CHAPTER 3
MONITORING AND EVALUATION OF SAFE MOTHERHOOD PROGRAMS AND MATERNAL DEATH CASE REVIEWS

Learning Objectives
By the end of this chapter, the participant will:

1. Recognize the importance of monitoring and evaluation for safe motherhood programs.
2. Define maternal mortality and morbidity.
3. Summarize the difficulties in measuring maternal mortality.
4. List and differentiate the alternative methods for measuring maternal mortality and their respective limitations.

In a series of "action messages" relating to safe motherhood, the Safe Motherhood Inter Agency Group[a] gave high priority to **the measure of progress made**, considering it critical to the reduction of maternal mortality worldwide.

Monitoring and evaluation activities are the collection and use of information. They enable program planners, managers, and health professionals to track performance indicators and the effects of safe motherhood programs on the survival and well-being of mothers and their infants. Of equal importance, these activities, depending on the method used, can also assist in identifying weaknesses, barriers, and programmatic priorities so that future maternal and infant deaths can be prevented.

For this reason, monitoring and evaluation activities related to safe motherhood programs should include not only data on the number of women who have died, but also data on the cause of death or severe morbidity and a critical review of how such deaths could have been prevented. More specifically, it should also look at evaluating medical practice against explicit, predetermined criteria. The delivery of effective interventions to improve maternal health could avert 70 % of maternal deaths. Furthermore, the maternal death case review should take into account the improvement made to newborn health when maternal mortality and morbidity are avoided. The survival of the mother has a direct impact on the health outcomes of the newborn both immediately and during the first month of life.

Definition: What is Maternal Mortality?

Maternal mortality is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental causes.

The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, (ICD-10) introduced a new category, namely the **late maternal death**, which is defined as the death of a woman from direct or indirect obstetric causes more than 42 days but less than 1 year after termination of pregnancy (WHO, 1992).

The ICD-10 subdivides maternal deaths into two groups.

Direct obstetric deaths: Deaths resulting from obstetric complications of the pregnant state (pregnancy, labour and the puerperium) from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above.

Indirect obstetric deaths: Deaths resulting from a previous existing disease or a disease that developed during pregnancy and which was not due to direct obstetric causes, but was aggravated by the physiologic effects of pregnancy (WHO, 2004).

Measures of Maternal Mortality

Three distinct measures of maternal mortality (MM) are widely used.

- **Maternal mortality ratio:** Number of maternal deaths during a given time period per 100,000 live births during the same time period. This measures the risk of death once a woman becomes pregnant.
- **Maternal mortality rate:** Number of maternal deaths in a given period per 100,000 women aged 15–49 per year during the same time period. This measurement reflects the frequency with which women are exposed to risk through fertility.
- **Lifetime risk of MM:** Probability of maternal death faced by an average woman over her entire reproductive lifespan. This measurement takes into account the probability of becoming pregnant and the probability of dying as a result of that pregnancy cumulated across a woman's reproductive period.

Although extremely valuable for advocacy purposes, these measures are considered complex, difficult, and costly to collect. Furthermore, they are often considered unreliable because of the many opportunities for misidentification and underreporting.

Why is measuring maternal mortality difficult?

- **Maternal deaths are frequently underreported and misidentified.**
  This is especially true in many low-resource countries, where people often die outside the formal health care system, and subsequently the family must assume the responsibility of registering the death with the local authorities. In this type of environment, such a death is often left unrecorded or information related to the cause of death—and the temporal relationship to pregnancy —is not recorded. Studies conducted in developed and low-resource countries indicate that underreporting of maternal deaths is significant. Some studies have shown that the actual number of maternal deaths for the period under study was double or triple what was initially reported.

- **Maternal deaths are often misclassified.**
  In many situations, the medical "cause of death" of the woman might not be known and/or noted properly by health care providers or other officials at the time of registry. The information as to whether the woman was pregnant or had recently delivered might also be omitted, thus further obscuring the possible causes of death. In some countries, the cause of death can also be intentionally misclassified, especially when it is related to complications of clandestine or illegal abortions.

Methods of Measuring Maternal Mortality

- **Quantitative methods**

  Vital registration
  This is the most precise method for measuring MM. All births and deaths are recorded in vital registration records. For death statistics, vital registration records provide medical certification of the cause of death. To be efficient, the vital registration approach must ensure **the complete or near-complete reporting** of all births and deaths within a specific region or country.

  Although considered the most theoretically efficient method to track MM trends, the vital registration approach relies on the proper registration and classification of all deaths, including maternal deaths.

  Unfortunately, the vital registration approach is not possible in many low-resource countries where vital registration systems are lacking or incomplete, and causes of death may not be correctly attributed or are unreported.

In response to this reality, alternative methods have been used to estimate MM. The best known include:

Reproductive age mortality surveys
This approach consists of in-depth reviews of deaths among all women of reproductive age. Although Reproductive age mortality surveys (RAMOS) can provide useful data for program planning, monitoring, and evaluation (e.g. not only direct estimation of maternal mortality ratio, but also causes of deaths, high-risk groups and avoidable factors), they are considered complex, time-consuming, and costly to conduct.

Household survey using direct estimations
The household survey method consists of visiting a large number of households for the purpose of seeking data related to maternal deaths. Overall, this method is also considered expensive for most countries because of the large sample of households that need to be surveyed to ensure reliable and representative results.

Direct sisterhood method
This method is based on the collection of information provided by siblings (usually sisters). It requires much smaller sample sizes and it is considered a more cost-effective method, especially when conducted in conjunction with existing household surveys. Its major disadvantage lies in the fact that the data collected is usually for a reference period of 10 years before the survey. Thus, this method provides little insight into the changes that may have occurred over the recent past.

The Demographic and Health Surveys (DHS) program has published an in-depth review of the results of the DHS sisterhood studies, and has advised against the duplication of surveys at short time-intervals. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) have issued guidance notes to potential users of sisterhood methodologies that must be taken in consideration. These guidelines define the circumstances when sisterhood methodologies are appropriate and how to interpret the results.

Data generated from reliable vital registration systems and RAMOS studies is generally recognized as reliable in establishing MM rates. Household surveys and sisterhood study measurements provide general estimates of the magnitude of the problem; they should not be used to track the progress of safe motherhood programs. Their values are in their uses to:

- Gain a general sense of the size of the problem
- Sensitize policy makers, program planners, and others to the magnitude of the problem
- Stimulate discussion and action, and finally
- Mobilize national and international resources for maternal health.

If the purpose is to monitor progress in a specific hospital or health facility at the local level, gathering data on the deaths that have occurred in the health system is of importance. This can be done by reviewing, at regular intervals, all available hospital data collection documents (e.g. emergency logs, delivery room logbooks, operating room records, billing records, etc.). These documents also help in determining the main obstetric complications diagnosed and monitoring obstetrical activities, such as cesarean sections. An annual activity report from the obstetrics department should be available in each hospital or health facility. These reports constitute an important source of information for alternative evaluation methods.

Alternative methods: collection and use of maternal mortality information

Although each investigative tool provides valuable information on some aspect of the issue, none of them individually provide a comprehensive picture of the whole situation. The different investigative tools are mutually complementary; therefore, the use of several of them at any given time is considered appropriate and even recommended.

In light of the difficulties and limits of the above approaches, new investigative methods have recently been developed for safe motherhood programs. These new methods focus mostly on understanding the reasons women die from pregnancy and childbirth (i.e. answering the question "why"), instead of determining the level of MM of any given region or country (i.e. determining "the actual number of women who have died").

Information about why women are dying is essential for the development, implementation, monitoring, and evaluation of policies and programs that aim to reduce MM. It can also be used by key stakeholders in the field—policy makers, program planners and health care providers—to gain better understanding of the challenges and barriers which must be addressed to deal with this tragedy. The following are a number of different investigative tools that may be used for the collection of data and information related to MM. These tools may provide valuable information for the formulation of national strategies, the development of programs to reduce MM, and the conduct of activities to improve quality of emergency obstetrical care (EOC) in health facilities.

They are summarized as follows to initiate discussion, and to encourage and stimulate actions related to the monitoring and evaluation of safe motherhood initiatives.

Process indicators

In the last decade, the use of process indicators in the monitoring and evaluation of safe motherhood initiatives has proven to be an effective, relatively quick, and low-cost method compared with other conventional approaches.

Process indicators measure levels and changes in processes that are believed to influence the issue or anticipated intended (Wardlaw et al, 1999). They have the added benefit of providing information about the actions that need to be taken to improve the situation, and further allow the evaluation of change or progress almost immediately. Therefore, they provide important information for policy and program design, implementation, monitoring, and evaluation activities.

With regard to safe motherhood programs, several indicators series have already been developed to monitor the use of EOC services and other safe motherhood issues, such as the availability and quality of antenatal, childbirth, and post-natal care.

Process indicators for emergency obstetrical care

In 1997, UNICEF, WHO, and the United Nations Population Fund developed a series of emergency obstetrical care process indicators, which intend to monitor the extent to which women who develop serious obstetric complications receive the services they need. The following table presents the process indicators with their corresponding "minimal acceptable levels." By comparing the collected data on what actually existed in a specific region before any interventions to the data collected a short time after the implementation of any actions, it is thus possible to gain insight on the "met need" for EOC services.

Table 1 – Met need for emergency obstetrical care

Process Indicators	Minimal Acceptable Level	Questions to be Answered
Number of facilities offering EOC: comprehensive and basic EOC	For every 500,000 people, there should be four basic EOC facilities and one comprehensive EOC facility.	• Are there enough basic and comprehensive EOC facilities in the region to meet the need? • Are EOC facilities available 24 hours a day, seven days a week? • Are EOC facilities equipped with the necessary resources to provide the services when needed?
Geographic distribution of EOC facilities		• Are EOC facilities equally accessible to all women?

Process Indicators	Minimal Acceptable Level	Questions to be Answered
Proportion of births in EOC facilities	At least 15% of all births in the population should be taking place in EOC facilities.	• How many births have taken place in the EOC facilities? • How many of these births were normal births? How many were complications? • Are we reaching women with complications?
Met need for EOC	100% of women who develop complications should be treated in EOC facilities.	• Have all the women in need of EOC reached the facility? • Have all the women in need of EOC received quality care?
Cesarean section rate	Between 5% and 15% of births in the population	• Are the numbers of cesarean section equal to or less than 15%? If lower, why? If higher, why?
Case fatality rate: The number of deaths from obstetric complications as a proportion of all women with obstetric complications	1%	• What is the case fatality rate? • What does it tell us about the quality of EOC services in the region or the country?

Adapted from: UNICEF. Programming for Safe Motherhood: Guidelines for Maternal and Neonatal Survival. UNICEF. New York, 1999, p. 40.

Indicators for Safe Motherhood Programs

Indicators are useful for objectifying the scope or the importance of a phenomenon such as identifying health priorities, identifying progression, observing accident situations, comparing different situations within the health facilities or among institutions or departments. The evaluation of obstetrical care is necessary to all aspects of medical activity. Beyond classical epidemiological investigations, the evidence-based practice in obstetrical care presumes that the indicators are routinely collected, that maternity unit activity is assessed, and that a maternal mortality surveillance cycle is in place.

Indicators that can be used to monitor and evaluate safe motherhood programs include:

- Percentage of births with skilled attendance
- Percentage of pregnant women attending antenatal care at least once
- Percentage of women immunized with tetanus toxoid
- Percentage of women receiving postnatal care
- Time interval from onset of complication (or arrival at facility) to treatment at referral site
- Proportion of complicated obstetric admissions
- Reviews of maternal deaths

Maternal death reviews: beyond the numbers

This section is adapted from *Beyond the Numbers—Reviewing Maternal Deaths and Complications To Make Pregnancy Safer* (WHO, 2004)

Facility-based maternal death review
A maternal death review is defined as "a qualitative, in-depth investigation of the causes of and circumstances surrounding maternal deaths occurring at health facilities" (WHO, 2004: 15). Maternal deaths review focuses on identifying the factors at the health facility and in the community that contributed to the death, and which ones were avoidable. This is usually carried out by facility staff, maternal case reviews provide valuable information on the circumstances—in the facility and in the community—surrounding a death. They are considered affordable, and they can offer good opportunities for sensitizing and educating people to the issue of MM because of their participative approach, involving health professionals at all levels and people from the community.

See Appendix 1, Step-by-Step Process to Implement a Facility-Based Maternal Death Review Process.

Community-based maternal death review
Verbal autopsies consists of "a method of finding out the medical and non-medical causes of death and ascertaining the personal, family or community factors that may have contributed to the deaths in women who died outside of a medical facility" (WHO, 2004: 14). They consist of inquiries collected from lay reporters and relatives to establish the cause of death that occurred outside the health facility. The data is usually collected outside the health facility.

Verbal autopsies are a useful tool for identifying maternal deaths and collecting important information regarding the deaths that occurred outside the health facility. Further, they provide a great opportunity to obtain family and community members' opinions on issues related to access to and the quality of health services.

See Appendix 2, Step-by-Step Process in Carrying Out Verbal Autopsies for Maternal Deaths.

Confidential enquiries
A confidential enquiry into maternal deaths can be defined as "a systematic multidisciplinary anonymous investigation of all or a representative sample of maternal deaths occurring at an area, regional (state) or national level which identifies the numbers, causes and avoidable or remediable factors associated with them. Through the lessons learnt from each woman's death, and through aggregating the data, confidential enquiries provide evidence of where the main problems in overcoming maternal mortality lie and an analysis of what can be done in practical terms, and highlight the key areas requiring recommendations for health sector and community action as well as guidelines for improving clinical outcomes" (WHO, 2004: 16).

Confidential enquiries are not interested in determining who is at fault, but more specifically in determining the deficiencies in the health care systems that may have contributed to the death. The purpose is to institute change to ensure that future similar deaths are prevented.

Usually more resource intensive (e.g. time, structure, and support system needed) than the other investigative tools, confidential enquiry methods can be instituted by public health authorities or by government, and are usually undertaken and supported at the national level by a ministry of health.

Near-miss audits
In near-miss audits, cases of severe, life-threatening complications rather than death are reviewed in hospitals by a team of midwives, doctors, social workers, and administrators.

This approach is designed to result in the development of standard treatment criteria for complications. This approach is less sensitive because of the women's survival after complications, and therefore it is more acceptable in the medical community. Professionals and other individuals involved can then also learn from the surviving mothers.

Clinical audits
Clinical audits are a quality improvement process that seeks to improve patient care and outcomes by the systematic review of care against explicit criteria and the implementation of change. Aspects of the process and outcomes of care are selected and systematically evaluated against explicit criteria. When indicated, changes are implemented at individual, team or service level and further monitoring is used to confirm improvements in health care delivery monitoring.

See Appendix 3, Beyond the Numbers, for more information about the five preceding audit activities.

Other audit activities
Other audits, such as provider care or barriers to care, are relatively new approaches. Two examples follow:

- Professional associations may be mandated to conduct audits at one or another level. This audit involves five steps: establishing criteria for best practices in managing obstetric complications, measuring current practice, providing feedback and setting local standards, implementing changes in practice, re-evaluating practice and providing feedback.

- Audits of barriers and problems encountered by women in need of care have been proven effective in identifying interventions to fill gaps or address the three delays that adversely impact care. The results have to be communicated to individuals, communities or organizations that can use the data to advocate for positive change at the health policy, provider, or community levels.

The Three Delays Model

When looking at the issue of access to essential obstetrical care, or medical care at the time of complications, the Three Delays Model is often used (Maine, 1994). This concept may be useful in helping to identify which delays, or barriers, prevented the birthing mother from accessing appropriate health care when complications arose. They include:

- The delay to seek care
- The delay to reach proper medical services
- The delay in accessing quality care at a health care facility.

Delay 1: Seeking care

When complications arise, the decision to seek care is the first step that must be taken by the birthing mother, her family, and/or her attendant(s) to ensure access to the appropriate medical care needed. This decision may be influenced by many factors, such as:

- Ability of the birthing mother and her family or attendants to recognize obstetrical complications
- Who decides when to seek care: the birthing mother, her family (e.g. husband, mother-in-law), or the assistants
- Knowledge as to where to go to seek appropriate medical assistance
- Cultural factors, such as the way society views delivery and childbirth (e.g. women are expected to labour in silence)

Delay 2: Reaching the proper medical services

Once the decision has been made to seek medical care, the issue of transportation and/or communication often comes becomes a factor. A woman who lives in a rural area, far from health facilities, can face difficulties accessing transportation to get to a health care facility, especially if she or her family has no means of transportation and/or little financial resources. Furthermore, once at the health care facility, the birthing mother may need to be transferred to a higher-level health care facility for specific medical procedures, such as blood transfusion or cesarean section. The delay in accessing transportation to ensure timely access to health services is thus extremely important to consider when trying to improve the accessibility of health care services for obstetrical complications.

One question to ask when evaluating this barrier is, "Is there a village or sub-county plan for emergency transportation in case of obstetrical emergencies?"

Delay 3: Accessing quality care at a health care facility

Once the birthing woman arrives at the health care facility, it is just as important that she accesses the required emergency care services. Access to care delay is usually dependent on a number of factors, such as the number and skill level of staff; availability of drugs, supplies, and blood; and the general condition of the facility. They may also include:

- Delay in the timely arrival of the nurse, midwife, or physician attending the patient
- Delay in accessing the needed medical procedure in a timely fashion (e.g. cesarean section, blood transfusion).

It is usually recognized that the quicker each delay is dealt with, the greater the chances that a birthing mother and her newborn will survive and be able to live free of any long-term injuries.

Summary

Monitoring and evaluating safe motherhood programs and maternal audit activities aim to improve the quality of EOC services. These activities involve the efforts of all health care providers and health care facility staff to provide competent EOC to every woman, using resources effectively.

The quality of care in EOC involves readiness—in competency skills and working in an enabling environment. This requires that all members of the health care team are able to respond appropriately to all obstetric situations within a sexual and reproductive health and rights approach. In this way, the rights and needs of every woman that seeks care will be satisfied**.**

The quality of EOC is improved by a continuous monitoring system that provides:

- Access to information and the possibility to make an analysis based on the information gathered
- Possibility to develop concrete action plans designed based on information gathered
- Encouragement to implement solutions and actions to promote better practices in EOC
- Functional process to review and measure progress on issues such as obstacles, achievements, results, indicators improvement, functional environment, team-work efficiency, involvement and mobilization of administration and professionals, training offered, formulation of new recommendations and applying a new cycle of maternal death case reviews.

Monitoring progress and evaluating the impact of interventions and actions are essential to improving performance in EOC services at individual, team, and health facility levels, and for achieving expected results of providing better quality of care to save the lives of women and their newborns. The maternal mortality surveillance cycle should permit generation of evidence-based decision making in effective ways.

The strengthening of maternal and newborn health and services processes in an era of decentralization supports health care managers in the improvement of coverage, equity, acceptability and continuity of care, and of quality of care.

> *"For midwives and obstetricians practicing in developing countries, maternal mortality is not about statistics. It is about women; women who have names, women who have faces. Faces which we have seen in the throes of agony, distress and despair… Not simply because these are women in the prime of their lives who die at a time of expectation and joy; not simply because a maternal death is one of the most terrible ways to die . . . above all because almost every maternal death is an event that could have been avoided, and should never have allowed to happen."*
>
> Prof. M. Fathalla
> Past President, International Federation of Gynecologists and Obstetricians

In the last few years, a growing number of resources have also been developed for the purpose of educating and sensitizing stakeholders to the importance and value of monitoring and evaluation safe motherhood programs and maternal mortality case reviews. Several of these resources have been listed at the end of this chapter to allow for further reading on the issue.

Key Messages

1. Monitoring and evaluation processes are necessary to guide the activities of safe motherhood programs and to influence policy to create positive change at local, national, and global levels.
2. Health care providers and administrators are responsible for implementing a review system of maternal and neonatal deaths, and "near-miss" cases, to learn both from mistakes and to prevent errors from happening again.
3. Monitoring and evaluation process is a multi-stage process that requires a collaborative approach with clear objectives and predefined responsibilities of all involved, and it takes time.

Suggestion for Applying a Sexual and Reproductive Rights Approach to this Chapter

It is not just clinical management of care that needs to be monitored and evaluated. Ensure that a sexual and reproductive rights approach is being implemented in your health care facility. One way to do this is to install a suggestion box in a highly visible area in your health care facility. In this way community members can provide input about what kind of health facility they want.

Resources:

- Maine D: Too far to walk: maternal mortality in context. *Soc Sci Med* 1994, **38:**1091-1110.
- Maine D et al. *The Design and Evaluation of Maternal Mortality Programs*. New York: Columbia University, 1997.
- UNICEF. *Programming for Safe Motherhood – Guidelines for Maternal and Neonatal Survival*. New York: UNICEF, 1999.
- Wardlaw T, Maine D. "Process Indicators for Maternal Mortality Programmes" In Berer M and Sundari Ravindran TK (eds) *Safe Motherhood Initiatives: Critical Issues* London, Blackwell Science, 1999. p. 24-30.
- World Health Organization. *Beyond the Numbers: Reviewing maternal deaths and complications to make pregnancy safer*. Geneva: World Health Organization, 2004.
- World Health Organization. *International Statistical Classification of Diseases and Related Health Problems*, Tenth Revision. WHO Geneva, 1992.

APPENDIX 1

STEP-BY-STEP PROCESS TO IMPLEMENT A FACILITY-BASED MATERNAL DEATH REVIEW PROCESS[a]

1. **Essential Prerequisites**
   - Someone with experience and authority is needed for the overall coordination.
   - The facility must have a reasonable level of record keeping—registering deaths, retrieving case notes, and the quality of recording in the notes.
   - The health care providers who are being initiated in this process need the required authority and support from different levels—regional administration, health facility, and the community.
   - A protocol that states when a maternal death case review should be initiated and the process of the maternal death case review should be available.
   - Appropriate permission to conduct maternal death case reviews is obtained.
   - Agreement is reached about the costs and the use of personnel to conduct the maternal death review.
   - A multidisciplinary committee is formed consisting of two to four individuals that reflect a mix of professions and skills; this committee has the responsibility of conducting the maternal death reviews. Collaboration of a number of other people (e.g. representing the blood bank, pharmacy, laboratory, etc.) may be required from time to time, depending on the problems identified.
   - Responsibilities are assigned for each member of multidisciplinary committee: investigator, data collector, selected collaborators, etc. The most important criteria are that the members should have an interest in and commitment to investigating maternal deaths, and be able to devote sufficient time to the work to be done.
2. **Decide on the Scope of the Facility-Based Maternal Deaths Review**
   - A single health facility can initiate maternal death case reviews. A **facility-based maternal deaths review** is indicated where there are more than six cases of deaths annually, although it is also suitable when there is only one death that occurred. In situations where there are insufficient numbers of deaths, the near-miss approach is preferred. The same methodology is used for near-misses, but the criteria for near-misses need to be defined. Refer to Chapter 7 of the WHO guide, *Beyond the Numbers*, for more information about near-misses.
3. **Develop Data Collection Forms and Carry Out a Small Pilot Study**
   - Some tools are already developed and available. WHO guide, *Beyond the Numbers*, provides some models; these are available on line. The ALARM International Program manual contains a data collection form that has been developed for a new research project, QUARITE (See Appendix 4).
   - The collected information enables the maternal death review team to identify and classify avoidable factors. Once patterns of avoidable factors are identified, actions plans or interventions are established to prevent these avoidable factors of maternal death from occurring in the future.
   - A pilot study should be carried out of sufficient size to allow the multidisciplinary committee to determine the feasibility of their plans and to test the data collection form. The pilot study usually consists of about four to six maternal death cases. When conducting the pilot study, the committee should follow steps 4 to 8 as presented here. It is recommended that the members of the committee conduct the pilot study. This will enable them to give better guidance to additional data collectors at a later date.
4. **Select Collaborators and Train Data Collectors**
   - The members of the multidisciplinary maternal death review committee can conduct the whole maternal mortality surveillance cycle when within in one health facility. The roles of investigator, collector of data, and president or leader of the committee should be clearly defined and understood by all. There should also be one person who is responsible to call upon other collaborators in a timely manner, when needed. When an investigation in the community is required, it is preferable to recruit some data collectors specifically for this function. This ensures that those collecting data in the community do not know details about the management of cases in the facility, and thus cannot be drawn into potentially difficult discussions on this subject. They will need training from the multidisciplinary committee.

[a] This summary is adapted from: Bullogh C, Graham, W. Facility-based maternal deaths review: learning from deaths occurring in health facilities. In: Beyond the Numbers. WHO. Geneva, 2004.

5. Identify Cases of Maternal Death

- Sources to identify maternal deaths at a health facility include admission and discharge registers, emergency room, delivery room, operating theater, and mortuary records.
- Data should be collected for all maternal deaths. This includes collecting data regarding direct OR indirect obstetric causes of maternal deaths that occur outside of the obstetric or gynecology ward.
- If there are more cases to review than there are resources available, then a selection must be made. One suggested approach in this case is to include at least on of the four major maternal complications (hemorrhage, preeclampsia, infection, obstructed labour), and to make further selections incorporating a range of maternal characteristics, such as residence, referred case or not, primigravida, multigravida, etc.
- For example, the QUARITE study uses an information system that collects information on all deaths. These registers are used at each facility.

6. Identify sources of data

- Different sources of data contribute to obtain a complete and accurate picture of the circumstances surrounding the death Different sources will yield different insights. Sources of information include:
    - Written: ward and operating theater registers, facility antenatal notes, women's hand - held medical records, inpatient case notes and discharge notes
    - Interviews: with doctors midwives, other hospital staff, community birth attendants spouse, relatives, neighbors and community leaders
- The interviewer should be nonjudgmental about what happened in both the community and the health facility.

7. Collect Data at the Health Facility and in the Community if Appropriate

Facility data collection

- To ensure greater accuracy of information, collect data as soon as possible after the death.
- Facility staff needs to be certain that the review process does not involve apportioning blame for anything that happened. They need to know that all findings will be recorded and reported data completely anonymously. Tell them that confidential codes will be assigned to each staff member for the purpose of data collection, and only the review team will have access to the codes.
- Data collectors need to demonstrate tact, sensitivity, and attention to detail.
- The usual order for carrying out the data collection is:
    - Review of medical and nursing records
    - Interview all clinical staff involved in the woman's care. Depending on the number of staff involved and the sensitivity shown, it may be decided to interview staff separately or in groups. In the group interview, the data collector begins by encouraging staff to **freely express** an account of the events. After, the data collector then asks directed questions to fill gaps in the account or to expand on parts that are not understood or not consistent with other evidence.
- For some deaths, it may be found that almost no information can be obtained. These deaths should not be omitted. Special effort should be made to find out why there may be a lack of information and to build a picture of relevant events from data collection in community.
- Communication must be established between the **facility** who received the transfer and the referring facility or the community. In such a case, it is the responsibility of the referring facility to investigate the causes and circumstances of the maternal death, and to seek out the factors related to the onset of complications (in the community and/or health facilities). The "no-blame" approach should guide the process of investigation; the aim is to avoid a similar situation.

Community data collection if appropriate

- Collecting data from community sources may uncover valuable information about the circumstances that influenced the pregnancy or the labour before the woman sought help.
- A health care provider without midwifery experience, but with specific training on data collection, can adequately assist the process. Interviews should be conducted with two or three people after preliminary conversation with a number of people. In some circumstances a group discussion may be appropriate.
- The data collector focuses only on community factors and does not comment on the case management at the health facility level.

8. Synthesize the Data, Interpret the Results, and Draw Conclusions (Maternal Death Case Review)

- Each maternal death is reviewed individually.
- At each review highlight avoidable factors related to (refer to Appendix 5):
  - Events before admission
  - Availability of health facility
  - Care provided by health professionals.
- Hold a peer review comprising of all staff involved with the management of the case. The details of the case are presented in a factual, comprehensive and precise manner without any judgments made. Discussion should follow in an attempt to fully understand the chain of events. It is important that a non-recriminatory (non-blaming) atmosphere be maintained. Search to improve the participants' accountability and willingness to cooperate in the subsequent corrective measures. Although it is neither an anonymous nor a confidential process, confidentiality is expected for all those involved. The ultimate goal is to identify the factors that, if they could have been avoided, might have prevented the death. In addition, take into account failures in the systems and the management of the health facility (e.g. shortage of human resources, lack of material and equipment, limitations related to organizational and functioning infrastructure, etc.). A tool has been developed by QUARITE to help summarize and report the information (see Appendix 6-Maternal Death Case Review Form)
- When there is a review of more than one case, the same procedure is followed as in the preceding steps, and common patterns highlighted from the cases should be identified. Aggregated data and results should be presented anonymously. Present the synthesis of these findings to a small group of staff and obtain agreement regarding the causes, avoidable factors, and recommendations. If agreement cannot be reached, it may be necessary to search for further interpretation or explanations. Checks may be necessary to attest the accuracy of data, such as checking on the way data have been synthesized, obtaining a second opinion on the interpretation of findings, etc.

9. Utilize the Findings

- The ultimate goal of maternal death case reviews is to prevent similar cases of maternal death in the future by improving the quality of care. It is expected that individual staff members will learn through these activities.
- The role of the multidisciplinary deaths review committee is to ensure that lessons learned are acted upon. The committee is morally and ethically required to provide of feedback to the appropriate people. An action plan should be prepared at the conclusion of every review, whether it involved an individual maternal death or a series of maternal deaths.
- The action plan should indicate:
  - What needs to be done
  - Who is responsible for completing each action
  - Date for implementing each action
  - Who is responsible to confirm that all actions have been taken and implemented, and that all expected results have been achieved.

10. Synthesize the Results to Create an Annual Action Plan

- A yearly meeting, consisting of an analysis of all maternal death reviews held, permits the maternal deaths review committee to evaluate the results of the process. This annual meeting reviews the recommendations made in relation to all the cases discussed, identifies implemented actions and the obstacles to the implementation of specific actions, and enables the committee to determine lessons learnt.
- An annual action plan is created with clear recommendations on all areas of improvements, identified with an expected date of completion. The annual action plan is a tool that contributes to ensuring continuity of expected changes or improvements to achieve.
- An annual action plan meeting requires the involvement of all individuals and involved departments at all levels of the health facility.
- At the same time, the maternal mortality surveillance cycle and of the conduct of the maternal deaths review committee is evaluated to ensure efficiency and adaptability of the whole maternal death review process to the health facility.

APPENDIX 2

STEP-BY-STEP PROCESS IN CARRYING OUT VERBAL AUTOPSIES FOR A MATERNAL DEATH

STEPS	DESCRIPTION
1	Set up the verbal autopsy process.
2	Identify cases of maternal death.
3	Determine the sources of information.
4	Develop the verbal autopsy questionnaire.
5	Select and train interviewers.
6	Select respondents.
7	Develop a mechanism to classify the medical causes.
8	Develop a mechanism to classify contributing factors.
9	Use the findings for action.

Resource:

- World Health Organization. *Beyond the Numbers: Reviewing maternal deaths and complications to make pregnancy safer*. Geneva: World Health Organization, 2004.

APPENDIX 3
BEYOND THE NUMBERS

Beyond the Numbers, a new guide from WHO, shifts the emphasis from simply measuring maternal mortality to understanding what happened and why. This enables us to learn lessons and make changes. Professor Mahmoud Fathalla in the 1980s, in the powerful video produced by WHO, *Why Did Mrs. X Die?*, demonstrated the value of reviewing each case of maternal death. Through Mrs. X's story, he shows the many points where, if someone had intervened appropriately, her life could have been saved.

"Whose faces are behind the numbers? What were their stories? What were their dreams? They left behind children and families. They also left behind clues as to why their lives ended so early. " (Berg, 2001, 53).

The Five Methods
Beyond the numbers outlines different ways to learn why a woman died.

1. **The community**
   Verbal autopsy, talking with her family and local people:
   - MAY reveal personal, cultural, community, and medical factors
   - WILL increase community awareness (e.g. the need for education about warning signs), advocacy, and change (such as transport)
   - MAY NOT reveal the precise cause of a woman's death
2. **Facility-based death review**
   A systematic, confidential, in-depth investigation of the causes and circumstances of each maternal death:
   - WILL improve local management or professional practice, training, and standards
   - CAN be used to advocate for extra local resources
   - WILL NOT provide information about women dying in the community
3. **Confidential enquiries into maternal deaths**
   Systematic investigation of all or a sample of deaths in the area or country:
   - WILL produce more robust evidence to help national, regional, or district policy making and resource allocation
   - CAN lead to clinical guidelines and other improvements in service delivery
   - BUT requires the commitment of senior managers or government to act on the findings
4. **Near-miss incidents**
   Surveys of severe morbidity:
   - CAN be done at any size of facility or level of health care
   - CAN show what worked, providing lessons from positive experiences
   - BUT involves reviewing many cases and obtaining agreement from women survivors
5. **Clinical audit**
   Reviewing cases against criteria:
   - CAN be used to improve clinical practice or enhance the rational use of limited resources
   - BUT requires local consensus on the standards
   - BUT cannot be done where records are poor or not kept

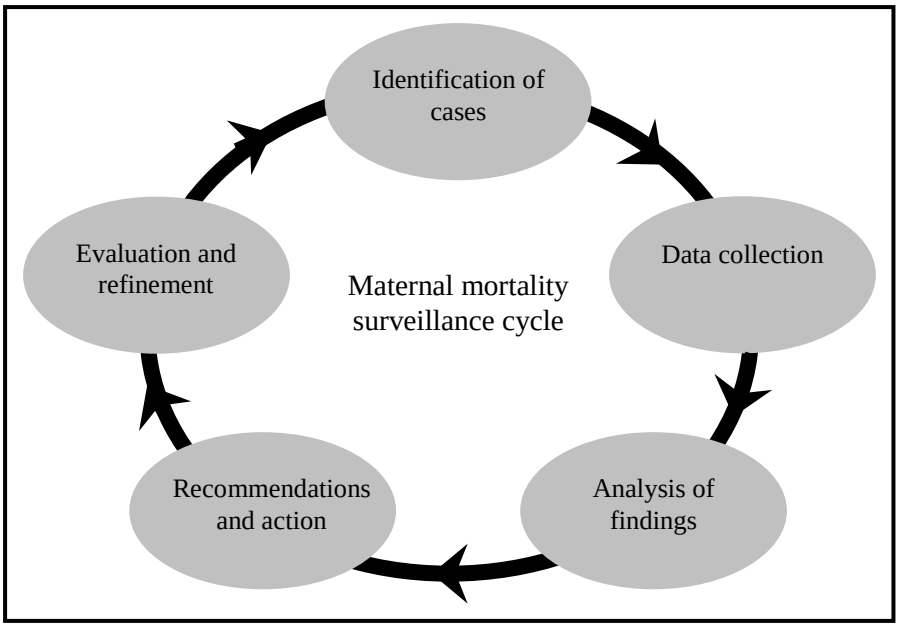
Key Points
- The vast majority of deaths are avoidable.
- Don't just count the numbers; understand why. Each death tells a story; each story shows what could have been done better.
- Base reviews on the maternal mortality surveillance cycle (see figure).
- Taking action on the results is essential.
- Many changes cost nothing.
- The sole purpose of these reviews is to save lives: No Blame. No Name. No Shame.
- Even a simple study, or study of one case, can help save another woman's life.

The Facts

- Eight million women suffer pregnancy-related complications every year; over half a million die.
- In developing countries 1 in 16 women may die of pregnancy-related complications compared with 1 in 2,800 in developed countries.

Figure 1 - Maternal mortality surveillance cycle

This figure can also be used as a model for investigating perinatal mortality or morbidity.



Action in Mexico

Verbal autopsies found:

- Women did not know what symptoms were abnormal,
- Transportation was lacking.

This knowledge led to change, bringing about better antenatal education about complications, improved access to transport, and fewer maternal deaths.

Action in West Java

Facility-based death reviews found:

- Half the mothers died from hemorrhage,
- Midwives at the facility were transferring these women to another distant hospital; women died on the way or soon after admission.

This knowledge led to change, bringing about midwifery retraining and empowerment, and fewer maternal deaths.

Resources:

- Berg C, Danel I, Atrash H, Zane S, Bartlett L (Editors). Strategies to reduce pregnancy-related deaths: from identification and review to action. Atlanta: Centers for Disease Control and Prevention; 2001.
- WHO http://www.who.int/reproductive-health/publications/maternal_mortality_2000/index.html

APPENDIX 4

DATA COLLECTION FORM FOR A MATERNAL DEATH

Form courtesy of Dr. Alexandre Dumont, Université de Montréal
« Qualité des soins, management du risque et techniques obstétricales (QUARITÉ) »

Data collection interview regarding a maternal death

1- Date of interview with the mother's family or close friends: ☐☐-☐☐-☐☐

2- Name of interviewer _____ 3- Interviewer's code: ☐☐

NB – All sections are completed by the collector that interviewed both family and health personnel.

Mother's identification

4- Mother's name: _____

5- Name of village or borough of residence: _____

6- Complete address: _____

_____

_____

7- Name of the head of household: _____

8- If the mother started her labor at an address other than that indicated above, please specify:

_____

_____

9- Name of the individual(s) present at delivery before transfer to a health facility:

_____

10- Name and address of health facility where the woman was initially transferred:

_____

_____

11- Mother's date of birth: ☐☐-☐☐-☐☐ 12- Date of death: ☐☐-☐☐-☐☐

Part A: Interview details

No.	Questions	Code	Go to question:
QA01	Codes of interviewers who participated in the interview	|__|__| |__|__| |__|__|	
QA02	Dates of each interview	dd / mm / yyyy ___/___/_____ dd / mm / yyyy ___/___/_____ dd / mm / yyyy ___/___/_____ dd / mm / yyyy ___/___/_____ dd / mm / yyyy ___/___/_____ dd / mm / yyyy ___/___/_____	
QA03	Language(s) used in interview (specify all languages used) :	English 1 _____ 2 _____ 3 other 4	

Part B: Identification of respondents for the verbal autopsy

No.	Questions	Code	Go to question:
QB01	Who was looking after / caring for the woman before her death?		
QB02	Who was around at the time of the woman's death?		
QB03	If woman was married and husband hasn't been mentioned: Ask: Was her husband around (i.e. in the village) just before she died?	Yes 1 No 2 Not married 3 Deceased husband 4	

Part C: Provide the names of the mother's family member or close friends who participated in the interview

Name	**Relation to mother**	**Present at time of**		**When they joined / left the interview** (ex. Q112)
		Illness	**Death**	
1.				
2.				
3.				

Part D: Provide the names of the health care providers who participated in the interview

Name	**Position**	**Present at time of**		**When they joined / left the interview** (ex. Q112)
		Illness	**Death**	
1.				
2.				
3.				
4.				
5.				
6.				

Part E: Section 1: Background information

No.	Questions	Code	Go to question:
	I would like to start the interview with questions regarding the events that surround the death of the mother.		
Q101	How long ago did she die? (write down what is said and code in months)	Months |__|__|	
Q102	How old was the mother when she died?	|__|__| (99= do not know)	
Q103	Where did the death take place? If in health facility, specify the name:	Household 1 Health centre 2 During transfer 3 Do not know 9	
Q104	Was the death due to an accident?	Yes 1 No 2 Do not know 9	
Q105	Do you know the cause of death? If yes, specify:	Yes 1 No 2	
Q106	Do you have the mother's pregnancy health record? *If yes, seek permission to photocopy the pages that indicate received vaccinations and prescribed prophylactic treatments.*	Yes 1 No 2	
Q107	Do you know if before she died she had any long term medical problems? *(For example: Hypertension, diabetes, epilepsy…)* If yes, indicate:	Yes 1 No 2 Do not know 9	 →Q109 →Q109

Q108	Did the mother receive any treatment for this illness? If yes, indicate what the treatment was:	Yes 1 No 2 Do not know 9	
Q109	What was the mother's marital status? Is she was married or common-law, indicate the name of her husband:	Married 1 Living together 2 Not married 3 Widow 4 Divorced 5	 → Q112 → Q112 → Q112
Q110	Excluding the deceased mother, how many wives did her husband have?	|__|	
Q111	What was her rank in the household? (Example: First wife = 1, Second wife = 2…)	|__|	
Q112	Had she ever been to school (koranic or other)? If yes: What was the highest level she attended? For Madrassa: How many years: |__|__| *(Do not know = 99)*	No education 1 Madrassa 2 Primary 3 Secondary 4 Technical 5 University 6 Do not know 9	
Q113	What was her occupation? Specify:		
Q114	How old was the husband when she died?	|__|__| years	
Q115	*Preamble: If the mother was married, ask the following questions to her husband. If she was not married ask the head of the household :* What is the highest level of education did her husband or the head of the household obtain? For Madrassa: How many years?: |__|__| *(Do not know = 99)*	No education 1 Madrassa 2 Primary 3 Secondary 4 Technical 5 University 6 Do not know 9	
Q116	What is the husband's or the head of the household's occupation? Specify:		
Q117	Did the mother have any previous pregnancies, including miscarriages, stillbirths or pregnancies where the baby did not survive?	Yes 1 No 2 Do not know 9	
Q118	How many pregnancies did she have, including this one?	Number |__|__|	
Q119	How many months pregnant was the mother when she died?	Months |__|	

Q120	What was the outcome of this last pregnancy for the baby and the mother?	Live birth 1 Still birth 2 Abortion / Miscarriage 3 Death of mother and baby before or during birth 4 Death of mother before labor began 5	
Q121	Did the mother have any previous obstetrical complications? If yes, indicate which ones:	Yes 1 No 2 Do not know 9	
Q122	Did the mother have any previous medical conditions? If yes, indicate which ones:	Yes 1 No 2 Do not know 9	
Q123	Did the mother have any previous surgery? If yes, indicate which ones:	Yes 1 No 2 Do not know 9	
Q124	How long after the birth did the mother live? *(write down responses provided, then calculate the number of months)*	Months |__|__|	

Section 2 Details of the events surrounding the maternal death provided by those close to the mother

Explain to respondents that you would like them to describe the events prior to the mother's death:

1. From the time when the health problem arose until the time of death (told by close friends and relatives of the mother)
2. During the last hours of the mother's life (told by medical personnel and close friends and relative of the mother who were present)

Clearly identify what is being said and by whom. Write down the respondent's initials beside their given answer.

Important: Reconstruct the order of events on the time line found at the end of the questionnaire.

Section 3: Symptoms experienced by the mother before she died

Based on the summary provided, complete what was not revealed.

(If the response was already stated in Section 2, put an asterix (*) in the third column below. This symbol will indicate that the answer has already been provided.)

Q301	How long had she been ill before she died? *(The response is based on what is said by the respondents)*		
Q302	What symptoms did the woman have when she died or just before she died? *(What did she tell you?):* *(What did you observe when you were with her?):*		
Q303	What symptoms did the mother have at the very beginning of her health problem? *(What did she tell you? What did you observe when you were with her?):*		
Q304	What other symptoms did she have during her health problem? *(What did she tell you? What did you observe when you were with her?):*		

For a maternal death that occurred <u>before the beginning of labor</u>, please fill out <u>Section 4</u>.

For a maternal death that occurred <u>during labor or immediately after the birth</u>, please fill out <u>Section 5</u>.

Section 4 Maternal death occurring before the beginning of labor: Symptoms

No.	Questions	Code	Go to question :
I would like to ask you several questions regarding the mother's health during her pregnancy :			
	During her pregnancy, did the mother :	*Code*	
Q401	Have any swelling of her legs?	Yes 1 No 2 Do not know 9	
Q402	Have a swollen face?	Yes 1 No 2 Do not know 9	
Q403	Complain of blurred vision?	Yes 1 No 2 Do not know 9	
Q404	Have fainting episodes or dizziness?	Yes 1 No 2 Do not know 9	
Q405	Appear pale?	Yes 1 No 2 Do not know 9	
Q406	Become breathless during her routine household activities?	Yes 1 No 2 Do not know 9	
Q407	Lose weight?	Yes 1 No 2 Do not know 9	
Q408	Have her blood pressure taken?	Yes 1 No 2 Do not know 9	 →Q410 →Q410
Q409	Did she tell you what her blood pressure was? If yes, what was her blood pressure?	High 1 Normal 2 Low 3 Do not know 9	
Questions pertaining to health problems that may have caused the maternal death			
Q410	Before her death, did the mother have any vaginal bleeding?	Yes 1 No 2 Do not know 9	 →Q414 →Q414
Q411	Did the bleeding soil her clothes, the bed or the floor? Specify:	Yes 1 No 2 Do not know 9	→Q412 →Q413 →Q413
Q412	Did anyone try to do something to stop the bleeding? If yes, please specify:	Yes 1 No 2 Do not know 9	

Q413	Did she experience any pain with this bleeding?	Yes 1 No 2 Do not know 9	
Q414	Was there any other kind of bleeding that she had during the pregnancy?	Yes 1 No 2 Do not know 9	 →Q416 →Q416
Q415	Was this bleeding painful?	Yes 1 No 2 Do not know 9	
Q416	Did she have a fever during her final illness?	Yes 1 No 2 Do not know 9	
Q417	Did she have yellow skin (jaundice) before her death?	Yes 1 No 2 Do not know 9	
Q418	Was she breathless before she died?	Yes 1 No 2 Do not know 9	
Q419	Did she have any other health problems during her pregnancy? If yes, please specify:	Yes 1 No 2 Do not know 9	

********** PROCEED TO SECTION 6 **********

Section 5 Maternal mortality occurring during labor or after the birth: Mother's Symptoms

No.	Questions	Code	Go to question :
	I would like to ask you several question pertaining to the mother's health during her labor and birth: *(Nb. Emphasize that these questions pertain to maternal death associated to labor and delivery)*		
Q501	Where did the delivery take place?	Home 1 On the way to health centre 2 Health facility 3 During the transfer 4 Death occurred before birth 5 Do not know 9	
Q502	Who assisted the mother at the time of delivery?	No one 1 Close friends 2 Traditional birth attendant 3 Nurse/midwife 5 Doctor 6 Do not know 9	
Q503	What type of delivery was it?	Normal 1 Instrumental 2 Caesarian 3 Do not know 9	
Q504	How many months pregnant was the mother when she went into labor?	Months |__|__| (99 = not known)	
Q505	Was the mother in good health at the time labor began?	Yes 1 No 2 Do not know 9	

Q506	How long was she in labor?	Hours |__|__| (99= not known)	
Q507	Did the mother die before the baby was born?	Yes 1 No 2 Do not know 9	→Q510
Q508	Did the placenta come out?	Yes 1 No 2 Do not know 9	 →Q510 →Q510
Q509	How much time passed from the time of the birth of the baby to the time of the placenta coming out?	Hours |__|__| (99= not known)	
Q510	Did the mother faint or felt dizzy before she died?	Yes 1 No 2 Do not know 9	 →Q512 →Q512
Q511	Did the fainting or dizziness stop after the birth?	Yes 1 No 2 Do not know 9	
	Questions regarding the health of the mother during the last pregnancy:		
	During the pregnancy, did the mother:	*Code*	
Q512	Have any swelling of her legs?	Yes 1 No 2 Do not know 9	
Q513	Have a swollen face?	Yes 1 No 2 Do not know 9	
Q514	Complain of blurred vision?	Yes 1 No 2 Do not know 9	
Q515	Have fainting episodes or dizziness?	Yes 1 No 2 Do not know 9	
Q516	Appear pale?	Yes 1 No 2 Do not know 9	
Q517	Become breathless during her routine household activities?	Yes 1 No 2 Do not know 9	
Q518	Lose weight?	Yes 1 No 2 Do not know 9	
Q519	Have her blood pressure taken?	Yes 1 No 2 Do not know 9	 →Q521 →Q521
Q520	Did she tell you what her blood pressure was? If yes, what was her blood pressure?	High 1 Normal 2 Low 3 Do not know 9	
Q521	During her final illness, did the mother have any vaginal bleeding?	Yes 1 No 2 Do not know 9	 →Q526 →Q526
Q522	Did the bleeding soil her cloths, the bed or the floor?	Yes 1 No 2 Do not know 9	 →Q524 →Q524

Q523	Did anyone try to do something to stop the bleeding? If yes, please specify:	Yes 1 No 2 Do not know 9	
Q524	Did she experience any pain with this bleeding?	Yes 1 No 2 Do not know 9	 →Q526 →Q526
Q525	Did the pain start before the beginning of labor pains?	Yes 1 No 2 Do not know 9	
Q526	Did she have a vaginal exam during her health problems?	Yes 1 No 2 Do not know 9	 →Q528 →Q528
Q527	Did the exams cause or increase bleeding?	Yes 1 No 2 Do not know 9	
Q528	Did she have any other kind of bleeding during her pregnancy?	Yes 1 No 2 Do not know 9	 →Q530 →Q530
Q529	Was this bleeding painful?	Yes 1 No 2 Do not know 9	
Q530	Did she have a fever during her final illness?	Yes 1 No 2 Do not know 9	
Q531	Did she have excessive foul-smelling bleeding before she died?	Yes 1 No 2 Do not know 9	
Q532	Did she have yellow skin (jaundice) before she died?	Yes 1 No 2 Do not know 9	
Q533	Was she breathless before she died?	Yes 1 No 2 Do not know 9	
Q534	Did she have other health problems during her pregnancy, during the labor and delivery or postpartum period? If yes, please specify:	Yes 1 No 2 Do not know 9	

Section 6: Health Care Seeking Behavior

Q601	Did the mother seek advice for her health problems?	Yes 1 No 2 Do not know 9	 →Q614 →Q614
Q602	What were her reasons to seek advice?		

	Indicate who the mother sought for advice *Ask if the mother consulted each of the following:*	*Code*	
Q603	A. Village health worker	Consulted 1 Not consulted 2 Do not know 9	
Q604	B. Traditional birth attendant	Consulted 1 Not consulted 2 Do not know 9	
Q605	C. Dispensary nurse	Consulted 1 Not consulted 2 Do not know 9	
Q606	D. Health facility nurse	Consulted 1 Not consulted 2 Do not know 9	
Q607	E. Nurse or doctor at hospital	Consulted 1 Not consulted 2 Do not know 9	
Q608	F. Private doctor	Consulted 1 Not consulted 2 Do not know 9	
Q609	G. Pharmacist	Consulted 1 Not consulted 2 Do not know 9	
Q610	H. Drug dealer	Consulted 1 Not consulted 2 Do not know 9	
Q611	I. Healer	Consulted 1 Not consulted 2 Do not know 9	
Q612	J. Witch doctor	Consulted 1 Not consulted 2 Do not know 9	
Q613	K. Herbalist	Consulted 1 Not consulted 2 Do not know 9	

Events preceding the death of the mother

I would now like to ask you several questions regarding the events preceding maternal death:			
Q614	Who was involved in making the decision to seek care?		
Q615	What happened that indicated that there was a need to seek health care? (*name the symptoms)*		
Q616	Once the decision was made to seek health care, did the mother leave immediately to go?	Yes 1 No 2 Do not know 9	→Q619 →Q617 →Q619
Q617	Why not?		
Q618	How long did it take for her to leave?		
Q619	Was it difficult to find money for the medical consultation?	Yes 1 No 2 Do not know 9	
Q620	Where did the money come from for the consultation? *(who paid?)*		

Health care seeking behavior during pregnancy

	I would now like to ask several questions about seeking health care during the pregnancy		
Q621	Did the mother receive routine antenatal care (ANC)?	Yes 1 No 2 Do not know 9	 →Q624 →Q624
Q622	How many ANC visits did the mother have?	|__|__| (99= not known)	
Q623	Where did she receive the ANC service?	Health post 1 Health centre 2 Clinic 3 Village doctor 4 University hospital centre 5 Other 6	
Q624	Did she receive anti-tetanus vaccination? How many doses? |__|	Yes 1 No 2 Do not know 9	
Q625	Did she take an iron supplement?	Yes 1 No 2 Do not know 9	
Q626	Did she take malarial prophylaxis?	Yes 1 No 2 Do not know 9	

Q627	Do you know where the mother was planning to give birth?	Yes 1 No 2	 →Q629
Q628	Where?		
Q629	Other than ANC, did she have any other consult?	Yes 1 No 2 Do not know 9	 →Q632 →Q632
Q630	Who did she consult? *(More than one answer is possible)*	Traditional birth assistant 1 Nurse/midwife 2 Doctor 3 Pharmacist 4 Drug dealer 5 Healer 6 Witch doctor 7 Herbalist 8 Do not know 9	
Q631	Why did she consult someone?		

For maternal mortalities that occur after the delivery:

Q632	Did the mother seek health care from anyone after the delivery?	Yes 1 No 2 Do not know 9	
Q633	Who did she consult?	Traditional birth assistant 1 Nurse/midwife 2 Doctor 3 Pharmacist 4 Drug dealer 5 Healer 6 Witch Doctor 7 Herbalist 8 Do not know 9	
Q634	Did she receive routine postpartum care or did she consult for a specific problem?	Routine visit 1 Health problem 2 Do not know 9	
Q635	What was the health problem?		

Other comments:

Q636. Once the decision was made to seek health care:

	Centre 1	Centre 2	Centre 3
Name the health facilities visited			
a) How did she get to this location?			
b) How long did it take to get there?	Hours |__|__|	Hours |__|__|	Hours |__|__|
c) If transport was by bus/ car / local bus/ etc.: Did you have to pay for transportation? If yes, who paid and how much?			
d) Once you arrived to the health centre, how long did it take to be seen by a health provider?	Hours |__|__|	Hours |__|__|	Hours |__|__|
e) Who saw/assessed the mother?			
f) What did the health care provider(s) do?			
g) What did the health care provider(s) say to you?			
h) How much did you have to spend for the consult?			
i) Did anyone ask you to go buy anything? If yes, how much did it cost? Where did you get the money?			
j) Was the mother referred to another location afterward?			
k) If yes, where? Did you go? If yes : provide answer in next column If no: why not?			
l) What did you do next?			

To be completed by principle collector or with all people who have conducted interviews.

Time line of symptoms and treatment from the beginning of health problems until the time of death.

Symptoms/ Complaints :

Beginning of the health problem (time interval) ◆·····➤ **Death**

Sought treatment:

APPENDIX 5

MATERNAL DEATH ANALYSIS FRAMEWORK

Documentation courtesy of Dr. Alexandre Dumont, Université de Montréal
« Qualité des soins, management du risque et techniques obstétricales (QUARITÉ) »

1. Objectives

The "analysis framework" is above all a training tool that aims to:

- Offer a bank of key questions to ask in order to assess the quality of care at arrival and during management of the patient at the hospital.
- Bring out and differentiate the medical and structural aspects of management.
- Identify the positive and negative elements of management that must be reinforced or modified within current obstetrical care practice.

2. Conduct of the Maternal Death Case Review

The maternal death case review is comprised of three separate phases:

A. Reconstruction of the patient's itinerary, from her arrival at the hospital to her discharge (door-to-door approach), and identification of positive and negative events within the management process.

B. Analysis of the reasons or factors that gave rise to the positive and negative events within the management process.

C. Identification of factors that can be improved upon, as well as actions or solutions the maternal deaths review team agreed upon in order to ensure that the best possible care is provided during future obstetrical emergencies.

A. Patient's itinerary and management

The maternal death case review starts with the reconstruction of the patient's itinerary, from her arrival at the hospital to her discharge (door-to-door approach). The maternal deaths review team then brings out the strengths and weaknesses of the hospital's management of patients. These strengths and weaknesses vary from one case to the next.

In certain cases (e.g. delay in execution), the maternal deaths review team has to consider what constitutes a "quick response" or a "delay in management". Delays need to be quantified in hours. If a delay cannot be calculated because of missing information in the medical files, it needs to be specified.

Procedures must be written down so as to objectively show where deficiencies lie. Barring that, clinical judgment will be the standard used.

The key events to be considered are below. However, the maternal deaths review team may eventually add other elements or aspects that relate to care provided to patients.

A.1 Information on the woman's transport to emergency obstetrical care

- Did the woman require an emergency transport?
- If so, where from?
- By what means?
- Is there an emergency transport record?
- Was care provided to the woman before the emergency transport?
- Was someone attending the woman during the transport?
- Was there a skilled attendant attending the woman during transport?

- Was the reception center advised?
- If so, was it ready for the woman's arrival?
- What was the interval between evacuation and arrival at the reception center?
- Was the woman transferred to yet another health facility?
- If so, which one?
- By whom?
- Why was the woman transferred a second time?
- Was care provided to the woman before the second transfer?
- Was the woman accompanied?
- Did a skilled attendant accompany the woman during this transport?
- Was the reception center advised?
- What was the interval between the second transfer and arrival at the reception center?

A.2 Admission

- Was this woman considered to be at risk of complications?
- What was her history? What were her risk factors?
- At what point of the woman's itinerary (between the time she left home and arrived at the hospital) did her condition grow severe?
- When she arrived (date and time of arrival), was the woman care taken over quickly by a qualified attendant (nurse or midwife)? How quickly?

A.3 Diagnostic

- Was the clinical exam performed adequately from a technical standpoint? (see appendix)
- Was the initial diagnostic correct?
- Was the diagnostic arrived at in good time?
- Was there a lag in communications between the staff members from the time of arrival at reception to the time of diagnostic (for example, between the midwife and the casualty officer)?
- Were all the necessary investigations (clinical exam, lab tests, x-rays, etc.) requested?
- Were all the investigations requested necessary?
- Were all the necessary investigations performed?
- Were all the investigations performed necessary?
- Were all the necessary investigations performed in good time?
- Did the results come in good time?
- Were the results used?

A.4 Treatment

- Was the emergency treatment adequate? This can include using an IV to stabilize the woman's condition.
- Was the subsequent treatment adequate? This can include surgery, a prescription for management of complications or infection, transfusion, etc.
- Were all the steps of therapeutic management taken adequately?
- Were all the procedures implemented necessary?
- Was the prescribed treatment based on a treatment protocol?
- Was each of the therapeutic problems identified managed properly?
- Was the necessary treatment prescribed in good time? For example, the qualified attendant responsible for examining the woman may have been delayed or there may have been a delay in recognizing the need for treatment.
- Was the necessary treatment provided in good time?
- In the case of a major treatment, such as a cesarean section, divide the treatment in steps—inform OR staff, inform other essential personnel, take patient to OR, prep the patient, anesthetize, operate.
- A similar list for transfusion would include the following: ensure blood grouping, place in a request for blood, receive the blood, ensure that the donor's blood was tested for HIV and hepatitis, run a compatibility test at the woman's bedside, perform the transfusion.

A.5 Treatment monitoring and provision

- Was monitoring requested? This can include creating a monitoring sheet, taking the pulse and measuring the blood pressure, monitoring blood loss and diuresis, assessing general condition, etc.
- Was a monitoring sheet created?
- Was surveillance based on a protocol?
- Was monitoring based on a protocol?
- Was monitoring performed as prescribed?
- Were the decisions taken as a result of surveillance taken in time?

A.6 Record keeping

- Was the information contained in the record complete?
- If not, make a list specifying what information was missing.
- Was the information contained in the record adequate for the purpose of:
  - Making a diagnostic?
  - Performing monitoring efficiently?
  - Auditing the case?

If not, make a list specifying what information should have been included in the record.

B. Reasons or factors explaining positive and negative events

B.1 When did this problem occur?

- During transport
- During admission
- During treatment
- During surveillance

B.2 Is the staff sufficiently qualified to handle a situation of this gravity?

B.3 What caused this problem?

- Equipment
- Availability of equipment
- Availability of drugs
- Organization of care
- Lack of funds

C. Identification of factors that can be improved upon and recommendations

The final step of the maternal death case review is to offer solutions to the problems that were identified. These solutions should be specific to each hospital.

The maternal death case review must focus on both positive and negative elements.
The focus must be put on organizational aspects:

C.1 Infrastructure

- **Permanent or intermittent availability:** For example, of the operating suite or of sterilized surgical instruments. Is surgical equipment limited?

C.2 Equipment

- ***Availability***
  - Permanence: Is the equipment available on a permanent or an intermittent basis in terms of time, space and needs? For example:
    - Is there an aspirator in the delivery room?
    - Was a sphygmomanometer (blood pressure monitor) available when needed?
    - Were the surgical instruments sterilized by autoclave and ready for use?
    - Was the inventory of suture materials or of laboratory reagents controlled?
    - Was material supplied on time?

- ***Accessibility:*** Is the aspirator locked in, with only one person in charge of the key?
- ***Condition:*** In working condition or broken

C.3 Drugs

- ***Emergency drugs***
  - *Available at all times*
    - At the hospital pharmacy
    - In the emergency room
    - In the delivery room
    - In the operating suite
  - *Available intermittently*
    - At the hospital pharmacy
    - In the emergency room
    - In the delivery room
    - In the operating suite
  - *Accessibility*
    - Locked in
    - The pharmacy staff is on guard duty and can provide the drugs
  - *Accessibility to funds:* the patient provides the drugs within the prescribed time
    - In the emergency room
    - In the delivery room
    - In the operating suite
  - *Material for emergency obstetrical care*
    - Material that meet the needs of a basic EOC health facility
    - Material that meet the needs of a comprehensive EOC health facility for example; manual vacuum aspiration syringe, forceps, etc

C.4 Staff

- ***Qualifications:*** Was the person who performed a specific act qualified to do so?
- **Technical ability and/or expertise**: Does the qualified person have sufficient expertise or technical ability to perform certain tasks.
- ***Availability***
  - Permanent: Does the hospital have:
    - an anesthetist?
    - a full **time lab technician who can be on site?**
  - Temporary: Does the hospital have:
    - an anesthetist who is on holiday or who is not on site?
    - a lab **technician who is on holiday or who is not on site?**
- ***Rotation***
  - Is key staff part of the rotation so they can have guard duty?
  - Has a member of the staff been designated to warn the staff that has guard duty?
  - Staff's place of residence: Does the staff on guard duty live sufficiently close to the hospital to intervene in time?
  - Locating guard duty staff:
    - Can the staff be located in time?
    - Does the staff conform to hospital guidelines with regards to availability during guard duty?
- ***Supervision of less experienced staff:*** Is supervision regular, effective and adequate during guard duty also (with regards to treatment, diagnostic, and implementation of protocols)?
- ***Communications and interaction:*** What is the status of communications and interaction among members of the medical staff and between the staff and the woman.

It should be noted that these factors apply to all of the staff involved in the cycle of care, regardless of their position. For example, a major delay in performing certain key actions can be due to a combination of minor delays that accumulate during the various steps of management. It is also important to note, for each problem, what type of staff is involved (expertise needed to manage certain complications, delay in responding, etc.)

C.5 Management

- ***Organization and management***
  - Have arrangements been made to ensure availability of staff?
  - Have arrangements been made to facilitate access to the operating suite?
  - Do the guidelines and the rules run counter to quality of service?
  - What are the relations like between the medical staff and administration?
  - How are communications between the various units within the department and within each of the units?
  - Were consumables renewed?

- ***Standardized protocols***
  - Are there standardized protocols in place?
  - Are they available?
- ***Patient and family***
  - Capacity to pay; specify whether patient was able to pay or not.
  - Cooperation from the family

C.6 Other (specify)

APPENDIX 6

MATERNAL DEATH CASE REVIEW REPORT FORM

Form courtesy of Dr. Alexandre Dumont, Université de Montréal
« Qualité des soins, management du risque et techniques obstétricales (QUARITÉ) ».

PART A: TECHNICAL INFORMATION (VERIFICATION OF THE CASE REVIEW)

1- Country ☐☐ 2- Region ☐☐ 3- Facility ☐☐

4- Identification of the deceased mother:

Surname: _____ Name: _____

5- Date of birth: ☐☐-☐☐-☐☐ 6- Age ☐☐ years

7- Date of death: ☐☐-☐☐-☐☐

8- Place of death: ☐ Home = 1, Health post = 2, Health Centre = 3, Private Maternity Centre = 4, Regional Hospital = 5, University Hospital = 6, Village = 7, During transport = 8, Other = 9

9- If 'other', please specify: _____

10- Death declared by: Full name _____

11- Address _____

12- Data collected by: Name _____

13- Profession: _____

14- Case report completed by: Name _____

15- Profession: _____

16- Date of the case review (dd/mm/yy): ☐☐ / ☐☐ / ☐☐

17- Number of people present at the case review: ☐☐

18- Doctors ☐ 19- Midwives ☐ 20- Nurses ☐ 21- Students ☐

22- Administrative personnel ☐

23- Other personnel: specify_____

24- Case review presided by: Name_____

25- Patient Chart No. ☐☐☐☐☐

DETACH THIS FORM BEFORE SUBMITTING IT TO THE COMMITTEE

No name, no blame!

MATERNAL DEATH CASE REVIEW REPORT FORM

PART B: MATERNAL DEATHS REVIEW COMMITTEE ASSESSMENT

1- Patient's Chart No.: ☐☐☐☐☐	2- Date of case review (dd/mm/yy): ☐☐/☐☐/☐☐
3- Structure codes: Country/Region/Facility: ☐☐/☐☐/☐☐	4- Length of case review: ☐☐hours

I- Case summary:

II- What was the committee's conclusion?	Direct obstetrical cause 1 Indirect obstetrical cause 2 Non-obstetrical cause 3 Cause unknown 4	
III- What is the cause of death?		
IV- If it is an obstetrical cause, was the death considered avoidable?	Definitely avoidable 1 Possibly avoidable 2 Unavoidable 3	

V- At what stage/point was this death avoidable? (*More than one response is possible*) If other, please specify:	Admission exam 1 At time of diagnosis 2 During the treatment 3 By the absence of treatment 4 By the lack of observations 5 By the lack of cesarean 6 Other 7	

VI- Under what conditions would the death have been avoidable? (please clearly describe)

VII- Recommendations and person responsible for its implementation

Category	Recommendation(s)	Person responsible
Infrastructure Example: Equip the operating room.		
Equipment Example: Purchase a fridge for the blood bank		
Medications and supplies Example: Ensure the 24 hour availability of drugs. Guarantee the availability of intravenous magnesium sulphate		
Health Care and Support Staff Example: Hire four nurse-anesthetists		
Management Example: Train laboratory staff to manage the blood bank.		