RESEARCH ARTICLE

REVISED Barriers and facilitators to maternal death surveillance and response at a busy urban National Referral Hospital in Uganda [version 2; peer review: 2 approved]

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Abstract

Background: Preventable maternal and newborn deaths remain a global concern, particularly in low- and- middle-income countries (LMICs) Timely maternal death surveillance and response (MDSR) is a recommended strategy to account for such deaths through identifying contextual factors that contributed to the deaths to inform recommendations to implement in order to reduce future deaths. Implementation of MDSR is still suboptimal due to barriers such as inadequate skills and leadership to support MDSR.
With the leadership of WHO and UNFPA, there is momentum to roll out MDSR, however, the barriers and enablers for implementation have received limited attention. These have implications for

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successful implementation. The aim of this study was: To assess barriers and facilitators to implementation of MDSR at a busy urban National Referral Hospital as perceived by health workers, administrators, and other partners in Reproductive Health.
Methods: Qualitative study using in-depth interviews (24), 4 focus-group discussions with health workers, 15 key-informant interviews with health sector managers and implementing partners in Reproductive-Health. We conducted thematic analysis drawing on the Theory of Planned Behaviour (TPB).
Results: The major barriers to implementation of MDSR were: inadequate knowledge and skills; fear of blame / litigation; failure to implement recommendations; burn out because of workload and inadequate leadership- to support health workers. Major facilitators were involving all health workers in the MDSR process, eliminate blame, strengthen leadership, implement recommendations from MDSR and functionalize lower health facilities (especially Health Centre -IVs).
Conclusions: The barriers of MDSR include knowledge and skills gaps, fear of blame and litigation, and other health system factors such as erratic emergency supplies, and leadership/governance challenges.
Recommendation: Efforts to strengthen MDSR for impact should use health system responsiveness approach to address the barriers identified, constructive participation of health workers to harness the facilitators and addressing the required legal framework.

Keywords
Key words: Barriers, facilitators, death reviews, multi-stakeholder perspectives

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Any reports and responses or comments on the article can be found at the end of the article.

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REVISED **Amendments from Version 1**

Thanks to the editors of Open Research Africa and reviewers for editing our paper. We are happy to note that the paper was considered an important contribution to ongoing efforts to strengthen maternal and perinatal death surveillance and response (MPDSR) as a quality improvement process to contribute to reduction of maternal and perinatal deaths.

Confidentiality was raised as one of the major concerns so that it is not possible to link statement to individual study participants in this sanative study. The authors read the article and edited the method, results, and discussion sections appropriately. The critical issue is that none of the participants was addressed by name. Most of the study participants were in positions that have many people at that level. Even for the level of the leaders and managers, the voices have been grouped such that the reader can only attribute information to leaders or managers but not to a particular individual.

We were requested to add number of total deliveries at the study setting (refer to method section). We also described stakeholders' selection in detail (refer to methods section).

The other critical aspect requested was to add aspect of reflexivity to show how the position of the lead researcher was minimized during the study. There were efforts to bring an independent team of social worker and note takers during data collection. The other aspect involved working with independent people to do the transcription, initial coding, and development of themes (refer to explanation under section on reflexivity). There are no new tables or figures. Some other edits have been addressed as appropriate.

Therefore, we feel that there were efforts to enhance trustworthiness of the information presented to ensure credibility, confirmability and dependability as recommended by some researchers such as (Lincoln & Guba, 1986) and (Connelly Lynne, 2016).

Any further responses from the reviewers can be found at the end of the article

Introduction

Preventable maternal mortality has remained a global concern despite the 44% reduction that occurred from 2000 to 2015 (UNICEF, 2019; UNFPA *et al.*, 2019). Uganda had a modest reduction in its maternal mortality ratio (MMR) over that millennium development goals (MDG) period, i.e. from 506 per 100,000 live births to 336 per 100,000 livebirths (Uganda Bureau of Statistics and ICF, 2016) which is/was the official MMR for the study period too. This MMR of 336 per 100,000 livebirths is still way below the national sustainable development goal (SDG) target of ≤140 to contribute to a global one of ≤ 70 per 100,000 livebirths by 2030 (McArthur *et al.*, 2018; United Nations, 2015). Overtime, women are dying from conditions considered preventable (Kaye *et al.*, 2003; Nakimuli *et al.*, 2016a; Ngonzi *et al.*, 2016). Implementation of a sustained maternal death surveillance response (MDSR) system is one of the innovations that is recommended as a strategy to reduce maternal deaths (Koblinsky, 2017; World Health Organization, 2013; World Health Organization and UNICEF, 2015). Timely MDSR would enhance accountability at all levels of the health care system up to the community level in order to prevent maternal and newborn death (Bandali *et al.*, 2016; Hunt & Gray, 2013; Koblinsky, 2017; Mathai *et al.*, 2015).

Indeed, implementation of recommendations from maternal death reviews and confidential enquiries has contributed to reduction in maternal deaths in some settings such as Rwanda (Sayinzoga *et al.*, 2016), the United Kingdom (Knight *et al.*, 2016), Ethiopia (Abebe *et al.*, 2017; Lindtjørn *et al.*, 2017). However, the recommended timely notification and review of these deaths (World Health Organization, 2021) does not occur in many parts of the world especially in Sub-Saharan Africa (SSA) where most of the maternal deaths occur (Mathai *et al.*, 2015; Smith *et al.*, 2017a; Smith *et al.*, 2017b). There are efforts to improve both maternal and perinatal death reviews. Some studies have reported barriers such as inadequate training, lack of financial motivation and high turnover of staff (Abebe *et al.*, 2017; Agaro *et al.*, 2016; Smith *et al.*, 2017b). However, a strong political will, supportive legal frame work that minimized fear of litigation are some of the reported facilitators for MDSR (Abebe *et al.*, 2017). There is limited information on barriers and facilitators to timely MDSR from high-volume settings in SSA where MDSR uptake is still low.

Drawing on the Theory of Planned Behaviour (TPB) (Ajzen, 1991) we explored barriers and facilitators to strengthen MDSR system as a quality improvement process at a busy tertiary hospital in Uganda. The constructs within the theory have been reported to predict attitudes and intention to implement particular behaviour including health sciences (Ajzen, 2015; Cooke *et al.*, 2016; McEachan *et al.*, 2011). In addition, the TPB has been used to understand behaviour and successfully applied in other studies including health sciences (Bosnjak *et al.*, 2020; Wiese *et al.*, 2021). TPB has the following domains: Attitude; subject norms; perceived behavioral control; intention (plan to change to embrace a particular behavior or action, in this case MDSR); then planned behavior to effect or perform the actual practice. The TPB is widely used to explain behaviour in terms of the beliefs that individuals hold about the behaviour in question in this case MDSR. Therefore, in this study we purposed to explore the barriers and facilitators to MDSR implementation and obtained information on the proposed priority interventions.

Methods

Study setting

This work has been conducted in the Department of Obstetrics –Gynaecology of a high-volume National Referral Hospital. It was originally located on Mulago Hill (5 km North of Kampala City), but currently at Kawempe, 7km North of Kampala City of Uganda. It is part of the wider research project whose title is *"Reducing maternal deaths using maternal death surveillance and response at Mulago-Kawempe National Referral Hospital in Uganda*". The study setting is one of the sub-Saharan Africa's busiest maternity Centre (Nakimuli *et al.*, 2016b). The total number of annual deliveries ranged from 23,000 – 27,000 over the three years 2016 to 2018 (Namagembe *et al.*, 2022), In addition, this Centre contributes to the biggest number of deliveries plus maternal and perinatal deaths in Kampala District but performance of death reviews (audits)

Table 1. Characteristics of study participants who participated in KII, IDIs and FGDs.

Job Title	Age range	Mean Age	Range of years at work station	Gender		Previous MDSR training		Total
				Female	Male	Yes	No	
Specialist Doctors Obs-Gyn (8); Anaesthesia providers, & Pathologists (IDIs,)	30–53	47.0	6–26	3	8	7	4	11
Midwives (9 IDIs)	27–58	46.0	3 – 30	9	0	4	5	09
Resident Doctors (SHOs) (IDIs)	29–38	32.5	2.5–3.0	0	4	3	1	04
KII interviews for Leaders (Directors=3; Admin=2 & HOD=1)	42–58	50.5	5–30	4	2	3	3	06
MoH & RH-Partners (WHO, UNFPA, FHI-360, MANE, UMDPC, UMA) (KIIs)	33–60	49.4	3–20	2	7	8	1	09
4-FGDs:(SHOs=10; E/mid=6; R/Mid=7; Support team =5)	26–50	35.0	1–12	21	7	11	17	28
Total	**26–60**	**43.4**	**1–30**	**39**	**28**	**36**	**31**	**67**

was still low by then (Namagembe *et al*., 2022). The institutional MMR ranged from 500 to 600 per 100,000 livebirths.

Study participants

Most of the study participants (internal stakeholders) work at the Hospital which also doubles as the main teaching hospital for Makerere University and other medical training institutions. These included: obstetricians, midwives, senior house officers (resident medical officers on masters training program), representatives from laboratory, pharmacy, stores, anesthesia providers, administrators and hospital managers. These participants were mainly from labour ward, theatre, High-Dependency Unit (HDU) and gynae-emergency where most of the maternal deaths occur.

The other participants (external stakeholders) were representatives from Reproductive Health division of Ministry of Health (MoH), implementing partners in Reproductive Health such as WHO, UNFPA, Kampala Slum Maternal and Newborn (MaNe) Project, regulatory body for medical doctors (Uganda Medical and Dental Practioners' Council -UMDPC) and representative from Uganda Medical Association. The external stake holders whose data is used in this paper were people expected to have some level of knowledge regarding the processes of MDSR.

Stakeholder selection was as follows: The inclusion criteria for the study participants for IDIs, FGDs for the health workers or KIIs for leaders /managers at the National Referral Hospital or external stakeholders required having stayed at the respective position for at least six months and above. Then a written consent was obtained before actual participation and they had received earlier information that the study was for research purposes for the student (NI) first author).

After discussing the main objective of the study "to explore the barriers and facilitators to maternal death surveillance and response", the list of names of potential study participants was developed assisted by the Clinical Head, and a Senior Nursing Officer. Those in leadership positions, those who used to participate in maternal and perinatal death review related activities, ward in charges and others who were considered rich in information or those described as people committed to their work as judged by the team. The identified people were then contacted by one of the research team members or Principal investigator and requested to give an appointment at their convenience to participate in the study. Ten of the participants failed to create time because of their busy schedule (3 SHOs, 3 midwives and two anaesthesia providers plus some two of the external stakeholders from Ministry of Health). The fact that some participants excused themselves (did not participate) gave us some level of confidence that study participants' decision was voluntary. A written consent was obtained before actual participation

The study participants were aware that the main researcher (NI) was a student whose research goal was to explore barriers and facilitators to implementation of maternal and perinatal death surveillance in general, but with main focus on MDSR as per the guidance. The study participants had been informed that their input would greatly inform what needs to be done to strengthen implementation of the MPDSR policy in general since the retrospective quantitative maternal death- data had shown that the proportion of deaths reviewed was still low (at 33 %) and not done in a timely manner (Namagembe *et al*., 2022).

Exposure to previous training in maternal or perinatal death surveillance and response was not used as criteria to select

study participants since some messages to support MPDSR activities used to be discussed in departmental meetings in a non-selective manner even before this research. However, during collection of biodata, a question was included to have an idea of those that had previous exposure to formal training in MPDSR processes

Reflexivity concerns

Although NI is one of the Senior Clinicians at the study hospital, she read more and also made enquiries from social scientists (senior qualitative researchers) who proposed that she can participate as one of the tools in this research. However, she continuously self-examined and remained aware of the need to detach self from the phenomenon being explored (in this case MDSR) in order to capture participants' views with an open mind. This involved remaining neutral and setting aside views of the 'clinician' to fit in the role of a researcher guided by study objectives and a pre-designed interview guide with clear topics for discussion during the conduct of interviews. In addition, the lead researcher was commonly introduced 'as senior-midwife' in order to minimize positionality to a certain degree to enhance a free environment of communication.

NI put in a deliberate effort to work with independent social scientist and note takers and participants were encouraged to give their correct perspectives. No participant was addressed by name during interviews.

It is true that in reflexivity, some researchers tend to carry their own perspectives during the conduct of research and interpretation of findings. This challenge was mitigated by working with an independent social scientist, using open ended questions, having an independent note taker who did the initial transcription and independent qualitative researchers who worked on the initial coding of the data and later discussed with NI and other co-authors. The variety of health workers in the study plus use of IDIs, KIIs and FGDs helped to enhance triangulation of data. The nature of the interviews looked at both barriers and facilitators to get a more balanced enquiry. Therefore, we feel that these efforts enhanced trustworthiness of the information presented in this research. As recommended by some researchers (Lincoln & Guba, 1986) and (Connelly, 2016), there was effort to enhance credibility, confirmability and dependability.

Ethics approval and consent to participate

The study was approved by the Makerere University Higher Degrees School of Medicine Research and Ethics Committee (SOMREC), # REC Ref 2018-001 and by the Uganda National Council of Science and Technology (UNCST), assigned number (UNCST, Ref SS4797). All study procedures were conducted as per the relevant guidelines and regulations. The study participant had to provide written consent before the interviews and they agreed to have audio recordings and dissemination of study results. The confidentiality of the participants was maintained by use of interviews numbers, no actual names within the transcripts and audio tapes would be destroyed as soon the data analysis is completed

Study design and sampling

In order to explore the barriers and facilitators to MDSR, we conducted an explanatory qualitative study from March 2019 to December, 2019 to assess perceptions of the different stakeholders.

Overall, 67 health workers and other stakeholders were purposively selected on the basis of their current or past involvement in conducting or planning MDSR, using maximum variation sampling to enrich the data. Of these, 24 participated in-depth-Interviews (IDIs), 15 in Key informant interviews (KIIs) and 28 in the 4- focus group discussion (FGDs). Table 1 shows the characteristics of the study participants. The stakeholders from Ministry of Health and other partners in Reproductive Health were people familiar with the MPDSR process.

Most of the Internal stakeholders participated in IDIs. These were mainly health workers who were participating in activities of MPDSR committees. Additional participants were those available and identified by the Head Nurse or Clinical Head as having rich information on the maternal death review processes. Participants were contacted by phone call or physically by the first author who requested for an appointment on a day convenient for them to participate in interviews. The FGDs were conducted after the IDIs. The purpose of FGDs was to generate normative information about the MDSR process as well as health workers views and experiences regarding MDSR. We targeted people likely to be information-rich based on their experience after consulting the ward in-charges and people they work with. We felt that data from FGDs would enrich that from IDIs and KIIs to enhance data triangulation, since the MDSR processes requires team participation. Those who had participated in the KIIs or IDIs were excluded from the FGDs. In order to have homogenous groups, separate groups were arranged for specialists, residents, nurses/midwives and support staff (anesthetic officer, laboratory leader, pharmacy, stores, assistant -administrator).

The external stakeholders who participated in the study were identified by NI working closely with the Ministry of Health (MoH) officers. All interviews were conducted in a private space to allow free communication and privacy.

Data collection and informed consent process

The interview guides were pre-tested by the first author using one senior midwife, one obstetrician -gynecologist and one SHO. These initial interviews were used to refine data collection tools and data from this phase was excluded from the final analysis. All interviews and FGDs were conducted in English. The KIIs and IDIs lasted for about 30 to 50 minutes whereas the FGDs lasted 60 to 90 minutes. Each FGD had 6 to 10 participants.

Participants gave written informed consent to participate and to have interviews recorded. Open ended questions were used to explore their views on barriers and facilitators to timely MDSR at the Hospital. Other questions sought for top causes of

Table 2. Codes and sub-themes within the broader theme of barriers to maternal death surveillance and response (MDSR) aligned to Theory of Planned Behaviour (TPB).

Basic concepts/Codes	Categories (Sub-Themes)	Linkage with the Theory of Planned Behavior	Broader Theme
Inadequate knowledge	Inadequate knowledge/skills in MDSR	Perceived behavioral Control	BARRIERS
Inadequate training in MDSR			
Lack of skills of MDSR			
Too many patients	Heavy workload		
Many deaths			
Inadequate number of health workers			
Inadequate institutional support	Leadership / Governance Challenges	Subjective norm	
Inadequate commitment of leaders			
Inadequate (Sub-optimal) leadership			
Limited interest by staff in MDSR			
False documentation	Fear of (Blame, litigation or criminalization)	Attitude towards MDSR	
Fear of blame (fear of arrest)			
Fear of litigation/ criminalization			
MDSR perceived as a policing game			
Low interest by staff	No response (MDSR cycle not completed)		
Failure to implement actions			
Implementing partners (IP) elsewhere			
Failure to follow up			

maternal death at the Hospital and whether such deaths were preventable; participants' opinions on protection of health worker from litigation and whether the information on review forms is protected from being used in Courts of Law in case of litigation. In addition, some questions to explore the domains in the theory of planned behavior (TPB) such as: attitude, towards performing MDSR, subjective norm (about usefulness and supervisor's influence regarding MDSR); perceived behavioral control which would influence behavioral intention and finally behavior. The interviews were conducted by NI (an obstetrician-gynaecologist with public health training) and MM (a Social Scientist with public health training). Field notes were discussed to assess emerging issues. The study tool was developed using information available in the literature that guided the conceptual framework.

Quality control

NI worked with another researcher (a social scientist) and note takers during the study to conduct interviews. The interview guides were pre-tested and refined to enhance clarity. All interviews were audio recorded and reference to field notes was also done during transcription. In addition, two other independent researchers participated in the manual coding of the transcripts to identify the meaninful units, subthemes and themes and later discussed with NI.

Data analysis

The audio-recorded interviews (IDIs, KIIs, and FGDs) were transcribed verbatim by the note taker and prepared for analysis. Thematic analysis guided identification of emerging themes in an inductive manner. We followed the steps recommended by Braun and Clarke. i.e , "transcription; reading and familiarization; coding; searching for sub-themes; reviewing them; defining and naming themes; and finalizing the analysis", (Braun & Clarke, 2006; Damayanthi, 2019).

The initial coding (to identify meaningful phrases) and categories was done by NI and two research assistants with experience in qualitative research. These held de-brief meetings with the research team and discussed the codes to enhance trustworthiness of data. The coding team initially coded two transcripts together, then worked independently to identify upcoming themes and met regularly to get agreement and consensus on the codes generated. NI with the team read the transcripts a

Table 3. Facilitators aligned to Theory of Planned Behavior (TPB) that strengthen implementation maternal death surveillance and response (MDSR) at National Referral Hospital.

Basic concepts/Codes	Categories (Sub-Themes)	Theory of planned behavior	Broader Theme
Orient HWs in concepts/ benefits of MDSR	Train / mentor all stakeholders on MDSR	**Perceived behavioral Control**	FACILITATORS
Sensitize HWs on MDSR			
Train all health workers on importance			
Train how to conduct			
Train administrators			
No blame game	Strengthen Leadership/ Governance and support blame free environment	**Subjective norms**	
Not punitive			
Collective responsibility			
Committed leadership			
Address leadership issues			
Change attitude			
Provide refreshments during meetings	Create Incentives for meetings	**Enhance attitudes to MDSR**	
Identify motivators			
Give an allowance			
Reward people			
Keep meetings short			
Regular committees	Strengthen / Create more committees		
Strengthen teams			
Orient committee members			
Conduct weekly meetings			
Orient all new members e.g SHOs as soon as they come			
Feedback to providers	Complete the MDSR cycle		
Complete the cycle			
Implement actions			

number of times in order to get familiar with the data. Transcripts were then coded manually using framework analysis in Microsoft-Excel (2010) computer program. The sub-themes were generated and aligned to TPB constructs of attitudes towards MDSR, subjective norms and perceived behavior control (Ajzen, 1991) regarding implementing MDSR system Selected quotes from study participants have been used to present study findings..

Results

This paper presents results from 67 participants; 24 IDIs from health workers at the Hospital, 15 key-informant interviews (KIIs) with external stakeholders and hospital managers; and 28 health workers who participated in 4 focus group discussions (FGDs). The 24 IDIs included 9 -midwives; 8-obstetricians-gynaecologists; 1-anesthesiologist, 2-pathologists and 4-residents (Senior House Officers).

Table 1 shows characteristics of the study participants. Their age range was 26 – 60 years with a mean age of 43.4 years. Most of the study participants had served for more than 5 years at their places of work, range in service of 1–30 years. Most of the participants were females 39 (58.2%). Many had not had exposure to formal MDSR training 31(46.2%) (Table 1).

Causes of maternal deaths as reported by the participants

All participants agreed that the burden of maternal deaths was high although most were not so sure of the exact number of women who die from the Hospital per month or per year.

Most health workers mentioned post-partum hemorrhage, pre-eclampsia / eclampsia, sepsis and abortion complications as major causes of maternal deaths. However, some of the external stakeholders reported that delays of mothers at home, negligence of health workers and lack of emergency supplies were the major drivers. All study participants were in agreement that most of maternal deaths are preventable.

Importance of MDSR as perceived by the study participants: Almost all study participants scored the MDSR process to be very useful. Most of them proposed that all health workers should be brought on board to support the MDSR.

Barriers and facilitators to maternal death surveillance and response

The major themes presented here as barriers and facilitators to implementation of MDSR were aligned to constructs of TPB as summarized in Table 2 (for barriers) and Table 3 (for facilitators) to MDSR respectively.

Under the theme of "barriers to implementation of MDSR" at the Hospital, the study findings revealed barriers in all the three constructs of the TPB as explained in the following sub-sections.

Perceived lack of behavioral control

Under this domain, study participants identified inadequate knowledge and skills plus heavy work load as the major barriers affecting the implementation of MDSR.

Inadequate knowledge and skills about MDSR. Study participants cited knowledge gaps and inadequate skills as one of the barriers to implementation of MDSR. Participants expressed difficulties in filling MDSR forms and the death notification process especially health workers that had not been trained as FGD participants explained;

"*…it feels [seems] that most do not know when to do the notification* (FGD-3- Enrolled midwives).."

Most of us health workers have not been enlightened about this…there is knowledge gap because….no training of health workers (FGD-4-Registered midwives)

When someone lacks the knowledge and skills, it becomes hard to take charge of something or behavior change. Some participants reported that at one stage they did not know what to do until they were taught about MDSR processes as one FGD participant explained:

"*…the other thing that actually kills us health workers is knowledge gap. I believe a person tries to fill one of those audit forms the way they used to call them I used to fear actually to fill it, until I was taken through it and I got to know it is something easy that I can actually lead a team… and …. but before that you don't fill them because you have no idea of how to put things right (FGD-1-SHOs)*

Heavy workload as a barrier to MDSR implementation. Most study participants mentioned heavy workload as a major barrier to MDSR. Most participants echoed the high burden of patient numbers in relation to the limited number of health care providers. Some participants reported that the current staffing level is about one third of the expected (staff capacity of 320 / 900). Others noted lack of time to do the maternal death reviews because of competing schedules, which led to postponing the reviews, often creating many unreviewed or delayed reviews of deaths. This greatly interferes with control domain. They felt that it is beyond them as reflected in some of the quotes below.

"…overwhelming number of patients… there might be this other team who [report] the house is very bad…They are supposed to audit and really they cannot leave other mothers again to die and then begin auditing so they put it aside, at the end of the day they go in exhausted so… they keep on postponing and when somebody take long (without doing the reviews), they tend to forget certain things" (IDI-Resp-02, Midwife)

Many health workers expressed feeling work overload which often emerged as an area of conflicting interests to either leave work at the unit or participate in MDSR meetings. This setting characterized by inadequate number of health workers, who are overworked and with knowledge and skill gaps hindered implementation of the MDSR.

Unfavorable subjective norms as a barrier to implementation of MDSR

Regarding unfavourable subjective norms, findings revealed leadership and governance challenges such as inadequate institutional support for MDSR, inadequate commitment by leaders and low interest by staff affecting implementation of MDSR.

Inadequate leadership and governance. Some study participants cited that some leaders appear unconcerned, indifferent or ambivalent regarding implementation of MDSR which discouraged health workers. Participants reported that leadership at various levels is very important (i.e., Right from the politicians, the Ministry of Health, the Directors, Administrators, In-charges of the wards, and head of Department teaching side are all critical) for effective implementation of MDSR. Participants believed that once the leadership supports, provides the resources and embraces the entire process, then high levels of MDSR will be performed. This would enhance better survival of patients. When leaders have interest, health workers would be encouraged and motivated to stop doing MDSR as a formality but instead as a routine practice as exemplified by respondents:

"…. maternal death review …[looks] as if it is just a formality whether you do it or you don't do it you are not going to see anything different (Resp-9 –SHO, IDI)"

"*……leadership not showing interest is a problem… …. because you know these facilities are very busy and if leaders do not structure a way of having the deaths reviewed on a regular basis so that there is no backlog…(Resp-41-Leaders/Managers-, KII).*

"*…I think first and fore most there should be buy-in from leaders and key stakeholders... to walk the MDSR talk…… (Resp-14-Leaders/Managers, KII)*

Another governance challenge that was often expressed by study participants as a barrier to the implementation of MDSR was erratic supplies [shortage of supplies] which tend to demotivate the service providers. Recurrent shortage of supplies such as sutures, magnesium sulphate, blood products and so on was understood by some health workers to imply that MDSR was not important.

"..the key barriers is relative supply like I will overly emphasize emergence preparedness and complication readiness of the facility in terms of you know yes the supplies, sundries, drugs…" (Resp-21-OBS-GYN-IDI)

Other health workers mentioned lack of incentives such as allowances and refreshments during MDSR meetings as a barrier.

"*…lack of incentives, the incentives basically, those because we come expecting and they readily demanded but we are doing all this work, we have sat here for two hours…but nothing*" (Resp-012- OBS-GYN-IDI)

In addition, some participants cited insufficiency of the hard copies of death notification and audit forms and failure to have an electronic system to submit the required information to MoH as a hindrance to implementation of MDSR.

Unfavorable attitude of health workers and managers towards MDSR

The main sub-themes reflecting unfavorable attitude towards MDSR in study participants' narratives were 1) fear of blame and 2) incomplete MDSR cycle.

Fear of blame as a barrier to MDSR implementation. Fear of blame was reported as a major barrier to MDSR process especially by senior house officers (SHOs). They felt that leaders and other health workers insinuate that they are the cause of deaths. Others reported that writing names on maternal death notification exposes them to blame. Furthermore, participants quoted stories of health workers who were arrested after a maternal death. The fear is even more in the event of a maternal death of a politician or someone related to influential people. Fear of blame is not only with the team in training, but also with some of the senior health workers and leaders. Some people get worried that if they notified a death within the first 24 hours, probably it would backfire on them if there were enquiries from the higher level, as exemplified by quotes from respondents:

"Yeah, if you think squarely, you will be blamed for this maternal death you wouldn't be motivated in participating … No, that word who caused the death, actually …. last night -ok you killed a mother last night. Somebody asking you the question, you killed one last night, there is a way it just makes you feel, eh, (pause) it means I was the cause of death of this one (FGD1-SHOs)

"…. people are not free, I think that's fear. Fear is something we see very often because it's like it's supposed to be a process that is blame free, but in the end, it almost appeared like it's a blame game". (Resp-9-SHO, IDI).

"…there is fear even reviewing the maternal deaths because in most cases you will identify there is a gap, [in care] maybe if we have acted, so this we could have saved this mother from what, (pause) from dying, so that fear alone also is a deterrent especially you know……but if the law asked us to produce the maternal death review form [from] the health workers, [we fear].....we are not protected" (Resp-4, Obs-Gyn, IDI)

One of the obstetrician/gynecologists reported that fear is still real, relating it to a letter from a past Minister of Health which instructed the police to investigate every maternal death.

"*….I remember when the president wrote a letter instructing the ministry, copy to the police, copy to so many people, (to these RDCs) instructing that every maternal death should be investigated by police and some of our colleagues were actually arrested when a maternal death happened because they had the authority…… because of that fear most people fear to report maternal deaths (Resp-4, Obs-Gyn, IDI)*

"…sometimes we try to point fingers and even blame colleagues ..(respondent laughs)..(Resp-1-Midwife-IDI).

Some study participants felt that influential people abuse the MDSR process and induce fear among healthcare providers about notifying deaths, as it might involve court proceedings:

"Some patients might be highly influential/political or those who have too many attendants. and most staff feel, they will be held responsible [for] that death (FGD-4-Registered Midwives)

"…what most people have been fearing is that supposing I notify, the ministry of health is going to ask the head of the institution, there is a death which has happened in your place ok and some of those messages coming back from the ministry of health are not supportive ….. the head of the institution says but who told you to notify?... you know, because it [may have] has the legal implications (Resp 6, Obs-Gyn-IDI)

"…… the forms [filled death review forms] might be used in court against them and... it's hard to remove those fears especially due to deaths caused [gaps in care] as a result of many patients". [FGD3-Enrolled midwives]

However, few participants reported that MDSR is not a punitive process for the individual, but can be used to correct errors when things can go wrong within the system, and suggested that in such a situation, call a colleague and correct him or her, as reflected in the quote below.

"*….MDSR process is not a blame system but you can just pick and talk to an individual of whatever happened and maybe you can also review the system …..see whether it is the system which failed …., to manage the patient for example like theater you can have a system where there very many patients and you cannot put in an individual and sometimes happens before she goes to theater, sometimes it is blood, sometimes it is human resource so it [MDSR] gives you time to identify what went wrong so that it is corrected.." (Resp-2- midwife, IDI*)

Incomplete MDSR cycle as a barrier

Implementation of recommendations is partly governed by attitude at various levels although availability of resources may also affect it. Most of the participants reported that failure to implement recommendations is a major barrier to MDSR. Completion of the cycle is considered to be a critical step, but support for this even from Ministry of Health was perceived to be low, as reflected in the quotes below

"I want to start with the biggest barrier being lack of implementing the recommendations (FGD1, SHOs).

"Failure to implement recommendations, minimal level of commitment by the staff members, work load…" I think also other barrier beyond the health facility we are not getting adequate support from the ministry". (Resp 4, Obs-GYN, KII)

Negative attitude as a barrier to MDSR under personal attitude was also reported. Some of the participants cited negative attitude of health workers as a critical barrier to MDSR. Some felt that commitment is not from all members partly because of negative attitude, despite all the other challenges. However, some of the participants noted that health workers do not take MDSR processes seriously due to heavy work load, inadequate knowledge and skills and others perceiving the process as punitive.

"*The ones that I've sat with are seeing it good but the people who are not involved in sitting in those meetings for reviews, they still have a negative attitude because whenever you call them come let's go for review, aa…aah, they still think that it is a punitive review"* (Resp-1-Midwife, IDI).

Negative attitude of the health workers towards the review hinders the process. (Resp- 6, OBS--GYN, IDI)".

"Some *of my peers have…, they still have a negative attitude. Yes, so the training is all in all for all because it is very important for all of us to have the knowledge and also to participate in the reviews and use it for continuous improvement"* (Resp-28 –OBS-GYN, IDI*).*

Lack of adequate champions to spearhead implementation of MDSR and differences in exposure and understanding of the process are other key barriers mentioned.

"..there are, a few people who have dedicated themselves to making these reviews and everybody knows that it is very important, it is a recommendation by ministry of health but people have to dedicate themselves to make sure that these reviews are done timely. (Resp-1-Midwife, IDI)

"I think one of the challenges could be that maybe not everybody is well informed about it or not everybody in the units has probably received it with the same kind of importance…" (Resp-25-OBS-GYN,IDI).

Facilitators to strengthen MDSR at the National Referral Hospital

Under the theme of "facilitators to implementation of MDSR" at the hospital, again the facilitators were aligned to the three main constructs of the TPB as explained in the following sub-sections.

Training and mentorship to enhance perceived behavioral control as a facilitator of MDSR. Training in MDSR being essential in harmonizing the review process was echoed by most participants. In addition, most participants voiced the need to bring all stakeholders onboard through training. This would enhance behavioral control through enhanced skills and knowledge most likely performance of MDSR. One of the key facilitators was that some of the people who were already trained, although few, were conducting some reviews the facility. Training would enhance understanding of objectives of MDSR, the guidelines or policy that explains their scope of work, terms of reference, benefits of conducting the reviews, concepts and use of MDSR data to improve health systems for maternal health care. Important to note is that including administrators in the training was reported to be critical to enable them address the health systemic issues that are identified to improve outcomes.

"..the important thing would be to train people, train people on how to conduct [MDSR], train people on how to utilize results of the review process, yes to me I think that would be the most important". (Resp-28-OBS-GYN, IDI).

"We need to get our hospital administrators trained with the health service providers and to take lead…. rectifying things which are supposed to be done; for example, like when somebody dies of a situation without blood [Blood not available]], we must look at why and how to get that blood so that it doesn't happen again". (Resp-002- midwife-IDI).

Training comes with other things and not just how to conduct MDSR. It comes with information on why it is important, training in soft skills, communication skills, leadership, and how you should handle issues where the MDSR cycle is not completed. It is the shared experiences that come with the training that cause trainees to have a change of mentality about MDSR. Some participants reported that including MDSR training in teaching institutions as a pre-service course unit would be a good strategy to get the students get MDSR embedded in their maternal health knowledge and skills acquisition. In addition, participants recommended that legislators also need training regarding the importance and principles of MDSR.

Favourable subjective norms as a facilitator to MDSR implementation. The main sub-themes under this were strengthening governance /leadership and supporting a blame free environment

Strengthening governance /leadership as a facilitator to MDSR. Most study participants identified strengthening leadership/governance as key to MDSR. If the leaders are committed to it, they will encourage people to conduct the reviews. In addition, most of our participants mentioned that acting on the recommendations to address gaps identified depends on leaders or administration of the hospital. Good leadership at various levels, also acts as cheer leaders when the leaders are committed to seeing the MDSR process working, functioning and producing results. The leaders should be empowered, supported to be in control and to support hold each other accountable at various levels of the health system for a holistic system strengthening.

"…this is a block [administration block] that articulates all the others, it does the decision making, it decides what happens [and] when. Now when you have decided at that level, it is very easy to tackle an issue because if you have a good leadership and governance, you will somehow have good supplies, … good health systems, you know they will decide when people train and when they don't, they will decide which health workers they have so I think leadership and governance is the first block we need to tackle. It will help us articulate all the others to have a good death surveillance system". (FGD-4_Senior Midwives).

"…governance is very critical, if people supply and they don't follow up to see what they've supplied, if health workers absent themselves and no one follows up to find out why…. The functionality of the hospitals depend on governance and governance is a structure right from up to your immediate boss. (Resp-6, Obs-Gyn -KII)

Furthermore, top leadership should ensure that the seniors and all people on the teams managing patients take charge. Currently the process is being driven mainly by junior doctors who would not impact on the decision-making and demand for actions on the recommendations made.

"*…the real top leadership ..[get involved] or probably where I am should ensure that the leaders of the teams managing patients take charge… because what is happening currently this [MDSR] process is being driven mainly by senior house officers, they really first of all are students" (Resp-14-Leaders/ Managers, KII).*

Creating a blame free environment as a facilitator to MDSR and enhancing accountability. Overall, the participants were of the opinion that there were few facilitators to MDSR at the time of the interviews in 2019/2020. However, one of the leaders mentioned that some MDSR related meetings were taking place and reportedly non-punitive since people were free to express themselves, without fear of being blamed.

"…they are very objective meetings, people are made to feel free to express themselves, to talk about how they feel, to talk about what happened and because they come with that attitude of am not going to be blamed, they even accept the mistakes where they happened (Resp-23-Leaders/Managers, KII)

However, most participants were of the opinion that blame was rampant and it should be eliminated while at the same time ensuring accountability and responsibility of one's actions. MDSR committee members should be reminded of the importance of separating blame from the actionable recommendations. Participants considered that there are actions to address absconding from duty causing a maternal death as much as there are actions to address a lack of clinical skills; albeit different. While the recommended action would be to re-train or give skills to the latter, for the former, the recommendation could include a harsher action such as expulsion from the institution. But in all this, the action is explained to the provider and is not blamed but rather s/he is taking responsibility for her actions.

".. but what I can say is much as we said it is not a blame game we don't want to promote negligence at whatever side be it administrative, be it on the clinical side there are cases where we detect negligence on the side of the health care providers if the law comes in, let it take its course as long as thorough investigations are made to prove beyond reasonable doubt that someone is guilty of negligence so the audits should not be a reason for people to commit careless mistakes moreover with the lives of others because of no blame" (Resp-23-Leader/Managers, KII).

"..not covering up on those in the wrong is important … that's why one of the weaknesses for the maternal audits, and which we have been quarrelling with, this business of saying that, let us not blame anybody. Let us not blame the wrongdoer…, let us correct what didn't go right. …. if it is a system failure, let the medical superintendent or the CAO who didn't provide the money be taken on. We cannot just sit on maternal deaths like that" (Resp-029- Leader/Manager, KII).

Favourable attitude of health workers as facilitator to MDSR

The main sub-themes reflecting favourable attitude towards MDSR in this study were: (1) provide incentives/motivation for meetings (2) completion of the MDSR cycle (3) strengthen or create more MDSR committees as reflected in Table 3.

Provide incentives/motivation. Some participants reported a need to provide incentives to conduct MDSR which may not necessarily be monetary. Incentives could include refreshments during the meetings and an office designated for the purpose. Participants echoed that understanding the importance of the death review is in itself a motivation. Because care providers get to know why mothers are dying and are then able to make recommendations to address the gaps to prevent similar deaths in the future. In addition, some participants reported that refreshments during the meeting will enhance the quality of the discussions.

> *"…we should be having the money to make sure that those critical life-saving things must be there. ..what is the opportunity cost for me coming to sit in your MDSR meeting of which I know all meetings we have sat in, no response has been done there is no effect, no impact* (Resp-6_Obs-Gyn-IDI).
>
> "*…we could sit comfortably because you are not hungry, you concentrate, so they should give them some refreshments, simple ones*" (Resp-18-Midwife, IDI)

Completion of the MDSR-cycle as a facilitator. Completion of the cycle is considered as a critical step. Failure to implement recommendations was identified as a major barrier. Thus, all efforts should be geared to prevention of death from similar circumstances through implementation of the appropriate recommendations. Improving quality of care to prevent similar deaths (mothers and newborns) is the major goal of death reviews. Most participants believed that response at various levels is urgently needed. Some reported that, one of the major disincentives was repeated meetings without realizing any impact.

"…we need to see the implementation of the recommendations as a big motivator because, personally me I look at it as wasting my time, just like the morning meetings am sorry to bring it up. The same song is done from Monday to Friday, we sing. ..but nothing changes. So you actually feel you are wasting your time (Resp-21, Obs-Gyn-IDI)

"We should implement .for example ..we need a medical doctor either or an intern to be placed at least in the zero post-operative….[.it is] critical because those who going to get stable [post c/section] their survival is in our hands because [close] monitoring is needed .. (FGD-1-Senior House Officers)

"…I think we should be able to freely. discuss it and constructively look for the response ,,. what could we [do] at our level, individual capacities…such that next woman who walks through the cycle [system] does not have to suffer this same fate of death" (Resp-13-Leaders/Managers, KII)

Strengthen or create MDSR – Committees as a facilitator. Functional committees should have committed volunteers; members who feel that they can make a difference or they believe can generate information or data to make a change in the health care system. The committee composition should have different cadres and members should be able to seat regularly and have champions to spear head and enthuse the reviews.

"…we need to orient them [training committee members], we need to work on the aspect of when do they seat like what has been directed in the guideline and policy and then all that is explained in their scope of their terms of reference". (Resp-012, OBS-GYN,_IDI)

Some mentioned that it would not be very difficult to meet when people are committed to it and health workers are also encouraged to do their best. Therefore, what is most important is to have an active MDSR committee, and preferably, this committee should set a specific day for review. The meeting should preferably take place in the department where the death occurred instead of meeting in the administration block. This avoids people failing to attend because they deem themselves busy.

"*….I think that maybe we as health workers, we also need to play our cards rightly. Be on duty at the right time and when you are supposed to be on duty do the right thing.* (FGD-2- support team).

"…There should be a particular day, and a must day that the committee should sit every week. … say Friday because sometimes the death maybe on Thursday. So, it's an advantage for Friday you are closing the week; and then, the other workload through the week would have been summarized. (FGD4-Senior midwives)

Discussion

Our study findings revealed a favorable perception of the MDSR process as either very useful or useful. However, they mentioned a number of barriers that hindered successful implementation of MDSR at the National Referral Hospital. These were aligned to the major constructs within the Theory of Planned Behaviour (TPB). Regarding perceived control, most participants reported inadequate knowledge /skills and heavy work load as major barriers to MDSR implementation. Inadequate leadership/ governance a key barrier reported under unfavorable subjective norms. Fear of blame and failure to complete the MDSR cycle were the main barriers under the construct of attitude. Inadequate skills to conduct MDSR, work load, fear of blame and litigation and failure to implement recommendations have been reported in some studies as hinderances to maternal and perinatal death surveillance and response practices in Uganda (Agaro *et al.*, 2016); Rwanda (Tayebwa *et al.*, 2020), Tanzania (Kinney *et al.*, 2020).

Relatedly, the multi-stakeholder group of participants reported key facilitators to MDSR aligning them to the TPB. Regarding perceived behavioral control, our findings revealed a need to train all stakeholders. The participants voiced that all stakeholders should be on board so that they acquire the skills, importance of MDSR and receive terms of reference. The facilitators

under subjective norms are strengthening leadership and governance which moves along with efforts to eliminate blame. These are the cornerstones to enhance oversight of MDSR, accountability and implementation of recommendations at the various levels. Then under favourable attitude construct, the participants reported creation of incentives for MDSR meetings, strengthening or foaming more functional committees and completion of the MDSR cycle as key facilitators. All these require commitment and political will to support funding and streamline the legal framework to counteract the fear of blame. These findings are in agreement with studies in Ethiopia where strong political will, efforts to streamline the legal frame work and strengthening leadership/ governance enhanced MDSR uptake (Abebe *et al.*, 2017). Training and mentorship to build the capacity of service providers are greatly encouraged as stipulated in the WHO guidance (World Health Organization, 2021). A secondary analysis study on lessons from 10-country case studies (both low, middle and high -income countries) on MDSR, Smith and colleagues showed that the major drivers for successful implementation were adequate legal framework, no shame, no blame culture, government and political commitment (Smith *et al.*, 2017b) which further support the facilitators reported in our study.

The barriers and facilitators were aligned to the domains within the Theory of Planned behavior (TPB), (Ajzen, 1991) which emphasizes that desires inform motivations, which then inform intentions and eventual behavior. In this study, participants' desire to see maternal mortality reduction was a critical motivator to participate in MDSR activities. However, issues of inadequate skills, fear of blame and litigation could partly explain the sub-optimal participation. The lack of perceived control due to inadequate knowledge, inadequate resources to perform timely MDSR, workload and challenges with technology would greatly affect the feeling related to control and actual performance. However, with enhanced training and mentorship, plus strong leadership and governance to ensure provision of incentives, availability of tools and appropriate technology would enhance perceived control. When we critically analyze the domain of subjective norms, aspects of peer influence, from either senior or junior colleagues, side are also likely to be addressed by supportive leadership and governance. Other researchers have explored the utility of TPB in a metanalysis to predict behaviour in health-related research such as predicting alcohol consumption and nurses taking care of patients who are involved in binge-drinking (Cooke *et al.*, 2016; McEachan *et al.*, 2011). They recommended that the constructs of attitude and perceived control in TBP are still useful in predicting intention to perform a particular behavior, (Cooke *et al.*, 2016; McEachan *et al.*, 2011). Ajzen defends the TPB further by stating that it requires to understand the TPB and related constructs : attitude, subjective norms, perceived behavioral control, intention and behavior itself but not just looking at its graphic presentation alone (Ajzen, 2015).

The WHO guidelines and related support mechanisms have been developed and made available to Ministries of Health and online, (World Health Organization, 2021). These regional technical guidelines aim to standardize and improve national MPDSR processes. However, more studies to assess impact of implementation of maternal and perinatal death surveillance in general are needed. This also may be augmented by national, district, regional and health facility committees, as well as by a technical working group to advise on how MDSR is planned, implemented and evaluated.

Our findings revealed that all core elements/ steps of MDSR cycle are important. However, for improvements to occur, participants believed that implementation of recommendations (Response), eliminating blame, training to enhance skills and knowledge, plus strong leadership are all critical. All these aspects should be emphasized during training of all healthcare providers, and stakeholders. It important to remind all stakeholders that all steps of MDSR (timely notification and review of deaths; correct identification of gaps, developing feasible recommendations, implementation as well as monitoring and evaluation) are all important if the process is to achieve the intended goals (World Health Organization, 2021).

Our findings revealed the critical role of governance and leadership for successful implementation of MDSR. Often described as the most influential factor in shaping organizational culture, effective leadership is critical at all steps of the MDSR process (Mathole *et al.*, 2018). Supportive leadership enhances the software aspects which may be applicable to MDSR too. Though engaged leaders are widely recognized as an enabler, necessary leadership traits from individuals and critical thinking or problem-solving skills are also crucial (Mathole *et al.*, 2018). Thus, more needs to be understood on what motivates these leaders, what skills are needed, and how to nurture champions. In addition, there is need to innovatively equip them with leadership skills to discourage blame and other negative influences to enhance MDSR. Nonetheless, there is need to identify how MDSR can enhance leadership in health, responsibility and accountability among all stakeholders at various levels (Gilson, 2016); (Mathole *et al.*, 2018); (Schneider *et al.*, 2020). The complex interplay of networks between health system levels, different sites and different role players influences MDSR implementation (Lewis, 2014; Raven *et al.* 2011).

This study revealed failure to complete the MDSR cycle, characterized by not implementing actions from death reviews as a key barrier. In line with our findings, other studies have noted that the MDSR cycle must be completed by implementing actions in order to trigger iterative cycles of improvement as a culture of success to improve outcomes (Bandali *et al.*, 2016; Kinney *et al.*, 2020; Lewis, 2014; Moodley *et al.*, 2014; Pattinson *et al.*, 2005). Notwithstanding, is the importance of a holistic approach to weave in the various health system building blocks recommended by World Health Organization (WHO) to improve quality of health care to reduce deaths. Successful implementation of MDSR should embrace integration within the health system building blocks framework (service delivery, health workforce, health information systems, access to essential medicines and equipment, financing, and strong

leadership/governance) (Manyazewal, 2017). All these require a motivated team to prioritize what should be tackled first depending on available resources.

Strengths of the study

Data was obtained from multiple sources using IDIs, KIIs and FGDs and involving internal and external stakeholders. This diversity of study participants ensured complementarity of ideas that enriched the content and facilitated triangulation. In addition, the use of TPB helped to identify barriers and facilitators to MDSR implementation across the domains of the framework. In our study involvement of study participnats at policy level and National Referral/Teaching Hospital is likely to enhance utilization of study results to address barriers and probably scale up MDSR in the rest of the country. Strategies to strengthen this quality improvement process of MDSR in this setting is likely to have influence in other parts.

Limitations of the study

Most of the study participants were from one high volume setting. Thus, the results may not be generalized to other settings. However, the health system issues encountered in the National Referral hospital may not be different from other hospitals since more than 50% of the patients at the national referral are referred. In fact, issues such as lack of supplies, skills and fear of blame could be worse in lower health units.

Conclusions and recommendations

The study sheds light on barriers and facilitators to implementation of MDSR, which if addressed would enable stakeholders to fully embrace MDSR. This could focus on how MDSR is implemented, particularly looking at mitigating the barriers and enhancing facilitators to reduce maternal mortality.

Efforts to enhance knowledge and skills of various health workers in MDSR processes; eliminating blame, implementing recommendations and protection of health workers and data from audits from being used in courts of law in case of litigation as well as strengthening leadership are critical for a successful MDSR process. Successful implementation of MDSR requires use of a health system wide approach for impact.

Data availability

Information related to maternal death surveillance is deemed sensitive due to a lot of fear of blame. However, de-identified information can be availed from the corresponding author on reasonable request.

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Open Peer Review

Current Peer Review Status: ✔ ✔

Version 2

Reviewer Report 13 June 2023

https://doi.org/10.21956/openresafrica.15161.r29749

✔ **Wendy J. Graham**
Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK

The authors have comprehensively addressed my comments and I am completely satisfied with their responses and the amendments made to their paper.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: I am an obstetric epidemiologist, with 30+ years of experience in the measurement of maternal mortality, including the use of MDSR, and have worked in partnership with colleagues in many low and middle-income countries.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 05 June 2023

https://doi.org/10.21956/openresafrica.15161.r29750

✔ **Joseph Ngonzi**
Department of Obstetrics and Gynecology, Faculty of Medicine, Mbarara University of Science and Technology, Mbarara, Uganda

I have carefully read through the responses to the comments I raised. The author has adequately addressed the concerns raised and I am satisfied that the comments have been attended to with

great detail. The manuscript reads much better in the current form.

I do not have any further comments or questions concerning the revised manuscript.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: 1) Postpartum sepsis 2) Maternal mortality 3) Placental clinical and pathology 4) High risk obstetrics 5) Artificial intelligence in cervical cancer pathology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 21 November 2022

https://doi.org/10.21956/openresafrica.14587.r29317

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Joseph Ngonzi
Department of Obstetrics and Gynecology, Faculty of Medicine, Mbarara University of Science and Technology, Mbarara, Uganda

The abstract reads well. It is well summarized and the most important components of the research are well outlined. It would be great to include a sentence on barriers to maternal death surveillance and response. It is good to read some recommendations in the abstract section under the conclusions.

It would be a good idea to write a sentence on barriers and facilitators to maternal death surveillance and response as known from the literature, in the introduction. Please state the national MMR for Uganda at the time of the research.
You made mention of MDGs in the background, it would great to align your background with SDG 3 too. I recommend that the introduction is concluded by stating the aims of the research study.

Under the methods section, it would great to have a glimpse of the maternity load at the facility where the research was done. What is the MMR at the national referral facility? What is the annual total delivery numbers at the facility? You mention that the external stake holders were people familiar with the MDSR process. Please give examples of those external stakeholders who were involved.
Why is table 1 on Characteristics of study participants who participated in KII, IDIs and FGDs in the methods section rather than the results section? I thought it's part of the results.

Table 2 and 3 present the codes and subthemes of the barriers and facilitators in a well aligned manner to the theory of planned change. In the text write up that follows the tables, please make the subsections uniform. Some of them are bolded while others are not.

The discussion is fairly well summarized. There's some attempt to elucidate the differences and similarities between their study and other quoted studies. Under the study strengths, you state that "the study site is a National Referral and Teaching hospital whose staff are likely to have a lot of influence elsewhere within the country". Is it the national referral status that makes the impact influence or the stakeholders you interviewed, including policy makers who have more influence on the rest of the facilities in the country?

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: 1) Postpartum sepsis 2) Maternal mortality 3) Placental clinical and pathology 4) High risk obstetrics 5) Artificial intelligence in cervical cancer pathology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 17 Mar 2023

Imelda Namagembe

Response to reviewer report from Joseph Ngonzi Department of Obstetrics and Gynecology, Faculty of Medicine, Mbarara University of Science and Technology, Mbarara, Uganda Thank you so much Prof Joseph Ngonzi for having created to review the manuscript. The response to the concerns raised is as follows.

1. The abstract reads well. It is well summarized and the most important components of

the research are well outlined. It would be great to include a sentence on barriers to maternal death surveillance and response.

Thank you for this kind note. We have inserted a sentence on possible barriers "Implementation of MDSR is still suboptimal in LMICs due to barriers such as inadequate knowledge, skills and leadership to support MDSR". Please Professor Ngonzi, there is a word limit in the abstract version, thus it difficult to add more.

1. It is good to read some recommendations in the abstract section under the conclusions.

Thank you so much for the comment We have discussed this aspect with some of the co-authors and agreed that the sentence in the abstract starting with "Efforts to strengthen..." is a recommendation, thus we added the word "recommendations" as shown below. Recommendations: Efforts to strengthen MDSR for impact should use health system responsiveness approach to address the barriers identified, constructive participation of health workers to harness the facilitators and addressing the required legal framework"

1. It would be a good idea to write a sentence on barriers and facilitators to maternal death surveillance and response as known from the literature, in the introduction.

We have inserted in the introduction paragraph 2. Some studies have reported barriers such as inadequate training, lack of financial motivation and high turnover of staff (Agaro et al., 2016, Smith et al., 2017, Abebe B et al., 2017). However, training stakeholders involved, a strong political will and supportive legal frame work that minimizes fear of litigation are some of the reported facilitators for MDSR (Abebe B et al., 2017).

1. Please state the national MMR for Uganda at the time of the research. You made mention of MDGs in the background, it would great to align your background with SDG 3 too.

Thank you for the comment. We have edited the sentence that has MDGs and added a clause to align with SDG-3 in that same paragraph No.1 of the introduction as stated here. Uganda had a modest reduction in its maternal mortality ratio (MMR) over that millennium development goals (MDG) period, i.e. from 506 per 100,000 live births to 336 per 100,000 livebirths (Uganda Bureau of Statistics and ICF, 2016) was the official MMR during the study period too. This MMR of 336 per 100,000 livebirths is still way below the national sustainable development goal (SDG) target of $\leq$140 to contribute to a global one of $\leq$ 70 per 100,000 livebirths by 2030 (Nations, 2015, McArthur et al., 2018).

1. I recommend that the introduction is concluded by stating the aims of the research study.

Thank you Prof for the comment. This statement has been inserted at the end of the introduction: "Therefore, in this study we purposed to explore the barriers and facilitators to MDSR implementation and also obtained information on what the participants proposed as priority interventions to strengthen the process".

1. Under the methods section, it would great to have a glimpse of the maternity load at the facility where the research was done. What is the annual total delivery numbers at the facility? What is the MMR at the national referral facility?

Thank you for the comment. The concern has been addressed in the method section and also inserted here. The study setting is one of the sub-Saharan Africa's busiest maternity Centre (Nakimuli et al, 2016). The total number of annual deliveries ranged from 23,000 – 27,000 over the three years 2016 to 2018 (Namagembe et al, 2022). The institutional MMR ranged from 500 to 600 per 100,000 livebirths. In addition, this Centre contributes to the biggest number of deliveries plus maternal and perinatal deaths in Kampala District but

performance of maternal death reviews (audits) was still low during the studied period (Namagembe et al, 2022).

1. You mention that most of the external stakeholders were people familiar with the MDSR process. Please give examples of those external stakeholders who were involved.

Thank you for this. Examples of the external stakeholders were representatives from Ministry of Health Reproductive Health division, World Health Organization, UNFPA, Kampala Slum Maternal and Newborn project as was stated on page 3 of the manuscript in the sub-section that described study participants.

1. Why is table 1 on Characteristics of study participants who participated in KII, IDIs and FGDs in the methods section rather than the results section? I thought it's part of the results.

Thank you for the query. During writing and initial submission of the manuscript for publication, Table 1 on characteristics of study participants was inserted in the results sections, however, during type-setting or formatting of the manuscript by the journal's team, it was moved to method section. Some journals do it.

1. Table 2 and 3 present the codes and subthemes of the barriers and facilitators in a well aligned manner to the theory of planned change. In the text write up that follows the tables, please make the subsections uniform. Some of them are bolded while others are not.

Thank you for raising the concern. It has been addressed and bolding made uniform in the relevant subsections.

1. The discussion is fairly well summarized. There's some attempt to elucidate the differences and similarities between their study and other quoted studies. Under the study strengths, you state that "the study site is a National Referral and Teaching hospital whose staff are likely to have a lot of influence elsewhere within the country". Is it the national referral status that makes the impact influence or the stakeholders you interviewed, including policy makers who have more influence.

Thank you so much for the comment. You are right. Most likely the policy makers have more influence. Most of study participants in this research who are at policy level and National Referral/Teaching Hospital are people who commonly participate in support supervision, training and mentorships to improve reproductive, maternal, newborn and adolescent health (RMNCAH) related services including efforts to strengthen maternal and perinatal death surveillance and response (MPDSR) in other parts of the country. Many of them again participate in policy discussions. Therefore, both groups (at policy level and National Referral/Teaching Hospital) are likely to learn from and use our findings to address barriers and scale up maternal death surveillance and response implementation in the rest of the country.

Competing Interests: None

Reviewer Report 19 October 2022

https://doi.org/10.21956/openresafrica.14587.r29318

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Wendy J. Graham
Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK

This is an interesting paper with the potential to make an important contribution to on-going efforts to strengthen the implementation of MPDSR* across low-&-middle-income countries. The application of the Theory of Planned Behaviour to guide this indepth research is novel and helpful, and the authors are to be congratulated on the thoroughness of their interpretation of the qualitative data.

There is, however, one major concern with the paper which requires the authors' action. As noted through out the paper, given the sensitivity of the tragedy of preventable maternal deaths and the real risks of inappropriate blame, indeed extending into legal redress, those taking part in this type of research – especially at one named hospital, need to have additional safeguards around confidentiality and anonymity. Although the authors describe good practices around informed consent, they should be requested to offer the journal further reassurance that the participants, listed in Table 1, cannot be identified. There is, for example, one anesthetist who participated, and readers of the paper familiar with this hospital maybe able to gauge who this is, and the same for the other senior clinicians. Similarly, for the external stakeholders, the participating UN organizations are mentioned and the paper indicates those taking part knew about MDSR, so again it may well be possible in Uganda to identify the specific individuals. Although it is widely-regarded as good practice to give direct quotations and attribute these by type of participant, some of the statements – especially on blame on p.8 & 10 – are sensitive (e.g. "respondent laughs"), and again – extra care is needed to maintain anonymity.

One way round this sort of confidentiality challenge is not to name the participating hospital, and it would be good for the authors to consider this, especially as some of the critique of managers is quite explicit, and may have consequences for their future willingness to participate in research. Of course, this is not suggesting that findings should be changed or toned-down in any way, but from a research perspective and the journal audience, the name of the hospital is not relevant but rather its level or characteristics. There is a separate matter of feeding back findings to the participating hospital, when again the confidentiality of participants needs to be protected, but decision-makers and managers certainly could benefit from the study in terms of local improvements. Once again, it is important for the authors to reflect on this important issue, and for the journal to receive a response prior to indexing.

There are a few other suggestions which could improve the paper:

1. Stakeholder selection – more detail would be helpful on how these individuals were chosen, and particularly the rationale for including those with no prior training in MDSR. With nearly half of the sample (43%) being untrained, this makes some of the questions about the purpose and processes of MDSR hard for them to answer. In fact, a case could be made for separating out the responses of those trained from those untrained, and this could yield more meaningful findings and probably some useful comparisons. Indeed, given the huge

diversity of participants, reporting how the findings varied across these different constituencies would be useful throughout.

2. Position of lead researcher at the participating hospital. It is good to read of the partnership between a clinical and social scientist for the conduct of the study, but for the former – it is important to know if they are also a clinician at the facility and if so, how this may have impacted on the conduct of research and the findings.

3. Medical causes of maternal deaths – on p.5 it mentions perceptions of the main causes according to participants, but it would be helpful to compare this with what the MDSR itself reports as the main causes.

4. Discussion & Conclusion - this is well-structured and informative, but concluding with a long list of barriers and facilitators without any suggestions on prioritization is a missed opportunity. Many of these elements have been noted in other studies of MDSR – especially around the lack of action step, HR shortages, lack of training and the importance of leadership, so are not new contributions to the field. The unique addition comes from the authors' use of their local understanding and insights to make valid suggestions on priorities.

Minor comments:

1. MPDSR or MDSR – it would be helpful to clarify at the beginning of the paper why this study is just on maternal deaths, and whether Uganda is also conducting MPDSR. The paper seems to use both abbreviations synonymously.

2. Some editorial improvements would be helpful as some sentences are not clear and seemingly some words or punctuation is missing e.g. last sentence of 2nd paragraph.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: I am an obstetric epidemiologist, with 30+ years of experience in the measurement of maternal mortality, including the use of MDSR, and have worked in partnership with colleagues in many low and middle-income countries.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 17 Mar 2023

Imelda Namagembe

Response to reviewer report from Wendy J. Graham Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK

This is an interesting paper with the potential to make an important contribution to on-going efforts to strengthen the implementation of maternal and perinatal death surveillance and response (MPDSR) across low-&-middle-income countries. The application of the Theory of Planned Behaviour to guide this in-depth research is novel and helpful, and the authors are to be congratulated on the thoroughness of their interpretation of the qualitative data.

Response: Thank you so much for the encouraging and kind note about our paper.

There is, however, one major concern with the paper which requires the authors' action. As noted throughout the paper, given the sensitivity of the tragedy of preventable maternal deaths and the real risks of inappropriate blame, indeed extending into legal redress, those taking part in this type of research – especially at one named hospital, need to have additional safeguards around confidentiality and anonymity. Although the authors describe good practices around informed consent, they should be requested to offer the journal further reassurance that the participants, listed in Table 1, cannot be identified. There is, for example, one anesthetist who participated, and readers of the paper familiar with this hospital may be able to gauge who this is, and the same for the other senior clinicians.

Response: Thank you so much for concern related to how to strengthen safeguards around confidentiality of information from this major study site to minimize risk of inappropriate blame to study participants. It is highly unlikely to identify the study participants individually. A group of people can be thought of having participated in the research, but not individual identification because the specific positions of the study participants have more than one person. In addition, even facility leaders or external stakeholders' voices are referred have been referred to as "***leaders/managers"*** when it came to quotes. In addition, source of the voices f(quotes) of study participants have been edited in such a manner that reflects a specific cadre not individual name such as midwife, enrolled midwives, registered midwives, OBS-GYN (Specialist-Obstetrician-Gynaecologist), senior house officers (SHO) or support staff. Leaders/Managers representing all forms of leaders (facility leaders, external stakeholders from Ministry of Health or other Implementing partners). For quotes where we had put e.g "facility leader" or "ministry of health person" has been changed to

"Leader/managers". Where we had one anaesthesia provider, has been changed to "anaesthesia providers". Two anaesthesia providers participated in the interviews, the 3rd one failed to create time from the busy schedules and the 4th one was called for an emergency at the start of a focus group discussion. We had 15 anaesthesia providers at the facility by then (anaesthetic officers & anaesthesiologists) . We believe that it is really hard to point out who of those 15 participated in the research. available participated. The study participants themselves and research team are the only people who are aware of those involved.

Similarly, for the external stakeholders, the participating UN organizations are mentioned and the paper indicates those taking part knew about MDSR, so again it may well be possible in Uganda to identify the specific individuals. Although it is widely regarded as good practice to give direct quotations and attribute these by type of participant, some of the statements – especially on blame on p.8 & 10 – are sensitive (e.g. "respondent laughs"),

Response: Thank you so much for raising this comment again to strengthen confidentiality. The phrase "respondent laughs" has been deleted from that quote on page 8 without losing meaning". Current quote is '..sometimes we try to point fingers and even blame colleagues...(Resp-1-Midwife, IDI). We had not considered the end phrase "respondent laughs" to be so sensitive. This aspect has been rectified. Although the names of the participating organizations (for external stakeholders) have been mentioned to enhance authenticity of the source of information given, the phrase "representatives from the implementing partners has been added" (under the methods section where we talk about other participants). At the time of reflecting the voice of external stakeholder / facility leader / administrator/ head of department we have instead used "Leaders/Managers" as source of that voice. We are of the opinion that this does not point to a particular organization as source of that voice or a specific leader but a group of people who fall in that category.

and again – extra care is needed to maintain anonymity. One way round this sort of confidentiality challenge is not to name the participating hospital, and it would be good for the authors to consider this, especially as some of the critique of managers is quite explicit, and may have consequences for their future willingness to participate in research. Of course, this is not suggesting that findings should be changed or toned-down in any way, but from a research perspective and the journal audience, the name of the hospital is not relevant but rather its level or characteristics.

Response: Thank you so much for raising this concern again to enhance confidentiality. In this paper, we commonly refer to the main study site as "a busy National Referral Hospital". Although it may be hard to anonymize the Hospital completely, we have removed the name and other descriptions likely to identify the hospital. What is encouraging is that at the moment, there is ongoing nationwide call to strengthen maternal and perinatal death surveillance and response (MPDSR) to reduce deaths**.** There is emphasis to minimize blame while enhancing responsibility and accountability. The National Referral Hospital has been prioritized by Ministry of Health and partners with the purpose of supporting it in view of its high volume of deliveries (> 20,000 per year), the training role and high burden of preventable maternal and perinatal deaths. There are efforts to streamline referrals to this setting, transform it into a Centre of excellence in a number of areas including

strengthening maternal and perinatal death surveillance and response (MPDSR) in general. We believe this will further reduce the sensitivity around maternal death notification and review. In addition, the advice from experts from National Referral Hospital and University institutions is greatly respected since they are considered as the mentors to strengthen uptake of quality improvement activities. In 2020, the "National Safe Motherhood Expert Committee (NASMEC) was created, it has experts from across the country including National Referral Hospital. The NASMEC works closely with the Ministry of Health and Implementing partners to scale up a number of quality improvement activities including MPDSR. Of late, the Ministry of health, national MPDSR committee, NASMEC and health facility leaders from various regions of the country freely discuss MPDSR issues on widely shared Media platforms, and lessons learnt are shared to improve outcomes.

There is a separate matter of feeding back findings to the participating hospital, when again the confidentiality of participants needs to be protected, but decision-makers and managers certainly could benefit from the study in terms of local improvements. Once again, it is important for the authors to reflect on this important issue, and for the journal to receive a response prior to indexing.

Response: Thank you so much for this comment and raising the fact that it is important to give feedback to the national referral site. Since this was an implementation research project with a before and after component, feedback has been given and discussions to improve implementation of MPDSR have been ongoing without disclosing details of study participants. During the feedback meetings, participants freely discussed the findings focusing on what can be done to improve implementation. Research related engagement and feedback has been ongoing to share findings and lessons from local data. There has been no disclosure of individual data sources but reported as grouped data e.g the midwives reported that or the seniors house officers or the .leaders/managers raised such a concern. The aspect of utilizing local data to strengthen implementation of the policy on maternal and perinatal death surveillance and response to inform quality improvement activities as part of the "Response" as a whole has been greatly appreciated.

There are a few other suggestions which could improve the paper: Stakeholder selection – more detail would be helpful on how these individuals were chosen, and particularly the rationale for including those with no prior training in MDSR. With nearly half of the sample (43%) being untrained, this makes some of the questions about the purpose and processes of MDSR hard for them to answer. In fact, a case could be made for separating out the responses of those trained from those untrained, and this could yield more meaningful findings and probably some useful comparisons. Indeed, given the huge diversity of participants, reporting how the findings varied across these different constituencies would be useful throughout.

Response: Thank you so much for the comment. The stakeholders' selection was as follows: The inclusion criteria for the study participants for IDIs, FGDs for the health workers or KIIs for leaders/managers at the National Referral Hospital or external stakeholders required having stayed at the respective position for at least six months. For both the internal and external stakeholders, a preliminary list was developed in conjunction with officials at the National Referral Hospital and the Ministry of Health. The initial study

participants also recommended others who they thought would enrich understanding of the barriers and facilitators of MDSR implementation. The identified people were then contacted by one of the research team members or Principal investigator (NI), first author, informed about the research and requested to give an appointment to participate. Ten out of the 77 potential participants contacted failed to create time because of their busy schedule (3-SHOs, 3-midwives and two anaesthesia providers plus some two of the external stakeholders (from Ministry of Health). The fact that some participants excused themselves (did not participate) gave us some level of confidence that participants decision was voluntary. .A written consent was obtained before actual participation. The study participants were informed earlier that their input would greatly inform what should be done to strengthen implementation of the maternal death surveillance and response policy as a quality improvement process since the retrospective quantitative maternal death- data had shown that the proportion of deaths reviewed was still low (at 33 %) and not done in a timely manner (Namagembe et al., 2022). Exposure to previous training in maternal or perinatal death surveillance and response was not used as criteria to select study participants since some messages to support MPDSR activities used to be discussed in departmental meetings in a non-selective manner even before this research. However, during collection of biodata, a question was included to have an idea of those that had previous exposure to formal training in MPDSR processes. When we explored the data qualitatively, there were no differences regarding the identified barriers or facilitators based on whether someone had formal training in MPDSR previously or not.

Other aspects

1. Position of lead researcher at the participating hospital. It is good to read of the partnership between a clinical and social scientist for the conduct of the study, but for the former – it is important to know if they are also a clinician at the facility and if so, how this may have impacted on the conduct of research and the findings.

Response: Thank you for raising these comments and thank you for appreciating the partnership with the social scientists (MM) during this qualitative research. **Reflexivity concerns:** Although NI is one of the Senior Clinicians at the study hospital, she made read more and also made enquiries from social scientists (senior qualitative researchers) who proposed that she can participate as one of the great tools in this research. However, she continuously self-examined and remained aware of the need to detach self from the phenomenon being explored in this case MDSR in order to capture participants' views with an open mind. This involved remaining neutral and setting aside views of the 'clinician' to fit in the role of a researcher guided by study objectives and a pre-designed interview guide with clear topics for discussion during the conduct of interviews. In addition, the lead researcher was commonly introduced 'as senior-midwife' in order to minimize positionality to a certain degree to enhance a free environment of communication. NI put in a deliberate effort work with independent social scientist and note takers and participants were encouraged to give their correct perspectives. No participant was addressed by name during interviews. It is true that in reflexivity, some researchers tend to carry their own perspectives during the conduct of research and interpretation of findings. This challenge was mitigated by working with an independent social scientist, using open ended questions, having an independent note taker who did the initial transcription and independent qualitative researchers who worked on the initial coding of the data and later discussed with NI and other co-authors. The variety of health workers in the study plus use of IDIs,

KIIs and FGDs helped to enhance triangulation of data. The nature of the interviews looked at both barriers and facilitators to get a more balanced enquiry. Therefore, we feel that these efforts enhanced trustworthiness of the information presented in this research. As recommended by some researchers (Lincoln and Guba, 1986) and (Connely Lynne M, 2016), there was effort to enhance credibility, confirmability and dependability.

1. Medical causes of maternal deaths – on p.5 it mentions perceptions of the main causes according to participants, but it would be helpful to compare this with what the MDSR itself reports as the main causes.

Response: Thank you so much for this comment. It is important to note that the causes of death reported by majority of the participants' during the qualitative study do agree with the findings from quantitative maternal death data (excessive bleeding due to postpartum hemorrhage as number 1, followed by complications of hypertensive disorders, puerperal infection, abortions related complications and others (Namagembe et al, 2022; Kaye et al, 2003). However, other aspects such as negative attitude of some of the health workers and under table payments were newly identified in the qualitative study.

1. Discussion & Conclusion - this is well-structured and informative, but concluding with a long list of barriers and facilitators without any suggestions on prioritization is a missed opportunity. Many of these elements have been noted in other studies of MDSR – especially around the lack of action step, HR shortages, lack of training and the importance of leadership, so are not new contributions to the field. The unique addition comes from the authors' use of their local understanding and insights to make valid suggestions on priorities.

Response: Thank you so much for this comment. Most of the participants suggested the following priority interventions

- To prioritize training of all health workers including midwives and administrators in both maternal and perinatal death surveillance and response (MPDSR)
- To prioritize capacity building to strengthen health workers' skills in emergency care to prevent complications and manage patients in a timely manner in case complications occur.
- Discuss modalities to eliminate blame from leaders/ managers and specialists, but strengthen accountability and endeavor to streamline the legal framework for MDSR.
- Strengthen leadership and governance at health facility and national levels to ensure continued supervision of health workers, timely referral and feedback
- Strengthen regular engagement of various stakeholders to enhance implementation of recommendations from MDSR.
- Increase funding: Lobby the Ministry of Health, Parliament Ministry of finance, and partners to allocate adequate resources for MDSR implementation and address the challenges of patient overload, availability of emergency supplies including blood, at the National Referral Hospital and functionalize referring facilities.

1. Minor comments: MPDSR or MDSR – it would be helpful to clarify at the beginning of the paper why this study is just on maternal deaths, and whether Uganda is also conducting MPDSR. The paper seems to use both abbreviations synonymously.

Response: Thank you so much for raising this concern. True, Uganda is advocating for both maternal and perinatal death surveillance and response (MPDSR). The principal investigator had an original plan to conduct research on both aspects comprehensively as MPDSR. but, she was advised that as an obstetrician, it was better to focus on the maternal

component since it was not being done as recommended by Ministry of Health. This happened at both the Departmental level and Research/ Ethics and clearance committee. However, during the training intervention, stakeholder engagement sessions and actual application of the practice, both maternal and perinatal death surveillance components were emphasized. The discussions at the facility level have shown improvement for both maternal and perinatal death notifications and reviews post intervention.

1. Some editorial improvements would be helpful as some sentences are not clear and seemingly some words or punctuation is missing e.g. last sentence of 2nd paragraph.

Response: Thank you so much for the comment. The last paragraph has been edited and changed to read follows: “There is limited information on barriers and facilitators to timely MDSR in high-volume settings in SSA where MDSR uptake is still low”

Competing Interests: None