

Facility-based maternal deaths: Their prevalence, causes and underlying circumstances. A mixed method study from the national referral hospital of Somaliland

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ABSTRACT

Objective: Somaliland has one of the highest rates of maternal deaths in the world. An estimated 732 women die for every 100,000 live births. This study aims to identify the prevalence of facility-based maternal deaths, the causes and their underlying circumstances by interviewing relatives and health care providers at the main referral hospital.

Method: A hospital-based mixed method study. The prospective cross-sectional design of the WHO Maternal Near Miss tool was combined with narrative interviews with 28 relatives and 28 health care providers in direct contact with maternal deaths. The quantitative data was analysed with descriptive statistics using SPSS and the qualitative part of the study was analysed with content analysis using NVivo.

Results: From the 6658 women included 28 women died. The highest direct cause of maternal death was severe obstetric haemorrhage (46.4%), followed by hypertensive disorders (25%) and severe sepsis (10.7%). An indirect obstetric cause of death was medical complications (17.9%). Twenty-five per cent of these cases were admitted to ICU and 89% had referred themselves to the hospital for treatment. The qualitative data identifies two categories of missed opportunities that could have prevented these maternal mortalities: poor risk awareness in the community and inadequate interprofessional collaboration at the hospital.

Conclusion: The referral system needs to be strengthened utilizing Traditional Birth Attendants as community resource supporting the community facilities. The communication skills and interprofessional collaboration of the health care providers at the hospital needs to be addressed and a national maternal death surveillance system needs to be commenced.

Introduction

Maternal mortality remains one of the greatest challenges for low-income countries. More than 300,000 maternal deaths occur each year in sub-Saharan Africa each year due to severe maternal complications during pregnancy, birth and the six-week period directly after birth [1]. Despite the progress made through programmes implemented by different actors such as government ministries, private organizations, and non-governmental organizations to reduce the Maternal Mortality Rate (MMR) and achieve the Sustainable Development Goal (SDG) of less than 70 deaths per 100,000 live births, the MMR in low-income countries remains persistently high [2]. Identifying strategies to

reduce avoidable maternal deaths in these settings is, therefore, an urgent global priority if the aspirations in Agenda 2030 are to be achieved [1]. Research has suggested that maternal mortality causes high rates of depression among surviving family members, especially other children, and decreases the infants' chances of survival. It also places enormous economic pressure on families and the surrounding culture and economy [3].

Global approaches for reducing maternal mortality have focused on encouraging skilled birth attendants to attend every birth and ensuring there is a good referral system in place for the transfer of complicated cases to hospitals where emergency obstetric care (EmOC) can be provided [4,5]. The MMR in Somaliland, however, is estimated at 396

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deaths per 100,000 live births, making it a country with one of the worst MMRs in the world [4,6]. Most of these deaths are caused by direct obstetric complications such as hypertensive disorders, severe obstetric haemorrhage and severe systemic infections [7]. International guidelines state that these complications should be managed within a health care system that includes access to a blood bank system, and the provision of lifesaving interventions such as caesarean sections and anti-convulsant and antibiotic drugs [1]. Scientific evidence from the sub-Saharan region shows that many deaths are the result of women's lack of trust in facility-based births and their preference for homebirths with traditional Birth attendants (TBAs), which in complicated cases can lead to a delay in preventive care and treatment [8]. Somaliland is dealing with severe shortage of skilled birth attendants (SBA) due to death and migration during the civil war [9]. The actual numbers of SBA and TBAs are not available but the latest health demographic survey shows that only 33% of deliveries are conducted by SBAs [7,10,11].

In order to intervene and provide timely care and treatment of emergencies in pregnancy and childbirth and reduce maternal mortality in Somaliland, their causes and underlying circumstances at the main referral hospital need to be uncovered. The only other study of maternal mortality in this region focuses on the Bossaso district Puntland and has a community focus [12]. With this background, the aim of this study is to identify the prevalence of facility-based maternal deaths, the causes and their underlying circumstances by interviewing relatives and health care providers at the main referral hospital in Somaliland.

Methods

Study design

This study adopts a mixed method approach using convergent design [13]. A mixed method approach enables the statistical analyses of maternal mortality to be combined with the qualitative knowledge and experiences that can be gained from personal interviews. In this study, the quantitative and qualitative data will be integrated in the discussion section [14,15,16]. The study was planned and conducted in accordance with the Declaration of Helsinki and its statement of the ethical principles for medical research involving human subjects [17]. The study was approved by the Somaliland Ministry of Health Development (MOHD) and the Ethics Committee at the University of Hargeisa (UOH) Dr: [ANONOMYZED].

Setting

The study was conducted at the Hargeisa Group Hospital (HGH), the largest governmental referral hospital in Somaliland. The hospital employs doctors, nurses, midwives, anaesthetists, and run a clinical laboratory. The HGH has one labour ward, two gynaecology wards, an outpatient's department, Intensive Care Unit (ICU) and operating rooms with blood transfusion services.

Data collection and participants

The data was collected at HGH between April 2019 to March 2020 as part of a research programme investigating Maternal Near Misses using a WHO tool, presented elsewhere [15], but adapted for this setting. The current study focuses exclusively on the maternal deaths identified during that period of data collection. Women who had experienced a 'near miss' while giving birth were identified on the wards and their medical records, including admission information, past obstetric history, care received during hospital stay and their follow-up plan, was reviewed. Independent variables also noted were age, gestation, parity, maternal age, educational level, area of residence, referral, mode of delivery, birth outcome, and underlying cause of death and diagnosis. With this information, the health care providers involved with the care of the woman were approached together with the midwife in charge. A

discussion about the care provided for the woman from admission until death was held with the health care provider and documented by XX. With the midwife in charge, the family of the woman was also approached and, after obtaining consent, a discussion was held with the family member who was present during the woman's admission and care in hospital. With the questions intended for family members the focus was on the situation at home before coming to the hospital, what happened that required transfer to hospital, their perception of the care received in hospital and the issues they have experienced throughout this experience. During the study period there were a total of 29 maternal deaths. Maternal mortality in this case has been defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not including deaths from accidental or incidental causes [18].

In parallel with the quantitative data collection, narratives were collected from relatives and health care providers at HGH that related to the maternal death cases. The first and second authors (XX, XX) made daily visits to the labour ward, Gynaecology I and II, the Intensive Care Unit (ICU), and the operating theatre. After identifying each maternal death, the woman's relatives and the health care providers who cared for her were individually approached and asked for an interview. After a sensitive and informative introduction, oral consent was obtained from the relatives and health care providers for an interview. For the relatives and health care providers it was strongly emphasized that they could withdraw at any time from participation in the study. Extra time and personal counselling were offered in case the interview led to an emotional state of grief that needed to be handled by a professional midwife. The staff and family members talked freely about the events leading up to the hospital admission, the transport of their loved one to the hospital and the care she received while in hospital. As the interviewees generally stated that it was a relief to express themselves about this event and to be able to talk about the events that led to their female relatives' death. None of the relatives or health care providers involved in this study asked for a separate counselling session with a midwife [17]. In total, 28 relatives and 28 health care providers were interviewed (see Table 1).

Analysis

The quantitative data was generated using SPSS descriptive statistics by computing frequencies, percentage and ratio. It was then analysed to determine the maternal death ratio using a 95% Confidence Interval CI and the mortality index ratio. The interview narratives (n = 56) were transcribed and analysed inductively using qualitative content analysis

Table 1
Qualitative Interview guide.

SPSS CODE: Patient Number: Date:

1- Questions for the Relatives:

- What is your relationship to the patient?
- How was the Pregnancy?
- What was the reason for transfer, what type of transfer did you have?
- Tell me about the care you received in hospital?
- What challenges have you experienced?
- What would you have changed?

2- Questions for Health care providers:

- Tell me about the patient condition when admitted.
- What care was provided to the patient?
- What was the diagnosis?
- Where there any challenges during care provision?
- What are the circumstances around the mortality?
- What are your suggestion to improving care?

according to Elo and Kyngas [19], with NVivo 12 used for coding. In the organization phase, the transcripts were read and re-read to get a sense of the complete data set. The interview data from the relatives and the health care providers was combined into one file per maternal death case. Through joint discussions within the research team, the first author analysed the original data. Text parts with the same meaning were allocated open codes, then the codes were organized into their similarities and differences. This has led to identifying subcategories, categories and one overarching category.

Results

This section presents the results of the qualitative and quantitative analysis separately. The total number of women admitted to hospital to give birth during the study period was 6658, with 6055 live births and 29 maternal deaths. One of these deaths was excluded from this study because was the result of a road traffic accident and so the total of 28 maternal deaths was used for the analysis here (Fig. 1) The maternal death ratio was 462 per 100,000 live births (95% Confidence Interval CI, 310–670) and the mortality index ratio was 7.6% (95% CI, 5.1–10.7). The demographic data of the participants are presented in Table 2.

The most common direct cause of the maternal deaths was severe

obstetric haemorrhage (46.4%), followed by severe hypertensive disorders (25%) and severe sepsis (10.7%). Of the indirect obstetric causes of these maternal deaths, 17.9% were caused by medical complications. None of them were the result of severe anaemia (see Table 3). Furthermore, Table 4 shows the use of critical interventions provided to the maternal mortalities.

Qualitative findings

The overarching category derived from the qualitative analysis was: *A series of missed opportunities to provide lifesaving treatment and prevent maternal mortalities.* This broad theme encompassed two generic categories: *Poor risk awareness at the community level* and *Inadequate inter-professional collaboration at the hospital* (see Table 5).

Poor risk awareness at community level

This generic category highlights the evidence gathered from the qualitative interviews which pointed to the causes of the maternal deaths in this study as the result of the missed opportunities to help these women in time. These missed opportunities can be further categorized as circumstances that took place at home and the challenges facing the

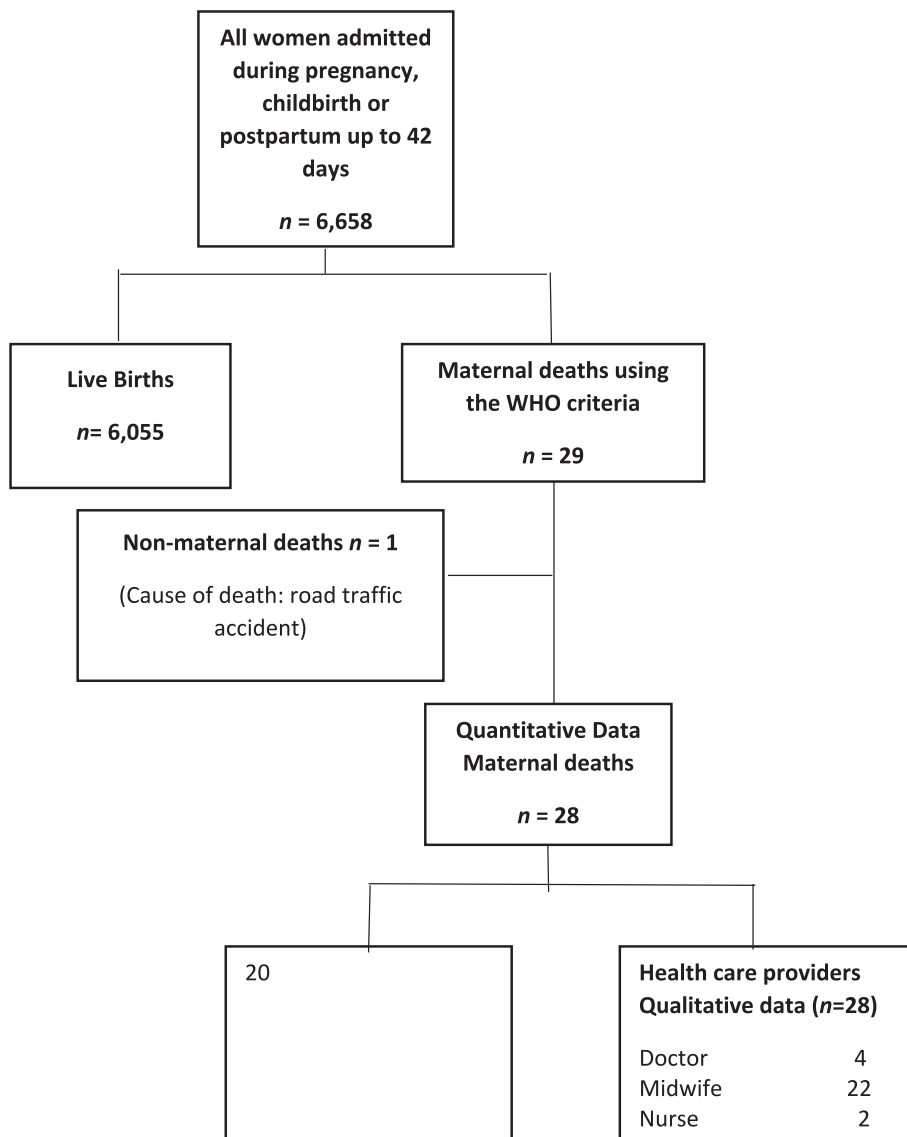


Fig. 1. Results flow chart of the maternal mortality study using sub-Saharan Africa criteria.

Table 2
Sociodemographic and obstetric characteristics of maternal deaths at the national referral hospital, Somaliland.

Characteristic	Maternal death n = 28 (%)
Age	
<20 years	2 (7.1%)
20–34 years	19 (67.9%)
≥35 years	7 (25%)
Missing	0 (0.0%)
Education	
No formal education	21 (75%)
Primary and secondary school	7 (25%)
University	0 (0%)
Missing	0 (0.0)
Rural area	6 (21.4%)
Urban area	22 (78.6)
Missing	0 (0%)
Gestational age at delivery	
< 22 weeks	0 (0%)
22–36 weeks	8 (28.6%)
37–42 weeks	20 (71.4%)
> 42 weeks	0 (0%)
Missing	0 (0%)
Parity	
0–para	6 (21.4%)
1–4	12 (42.9%)
> 4	10 (35.7%)
Missing	
Previous caesarean section (among multipara)	
Yes	4 (18.1%)
No	18 (81.8%)
Missing	0 (0%)
Female genital cutting	
Pharaonic	23 (82.1%)
Sunna, other types or no female genital cutting	5 (17.9%)
Missing	0 (0%)
Referral	
Traditional Birth Attendant	1 (3.6%)
Health care professionals at maternal and child health centres	5 (17.9%)
Self-referred	22 (88.6%)
Missing	0 (0%)
Mode of delivery	
Vaginal delivery	13 (46.4%)
Caesarean section	9 (32.2%)
Died while still pregnant	6 (32.2%)
Laparotomy for ectopic pregnancy	0 (0%)
Dilatation and curettage	0 (0%)
Complete spontaneous abortion	0 (0%)
Maternal deaths final mode of delivery	
Vaginal Delivery	14 (50%)
Caesarean Section	9 (32%)
Women Died Still Pregnant	5 (18%)
Total	28 (100%)
Contributory associated conditions anaemia	
No	5 (18%)
Yes	23 (82%)
Total	28 (100%)
Neonatal outcomes of the maternal deaths	
Dead	16 (57%)
Alive	12 (43%)
Total	28 (100%)

Table 3
Incidence of maternal deaths according to severe maternal complications (n = 28).

Direct obstetric causes	
Obstetric haemorrhage	13 (46.4%)
Hypertensive disorders in pregnancy, childbirth, and the puerperium	7 (25%)
Pregnancies with abortive outcomes	0 (0%)
Pregnancy-related infection	3 (10.7%)
Indirect obstetric causes	
Severe Anaemia	0 (0%)
Medical complication	5 (17.9%)

Table 4
Critical interventions and organ dysfunction as defined by the World Health Organization (n = 28).

Critical Intervention & ICU admission (n = 28)	
One Unit of Blood Transfusion	6 (21%)
2 to 3 Units of Blood Transfusion	6 (21%)
4 and above Units of Blood Transfusion	2 (7%)
Laparotomy other than caesarean section	0 (0%)
Admission to ICU	7 (25%)
Organ Dysfunction (n = 28)	
Cardiovascular dysfunction	10 (35%)
Respiratory dysfunction	7 (25%)
Coagulation dysfunction	1 (4%)
Renal dysfunction	7 (25%)
Neurologic dysfunction	9 (32%)
Hepatic dysfunction	3 (11%)

Table 5
Qualitative data results table.

Open Codes	Sub- Category	Categories	Main Category
Lack of knowledge and insight about the risks during pregnancy, labour and postnatally.	1. Circumstances at the home.	1. Poor risk awareness at community level.	
Lack of referral from Traditional Birth Attendants.			
Financial implications to facility delivery.	2. Challenges to timely referral from community to referral hospital		1. A series of missed opportunities to provide lifesaving treatment
Wrong information from community health facilities.			
Lack of communication between professionals. Communication gaps between staff and family. Incomplete disclosure of obstetric history to avoid intervention.	1. Ineffective communication for management of life-threatening conditions	2. Inadequate collaboration at referral hospital level.	
Consent issues for life saving interventions. No sense of emergency during emergencies.	2. Institutional challenges to management of life-threatening conditions		

timely referral of women from community to hospital.

Circumstances at home

The relatives in this study made it clear that they wished they would have come to hospital much sooner because the last thing they intended was to put the mother or child at risk at any point. They explained that they were excited and full of hope for the mother and the coming baby. However, the relatives said that they were unaware of the severity of the situation for their female relative and regretted their lack of knowledge

and insight about the health risks for women when giving birth. Relatives stated the belief that it is normal for women to bleed more postnatally the more babies they have had. This accounts for the general attitude that it was safe to keep a woman at home, even if she started to haemorrhage postnatally or infection postnatally.

Many relatives and healthcare providers agreed that misconceptions about the severity of a women's postpartum health was also caused by misconceptions about the signs and symptoms of emergencies during pregnancy, birth and the postnatal period. Family members explained that had understood their female relatives' problems as a result of the "evil eye" or evil spirits, not of a serious medical condition. Even though their female relative had sometimes been unconscious for several hours, the family members had focused on finding a spiritual healer or obtaining a herbal remedy instead of seeking to transfer her immediately to the nearest health facility. One relative said:

My sister [the woman giving birth] was told and believed that she suffered from evil spirits from jealous people, causing her to have health issues during this pregnancy. (Sister, Case 26)

When asked about the events at home that had led to the maternal death, many of the relatives mentioned a Traditional Birth Attendant (TBAs). They explained that TBAs are trusted and respected in the community and that their advice is followed. However, some relatives said that the TBA had left them soon after the birth and it was at that point those complications developed. Other stated that TBAs kept women at home, despite their signs of distress, and sought to apply self-made remedies and herbs instead of referring them to the health facilities.

We called the TBA after the delivery, and she gave the patient a drink to stop the bleeding which worked for a little but then the bleeding increased again. After three days of more home remedies, the patient's sister took her to the hospital and paid for the taxi. (Mother of woman, Case 9)

The health care providers painted a similar picture. Many of the maternal deaths they witnessed during this period started out as a home delivery with a trusted TBA, which, because of a lack of knowledge and understanding of the signs and symptoms of birth abnormality, delayed referring the woman to hospital by giving her remedies which they believed would stop the bleeding. Their efforts to treat women's episiotomies caused them to arrive at the referral hospital weak, deteriorated, and unprepared for the severity of their situation. One health care provider said:

Patient was admitted after normal vaginal delivery with the TBA. Baby was alive at birth, but woman developed postpartum bleeding at home and the TBA advised patient to rest and drink lots of warm soup to get her strength up. (Midwife, Case 3)

Challenges to timely referral from the community to the referral hospital

Of the relatives interviewed in this study, many spoke about the financial implications of taking their female relative to hospital. The costs associated with treatment had to be considered before they could decide to go to the health facility. They knew that if they spoke to the community healthcare services that they would have referred them to hospital, but that this would have cost them money that was difficult to come by. One relative explained:

Our biggest issue is money for transport, who is going with her and the medicines and also, we were embarrassed to ask our family and so we tried to avoid that as long as possible but obviously we wanted what was best for my sister. (Sister, Case 11)

When asked about the events leading to the maternal death family members said that they had asked for support from the community health services before coming to the hospital. They said that these local services advised them to go back home after a few tests and with some medications. This reduced the confidence family members had in the

knowledge and abilities of local health providers and raised their concerns about the costs of purchasing medicine. They suggested that this might have caused a further deterioration of the obstetric situation and thus contributed to the greater likelihood of maternal mortality. One relative stated:

My daughter never attended antenatal care because she believed that if you go to antenatal care or you don't it is all the same because the midwives do not tell you anything and they just try to sell you medication. (Mother of the woman, Case 12)

The health care providers in this study were aware of this attitude. They said that it was a shame that the families who did seek care in the community when their female relative started to experience difficulties were met with disrespect and indifference and were sent home with wrong information and inadequate care. One health care provider said:

During admission the patient explained that she attended antenatal care at 34 weeks pregnant because her legs were swollen, and she had headaches. The maternal and child health centre (MCH) midwife told her that she had gastric problems and gave the patient gastric tablets to buy. (Midwife, Case13)

Inadequate interprofessional collaboration and unsatisfactory communication with relatives at the referral hospital level

This category shows that maternal deaths could also result from the inadequate teamwork that exists between health care providers and extends outwards to include communication with the patient's relatives and family members. This shortfall in care provision has, of course, an enormous impact on the quality of care and slows wider efforts to reduce maternal mortality.

Ineffective communication for management of life-threatening conditions

The family members who were interviewed in this study believed that there was gap in the communication between them and the health care providers. They believed that they did not receive adequate information about the medical situation of their female relative. They did not understand the medical terminology that the health care providers used. The family members were thankful for the skills and knowledge that the medical staff had, and they expressed their understanding of the situation the staff found themselves in. However, they were very disappointed with the disrespectful way some health care providers had responded to their questions about procedures.

One participant explained:

These doctors and midwives do not talk to us in a respectful way..... this is important to us as a family because we love our daughter, and we want to make sure she will be fine. (Mother-in-Law, case 23)

The relatives explained that they felt there was a lack of communication between professionals at the hospital. They felt the professionals seemed confused and said that they had received mixed messages from different staff members. This made it seem that staff were not communicating the same messages and advice to them. They wished that staff had been able to communicate better with one another, both within and between different departments. Professionals had expressed different courses of treatment and given conflicting advice regarding their female relative's care. This had caused confusion and an increased lack of trust in the medical diagnosis among the family members who, in Somali culture, are all involved in agreeing the care decisions taken about their female relative. This uncertainty only promoted greater discussion among family members about treatment options and further lengthened the collective decision-making time. Thus delaying adequate treatment and increasing the likelihood of a maternal death.

Health care providers complained that one of the most important ways for healthcare professionals to communicate is through documentation. When discussing maternal mortality cases with health care

providers it was very difficult to trace the series of event and the findings of investigations that underpinned the medical plan due to lack of documentation. A health care provider explained:

When we are busy and patients are critical, we do not have time for writing and our patients tend to be very sick and critical, so we have all the information in our head, but we do not write it down. (Midwife, case 19)

Also, referrals documented in the medical notes were not followed up and not prioritized. One healthcare provider said:

The doctors documented the patient to be transferred to Operation Theatres as they suspected a uterine rupture or cervical laceration, but this was not done and two hours later the patient passed away (Midwife, Case 14)

The health care providers described a scenario where a woman could spend many days in labour at a different hospital before eventually an obstructed labour was diagnosed and it was agreed with her relatives to move her to the referral hospital. However, when she arrived, often with no record of her previous care, her family would claim that she had been in labour for only a few hours. There was no way that the health care professionals could verify anything with certainty.

When the woman came in, we managed to stop the bleeding. She was in labour for several days at home, and we identified that there was an obstructed labour using the partograph. Later we found that a private hospital had already advised a Caesarean section four days ago. (Midwife, Case 13)

Institutional challenges to manage life-threatening conditions

Both health care professionals and relatives believed that there were institutional challenges that hindered the management of obstetric emergencies at the hospital. These led to missed opportunities, to maternal deaths that, according to the participants, could have been prevented. The health care professionals said there was in the hospital no clear set of obstetric emergency guidelines which should be used to support the management of obstetric emergencies. Doctors and midwives mentioned that in the hospital there was no bell to call everyone to the emergency, no trolley standing ready with emergency resuscitation equipment on the wards and the absence of any specialized team with experience of working to save maternal lives. Health care professionals explained:

The midwives supported the delivery, which was very quickly...They transferred the woman to the gynaecology ward for resuscitation, but the woman died. Resuscitation should be possible on all wards and health care providers need group training on emergency preparedness. (Midwife, Case 20)

The health care professionals stated that although the families were aware that their female relative was now in an emergency situation, it was difficult for them to really grasp this fact. When they did, the presence of medical staff gave them the false hope that the situation was now under control and their relative could be saved. This false sense of safety and security is one of the main factors behind the missed opportunities to provide timely emergency care. The health care also noted there were other practices that they felt could have improved women's care provision. They explained that there was an excessive amount of time wasted on sending patients (with their family members) have blood taken and wait for the test results. One health care provider explained:

We tend to send ill patients to take bloods from the investigations department and women complain about this a lot. (Midwife, case 19)

In addition, the health care professionals believed that women presenting with an obstetric emergency, especially those which looked life-threatening, could have benefitted from more specialized care in the ICU. This is because most midwives do not have ICU experience and aren't trained to work in ICU. Other medical personnel suggested that

deaths could be prevented if the maternity department had a small ICU. This was because many births with complications can become critical within a very short period of time. One health care professional said:

I think the maternity department should have their own ICU to improve the care or there should be midwives working with us in the ICU. (ICU Nurse, Case 20)

Another vital issue affecting the sense of emergency, according to the health care professionals, was the requirement to obtain consent for any lifesaving treatment. For a variety of reasons, obtaining consent for treatment can take anything from a few hours to up to several days. This was frustrating for health care professionals. The fact that the hospital requires consent often gives relatives the (false) sense that there is no real emergency that requires immediate decision making. Obtaining consent could be delayed, not just because of the need to consult with relatives but also because of the women themselves, who often refused medical intervention because they genuinely believed that it was not good for their future health. Many women believed medical intervention would be painful, lead to possible infection and could limit their ability to have children in the future. One health care professional recalled:

This patient was severely eclamptic, with oedema of the legs, swelling and hallucinations many days before admission. She had antepartum haemorrhage and hepatic problems identified after admission. The patient and the family were advised to authorize a caesarean section, but the patient refused for five days before death (Doctor, case 15)

Husbands and fathers of a patient are the main parties expected to sign a consent form. They therefore experience huge pressure from within their community not to take this responsibility too lightly not to authorise potentially expensive treatment too quickly, treatment that the whole community will have to pay.. In addition, there is the impression that the more people whose advice is taken into consideration, the more reliable and responsible the husband or father will be viewed after the emergency regardless of the outcome for mother and baby. This is because the community sees his actions as measured and not taken alone. One relative explained:

They said that if he [the husband] signs too quickly, he will be regarded as irresponsible, it will seem like he does not love the woman and baby at all. Therefore, he should consult with as many people as possible to ensure a balanced decision that will give him and the relatives peace. (Sister, case 17).

Discussion

This study identified a series of instances where the opportunity to provide lifesaving treatment for women who had developed serious complications while giving birth were missed, resulting in maternal mortalities at the main referral hospital in Somaliland. The delay in getting women to a tertiary care hospital with ability of providing blood is critical. According to the data, post partum haemorrhage (PPH) was the main reason for maternal deaths at the main referral hospital in Somaliland. This paper suggests many reasons why such delays occur, among these are the need to establish a free transport system and increase community awareness. A good suggestion for low resource setting are non pneumatic anti shock garments (NASG) as a first line of management of PPH [20,21]. The results from this study also show that there was poor risk awareness at the community level which led to a delay in seeking care and poor intra-hospital health care which included a lack of interprofessional collaboration and a failure to communicate with and involve patient family members.

Poor risk awareness at the community level can be understood as a lack of knowledge about the warning signs in pregnancy and labour and a failure to recognize which signs are potentially life threatening. These misconceptions meant that TBAs and family members, anxious to avoid expensive and unnecessary medical treatment, allowed women to stay at

home when they should have been transferring the woman to a health facility so that she could receive the necessary treatment in a more timely fashion and thus avoid maternal mortality. This situation is consistent with the Paul et al study in Odisha [22]. The latest demographic survey data to emerge from Somaliland shows that only 47% of women who give birth receive any form of antepartum care, suggesting there is little by way of trained health care input which might increase understanding of the danger signs a women might display after giving birth. 7.1% of the maternal deaths was under the age of 20 years, however it might be that this group has less access to hospital or died on their way to hospital. Data collected for this study shows that 74% had no formal primary education, contributing still more evidence to the argument advanced in other studies that women's vulnerability to maternal death decreases in line with their age, education, and parity. Studies show that the older a woman is and the more education and children she has, the more she and her partner can control her birth choices and pregnancy outcomes [23,24].

Referral of women to the regional hospital from the community health centres was low. The fact that 89% of women were self-referrals indicates a weak referral system and the need for improving community maternal and child health centres [10]. A recent study from the same area showed that women preferred to rely on TBAs because they were trusted in the community [8]. While this might be one way to prevent maternal deaths, TBAs need to be better trained so they can recognize when women need to be directed to health facilities instead of using home remedies to keep seriously sick women at home longer than is safe for them. The data from this study shows that only 1% of the referrals to hospital in this study came from TBAs. According to the family members interviewed here, they had taken their female relative to their local health centre when she started to present with problems, but they were sent back home. These experiences led them to display a lack of trust in the ability of health care providers. These experiences point to the critical importance of providing local health centre staff with adequate training in respectful maternity care and risk assessment so that women and their families are not discouraged from visiting health facilities [25].

Another measure for reducing maternal deaths is to improve the referral system itself. This will ensure that women get the care they need in the community much faster and that only the most critical cases come to the main referral hospital which will reduce the burden on the hospital system and staff [25]. This suggests that efforts should be directed towards improving the quality of care at the community health facilities because they are closer to the community people should feel welcomed and supported. Local health facilities should be able to provide high quality care that can offer trained midwives able to manage antenatal and postnatal care in women's homes with the support of community workers [26]. The new global target for 2025 to accelerate ending preventable newborn deaths and stillbirths by 2030 target one focuses on at least four antenatal visits and up to three postnatal visits within 2 days of delivery in order to reduce maternal mortality, a recommendation which our conclusions support [27]. In addition, 32% of the women in this study died before they were able to give birth, which represents another missed opportunity to save these mothers and their babies. The deaths examined in this study could have been prevented if the institutional challenges identified in the qualitative data could have been addressed, especially the delays around consent shown in this study, and in others which have examined the influential cultural practices which surround birth in Somaliland [11,28,29]. Even though the highest cause of maternal mortality was obstetric haemorrhage, only 7% had a blood transfusion of more than 4 units which indicates a sub-optimal level of care (Table 4). Haemorrhaging is often caused by a ruptured uterus as the result of prolonged labour. In Somaliland there is the suggestion that this is the result of a cultural resistance to life saving treatment, in the form of a caesarean section, although this conclusion requires further research. Another factor in the reduction of maternal mortality is the hospital treatment women with critical maternal complications receive.

In this study, only 25% of women who presented to hospital and have developed serious complications leading to maternal mortalities were referred to the ICU, thus suggesting sub optimal care [30]. In addition, collaboration between obstetricians and the other hospital maternity staff and the ICU staff could be improved. This relationship has elsewhere been seen as a vital component for the reduction of maternal mortality [31].

The health care that the women received in this study suffered from a lack of good communication. There was a lack of communication with family members and poor follow-up from diagnosis to treatment. Interprofessional working and communication between staff of the same and different wards was identified as poor in this study. An observational study conducted in South Africa has shown there was a 29.3% reduction in maternal deaths after the implementation of a skills-drills educational programme in maternity wards called Essential Steps in Managing Obstetric Emergencies (ESMOE). Over a period of two and half years 80% of the midwives in 12 districts were trained at EmOC centres and hospitals in confidence-building and supportive team-work in the work environment, skills enhancement which is missing at present in Somaliland [26,32]. Institutional barriers to new approaches can be tackled through case discussions within the team and, as such, open people up to the possibility that maternal deaths are preventable and that they have the skills to prevent them. It is a shame that fears of blame and a lack of trust in confidentiality, amongst other reasons, means that this important practice is not more widely used in low resource countries. A review of maternal deaths that take place within the community and a health facility should be combined to ensure the capture of the total number of maternal deaths in Somaliland. This has never yet been attempted, but the Somaliland Ministry of Health and Development (MOHD) has made it a priority to reduce preventable maternal deaths and improve the quality of maternal health care [33].

Strengths and limitations

This is the first of study of its kind in the Somali region, and as such provides vital insights into the number of maternal deaths, the causes of those deaths and the underlying circumstances which have accompanied them because one cannot determine how to prioritize initiatives unless each maternal death is adjudicated and maternal death audits are performed. The data collection process carried out for this study has ensured the existence of reliable statistics, particularly in a context where documentation and storage of medical notes is underdeveloped. Interviewing both family members and health care professionals has provided insights regarding the causes of maternal mortality that have gone beyond the numbers. Participants in this study were asked about the series of events that led to the mother's death and its underlying circumstances regardless of her age or parity. This ensures that the data is transferable to other studies and has not been influenced by age, parity, knowledge, or financial status. This study can offer only limited perspectives on maternal mortality in the community because it was hospital-based study. Quality healthcare in the hospital may be complemented with community interventions such as an educational program on the danger signs that prompt immediate action. In a country with limited resources, all the necessary initiatives suggested in this paper cannot possibly be instituted in a short period of time. This paper does not and cannot, determine which initiatives will be most accepted and cost effective in a particular setting. The results should therefore be transferred with caution. A register of maternal deaths along with a death audit as well as increased community education and engagement are all reasonable first steps to be considered in particular settings.

Conclusion and clinical implications

Poor risk awareness in the community and inadequate interprofessional collaboration at the hospital must be addressed if fewer women are going to die from giving birth in Somaliland. The referral system

needs to be improved and TBAs and other community health workers need to be better trained so they can act as more effective links between women and the hospital services. The ministry of health needs to consider ways it can help women and their families to access the health services more readily and more quickly. It could, for example, provide women with hospital transport vouchers and thus remove financial cost as an obstacle to seeking medical treatment. At the community and hospital level in-service and pre-service education for midwives, nurses and doctors can be a way to promote improved communication and teamwork amongst hospital professionals. Using a simulation lab for training in obstetric emergencies is another way to promote teamwork, together with community sensitization. In addition, we recommend the commencement of a national maternal death surveillance system starting in medical facilities and then extending out to the country as a whole. Having a better grasp of the total number of maternal deaths can only lead to still greater initiatives that, taken together, will improve the quality of care for pregnant women and reduce the likelihood of maternal mortality and morbidity.

Ethical Approval

Ethical clearance to conduct this study was obtained from the Somaliland Ministry of Health and Development. The research ethics committee at the University of Hargeisa also approved this study. Approval number Dr: [ANONOMYZED].

CRedit authorship contribution statement

Amina Essa: Data curation, Formal analysis, Project administration. **Fatumo Osman:** Conceptualization, Data curation, Investigation, Supervision, Writing. **Marie Klingberg-Allvin:** Conceptualization, Formal analysis, Funding acquisition, Supervision, Writing, review and editing. **Kerstin Erlandsson:** Conceptualization, Formal analysis, Methodology, Supervision, Writing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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