternal mortality is still unacceptably high with about 295,000 maternal deaths in 2017 (1). Most of these deaths occur in low resource countries. Maternal death reviews have been done in a lot of

countries including Tanzania, to reveal the causes and contributing factors to maternal deaths, with some success and challenges (2–7). In 2015, Tanzania introduced the Maternal Death Surveillance and Response (MDSR) system in line with World Health Organization (WHO) recommendations (8, 9). It is one way to address high Maternal Mortality Ratio (MMR), by uncovering local solutions for local problems and to guide national strategies towards improving quality of care. The MDSR system includes identifying, notifying and reviewing all maternal deaths to describe: (a) medical causes of deaths, (b) shortcomings/delays in the health system that contributed to the death, and (c) recommendations to address the identified delays. The recommendations address the underlying medical cause of death and delays in care identified from the community to health system.

Facilities providing childbirth service in Tanzania are sought to have a multi-disciplinary MDSR committee to review and audit maternal deaths. The MDSR guideline includes instructions and illustration on the collection of information from i) medical files, ii) interview of health care providers and iii) interviews with relatives who cared for the woman before death (8). The information is used to prepare a narrative summary for discussion during MDSR meetings at health facility, district and sometimes regional level of the health system. More information is sought in medical files (when available) during the meetings if what is written in the summary is not sufficient. The summaries are kept as confidential documents in hard or electronic copies by a designated person in the facility. After the meeting one or more recommended action points are suggested by the committee and filled in the maternal death reporting form. The action points are meant to stir up response at local and national level to prevent future deaths (10). The recommended actions from maternal reviews need to have clearly defined and measurable activities so that implementation can be tracked and assessed. That means they ought to be *Specific, Measurable, Attainable, Relevant and with specific allocated Time* (SMART) and responsible person for implementation. (See Fig. 1. The action points are then shared to the district health office and quality improvement committees for further follow up. Having a system of following up quality and implementation of recommended action points can be effective in making sure MDSR is implementable. This has been shown to be effective in other countries which implement MDSR. A study from Nigeria reported use of scorecard to track MDSR implementation pointed out facilities with recommended actions without clearly defined activities(10). This could have created problems during implementation and follow up. The MDSR guideline of 2015 in Tanzania does not provide a framework for follow up of implementation of action plans but recommends them to be SMART.

Comprehensive documentation of history, physical examination, investigation results and treatment in medical practice is important in assisting practitioners and other medical staff to manage, follow up patients, used the information in research and audits/reviews to improve practice and patients' safety (11–13). During death reviews such as those in MDSR system, the quality of documents used may directly impact the recommendations from the audit, especially when it is done from abstracted information. Oftentimes, health care providers fail to follow guidelines in documenting patients' information by prioritizing care over documentation and so the abstracted information may be inadequate (14). Studies from United States and Iran have shown record keeping in medical files in health facilities are weak and face challenges as health care providers fail to follow recommendation during

gathering and storing of information (12, 15–17). While in Northern Tanzania, a report on MDSR implementation by Maternal and Child Survival program and other partners revealed most facilities' medical records were not sufficient to decide the cause of death and substandard care (18).

In view of poor record keeping and documentation of medical files in health facilities in Tanzania, the maternal deaths narrative summaries need to be comprehensive since there is a chance to gather information from multiple sources. Therefore it is imperative to reveal the shortcoming in writing and storing information in the summaries in order to recommend way forward.

We sought to investigate the availability and comprehensiveness of the summaries in health facilities, and assess how well action plans aligned with the SMART criteria. Results will provide recommendations for improvement of record keeping and gathering of information in the maternal death narrative summaries.

Methods

Study design

This was a retrospective desk review of maternal deaths documents (narrative summaries and action plans). To do this we visited all facility that reported deaths between 1st of January to 31st of December 2018 for Mtwara and Lindi regions of Southern Tanzania and reviewed the narrative summaries and action plans. A total of 122 maternal deaths were followed up in the facilities for their summaries and action plans

Study setting

The total population of Lindi and Mtwara regions is about two million people (19) . There are two regional referral hospitals, 12 district hospitals, four private/mission hospitals, 40 health centres and 399 dispensaries. In 2015, the MMR was 456 in Lindi and 579 per 100,000 live births in Mtwara (20). Facility delivery was 80.8% and 81.3%, caesarean section rate 6.0% and 10.3% respectively and family planning use was at least 50% in both regions(21). The two regions like all other regions in Tanzania have an MDSR system through which all maternal deaths occurring in health facilities are routinely reviewed. Maternal deaths occurring in each facility are reported to the district and ultimately to the region and Ministry of Health, Community, Development, Gender, Elderly and Children.

Outcomes

We reviewed the deaths documents following a defined set of criteria. We defined *Comprehensiveness* of narrative summaries as summaries that have more than 94% of the information that is recommended by Tanzania MDSR guideline of 2015. The information in the summaries was divided into four domains

each with several attributes (Panel 1). The domains were 1. Demographic characteristics and Antenatal care information (12 attributes), 2. Delivery/abortion information for those who delivered/aborted before admission (six attributes) 3. Referring information (four attributes) 4. Information of events after admission (20 attributes)

Panel 1: Domains and attributes checked to assess comprehensiveness of narrative summaries

1. Demographic characteristics and Antenatal care information

- Date of review, Maternal death review number, Patient code, Age, Marital status, Gravidity, Parity, Live children, Mode of delivery of previous pregnancy, Date of last caesarean section, Number of antenatal care visits in this pregnancy, Risk factors detected during this pregnancy

2. Delivery/abortion information for those who delivered/aborted before admission

- Date of delivery/abortion, Duration of amenorrhea, Status of baby at delivery (dead/alive/abortion), Place of birth/abortion(home/facility), Assisted by who, Information on complications that occurred after delivery

3. Referring information

- Type of referring facility, Reason for referral, History of the case, How does a woman position in the community affects her referral

4. Information of events after admission

- Date of admission, Main reason for admission, Summary of history, physical examination and investigations, Initial diagnosis at admission, Summary of case evolution, Sequence of events of abortion/delivery, Indication of surgery, Diagnosis made at complications, How does a woman position in the community affects process after admission, Treatments given, Time between diagnosis of complication and treatment, Complimentary Investigation results present, Summary of case evolution (monitoring vital signs, input output, bleeding), Date of Death, Time between complications and death, cause of death, Pregnancy outcome, Other information (from community or other centres)

SMART action point means a recommended action point is *Specific, Measurable, Attainable, Relevant and Time-bound*. An action was considered *Specific* if it clearly mentioned what is to be done, how it will be done, who will do it and describes the results of the action to be done. An action point was considered *Measurable* if it could be evaluated against standards. *Attainability* meant that the action could be implemented considering the resources and available skills and capacity. A *Relevant* action was considered as an action that was actually needed considering the case and the dysfunction identified. An action was considered *Time-bound* when it had a specific time for starting or ending or both.

Data sources and measurements

A team of researchers led by the first author (AS) visited the health facilities in March and April of 2019 and requested the narrative summaries of all 122 notified maternal deaths from the facility in-charge. The first author (AS) reviewed the narrative summary using a checklist informed by recommendation in the 2015 Tanzania MDSR guideline (8).

The narrative summaries were assessed by familiarisation and checking for presence of attributes on the four different domains (Panel 1). Presence or absence of information/attributes in each domain was scored and coded as present (1), not present (2) or not applicable (3) depending on the case. The researcher read each summary repeatedly to make sure all information was available or not even if it was not explicitly mentioned. For example, the duration of amenorrhea was considered to be present if the last normal menstrual period was mentioned even if the gestation age was not mentioned explicitly. Also, marital status was considered to be present if it was mentioned that the deceased was brought to facility by husband.

After familiarisation with the action plans the first authors extracted i) the target of each action plan (community, facility or higher level) ii) specific issues it addressed in the community or facility. For community action plans, the researcher indicated whether the action was for decision making at family level, danger signs recognition or health seeking behaviour or traditional practices. Action plans in the health facility were assessed whether they addressed service delivery, human resource, equipment and supplies, referral system, accountability or facility infrastructure. The action plans were then assessed for appropriateness by checking whether they met the SMART criteria.

Quantitative variables

Quantitative data collected was entered and cleaned in SPSS version 23 for analysis. The *Comprehensiveness* of each narrative summary was determined by calculating individual proportion of amount of information depending on each case. We summarised the total amount of information for each summary and then the proportion of present (1) was calculated from the expected total score for that case. The proportional score of each summary was ultimately divided into be *poor, average, or good/comprehensive* if it had 0-74%, 75-94% or more than 94% of the required information respectively. The cut off points were decided based on having been used in a study done by Mohseni et al in Iran (15), and were used for analysis and description purposes and are not recommended as standard cut off levels. Action plans were considered to be SMART if all the criteria were met.

Statistical methods

Descriptive analysis was done for all variables and data presented in figures and tables.

Results

Narrative summaries were available for 76(62%) maternal deaths from both regions.

Assessment Of Comprehensiveness Of Narrative Summaries

Each narrative summary is recommended to have demographic, antenatal care information, delivery information (if delivered before admission), referral information (for referred cases), and information of events after admission until death.

Table 1

Assessment of presence of demographic characteristics, antenatal care, delivery/abortion and referral information

Variable	Frequency	Percent
Demographic and antenatal care information (N = 76)		
Date of review	18	23.7
Maternal death review number	7	9.2
Patient code	8	10.5
Age	69	90.8
Marital status	8	10.5
Gravidity	69	90.8
Parity	68	89.5
Live children	54	71.1
Mode of delivery of previous pregnancy*	8	12.7
Date of last caesarean section**	1	25.0
Number of antenatal care visits in this pregnancy	54	71.1
Risk factors detected during this pregnancy	46	60.5
Delivery/abortion information for those who delivered before last admission (N = 19)		
Date of delivery/abortion	18	94.7
Duration of amenorrhoea	8	42.1
Status of baby at delivery (dead/alive/abortion)	11	57.9
Place of birth/abortion(home/facility)	18	94.7
Assisted by who	11	57.9
Information on complications	16	84.2
Referring information for referral cases (N = 32)		
Type of referring facility	28	87.5
Reason for referral	26	81.3
History of case	17	53.1
How does a woman position in the community affects her referral	0	0

*Only for eligible cases (multigravida) N = 63

**Only for eligible cases (those reported C/S for previous delivery) N = 4

Age and gravidity were the most common information 69(91%) present in the summaries, while only 7(9%) of the summaries had a maternal death review number indicated. Only 8(13%) summaries indicated the mode of delivery of previous pregnancy and only one had a date of previous caesarean section. (Table 1)

The table also indicates that for those who delivered before last admission, 18(95%) summaries had information on date and place of delivery/abortion while 8(42%) had information on the duration of amenorrhea.

Most summaries 28(88%) indicated the type of referring facility, while none of them indicated "how the woman`s position in the community affects her referral" as recommended in the guideline

Table 2
Assessment of presence of information of events after admission (N = 76)

Variable	Frequency	Percent
Date of admission	73	96.1
Main reason for admission	75	98.7
Summary of history, physical examination and investigations	70	92.1
Initial diagnosis at admission	67	88.2
Summary of case evolution	72	94.7
Sequence of events of abortion/delivery occurred*	62	95.4%
Indication of surgery written*	44	95.7
Is there diagnosis made at complications	61	80.3
Treatments given	66	86.8
Time between diagnosis of complication and treatment	49	64.5
Complimentary Investigation results present*	36	47.4
Summary of case evolution (monitoring vital signs, input output, bleeding)	39	51.3
Date of death	73	96.1
Time between complications and death	62	81.6
Cause of death	67	88.2
Pregnancy outcome	67	84.2
Other information (from community or other centres)	12	15.8
*Only for eligible cases		

Date of admission, main reason for admission, summary of case evolution, sequence of delivery/abortion events, surgery indication and date of death was present in more than 94% of summaries (Table 4). Information on how the woman`s position affects the process after admission was not present in any of the summaries. Overall, 64(84%) of summaries were scored to be *poor* and only 12(16%) were *average* and none were *good/comprehensive*. When the two variables that scored zero were removed (Tables 1 and 2) the summaries scored changed to 66% *poor* and 34% *average*.

Assessment Of Recommended Action Points After Maternal Death Reviews

A total of 285 action plans were included in the analysis. Of the reviewed action plans, 242(85%) included recommendations targeting the facility, 42(15%) the community and 0.4% higher level of health system. Almost half 120(42%) of the recommendations directed to the facility were for service delivery, such as knowledge and skills, while in community most action plans were for delays in decision making (Fig. 2).

Recommended action points assessments

Two summaries did not have documented action points. A total of 285 recommended action points were included in the analysis

Table 3
Assessment for SMARTness of the action points
(n = 285)

Variable	Frequency	Percent
Specific	131	46.0
Measurable	146	51.2
Achievable	184	64.6
Relevant	201	70.5
Time	265	93.0
SMART action point	119	41.8

Table 5 shows that approximately 42% of the action points were SMART, and most of them were time bound (93%) and were deemed relevant (71%).

Discussions

Main findings

Our study reveals that only 62% of narrative summaries for maternal deaths were available and none had all the recommended information as according to 2015 MDSR guideline. Missing key information included information of events that occurred in the community before reaching facility (16%), time between diagnosis of complication and commencing treatment (65%), investigation results (47%) and summary of case evolution after complications (vitals, input, output, treatments given) (51%). Furthermore, just over half of referral deaths had summary of the medical history, physical examination and treatment of case before referral (53%). Demographic characteristics such as death review number, patient code, and marital status, duration of amenorrhea and mode of delivery of previous pregnancy were missing in most summaries. Most action points (85%) were directed to health facilities and they were mostly targeting service delivery issues such as knowledge and skills due to human error in management. Only 42% of the action plans were deemed to be SMART, most of the action plans (93%) had time line of implementation while less than half (46%) were found to be specific.

Comprehensiveness of the narrative summaries and action plans

This study confirms that MDSR systems are constrained by poorly prepared narrative summaries lacking important information. Studies in the US and Wales, UK have shown that medical files have poorly documented general symptoms, gynaecological history, treatment side effects, smoking history and drug allergies (16, 22, 23). This has direct negative impact on the comprehensiveness of summaries abstracted from such documentation. Luck et al in a study on quality of abstracted information in general internal medicine patients, cautioned against measuring quality using abstracted information as it may have many deficiencies. They reported that chart abstraction resulted into only 54% of the standard information required (14).

One of the reasons for poorly documented narrative summaries in our study could be the fact that, a person who was involved in the management of the deceased is tasked with writing the summary. This could lead to attempt of hiding some of the information in the summary in fear of blame. A study in Malawi reveal that fear of blame was one of the main barriers to conduct of maternal deaths reviews in health facilities (24). This problem could have been mitigated by assigning a different person to prepare the summary and providing a comprehensive example narrative summary in the guideline (8). This should serve as a wakeup call for facilities to appoint a single designated person to write the narrative summaries and a guideline to have a friendlier user guide for preparing summary.

Documented recommendations or action plans in the MDSR systems were mostly directed to health facility (third delay) targeting directly health care provision such as knowledge and skills of health care providers. This seems to be reasonable as also other studies from Malawi, Tanzania, Kenya and Nigeria indicated that most maternal deaths occur due to substandard care in health facilities (25-29) while facility delivery in these countries stands at 91%, 63%, 61% and 39% respectively (21, 30-32).

For the action plans to be effective in preventing and reducing maternal death they need to be implementable and easy to follow up. Most action plans in the MDSR system were found to be non-specific (54%) as they were not clear about what was going to be done and only 42% were found to be SMART. This may limit the impact of the MDSR strategy on quality of care in Tanzania. Few studies have assessed the recommended action plans MDSR system such as in Nigeria and in Northern Tanzania (10, 18). During maternal deaths review, health care providers should put down recommendation with implementation in mind.

Limitations of the study

The main limitation of this study is the fact that the summaries were assessed by one person (AS). Bias was however minimized by using a prepared checklist from MDSR guideline recommendations. The cut-off points used in analysis of information were informed by a similar study from Iran (15) but may be a matter of discussion. In our study we used them for description purposes only and do not indicate standards in amount of medical information documented.

The generalisability of the study in settings where MDSR system does not use narrative summaries is also a limitation. Even in these settings, the study informs the importance of measuring quality of care using comprehensive medical information. It also shows the effects of incomplete documentation of medical information as it affects the quality of abstracted information.

Conclusions

Abstraction of information to prepare narrative summaries used in MDSR system is inadequately done. This can impact negatively the quality of care measured using the summaries. Action plans and recommendations in MDSR system are mostly for facility sub standards of care and are not specific on the issues to be addressed.

Recommendations

To improve documentation of narrative summaries and recommended action points, providers should use a checklist with spaces to fill the required information. A scheduled follow up of action point implementation is needed to ensure reviews work as intended

Abbreviations

C/S	Caesarean Section
MDSR	Maternal Death Surveillance and Response
MMR	Maternal Mortality Ratio
SMART	Specific, Measurable, Attainable, Relevant and Time-bound
WHO	World Health Organization

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from Muhimbili University of Health and Allied Sciences Institutional Review Board. Permissions to review documents were obtained from Ministry of Health Community Development Gender Elderly and Children, President`s Office Regional Administration and Local Government, Regional Medical Officers, District Medical Officers and facility In-charges.

Consent for publication

Not applicable.

Availability of data and materials

Datasets used and/or analysed during the current study are available from the first author on request.

Competing interests

The authors declare that they have no competing interests.

Funding

Funding of the study came from Swedish International Development Cooperation Agency (Sida) through bilateral cooperation with Muhimbili University of Health and Allied Sciences (MUHAS) and Uppsala University (UU).

Authors` contributions

All authors were involved during the planning of this study. AS did all field activities, data entry, management and analysis with close supervision of MM, CH, SM and ABP. AS prepared the first draft. All authors read and approved the final manuscript.

Acknowledgements

Lindi and Mtwara Regional Medical Officers (Dr Genchwele M and Dr Sichwale A), Regional RCHCos (Sr Arope R and Mr Chibanji N), All district RCHCos, All District Medical Officers, Sida, MUHAS, UU.

Authors` information

Ali Said (ali.saidi@kbh.uu.se , saidialli2011@gmail.com)

Department of Obstetrics and Gynaecology, Muhimbili University of Health and Allied Sciences, Dares Salaam, Tanzania

Department of Women's and Children's Health, Uppsala University, Uppsala Sweden

Andrea B. Pembe (andreapembe@yahoo.co.uk)

Department of Obstetrics and Gynaecology, Muhimbili University of Health and Allied Sciences, Dares Salaam, Tanzania

Sirieli Massawe (snanzia@gmail.com)

Department of Obstetrics and Gynaecology, Muhimbili University of Health and Allied Sciences, Dares Salaam, Tanzania

Claudia Hanson (claudia.hanson@ki.se)

Department of Global Public Health, Karolinska Institutet, Stockholm Sweden

References

1. WHO. Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019.
2. Pembe A, Paulo C, D`mello B, Roosmallen J. Maternal mortality at muhimbili national hospital in Dar-es-Salaam, Tanzania in the year 2011. *BMC Pregnancy Childbirth*. 2014;14:320.
3. Magoma M, Massinde A, Majinge C, et al. Maternal death reviews at Bugando hospital north-western Tanzania: a 2008–2012 retrospective analysis. *BMC Pregnancy Childbirth*. 2015;15:333.
4. Merali, et al. Audit identified avoidable factors in maternal and perinatal deaths in low resource settings: a systematic review. *BMC Pregnancy and Childbirth*. 2014;14(280):<http://www.biomedcentral.com/1471-2393/14/280>.
5. Muchemi MO, Gichogo AW. Maternal mortality in Central Province, Kenya 2009–2010. *Pan Afr Med J*. 2014;17(201):<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4229002/>.
6. Baharuddin M, Amelia D, Suhowatsky S, Kusuma A, Suhargono MH, Eng B. Maternal death reviews: A retrospective case series of 90 hospital-based maternal deaths in 11 hospitals in Indonesia. *Int J Gynaecol Obstet*. 2019;144(Suppl 1):59–64.
7. Kongnyuy EJ, Mlava G, van den Broek N. Facility-based maternal death review in three districts in the central region of Malawi: an analysis of causes and characteristics of maternal deaths. *Women's health issues: official publication of the Jacobs Institute of Women's Health*. 2009;19(1):14–20.
8. Ministry of Health and Social Welfare. Maternal and Perinatal Death Surveillance and Response guideline. Dar es Salaam: Reproductive and Child Health section; 2015.
9. World Health Organization. Maternal death surveillance and response: technical guidance information for action to prevent maternal death: World Health Organization; 2013.
10. Bandali S, Thomas C, Hukin E, Matthews Z, Mathai M, Thandassery D, et al. Maternal Death Surveillance and Response Systems in driving accountability and influencing change. *International Journal of Gynecology & Obstetrics*. 2016;135.
11. Wood DL. Documentation guidelines: evolution, future direction, and compliance. *The American Journal of Medicine*. 2001;110(4):332–4.
12. Moran MT, Wisner TH, Nanda J, Gross H. Measuring medical residents' chart-documentation practices. *Acad Med*. 1988;63(11):859–65.
13. Danladi Garba K. Significance and challenges of medical records: A Systematic Literature Review. 2016.

14. Luck J, Peabody JW, Dresselhaus TR, Lee M, Glassman P. How well does chart abstraction measure quality? A prospective comparison of standardized patients with the medical record. *The American Journal of Medicine*. 2000;108(8):642–9.
15. Saravi BM, Asgari Z, Siamian H, Farahabadi EB, Gorji AH, Motamed N, et al. Documentation of Medical Records in Hospitals of Mazandaran University of Medical Sciences in 2014: a Quantitative Study. *Acta Inform Med*. 2016;24(3):202–6.
16. Soto CM, Kleinman KP, Simon SR. Quality and correlates of medical record documentation in the ambulatory care setting. *BMC Health Serv Res*. 2002;2(1):22-.
17. Smith H, Ameh C, Roos N, Mathai M, Broek N. Implementing maternal death surveillance and response: a review of lessons from country case studies. *BMC Pregnancy Childbirth*. 2017;17(1):233.
18. Sunguya B, Thapa K, Kinney M, Lemwayi R, Mwaitenda US. Assessment of MPDSR Implementation in Kagera and Mara Regions, Tanzania. Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC), Maternal and Child Survival Program (MCSP), U.S. Agency for International Development, 2018.
19. United Republic of Tanzania URT. 2012 Population and Housing Census: Population Distribution by Administrative Areas. Dar es Salaam: National Bureau of Statistics, Ministry of Finance, Office of Chief Government Statistician President's Office, Finance, Economy and Development Planning Zanzibar, 2013.
20. United Republic of Tanzania URT. Mortality and Health. Dar es Salaam: Natinal Bureau of Statistics Tanzania, Ministry of Finance, Office of chief and Government Statistician, 2015.
21. Ministry of Health Community Development Gende Elderly and Children (MoHCDGEC). [Tanzania], Ministry of Health (MoH) [Zanzibar], National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS) al. Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS) 2015-16. Dar es Salaam, Tanzania and Rockville. Maryland: MoHCDGEC, MoH, NBS, OCGS, and ICF; 2016.
22. Cradock J, Young AS, Sullivan G. The accuracy of medical record documentation in schizophrenia. *J Behav Health Serv Res*. 2001;28(4):456–65.
23. Saravanan B, Muhammad R, Geach R, Jenkinson LR. Comparison of the history obtained by patient-completed questionnaires with doctors' standard notes for patients with acute abdominal pain. *Postgrad Med J*. 2009;85(1010):634.
24. Kongnyuy EJ, van den Broek N. The difficulties of conducting maternal death reviews in Malawi. *BMC Pregnancy Childbirth*. 2008;8(1):42.
25. Magoma M, Massinde A, Majinge C, Rumanyika R, Kihunrwa A, Gomodoka B. Maternal death reviews at Bugando hospital north-western Tanzania: a 2008–2012 retrospective analysis. *BMC Pregnancy Childbirth*. 2015;15(1):333.
26. Pembe AB, Paulo C, D'mello BS, van Roosmalen J. Maternal mortality at muhimbili national hospital in Dar-es-Salaam, Tanzania in the year 2011. *BMC Pregnancy Childbirth*. 2014;14(1):320.

27. Nyamtema AS, Urassa DP, Pembe AB, Kisanga F, van Roosmalen J. Factors for change in maternal and perinatal audit systems in Dar es Salaam hospitals, Tanzania. *BMC Pregnancy Childbirth*. 2010;10(1):29.
28. Muchemi O, Gichogo A. Maternal Mortality in Central Province, Kenya, 2009–2010. *The Pan African medical journal*. 2014;17:201.
29. Sageer R, Kongnyuy E, Adebimpe WO, Omosehin O, Ogunsola EA, Sanni B. Causes and contributory factors of maternal mortality: evidence from maternal and perinatal death surveillance and response in Ogun state, Southwest Nigeria. *BMC Pregnancy Childbirth*. 2019;19(1):63.
30. National Statistical Office (NSO). [Malawi], ICF. *Malawi Demographic and Health Survey 2015-16*. Zomba, Malawi, and Rockville. Maryland: NSO and ICF; 2017.
31. National Population Commission (NPC). Nigeria ICF. *Nigeria Demographic and Health Survey 2018*. Abuja, Nigeria, and Rockville, Maryland: NPC and ICF, 2019.
32. Kenya National Bureau of Statistics, ICF. *Kenya demographic and health survey report, 2013–2014*. <https://dhsprogram.com/pubs/pdf/fr308/fr308>, 2015.

Figures



Figure 1

The process of maternal death review by MDSR committee

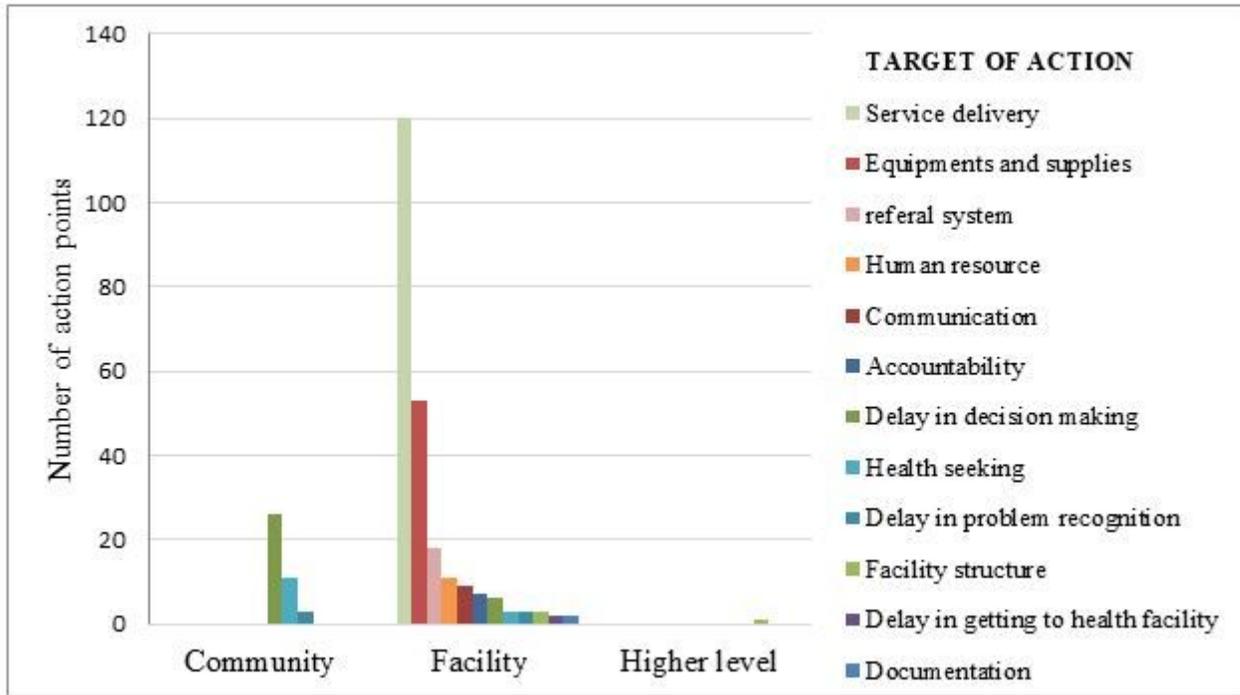


Figure 2

Place of implementation and issues addressed by the action points