

## ORIGINAL RESEARCH ARTICLE

# How complete were maternal death reviews in Central Kenya 2015 - 2018?

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## Abstract

In response to high maternal mortality ratio (MMR) Kenya implemented mandatory maternal death reviews (MDR) in 2004. This retrospective study used MDR data to assess the completeness of MDR process in seven hospitals of Thika sub-county, central Kenya from January 2015 to June 2018. Of all 43 maternal deaths that occurred, 98% were notified while 64% were audited. MDR forms were filled in 55% of the cases of which only 7% had complete documentation. The median age of patients was 30 years majority of whom died within 24 hours of admission. Caesarean sections were associated with 48% of deaths, with haemorrhage accounting for most of the direct causes. Data on hospital-related delays, missed opportunities and action points were most frequently omitted in MDR forms. Capacity building for audit teams is recommended to improve quality of MDR process particularly focusing on identifying causes of preventable maternal deaths. (*Afr J Reprod Health 2020; 24[4]: 122-131*).

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**Keywords:** Maternal, Mortality audits, SORT-IT

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## Résumé

En réponse à un taux de mortalité maternelle élevé (TMM), le Kenya a mis en œuvre des examens obligatoires des décès maternels (MDR) en 2004. Cette étude rétrospective a utilisé des données MDR pour évaluer l'exhaustivité du processus de MDR dans sept hôpitaux du sous-comté de Thika, dans le centre du Kenya, de janvier 2015 à Juin 2018. Sur les 43 décès maternels survenus, 98% ont été notifiés tandis que 64% ont été audités. Des formulaires MDR ont été remplis dans 55% des cas, dont seulement 7% avaient une documentation complète. L'âge médian des patients était de 30 ans dont la majorité est décédée dans les 24 heures suivant l'admission. Les césariennes étaient associées à 48% des décès, les hémorragies représentant la plupart des causes directes. Les données sur les retards hospitaliers, les occasions manquées et les points d'action étaient le plus souvent omises dans les formulaires MDR. Le renforcement des capacités des équipes d'audit est recommandé pour améliorer la qualité du processus de MDR, en se concentrant en particulier sur l'identification des causes de décès maternels évitables. (*Afr J Reprod Health 2020; 24[4]: 122-131*).

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**Mots-clés:** Audits maternels, de mortalité, SORT-IT

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## Introduction

Maternal mortality refers to death of a woman during pregnancy or within 42 days of termination of pregnancy, irrespective of gestation and site of pregnancy, or due to any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes<sup>1</sup>. Maternal mortality is often referred to as the “*litmus test*” for health system<sup>2</sup>. Globally, an estimated 830 women die daily secondary to pregnancy related complications, with more than 99% of these deaths occurring in low-resource countries. Sub-Saharan Africa (SSA) accounts for 66% of the deaths<sup>1,3</sup>. Life threatening obstetric complications have been

estimated to occur in approximately 15% of women in resource-limited settings<sup>4</sup>. Millennium Development Goal 5 focused on reducing maternal mortality ratio (MMR) by 75% by the end of 2015, but made the least progress among the eight goals especially in SSA. This is despite a global decline of maternal deaths by 45% between 1990 and 2013<sup>11</sup>. Subsequently, the Sustainable Development Goal (SDG) 3 aims at reducing MMR in SSA from 546 to 70 per 100,000 live births by 2030<sup>5</sup>.

In response to high maternal mortality burden, the World Health Organization (WHO) launched two initiatives. In 2012 it highlighted the need to improve maternal mortality reporting and

review as key strategies in improving maternal quality of care. Maternal Death Surveillance and Response (MDSR) initiative was created with specific technical guidance on conducting maternal death review, reporting and integration into existing country Health Management Information Systems (HMIS)<sup>6</sup>.

Strategies towards Ending Preventable Maternal Mortality (EPMM) were launched in 2015, with the goal of improving: 1) accurate maternal death reporting 2) reviews to ensure accountability and 3) quality of care<sup>7,8</sup>. This included establishing quality and performance indicators, strengthening healthcare systems to provide accurate and reliable maternal health data combined with timely and consistent reporting. The WHO guidelines promote the gathering of both accurate qualitative and quantitative maternal death review information, that can be utilized strategically to prevent future maternal deaths<sup>7</sup>. However, surveys have shown that maternal mortality reviews are often incomplete and unreliable, making meaningful healthcare system changes difficult going forward<sup>9</sup>.

The ministry of health in Kenya first recognized the scope of the burden with the MMR being 759 per 100,000 live births in 2000<sup>2</sup>. The government implemented mandatory maternal death review (MDR) system in 2004 with eventual integration into the country's HMIS<sup>10</sup>. However, only 46% of maternal deaths reported through HMIS were documented in the MDR system between 2004 and 2006. This decreased further between 2008 and 2010 when only 20% of maternal deaths captured in the HMIS were audited. This was attributed to poor documentation<sup>2</sup>. This likely led to inability to develop and implement successful interventions which would have been guided by MDR findings. In 2013, Kenya reported 6,300 annual maternal deaths contributing to 58% of such deaths globally<sup>11</sup>. This ranked the country among top ten nations with the highest maternal mortality burden demonstrating that prior interventions did not eventually improve maternal outcomes<sup>12</sup>. This could probably be attributed to poor documentation, failure to identify definitive causes of maternal deaths and lack of investment in evidence-based interventions.

In 2016 Kenya launched the national guidelines for Maternal and Perinatal Death Surveillance and Response (MPDSR) aimed at improving reporting of maternal deaths and review process. By this time only 15% of maternal deaths were documented in the country's health information system. Poor data management practices ranging from inadequate data collection tools and limited capacity for data entry were among gaps identified with the implementation of the MDR system<sup>12</sup>. Kenya's MMR in 2016 was estimated at 257.6 (195.1-335.3) per 100,000 live births which is still a long way from achieving SDG 3 MMR target of 70 per 100,000 by the year 2030<sup>13</sup>. As a means to understand and mitigate against the occurrence of avoidable maternal deaths, audits utilize primary data and information from health facilities. Primary data sources therefore ought to be complete and accurate in order to give the most reliable findings that guide interventions at different levels.

Confidential enquiry into maternal deaths report in Kenya for 2017 found that poor record keeping and documentation occurred in majority of maternal deaths that were audited<sup>14</sup>. However, this report did not expound on specific gaps in data management and critical data elements that were most likely omitted and their overall impact on the effectiveness of the MPDSR. This study evaluates the completeness of critical data elements within the MPDSR process that are likely to impact on the quality and effectiveness of the process in preventing avoidable maternal mortality.

## Methods

### Study setting

Kenya has an estimated population of 46 million inhabitants<sup>15</sup>. Adoption of a new constitution in 2010 devolved administrative authority from the national government to 47 county governments and further to smaller administrative units referred to as sub-counties. The central government continues to develop healthcare policies and guidelines that play regulatory roles. Since 2014, it is a national policy to provide free maternity services in all public health facilities commonly referred to as "*Linda Mama*" which translates to "protect the mother" in Kiswahili. County governments are implementers

of the national health agenda and providers of healthcare services. The control and decision-making regarding budget and distribution of healthcare funding has been shifted to the county-level.

Six tiers of healthcare based on the scope and complexity of services expected at each level exist. Tier 1 comprises of community and household level; tier 2 includes dispensaries and tier 3 incorporates health centres. These three tiers mainly offer preventive and promotive health services. Tier 4 comprises of primary hospitals, tier 5 secondary hospitals and tier 6 teaching/referral hospitals which offer more specialized preventive, curative and rehabilitative healthcare services. Thika sub-county is one of the twelve sub-counties in Kiambu County, located in the central region of Kenya. The county has an estimated population of 2.1 million while Thika sub-county has approximately 200,000 inhabitants<sup>16</sup>. The general population estimates may vary due to migrants who seek jobs in Thika sub-county and its proximity to the capital city.

Maternal death reporting in the sub-county follows national policy on notification and facility-based review of maternal deaths which recommends notification of all pregnancy-related deaths within 24 hours and review within seven days<sup>12</sup>. Notification is done through maternal death notification (MDN) forms. Upon review, MDR forms are filled and submitted to the sub-county health department. This form contains maternal demographic and obstetric profile, clinical care provided, causes of death, missed opportunities and action plans taken to avert maternal deaths. The MDN and MDR forms are anonymized for confidentiality purposes. Patient case notes are the primary source of information for the audits.

Thika sub-county has 44 health facilities that include 11 public, 4 faith-based, 26 private and 3 non-governmental organizations owned facilities which routinely submit service delivery reports on a monthly basis to the sub-county health records department. Among these are one (1) public level 5 hospital, three (3) faith-based and three (3) private level 4 hospitals that provide comprehensive emergency obstetric care which were included in the study. Level 2 and 3 health facilities provide

basic obstetric care and are least likely to record maternal mortality since they refer potential obstetric complications to level 4 and 5 hospitals.

### ***National maternal death review***

National level provides oversight role on MPDSR program through periodic monitoring and evaluation of maternal health indicators with a view to strategically allocate resources and offer technical support to counties needed for reducing maternal morbidity and mortality. This is through promoting notification, review and response to maternal and perinatal mortality in the country. The MDR process is based on a “three-delays model” that recognizes three forms of delays attributable to maternal mortality<sup>17,18</sup>. The first delay comprises of factors that hinder timely decision-making by women to seek health services and usually occurs at home; second delay entails time lost between home and hospital and third delay constitutes time lapse before timely, appropriate and adequate interventions are implemented within hospitals. Third delay can potentially be more amenable to mitigation since most women who seek professional healthcare in hospitals have already overcome the first and second delays. However, it has been demonstrated that majority of women who eventually die arrive at hospitals stable and in time suggesting that such deaths may be partially attributable to failure of facility-based care<sup>19</sup>. Assessment of health system challenges through MDR can therefore give insights as to what should be done to avoid future recurrences of preventable maternal deaths.

### ***Study population***

The study population included review of data and reports for maternal deaths that had occurred in seven hospitals within Thika sub-county between January 2015 and June 2018. Community-related maternal death audits which should routinely be done through community-based information system is currently not functional and could not be included in the study. Such deaths could have gone unreported or their causes misclassified in the vital statistics registry.

### Data variables and data collection

Key indicator variables were purposefully selected from MDR tools provided by the Ministry of Health. The indicators summarized subsections of MDR forms that contain data on patients' demographic and obstetric characteristics, cause(s) of death, presence of delay(s) in accessing care, interventions given/missed opportunities and action points taken by facilities to prevent future maternal deaths. The indicators included patients' clinical characteristics and facility-based service delivery factors that most likely contribute to or are associated with maternal mortality. Standardized data abstraction questionnaires were used to collect data. MDR data validation was completed by comparing patients' case notes for the purpose of assessing the level of consistence. An audited death referred to maternal mortality whose occurrence was not only notified but which the cause(s) of death were explored by MDR committees as prescribed by the national guidelines.

### Statistical analysis

Abstracted data were double entered into an electronic database (EpiData v4.1) and analysed using IBM SPSS version 25. Descriptive statistics were performed and presented in the form of tables and figures. The number of maternal deaths were classified based on their notification and audit status as provided by national guidelines for MPDSR. Further, analysis was based on completeness of information entered in MDR forms for audited maternal deaths. Demographic characteristics of pregnant women who died during the period were summarised using frequency tables. Stage of pregnancy on admission and at death as well as mode of delivery and cause(s) of death were summarized using pie charts. Concordance assessment between variables filled in MDR forms and patients' case notes was presented in a bar graph.

### Results

Between January 2015 and June 2018, 43 maternal deaths occurred in Thika sub-county. Upon review of the Kenya District Health Information System

**Table 1:** Trends in maternal death audits and reporting between January 2015 and June 2018 in Thika Sub-county, central Kenya

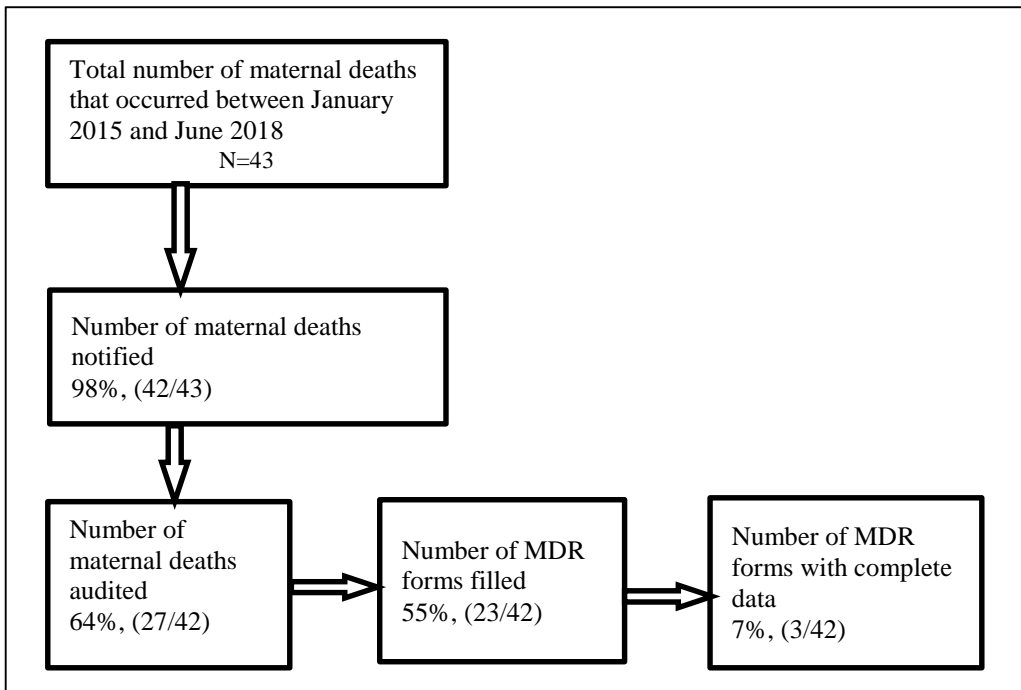
| Year         | Total Number of maternal deaths | Maternal audited (%) | deaths |
|--------------|---------------------------------|----------------------|--------|
| 2015         | 11                              | 2 (18)               |        |
| 2016         | 11                              | 5 (45)               |        |
| 2017         | 14                              | 14 (100)             |        |
| 2018         | 6                               | 6 (100)              |        |
| <b>Total</b> | <b>42</b>                       | <b>27 (64)</b>       |        |

**Table 2:** Characteristics of pregnant women who died between January 2015 and June 2018 in Thika Sub-county, central Kenya

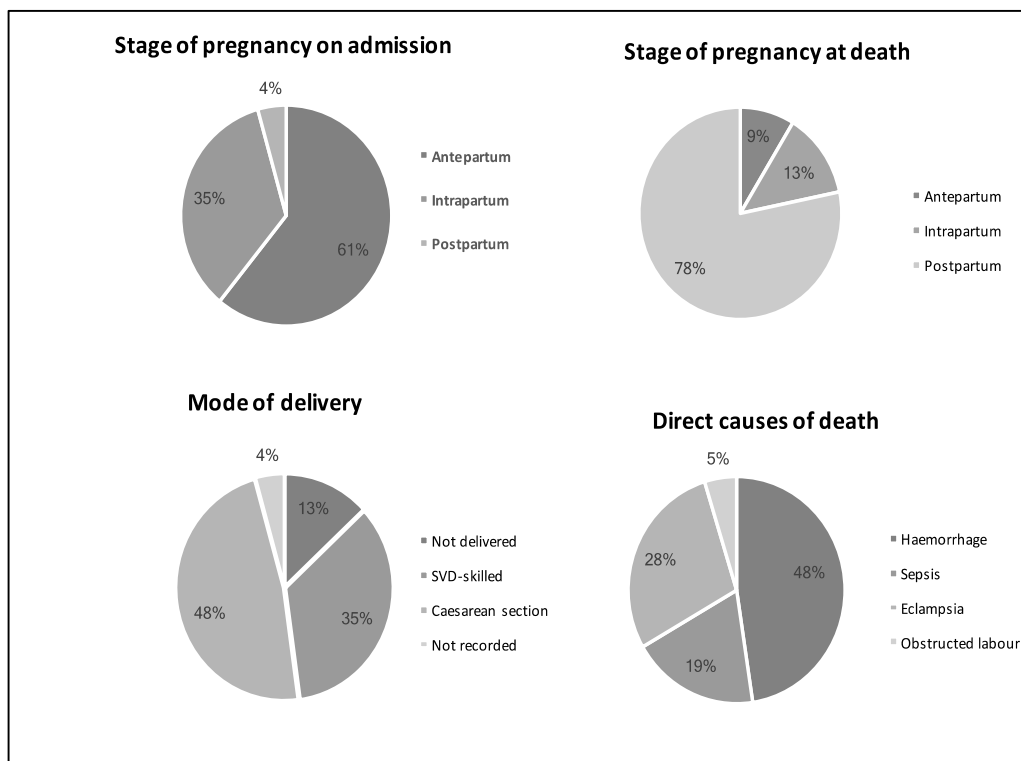
| Maternal characteristics       | Number (%) |
|--------------------------------|------------|
| <b>Age in years</b>            |            |
| 15 – 24                        | 3(13)      |
| 25 – 34                        | 15(65)     |
| 35 years and above             | 5(22)      |
| <b>Parity</b>                  |            |
| 0                              | 3(13)      |
| 0 – 4                          | 19(83)     |
| Not recorded                   | 1(4)       |
| <b>Gravida</b>                 |            |
| 1                              | 3(13)      |
| 2 – 4                          | 15(63)     |
| 5 and above                    | 2(9)       |
| Not recorded                   | 3(13)      |
| <b>Gestational age (weeks)</b> |            |
| 13 – 24                        | 1(4)       |
| 25 – 36                        | 3(13)      |
| 37 weeks and above             | 16(70)     |
| Not recorded                   | 3(13)      |
| <b>Length of hospital stay</b> |            |
| Less than 24 hours             | 16(70)     |
| 24 hours and above             | 7(30)      |

version 2 (DHIS2), the subcounty reported 42 maternal deaths during this same time period out of which 27 (64%) were audited. MDR forms were filled in 23 (55%) of the cases. see Table 1 and Figure 1. Only 3 (7%) of the MDR forms had complete data.

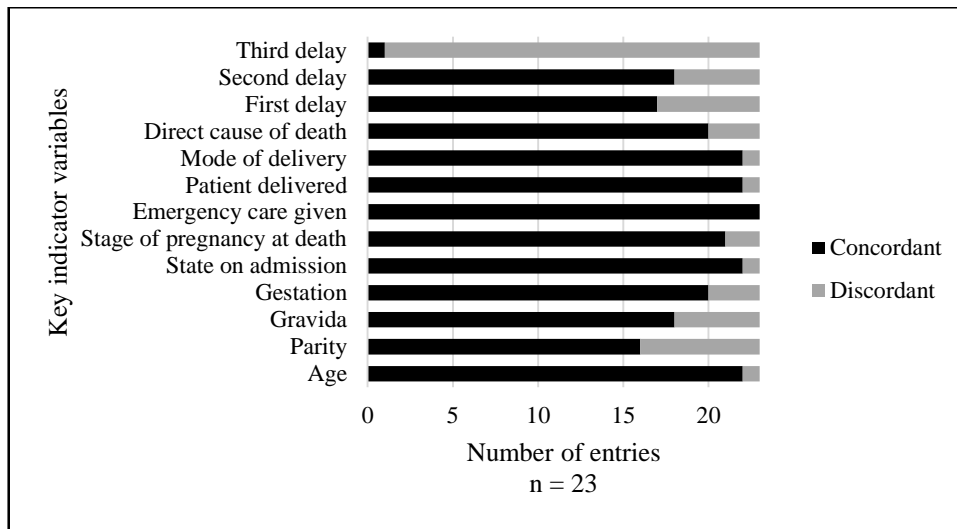
Of the 23 audited maternal deaths and MDR forms filled, majority 15 (65%) of women were aged between 25 and 34 years, 19 (83%) had at least one child and 16 (70%) were at term, see Table 2. Majority of cases 22 (96%) were admitted before delivery and 18 (78%) had delivered by the time of death, see Figure 2. Haemorrhage was the most common direct cause of death in 11 (48%) cases. Majority of deaths 16 (70%) occurred within 24 hours of admission.



**Figure 2:** Maternal deaths audit cascade between January 2015 and June 2018, Thika Sub-county, central Kenya. \*MDR = maternal death report



**Figure 3:** Obstetric characteristics, hospital care and direct causes of maternal deaths for women who died between January 2015 and June 2018 in Thika Sub-county, central Kenya



**Figure 4:** Concordance assessment of key indicators between MDR forms and patient case notes for women who died between January 2015 and June 2018 in Thika Sub-county, central Kenya

Operative delivery (caesarean section) was more commonly 48% associated with maternal deaths compared with other modes of delivery. Half of deaths following caesarean sections as a result of haemorrhage, while eclampsia accounted for 30% of cases. All patients were reported to have received skilled emergency obstetric care.

Whereas presence of a third delay was documented in 12 (52%) of the MDR forms, in-depth review of service delivery indicators in the same forms revealed presence of third delay in 16 (70%) of the cases. Further comparison of data in the MDR forms and patient case notes showed more instances of third delay which were not documented in the review forms. Collectively, elements of a third delay were observed in almost all (96%) cases. Figure 3 illustrates the variations.

## Discussion

Maternal death reporting has been mandatory in Kenya since 2004. The key finding from this study was that 98% of maternal deaths that occurred in Thika sub-county were reported during the study period. This finding is in stark contrast to 2014 low-reporting in which only 15% of maternal deaths were documented in DHIS2<sup>14</sup>. Our findings suggest that efforts in 2016 by the WHO and Kenya government to improve maternal death audits and reporting process has continued to yield desired outcomes.

Despite the high proportion of maternal deaths reported, only 64% cases had audits completed by maternal mortality review committees. There was however a systematic improvement in the reporting of maternal deaths from 18% in 2015 to almost 100% by the end of 2017 which has continued into 2018<sup>16</sup>. These findings again suggest that providers and their facilities are increasingly recognizing the crucial roles that maternal mortality reporting and reviews play in improving the quality of obstetric care. Similar improvements in maternal audits have been reported in similar study done in rural Tanzania<sup>20</sup>. These milestones in reporting should however entail improvement in data quality that can reliably be utilised design responsive strategies to combat maternal deaths and appropriate allocation of limited resources.

Community-related maternal deaths reporting and review also referred to as “verbal autopsy” is one of the strategies provided by the national guidelines for MPDSR. However, no community-based maternal death reports were identified suggesting that there could have been maternal deaths that occurred within the community that went unreported and possibly misclassified as to have resulted from causes unrelated to pregnancy and childbirth. Non-functional community-based maternal deaths reporting is a gap that this study identified. It is possible therefore that the country’s MMR could

actually be higher than documented if community-based deaths were to be correctly reported.

It remains unclear as to why there was poor reporting of maternal mortality and audits prior to 2017, but it may be due to several reasons. First, audits were simply never completed or were irregularly done. Secondly, the auditing health facility may not have completed the MDR forms and/or submitted them in a timely manner. Underreporting of maternal deaths has been documented in sub-Saharan countries due to various reasons. In Burkina Faso, planning for audits were noted to be irregular and sometimes motivated by critical occurrences. Adherence to guidelines were shown to be poor, which may have contributed to ineffective implementation of remedial strategies<sup>21</sup>.

This study identifies significant gaps in reviewing of maternal deaths compared to what has been prescribed by the national guidelines for MPDSR<sup>12</sup>. For instance, MDR forms were filled in only 55% cases and nearly all (93%) of the MDR forms filled were incomplete. This may be attributable to healthcare providers being unaware of the importance of completing MDR standard tools or substitution of the tools with minutes taken during audit meetings. Additionally, staff who are involved in the audit process may be overburdened and unable to adhere to MDR guidelines<sup>18</sup>. The low completion rate of MDR forms may also have been due to fear of documenting incriminating substandard care or clinical malpractice that could lead to litigations or simply unavailability of printed copies of MDR tools in facilities. Past studies on medical records for instance in Iran documented nearly 100% data incompleteness demonstrating that use of unreliable data for decision-making is rampant and possibly contributes to poor progress in improving clinical outcomes<sup>22</sup>.

Our study noted consistent lack of documentation for key information in the MDR forms, notably: 1) identification of definitive cause(s) of maternal mortality, 2) existence of sub-standard care and missed opportunities 3) strategies to mitigate against avoidable maternal deaths and 4) existence of third delay. Third delay was reported in only 52% of the MDR forms but upon chart review, it was noted that 96% of the MDR forms had other related and sufficient information

necessary to conclude that third delay was present even though not precisely stated. Missing critical information such as identification of actual cause of maternal deaths, poor quality of care and strategies to avoid occurrence of preventable maternal deaths means that health systems are potentially missing opportunities to strategically allocate and align resources to address maternal mortality burden.

Information on assessment of quality of care provided was documented in 48% of the cases while action plans to address identified gaps were stated in 52% of the MDR forms. Inability to identify and document instances of substandard care, which is known to contribute to maternal deaths, negates the principal of learning through audits. Failure to develop mitigation measures to prevent maternal deaths through audits means that health facilities are unable to discern appropriate responses meant to deter recurrence of avoidable maternal deaths. This ultimately makes MDR process ineffective. Discordance between data entered in the MDR forms and patients' case notes was more common for patients admitted in stable condition as opposed to those who arrived at the hospital in critical condition. This suggests that there may be systemic failure to attribute the occurrence of maternal deaths to institutional factors related to third delay especially for women previously admitted in stable condition and without any obvious prior co-morbidity.

In contrast, other variables like demographics, obstetric characteristics, length of hospital stay and time and date of death were routinely recorded. Omission of critical information during audit process that could attribute blame or litigation against care providers may be a related factor. Similar concerns have been identified in other studies that reviewed maternal near-miss cases and medical records in several African and Asian countries<sup>2</sup>. The findings suggest that maternity staff likely need further reassurance, support and education regarding goals of mortality audits. But does the "no name no blame" principle applied in MPDSR process inculcate a sense of laxity and irresponsibility among healthcare providers? Does this principle preclude opportunities to implement corrective measures? Seven years after introduction of MDSR, Ethiopia's maternal death reporting currently stands at 10%

which has been shown to divert individual and health systems responsibility in occurrence of maternal deaths<sup>24</sup>. Under-reporting also gives false perception that maternal death burden is reducing whereas it is not.

Documentation gaps highlight the importance of using multiple sources of data to reliably determine the most likely causes of maternal deaths. A study in Morocco demonstrated the usefulness of multiple sources of maternal death review data that collaborated information on reported cases<sup>25</sup>. This study also recognized that though implementation of MDSR was progressive, completeness of maternal death reporting was generally inadequate yet essential for effective MDSR process<sup>25</sup>. In Botswana, patients' case notes were key in maternal mortality data verification and determination of causes of maternal deaths<sup>26</sup>. Gaps in documentation have also been reported in Benin where incomplete documentation was observed in 49.9% of the MDR cases<sup>27</sup>.

## Ethical Approval

Ethics approval was granted by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France EAG number 08/18, Mt. Kenya University Ethics Review Committee Ref No. MKU/ERC/0713 and the County government of Kiambu department of health services health research and development unit Ref No. Kiambu/HRDU/AUTHO/2018/14/10/Mwaniki BK.

## Strengths and Limitations

The primary strength of this study is that all notified maternal deaths in Thika sub-county were identified during the study period and systematic review of all patient charts completed. The key limitation was that record keeping of patient case files, MDN, MDR forms and minutes at health facilities was poor, which made it difficult to consolidate individual patient records.

Similar limitations were noted in the ministry of health's confidential enquiry into maternal deaths in Kenya which identified rampant poor record keeping and documentation<sup>14</sup>. Community-based maternal deaths reporting was noted to be non-

functional in Thika sub-county which could be the case elsewhere in the county and country at large. Though this study was limited to Thika sub-county, its similarities with confidential enquiry reports and several other studies in different countries reflect common MDR gaps at large or in similar contexts elsewhere.

## Conclusion

There has been significant improvement in the reporting of maternal mortality in Thika sub-county since 2015. However, gaps still exist in completeness and accuracy of maternal death reporting, which could give erroneous data on circumstances surrounding occurrence of maternal deaths and the attributable causes. Community-based maternal death reporting and reviews are not routinely done thus contributes to the overall underreporting. It may therefore be difficult to identify actual gaps in the quality of obstetric care that could help in implementing effective interventions. We recommend targeted training and support for the maternal death review process if quality of emergency obstetric care is to be improved. Enhanced monitoring and evaluation of maternal deaths should be supported, including revision of MDR forms to capture informative data necessary for conducting MPDSR. Further research into the high number of maternal deaths following caesarean sections and during early postpartum period could potentially improve maternal outcomes. Near-miss audits are also recommended.

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## Conflict of Interest

No conflicts of interest to declare.

## Contributions of Authors

This research was conducted as a part of SORT-IT training in which the corresponding author Dr. Benson K. Mwaniki conceptualised the research topic, collected and analysed the data. Dr. Jeffrey K. Edwards and Walter Kizito provided teaching materials and literature search as well as technical guidance in writing-up the manuscript. All the authors critically reviewed and approved the manuscript.

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