

Maternal Death Surveillance System in Nepal: Status and Challenges Ahead

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ABSTRACT

A robust monitoring and documentation system is crucial for gaining insights into the extent and context as well as for devising solutions to preventable maternal deaths. In Nepal, the maternal death surveillance system, encompassing both health facility- and community-based maternal deaths, has been in operation for about a decade now. By mid-2022, this system had been introduced in 94 hospitals and 2,123 communities (Wards). Recent data regarding maternal deaths generated by the system, spanning 2020 to 2022, align broadly with the census-based estimates for 2021. Notable variations, however, exist in the causes of maternal deaths between health facility- and community-based data as recorded in the surveillance system. Key challenges facing the system include correctly identifying causes of death within reasonable timeframes, devising practical solutions for timely and appropriate response actions, and ensuring operational effectiveness of the system before its expansion to other areas of the country. Addressing these challenges is essential for the system to serve as an effective tool for tracking and ultimately reducing preventable maternal deaths in Nepal.

Keywords maternal death surveillance system, maternal mortality, reasons for maternal deaths, verbal autopsy, Nepal

INTRODUCTION

A 2022 report on maternal mortality in Nepal¹ points out that the road to achieving the target of maternal mortality ratio (MMR) of 70 per 100,000 live births by the end of 2030 remains a formidable challenge for the country. The rate of decline in MMR has slowed down in recent years.^{2,3,4}

A robust monitoring and documentation of maternal deaths is critical for understanding the extent and context, as well as for identifying actionable solutions to preventable deaths. In 2013, the World Health Organization (WHO) introduced Maternal Death Surveillance and Response (MDSR) system as a strategic tool for tracking all maternal deaths and identifying preventable ones.⁵ Drawing on years of global experience, the MDSR system is designed as a continuous cycle with four broad stages: (i) identification and notification of deaths on ongoing basis, (ii) reporting of deaths, (iii) review of deaths, and (iv) response and action.⁶ As designed, the MDSR system requires more than collection of data on maternal deaths for effective functioning.

This commentary reviews the progress, lessons learned, and the major challenges that lie ahead specifically concerning the implementation of the MDSR system in Nepal.

MATERNAL DEATH SURVEILLANCE SYSTEM IN NEPAL

In Nepal, the systematic documentation and understanding of the causes of maternal deaths began in 1990, and various improvements and additions have been made since then. Initially introduced in a major women's hospital in Kathmandu, this system has been refined and gradually extended to other healthcare institutions across the county. Subsequently, in mid-2020s, a community-based (in contrast to hospital-based) approach to tracking and data collection on maternal deaths and their probable causes was introduced. Further details regarding the development

of the data collection tools, refinements, the rollout of both hospital- and community-based modules (including cross-sectional studies) in an increasing number of health facilities and communities are reviewed elsewhere.^{7,8,9,10,11,12}

The MDSR system currently used in Nepal was introduced in the mid-2020s. (In Nepal, MDSR is generally referred to as MPDSR, in which 'P' stands for perinatal; in this commentary, the terms MDSR and MPDSR are used interchangeably). By mid-2022 (end of fiscal year 2021/22), MPDSR has been implemented in 94 hospitals and in communities in 24 districts, with support from the World Health Organization (WHO).¹³ The Family Welfare Division (FWD) within the Department of Health Services (DoHS) of the Ministry of Health and Population (MoHP) serves as the apex coordinating body.

The facility-based MDSR involves in-depth qualitative investigations into the causes and circumstances of maternal deaths in healthcare facilities.^{5,14} As the term suggests, the facility-based MDSR is conducted for the maternal deaths that occur in health facilities, specifically public hospitals, medical colleges or the private hospitals participating in the program. Among the 737 hospitals, both public and non-public, reporting to the MoHP's Integrated Health Management Information System (IHIMS) in Nepal, the facility-based MDSR is being implemented in 94 hospitals (12.8%) as of mid-2022.^{15,13} At the participating health facility, a senior nurse completes a maternal death review form within 24 hours of the death, while an obstetrician determines the primary cause of death. Subsequently, the hospital's MPDSR committee conducts an evidence-based review within 72 hours of the death.⁸

The community-based MDSR denotes the data collected at the community level, defined in the Nepali context as a "Ward", which is the lowest administrative division in the federal structure. At this level, Female Community Health Volunteers (FCHV) are responsible for notifying

the maternal deaths to the nearest health facility within 24 hours of becoming aware of the death. To verify whether the reported death is a maternal death or not, a nursing staff from the health facility visits the deceased woman's home and fills out the screening/confirmation form. Following this verification process and upon confirmation, a verbal autopsy (VA) report is filled out by a trained staff nurse or health personnel from the health department of the local-level government within 30 days of receiving the information about the probable maternal deaths from the community health facility. Once the VA is completed, a trained physician under the local-level government assigns the primary cause of death, and the local-level maternal death review committee conducts a review.⁸

As of mid-2022, the community-based MDSR is being implemented in 2,123 Wards (communities), constituting 31.5% of the total 6,743 Wards in the country.^{13,16}

The data collection for maternal deaths in the 2021 census took place in three stages. First, census enumerators collected data on live births and deaths of women of reproductive age in households during the last 12 months preceding the census. They completed the death reporting form to identify pregnancy-related deaths and forwarded these to census supervisors while also notifying the trained local health workers of the deaths. In the second phase, the local health workers visited the households of each of the deceased women, verified the information, and identified pregnancy-related deaths. For each identified pregnancy-related death, a VA was conducted by the health workers. In the third phase, trained obstetricians were deployed to assign the causes of pregnancy-related deaths using the International Classification of Diseases for Maternal Mortality (ICD-MM).¹

TRACKING MATERNAL DEATHS AND THEIR CAUSES

Maternal deaths, as discussed here, refer to pregnancy-related deaths, defined as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death (obstetric or non-obstetric)", encompassing unintentional or accidental and incidental causes.⁶ The primary objectives of the MPDSR system are tracking maternal deaths, whether occurring in healthcare facilities or in communities, and identifying their causes, ultimately aiming to reducing preventable deaths.⁵ Therefore, it is crucial to assess the accomplishments of the MPDSR system over time.

Table 1 presents the averaged data for the fiscal years 2021 and 2022 (mid-July to mid-July) of each calendar year) to minimize some fluctuations in reporting and recoding within the existing MPDSR system. Furthermore, we have disaggregated the data by community and health facilities. For comparison, we have included the data from the 2022 census-based survey, which tracked all maternal deaths (pregnancy-related) occurring between November 2020 and November 2021. Considering that most deaths occurred in the year 2021, we may consider this data largely corresponding to the year 2021.

The total number of maternal deaths tracked through both facility/hospital- and community-based MDSR systems during the two years was only 285. In contrast, the census-based approach identified 642 deaths across Nepal in 2021. The incidence of obstetric complications was higher in community-tracked records compared to hospital records (32.6% versus 16.4%). These data collectively indicate that the current MDSR system identifies less than one-third of estimated maternal deaths. Despite variations in the

Table 1. Causes of Maternal Deaths as Reported in the Health Facility- and Community-based Surveillance Data from Selected Districts and Hospitals, as well as from National Census Data Covering all Districts from 2020 to 2022, Nepal

Indicator	MPDSR System		Census [§]
	Facility [†]	Community [‡]	All Sources
Total number of hospitals and districts participating in the MPDSR system (as of 2022)	94	24	NA
Number of maternal deaths (2020/021, 2021/022)	(136, 149)	(50, 48)	-
Total	285	98	642
Primary causes (direct) (average of 2020/021 and 2021/022)	%	%	%
Obstetric hemorrhage	16.4	32.6	24.6
Hypertensive disorder	22.8	12.2	11.2
Other obstetric complications	11.5	13.5	12.0
Pregnancy-related infections	8.3	4.1	6.9
Pregnancies with abortive outcomes	3.2	0.0	4.5
Unanticipated complication of management	0.3	0.0	1.1
Primary causes (indirect)			
Non-obstetric complications	34.3	21.5	30.7
Coincidental causes	1.7	1.0	4.8
Unknown/undetermined	1.4	15.1	4.2
Total (%)	100.0	100.0	100.0
[†] percent distribution is based on the average of 24 months of maternal deaths (16 July 2020 to 15 July 2022). [‡] percent distribution is based on the average of 24 months 16 July 2020 to 15 July 2022). [§] refers to 12 months (12 November 2020 to 11 November 2021). NA=not available			

number of maternal deaths, obstetric hemorrhage emerged as the principal direct cause of maternal deaths across the three data sources. Similarly, non-obstetric complications were identified as the primary indirect cause.

Nationally, nearly 25% of all deaths were attributed to obstetric hemorrhage. Maternal deaths due to obstetric hemorrhage were notably higher in the community-based MDSR than in hospitals (32.6% versus 16.4%). Conversely, maternal deaths due to hypertensive disorder were notably higher within the hospital system (22.8% versus 12.2%) compared to the community or national level.

CHALLENGES AND OPPORTUNITIES

Between 2014 and 2022, four reviews were undertaken to assess the functioning of the MDSR system in Nepal. Of these, two^{17,18} were part of a multi-country review, while the other two^{7,19} were specific to Nepal. Although none of these reviews seems to have comprehensively assessed all four stages of the MDSR system, they still provide valuable insights into the system's functioning.

(i) Identification and Notification of Deaths

The first step in the MDSR cycle involves identifying and notifying maternal deaths. The MDSR system aims to identify and notify all maternal deaths occurring in both facilities and communities within 24 hours of occurrence to ensure comprehensive data collection. Despite an estimated annual occurrence of 642 maternal (pregnancy-related) deaths in Nepal,¹ only 49 maternal deaths were notified by the community-based MDSR system and 143 by the facility-based MDSR system during 2020–2021 and 2021–2022 combined (see Table 1). This indicates a gap in the system's ability to identify and notify all maternal deaths in both community and facility settings. By mid-2022, the community-based MDSR system had expanded to 24 districts, while the facility-based MDSR system had expanded to 94 hospitals.⁸ This represents approximately 32% of communities and 13% of hospitals reporting to HMIS in Nepal. The low coverage of the MDSR system expansion and potential misreporting could be the reasons for the under-identification and notification of maternal deaths.

A WHO-supported assessment undertaken in 2022, based on 30 key informant interviews and observational visits to 4 hospitals, reported under-identification and underreporting of maternal deaths.⁷ One significant reason pointed out was the absence of specific regulations mandating notification of maternal deaths. Consequently, responsible officials and healthcare workers may not feel accountable for notification. A similar finding was also reported in an earlier assessment, from 2014, where feedback from hospitals indicated that while deaths occurring in maternity wards were typically notified, those occurring in other wards, such as medical, surgical, and emergency wards, were often missed.¹⁷ This resulted in under-notification, delayed notification, and incomplete documentation of notified deaths due to a lack of clear mechanisms for ensuring comprehensive notification.^{20,18} This finding clearly reveals that the existing MDSR system failed to address the identified issues and improve the quality of maternal healthcare and death notification.

Incomplete legal framework, inadequately trained staff, and a failure to translate priority recommendations into an action plan and implementing them effectively are impeding

the MDSR system in Nepal.²⁰ In a health system assessment report, Wosti et al (2023)²¹ noted that, local government can hire own health staff, to improve staff availability at health facilities. However, there remains a shortage of trained health professionals, which has affected the quality of health services. While some health facilities have sufficient number of staff, they often lack the necessary mix of skills. To address these issues, the government should enforce strict regulations for mandatory notification of maternal deaths to ensure timely identification and notification of all maternal deaths. Integrating MDSR into the HMIS and raising awareness of MDSR among doctors and nurses in emergency, medical, and surgical wards can help to address the issue of under-notification of maternal deaths.⁷ Local recruitment of additional healthcare providers with the required skills, competence, and motivation, coupled with digital technologies, could significantly improve notification.²²

(ii) Reporting of Maternal Deaths

After identification and notification, the next crucial step in the MDSR cycle is the reporting of maternal deaths. Timely reporting of deaths is crucial for timely review and response actions. The FWD has developed standard maternal death VA and maternal death review forms to report community- and facility-based maternal deaths respectively. These forms should include complete information about the symptoms experienced by the deceased women during their illnesses, details of treatment sought, and management before death. This requires gathering additional information from patient charts, medical records, descriptions from attending health workers, and personal information from family members. However, the MDSR system in Nepal commonly faces issues of poor-quality VA forms and unclear statement regarding the cause of death. The information entered into the web-based MDSR system is often incomplete and seldom utilized for decision making.²⁰ Challenges such as nonreporting, underreporting, delayed reporting, and misreporting of maternal deaths persist.^{7,19,17}

One significant challenge in reporting is the detailed nature of the MDSR form. Providers perceive these reporting formats as lengthy and involving extensive individual and institutional details.⁷ Without an adequate motivational package, they may be reluctant to complete and submit these forms to higher authorities.¹⁹ Similar reporting challenges were identified in an assessment conducted in 2014,¹⁷ which highlighted that, due to high patient load and a shortage of human resources, service providers cannot allocate sufficient time for the paperwork required to fill out the lengthy MDSR form. Consequently, both VA and MDSR forms often remain incomplete, with missing information on illness and prior treatment histories.¹⁷ This indicates persistent issues with the effectiveness of the MDSR system in addressing the interminable challenges.

Despite improvements in the HMIS infrastructure and the introduction of an online real-time reporting system, the lack of trained health personnel hinders the rolling out of the electronic reporting system. The reported information also suffers from poor quality and absence of a system for assessing data quality.²¹ To address these issues, the FWD should streamline the VA and MDSR forms to be brief and SMART (Specific, Measurable, Appropriate, Reliable, and

Time-bound).⁷ Doctors and nurses should allocate sufficient time to document patients' illnesses and treatment histories, along with other clinical notes, in both patient charts and MDSR reporting forms. If necessary, patient charts should be revised to ensure they contain all required information for completing the MDSR forms.¹⁷ Providing options for zero reporting (even when no deaths occur at a facility or in the community), allocating additional human resources with motivational incentives for MDSR, and regular onsite coaching and mentoring might contribute to improving the timeliness and completeness of reported maternal deaths in Nepal.

(iii) Review of Deaths

The third stage in the MDSR cycle involves reviewing all maternal deaths. The objective of the review is to determine the primary cause of death, identify preventable factors, and prepare an action plan for quality improvement.⁶ The primary cause of deaths is assigned using the ICD-MM guidelines.²³ The FWD is expected to take the lead in establishing MDSR committees at all levels of government and within healthcare facilities.

However, reports indicate a lack of information on the number of MDSR committees formed and the knowledge of their functional status.^{7,18} Even if these committees are formed and individuals are assigned responsibility for review, they may not conduct reviews on specified time or follow the standard MDSR procedures.¹⁸ Delays in reviews can lead to crucial information being lost and can prolong the implementation of response actions. Poor planning, insufficient resources, and fear of punitive actions among providers were cited as barriers to effective MDSR reviews. Due to limited understanding, the service providers may not see the benefits of death reviews and may lack motivation to conduct review meetings.¹⁸

During the recent MDSR assessments, professional organizations raised concerns that "confidentiality and anonymity is not maintained in the MDSR process and a fear of punitive action out of the MDSR prevails among the service providers".⁷ This is because legal provisions do not exist to protect them from personal harm. The key challenges identified in the previous assessments include the absence or ineffectiveness of MDSR committees, nonadherence of the MDSR guidelines, delayed reviews of deaths, a culture of blame among the service providers, and negative perceptions of the MDSR system among the service providers.⁷ The principle of "no blame approach" is not abided by the staff members in cases related to healthcare mishaps.²⁰ Addressing these challenges requires implementing effective programs and policy-level interventions.

Previous assessments recommend four key actions to address the aforementioned challenges. These actions include forming and activating all MDSR committees, allocating more dedicated health personnel for MDSR, motivating MDSR committees and facility administration teams through direct or indirect incentives (such as training, onsite coaching, and mentoring), strictly implementing the principles of no blame and no punitive actions.¹⁷ Jayratne and Pokhrel (2023)⁷ recommended that "FWD should strengthen MDSR with a strong ToR to be more authoritative and dynamic governing body overseeing the entire MDSR process". Additionally, providing adequate and sustained

funding, developing a robust legal framework to prevent punitive actions resulting from the MDSR system, and fostering a non-threatening environment by discouraging the blame culture are other important interventions recommended for more productive case discussions.⁷

Incorporating training, awareness-raising, and capacity-building initiatives to educate the service providers about their rights, responsibilities, and protection under the MDSR legal framework can enhance their confidence and sense of security. With assurance of protection against punitive measures and without fear of consequences, they can contribute effectively to improving maternal healthcare.⁷

(iv) Response and Action

Timely response actions on the recommendations of the MDSR review meetings is a crucial aspect of the MDSR cycle. To achieve this, the recommended actions should be specific and linked to actions. The information collected from these meetings must be reliable and compliant with the clinical standards and care guidelines. Involving the quality-of-care focal point in developing response actions maximizes the likelihood of addressing these responses through a quality improvement cycle. Identification of persons responsible for implementing and tracking these actions is crucial.⁶ If the responsibility is not clear, or if the responsible person is not involved in the review process, or if there are no clear follow-up mechanisms, or if resources are not available for implementation, some interventions may not be implemented.²⁴ The recommendations should also adhere to the "SMART" criterion, and local community leaders, facility directors, and provincial and central government entities should be informed about the recommended actions.⁷

The MDSR system is gradually being recognized as a tool for improving the quality of care.¹⁷ Some key activities undertaken include establishment of round-the-clock emergency obstetric and newborn care services, ensuring availability of blood transfusion services, improving emergency transportation, training health workers, upgrading health facility infrastructure, raising community awareness, generating funds to provide emergency referral services to poor and disadvantaged women, revising management protocols, training MDSR personnel, and advocating for local and higher-level authorities' support in the implementation of interventions.^{7,18}

Despite some positive results of MDSR implementation documented in previous studies, numerous challenges persist. The action plans developed at the facility and district levels as part of the MDSR system for preventing maternal deaths are rarely put into practice.²⁰ Inadequate budget, shortage of human resources,¹⁷ and absence of clinical practice guidelines for managing obstetric complications^{7,17} were identified as major barriers to implementing response actions. In addition, the assessment report identified issues such as lack of skills among MDSR committee members to formulate SMART response actions, inadequate planning for response implementation and monitoring, failure to link the MDSR interventions with quality-of-care improvement initiatives, and inadequate communication of the MDSR outcomes with the FWD and professional agencies.⁷

A weak coordination mechanism and limited engagement between different levels of government, with a dominant role of the federal government in health

system management, have hindered the development of a learning, experience-sharing, and feedback culture.²⁰ Despite improvements in infrastructure, health service capacity, and access to outreach services, challenges persist due to a lack of monitoring and supervision provisions and limited understanding of health, healthcare system and the service delivery of the local-level government among elected members.²¹ Addressing these challenges requires multisectoral collaboration to allocate a separate budget for MDSR response actions, ensuring financial shortages do not hinder response interventions. In addition, hospital directors' and administration teams' involvement in reviews is crucial for generating and managing local resources for response actions.¹⁷ MDSR committee members should be equipped with the skills needed to develop SMART response actions. Engaging national- and subnational-level obstetric and pediatric societies can improve the technical capacity, knowledge, and enthusiasm of the service providers and local-level government officials, as well as helping develop standard guidelines and protocols. A robust mechanism should also be developed to link the MDSR system with quality improvement initiatives.⁷

Additional important recommendations for enhancing the effectiveness of the MDSR system in achieving its objectives include setting up a surveillance section within the FWD, revising the organizational structure by increasing sanctioned posts dedicated to the MDSR system, providing ICD-MM and data management and analysis training to service providers, and developing an integrated MDSR database that combines various information collected in the past.

CONCLUSION

The MPDSR system in Nepal, encompassing both health facility- and community-based components, has been operational for approximately a decade. As of Mid-2022, 94 hospitals (out of 737) and 2,123 communities or Wards (out of 6,743) across 24 districts participated in the program. Recent data on the cases of maternal deaths generated by the MPDSR system exhibit significant similarities with census-based estimates for 2021. However, notable differences exist between health facility- and community-based data regarding the causes of maternal deaths.

Periodic assessments and reviews reveal several challenges across all four stages of the MPDSR system. These challenges encompass correctly identifying the causes of death within reasonable timeframes; devising practical solutions for timely and appropriate response actions; and ensuring the effective functionality of the system before expanding it to other areas in the country. Addressing these challenges is essential for the system to serve as an effective tool for tracking and ultimately reducing preventable maternal deaths in Nepal.

ABBREVIATIONS

FCHV	Female Community Health Volunteer
FWD	Family Welfare Division
HMIS	Health Management Information System
ICD-MM	International Classification of Diseases-Maternal Mortality
LLG	Local Level Government
MDSR	Maternal Death Surveillance and Response

MMR	Maternal mortality ratio
MPDSR	Maternal and Perinatal Death Surveillance and Response
MoHP	Ministry of Health and Population
SMART	Specific Measurable Appropriate Reliable and Time-bound
VA	Verbal autopsy
WHO	World Health Organization

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