MATERNAL DEATH REVIEW (MDR) Report
MYANMAR 2015

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Acknowledgments

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List of Acronyms

AMW	Auxiliary Midwife
ANC	Antenatal Care
BEmONC	Basic Emergency Obstetric and Neonatal Care
CEMD	Confidential Enquiry into Maternal Deaths
CEmOC	Comprehensive Emergency Obstetric Care
CHWs	Community Health Workers
COIA	Commission on Information and Accountability
DHS	Demographic and Health Survey
EPMM	Ending Preventable Maternal Mortality
FP	Family Planning
HMIS	Health Management Information System
ICD-10	International Classification of Diseases (10th Revision)
INGOs	International Non-Governmental Organizations
IUD	Intrauterine Device
LHV	Lady Health Visitor
MCH	Maternal and Child Health
MDGs	Millennium Development Goals
MDR	Maternal Death Review
MDSR	Maternal Death Surveillance and Response
MMEIG	Maternal Mortality Estimation Inter-agency Group (of the United Nations)
MMR	Maternal Mortality Ratio
MoH	Ministry of Health
MoHS	Ministry of Health and Sports
MPDR	Maternal and Perinatal Death Review
MRH	Maternal and Reproductive Health
MW	Midwife
NGOs	Non-Governmental Organizations
PET	Pre-Eclamptic Toxaemia
PGE1	Prostaglandin E1
PIH	Pregnancy-Induced Hypertension
PPH	Postpartum Haemorrhage
RAMOS	Reproductive Age Mortality Studies
SBAs	Skilled Birth Attendants
SDGs	Sustainable Development Goals
SEAR	South-East Asia Region (WHO categorization)
TFR	Total Fertility Rate
WHO	World Health Organization

Executive Summary

Myanmar has been conducting Maternal Death Reviews (MDR) for more than a decade. The MDR started as a pilot study which was gradually scaled-up to cover the whole country. In the early years, reports on the MDR findings were sketchy and irregular, and the analysis was limited. In 2014, a serious effort was made by the Division of Maternal and Reproductive Health under the Ministry of Health and Sports (MoHS) to produce a formal comprehensive report for maternal deaths that was reviewed by the MDR system in 2013. This 2013 report was prepared, published and disseminated with support from the World Health Organization (WHO). A report has also been prepared for maternal deaths that were reviewed in 2014. This current report is the third in a series of comprehensive reports of the MDRs undertaken since 2013.

A basic principle of a MDR - and especially of the recently introduced Maternal Death Surveillance and Response (MDSR) system that will replace the MDR – is that all maternal deaths must be notified or reported, and out of this number a reasonable number should be reviewed by the MDR system. In Myanmar, since the reported number of maternal deaths is not exceptionally high (less than a 1,000 a year, which is almost certainly a gross underestimate of the true figure), attempts can be made to review all reported deaths. Performance in the review of maternal deaths has been encouraging - the percentage of deaths that were reviewed out of the total deaths reported in 2011 was 31 per cent; 55.5 per cent in 2012; 93.6 per cent in 2013; and 100 per cent in 2014.However in 2015, the review rate declined to 78.2 per cent.

The aim of a MDR is to identify the causes and circumstances surrounding maternal deaths, which gives an indication of the risk factors for deaths. This knowledge of risk factors can then be translated into strategies for preventing similar deaths in the future. Ultimately the MDR will contribute to the reduction of the maternal mortality ratio (MMR), which was a goal under the Millennium Development Goals (MDG 5), and which is now a goal under the Sustainable Development Goals (SDG 3). While Myanmar has not achieved MDG 5 of a 75 per cent reduction in the MMR from 1990 to 2015, it is making progress and the trend is encouraging. The baseline MMR in 1990 was 453 per 100,000 live births; it declined to 248 in 2000; and in 2015 the MMR stood at 178 per 100,000 live births.

The profile of maternal deaths in 2015 did not differ significantly from that of 2013 and 2014. The distribution by state/region has not changed; the highest number of maternal deaths were reported in Ayeyawady, Mandalay, Bago and Sagaing. When these absolute numbers are translated into the MMR, the states/regions reporting the highest MMR (exceeding the Union average) are Chin, Ayeyawady, Magway, Rakhine, Kayah, Kachin and Bago.

The age-specific death rates could not be computed in the absence of the denominator (live births in each age group). The highest number of deaths are among women aged 30 to 39 years (most pregnancies are in this age group). It is noteworthy that teenage pregnancies account for 48 deaths (7.1 per cent). Mothers aged 40 years and over constituted 10.6 per cent of maternal deaths. Although these are proportions and not rates or ratios, it is still a valid illustration of the well-documented relationship between maternal age and maternal mortality.

More than half of deceased women (53.1 per cent) had only received primary education and 13.9 per cent were illiterate. Nearly one fourth of deceased women, or 24.2 per cent, had attained secondary level education, and only 3.4 per cent had received a university education.

It is a fact that primigravida (gravida 1) and grand multigravida (gravida 5 and above) are at a higher risk of maternal death, and the 2015 profile shows this; primigravida accounted for 31 per cent of maternal deaths and multigravida for 42.4 per cent. Nineteen per cent of deceased women received at least four antenatal visits, and 22.2 per cent received more than four antenatal visits. Only 19 per cent of deceased mothers had no antenatal visits at all. The inference here is that although these women had regular antenatal visits, they were not aware of complications during delivery or the postnatal period.

Thirty one per cent of deceased women received first care from doctors, and of these, six (2.8 per cent) were obstetricians. Almost 22.6 per cent of deceased women received first care from midwives or lady health visitors (LHVs). This means that as many as 53 per cent of deceased women had a skilled birth attendant (SBA) as their first health care provider. Traditional birth attendants (TBA) were the first health care providers for 23.1 per cent of deceased women. Before death, doctors attended to 56.9 per cent of deceased women and midwives to 10.9 per cent. This suggests that women who experienced severe complications during pregnancy and childbirth that ended in death were referred to doctors.

More than half (57 per cent) of maternal deaths occurred in the postnatal period, while deaths in the antenatal period accounted for 30 per cent of deaths, and deaths in the intrapartum period for 13 per cent. This reflects the commonest cause of death, which is postpartum haemorrhage (PPH), and underscores the importance of postpartum interventions to prevent such deaths.

More than three quarters (81 per cent) of deceased women resided in rural areas, which is probably a reflection of the general population, and does not suggest differences in risk between rural and urban areas.

The place of maternal death was at home, on the way to a health facility or hospital, or at a health facility. More than half of the deceased women (56 per cent) died at a hospital while 27 per cent died at home, and 17 per cent died on the way to a health facility. Again the interpretation of this finding is linked to the severity of the condition or complication that needed facility/hospital care and the higher risk of death associated with such cases.

Distance and time are proxy indicators for accessibility to services, especially for emergency obstetric care (EmOC). The majority of deceased women (76 per cent) lived within five miles of a health centre. Among these women, 17.4 per cent lived within one mile of a health centre. Only 23.4 per cent lived more than five miles from a health centre. Most deceased women (70.6 per cent) could reach a health centre within one hour. More than one fourth of deceased women (26.7 per cent) took one to three hours to reach the nearest health centre, and only 1.9 per cent took more than three hours to reach the nearest health centre.

The seeking of timely care significantly determines whether a woman survives or dies from the complications of pregnancy and childbirth. Hence the importance of profiling maternal deaths by the type of delay using the Three Delays Model. It was found that more than half (54 per cent) of deceased women did not seek care on time because either she or her family members were not aware of the need to seek care (first delay). Notably a very small proportion (only 3 per cent) did not seek care because of the second delay, the inability to seek care due to barriers, commonly geographical and financial. A similar proportion of deceased women (3 per cent) experienced the third delay. These are women who had no barriers in reaching the point of care but did not receive the needed intervention or treatment. There are also women who faced a combination of delays, which is difficult to interpret.

All but 6 of the 674 cases that were reviewed had an assigned cause of death; 74 per cent were direct maternal deaths, which means that they were due to obstetric complications, and 26 per cent were indirect maternal deaths, which means that they were caused by existing medical conditions which influenced (or were influenced by) the pregnancy. The three main causes of all maternal deaths were postpartum haemorrhage (PPH) (30 per cent); pre-eclampsia/eclampsia (18 per cent); and sepsis (11 per cent). This profile does not significantly differ from the past years. PPH has consistently remained the leading cause of maternal deaths.

This report differs from the previous year's reports in one aspect – it has an additional section on actions that have been taken based on the recommendations of previous reports. A MDR is a rigorous exercise to identify risk factors that lead to maternal deaths, which once elucidated lead to recommendations. These recommendations, if not acted upon would make the MDR a futile exercise. While there is no method to check for direct evidence of any action having been taken, this report uses informal and indirect means. It was found that most of the recommendations from the 2013 and 2014 MDR reports had been implemented, except the recommendation on improving the information collected, which requires a review of existing forms, and that there is a plan to evaluate the MDSR system, which will very likely lead to a review of the information being collected and the forms used.

Recommendations, based on the findings, are presented in two sets. The first set are recommendations to improve the MDR system itself, and largely cover the actions needed to address weaknesses in the information collected (five recommendations). The second set are recommendations to prevent maternal deaths (five recommendations).

The report concludes by reiterating the global attention given to maternal mortality, and the importance of MDRs and the MDSR as part of this. Several strategies have been recommended to reduce maternal mortality – one of these is to improve the information collected, not only by getting more accurate estimates of the MMR, but also to understand the causes, circumstances, and risk factors of every maternal death, which can be done through a MDR or the MDSR. This will contribute to reducing maternal mortality, and to the global initiative of Ending Preventable Maternal Mortality (EPMM), and ultimately to sustainable human development.

Explanatory notes on the report

There are some observations that are relevant to the 2015 Maternal Death Review (MDR) in Myanmar.

1. The target year for the Millennium Development Goals (MDGs) was 2015 with 1990 as the baseline year. Therefore an analysis of trends could be made to compare maternal mortality in 2014 in addition to the years from 1990. However this report does not intend to do this, instead, this report will only make a comparison with the more recent years (2013 and 2014).

2. In 2014, the maternal deaths that were reported in the MDR system were analysed to some extent, and a report was prepared, but due to unavoidable circumstances it was not published, and was not circulated to a wider audience in the public domain. Therefore this report for 2015 will make comparisons mainly to the analysis of maternal deaths in 2013 (for which a report was published and widely circulated) and to a more limited extent with the data in the unpublished report of 2014, to the extent that comparable data are available.

3. The structure and format of the reports for 2013, 2014 and 2015 differ to some extent, mainly because different writers prepared the reports. This is unlike the practices in other countries; for example the reports of the Confidential Enquiry into Maternal Deaths (CEMD) in Malaysia follow an almost consistent format each year; the same applies to the CEMD reports of the United Kingdom[1].

4. Besides comparing quantitative data and findings, a MDR report has more value if comparisons are also made on other aspects such as; the strengths and weaknesses of implementing the MDR under the Ministry of Health and Sports; and more importantly whether recommendations made in the report of the previous year have been acted upon, and if not, why. This report will therefore revisit the recommendations made in the 2013 and 2014 MDR reports and see the progress made, if any.

5. Myanmar has moved forward to transition from the MDR to the Maternal Death Surveillance and Response (MDSR) system. The development of the MDSR system began in 2013, and it was launched for nationwide implementation in January 2017. Therefore the 2015 report still follows the MDR processes and not the MDSR system. The same will apply to the 2016 report for which data is currently being analysed.

6. In 2014, Myanmar conducted a National Population and Housing Census[2], the first in over three decades (the last census was undertaken in 1983). The 2014 Census incorporated measurements of maternal mortality. It has to be acknowledged that the 2014 Census captured data on pregnancy-related deaths and not maternal deaths (See definitions in Section 3.1). The 2014 Census thematic report on Maternal Mortality was released in September 2016. Therefore, although this MDR report for 2015 preceded the 2014 Census thematic report on Maternal Mortality, at the time of finalizing this report the findings from the 2014 Census had already been made available. Therefore data from the 2014 Census will be cited in the section on the situation of maternal mortality in Myanmar in 2015.

[1] In the United Kingdom and Malaysia these reports are written at least every three years due to the small number of maternal deaths each year.
[2] A population census is the total process of collecting, compiling, evaluating, analyzing and publishing or otherwise disseminating demographic, economic and social data pertaining, at a specified time, to all persons in a country or in a well delimited part of a country.

Chapter 1.
Introduction

The eight Millennium Development Goals (MDGs) promised to significantly reduce extreme poverty by 2015. Myanmar continued to actively pursue achieving MDG 5 (to improve maternal health) and Target 5A, which was to reduce the maternal mortality ratio (MMR) by three quarters, or 75 per cent, from the level in 1990. Having accurate knowledge of the MMR was a basic requirement for tracking the progress of MDG 5, Target 5A. Across 60 per cent of the world, where there is no reliable civil registration and vital statistics system (CRVS), there is little or no data about maternal deaths (Matthews Mathai a, 2015). Other sources of data are required such as household surveys.

Similarly, in Myanmar, where the CRVS is limited, estimates of maternal mortality are generated through household surveys and other methods such as statistical modelling. These estimates, despite their wide ranges of uncertainty, are the only available measures to indicate the severity of the problem. However they do not provide sufficient information for targeted actions to reduce maternal mortality, and to achieve an even more ambitious goal - to end preventable maternal deaths. Thus, better data is an essential requirement for better health, as highlighted by the Commission on Information and Accountability for Women's and Children's Health (COIA).

An accurate number of maternal deaths is only one part of the process of tracking MDG 5. In addition, there is a need to "go beyond the numbers" and to elicit the profile of maternal deaths. Without quality information on maternal deaths, such as who, where, when, and why maternal deaths occur, it is not possible to begin to tackle maternal mortality. To obtain this quality data, it is necessary to conduct a maternal death review (MDR). WHO has provided support to countries in the use of the guidelines developed in 2004, "Beyond the numbers: reviewing maternal deaths and complications to make pregnancy safer" which provide guidance on the different methods for the review of maternal deaths and morbidity. This widely disseminated document has been used in MDR implementation in several countries including Myanmar. The community-based maternal death audit began as the first pilot in five townships of Sagaing Region, and it included a perinatal death review as well. In 2009, this transitioned into the maternal and neonatal death review in 30 pilot townships, which was later scaled-up nationwide as the maternal death review. This was evaluated by the South-East Asia Regional office (SEARO) of WHO in 2012 as part of a five-country evaluation of MDRs. Since then MDR analysis has been conducted for 2013[3] for which a report has been published and in 2014.

This current report is the outcome of the MDR for maternal deaths that occurred in 2015 in Myanmar, which provides the level and profile of maternal deaths, and the analyses that leads to findings, inferences, conclusions and recommendations for action.

[3] The MDR report for the 863 maternal deaths that were reported in 2013 has been published by the MRH Division of the MoH, using the service of a short term consultant from WHO. In 2014, 846 maternal deaths were reported, reviewed, and analysed but the report was not published.

Chapter 2.
Maternal mortality – a preventable tragedy

Most maternal deaths are preventable as interventions for preventing or managing the complications of pregnancy and childbirth are well known, and can be made available in the health system. Preventing maternal deaths is closely linked to the concept of risk, and if risks that cause maternal deaths can be reduced or eliminated, deaths can be prevented. It was this concept of risk that led to the "high risk approach" introduced by WHO in the early 1970s. However this approach is no longer recommended. This is because of the reality that every pregnancy can cause complications, which is expressed in the axiomatic expression: "There is no such thing as a no-risk pregnancy". All pregnancies face the possibility of complications which can emerge at any of the pregnancy/parturition/puerperium stages[4].

The risks of maternal death can be identified and even measured if a detailed study or analysis of a large number of maternal deaths is carried out. The profile of deaths obtained from a death review process, which can take various forms – a MDR, the MDSR, a Confidential Enquiry into Maternal Deaths (CEMD), clinical audits - will give some ideas of why the death occurred or what caused the death. Therefore the concept of cause is crucial.

Nearly two-thirds of maternal deaths worldwide are caused by direct causes such as haemorrhage, eclampsia, obstructed labour, sepsis and the complications of unsafe abortions. The indirect causes of maternal deaths are mostly due to the interaction between pre-existing medical conditions and pregnancy (WHO, 2016). There are medical interventions for each of these causes of maternal death. For women to benefit from these interventions, they must have the opportunity to access these interventions, through health care facilities or services that are provided in a functioning health system.

As a basic necessity, all women must be provided with health care by a skilled professional/attendant during her pregnancy, at childbirth and in the immediate postpartum period. In MDG 5, one of the indicators is the skilled birth attendant (SBA) rate, which is also an indicator under Sustainable Development Goal 3 (SDG 3). Globally, the coverage of skilled attendance at birth was estimated to have reached 73 per cent in 2013. However, more than 40 per cent of births in the WHO African Region and the WHO South-East Asia Region were not attended by skilled health personnel, and within countries large disparities exist associated with persistent differences in socioeconomic status (WHO, 2016).

A functioning health system that can provide care to women, including SBAs, is only one side of the equation. This care must be accessed by women who need it; in other words women must seek care, and that care must be sought in a timely manner. A delay in receiving timely and appropriate care during an obstetric emergency condition is a major contributor of maternal mortality in developing countries (Shah N, 2009).

Women in general, especially in the developing world, face three major delays to seek care, as depicted by the Three Delays Model of Thaddeus and Maine. The first delay is the lack of awareness about the need to seek care (failure to "recognize"); the second delay is where a woman has the awareness and desire to seek care, but she is unable to do so because of barriers, which may be geographical, socio-cultural or financial in nature (failure to "refer"); the third delay is when, after a woman has arrived at the place where care is provided, she is not given the necessary care due to several reasons – there is

[4] It is due to this that WHO does not recommend the "high-risk approach" which was introduced in the early 1970s. However Malaysia has opted to continue to use this approach, and records of all pregnant women are tagged with a colour code to indicate their level of risk.

no health care provider who has the skills; no medicines or supplies; or a lack of facilities for specific procedures (failure on the part of the health system to “respond”). Needless to say the identification of these three delays is imperative, and this can be achieved by conducting a MDR. However, from the analysis of the MDRs in the years since it was introduced, identifying the three delays has been fraught with problems. This was discussed in the MDR report of 2013, and will again be highlighted in this current report, with a more detailed discussion. In the 2013 analysis, the problem was detected and discussed, but no attempt was made to make any interpretations on what appeared to be irreconcilable findings. In this current report, some interpretations are attempted in Chapter 8.

The reduction and elimination of these delays, along with the effective use of clinical interventions, is central to the formulation of strategies for preventing maternal deaths, and reducing maternal mortality. The preventability of maternal deaths forms the rationale and basis for the global quest of Ending Preventable Maternal Mortality (EPMM) spearheaded by WHO.

Chapter 3.
Basic concepts – defining and measuring maternal mortality

3.1 Definitions

To fully appreciate the findings of the MDR 2015, it is useful to understand the definitions related to maternal mortality. Likewise it is also useful to understand the sources of data and methods of measuring the MMR, and this will be covered briefly in Section 3.2.

The definitions adopted by the United Nations Maternal Mortality Estimation Inter-agency Group (MMEIG) are from the International Classification of Diseases (10th edition) (ICD-10) as follows. (WHO, 2012).

Pregnancy-related death

A pregnancy-related death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death.(This includes all maternal deaths and deaths due to accidental or incidental causes).

Note: There is also the concept of deaths of women in the reproductive age group (aged 15-49), regardless of their pregnancy status. This is relevant in some approaches to estimate maternal mortality as in Reproductive Age Mortality Studies (RAMOS). See below.

Maternal death

A maternal death 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 or incidental causes. Maternal deaths are subdivided into two groups by cause:

- **Direct obstetric deaths:** direct obstetric deaths are those resulting from obstetric complications of the pregnancy 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:** indirect obstetric deaths are those resulting from previous existing diseases or diseases that developed during pregnancy and which were not due to direct obstetric causes, but which were aggravated by the physiologic effects of pregnancy.

Incidental maternal deaths

These are deaths from unrelated or incidental/accidental causes that happen to occur during pregnancy or the puerperium. These deaths therefore will be included in pregnancy-related deaths, but not in maternal deaths. Another term sometimes used is accidental death; and in the CEMD in Malaysia, the term used is a fortuitous maternal death[5] (although called "maternal" the CEMD acknowledges that such deaths are pregnancy-related deaths and therefore are not included in the calculation of the MMR).

[5] The CEMD Malaysia uses an operational definition that helps in the audit of maternal deaths: "Fortuitous maternal deaths are deaths resulting from causes not related to or influenced by pregnancy and deaths during delivery, such as deaths due to drowning or road accidents, where the pregnancy is unlikely to have contributed significantly to the death, although it may be possible to postulate a remote association". This long definition underscores the difficulty in classifying some pregnancy-related deaths.

Late maternal death
There is universal agreement that the puerperium ends 42 days after childbirth. There are countries that also conduct a review on maternal deaths beyond this period. These are late maternal deaths - the death of a woman from direct or indirect causes more than 42 days but less than one year after the termination of pregnancy. These are not included in the calculation of the maternal mortality ratio for which there is an international agreement which limits the period to 42 days.

Lifetime risk (LTR) of a maternal death
The lifetime risk (LTR) of a maternal death is the risk that a woman who survives to the age of 15 will die of a maternal death at some point during her reproductive lifespan, given the current rates of maternal mortality and morbidity. This is not useful in the analysis and report on maternal deaths in Myanmar.

3.2 Measuring maternal mortality

It is often emphasized that measuring maternal mortality is notoriously difficult for both conceptual and practical reasons. Maternal deaths are hard to identify precisely and a maternal death is a relatively rare event. In addition, it is not easy to access reliable sources of data for calculating maternal mortality. And even after deciding on the sources of data to use, there are several methods that can be applied to the numbers derived from a particular source (or from more than one source) to estimate the MMR; and this can be complex, statistically sophisticated and resource intensive. In the published MDR report of 2013 and the unpublished report of 2014, there was no description of the methods used to measure maternal mortality. In this current report, it was felt that it would be useful for the reader to be familiar with the methods used. An understanding of this is also vital at a time when Myanmar is going to transition from the MDR process to the MDSR system, and has begun formulating strategies for Ending Preventable Maternal Mortality.

The following is a brief description of both sources for the number of maternal deaths, and the methods for deriving the MMR used by countries in various combinations.

1. **Civil vital/registration**
   In developed countries, and in a few developing countries, there is a system of registration of all births and deaths. In such instances information about maternal mortality can be retrieved from the vital registration system of deaths by cause. However, it must be noted that few developing countries, including Myanmar, has a vital registration system in place, and where it does exist it is often mainly for the urban proportion of the population. Furthermore, as most deaths in Myanmar take place outside of health care facilities, most of them would not be identified even if the cause of death was known. Since the rate of death registration through the civil registration system is low, the MMR derived from this source is fallaciously low. The Health Management Information System (HMIS) collects data from the civil registration system, and, in addition, data from health care providers, which may include data not captured by the civil registration system, but even this is fallaciously low. Therefore to get a more reliable number, surveys are needed from time to time.
2. **Sample Registration System (SRS)**
   For countries with very large populations and where the complete coverage of vital registration systems is not possible (or extremely difficult), a SRS can be done, and if undertaken meticulously (as in India for example), it can give a fairly reliable estimate of the MMR. Besides India, China also carries out a SRS.

3. **Household surveys**
   Household surveys or community-based studies; these can take several forms and approaches, the commonest being the Demographic and Health Surveys (DHSs) and the Multiple Indicator Cluster Survey (MICS). These have serious weaknesses in that since a maternal death is a relatively rare event a large sample size is needed to provide a statistically reliable result. This makes it complex, time consuming and extremely cost prohibitive. Also surveys identify pregnancy-related deaths and not maternal deaths, and they are retrospective instead of current.
4. **Population and Housing Census**
   A national population and housing census[6] is an excellent source of maternal death data, but it requires additional questions and training of enumerators. It is noteworthy that Myanmar included these questions and training in the Population and Housing Census undertaken in 2014. The advantage is coverage – all women aged 15-49 are covered, but like surveys, it elicits data on pregnancy-related and not maternal deaths.
5. **Reproductive Age Mortality Studies (RAMOS)**
   RAMOS involves identifying and investigating the causes of all deaths among women of reproductive age (15-49 years). This method uses multiple sources of information; civil registration systems, health facility records, community leaders, and cemetery officials to identify all deaths. RAMOS is considered to be the "gold standard" for measuring and estimating maternal mortality. However, it is expensive, complex and time consuming.
6. **Verbal autopsy (VA)**
   Verbal autopsies are useful to determine the cause of death, and are often incorporated in to household surveys. However the information collected depends on the memory and accuracy of the family member of the deceased woman who responds to the questions in the VA; as well as on the skill of the interviewer who asks the questions. A VA is an integral part of a MDR and the MDSR especially for deaths that occur within the community (outside of a health facility).
7. **Specialized studies**
   These are seldom cited in maternal mortality reviews and literature but can and have been used.
8. **Records at health facilities**
   Where health systems are relatively strong with reliable information systems, records from health facilities can be a useful source of information on maternal deaths.

[6] It is noteworthy that Myanmar conducted a Population and Housing Census in 2014, which incorporated a section on maternal mortality. The 2014 Census thematic report on Maternal Mortality was published in September 2016. The last census in Myanmar was conducted in 1983; in most countries, national population censuses are conducted every ten years. In some countries, smaller scale inter-census measurements are sometimes undertaken.

Chapter 4.
Maternal death reviews (MDRs) in Myanmar

4.1 Going beyond the numbers

Notwithstanding the difficulties in the identification of maternal deaths and measuring maternal mortality described in Section 3.2 above, Myanmar has made commendable efforts to generate estimates of the MMR that are as accurate as possible. Because civil registration and vital statistics (CRVS) systems have still not achieved extensive coverage, other sources of data to estimate the MMR have been used. It is also noteworthy that efforts are ongoing to improve the CRVS system in Myanmar, notably after the recommendations from the national workshop on the COIA road map in 2013.

Measuring the MMR is only part of the solution to improve maternal health and to reduce maternal deaths. Serious efforts have been undertaken to "go beyond the numbers". From determining the size of the problem, efforts have not been spared to seek to understand the underlying causes and circumstances of maternal deaths. As mentioned in the introduction above, WHO has provided support to Myanmar in the use of the guidelines developed in 2004, "Beyond the numbers: reviewing maternal deaths and complications to make pregnancy safer".

The community-based maternal death audit that began as a pilot project was expanded nationwide as the MDR. MDRs have been conducted in Myanmar since 2011. Using the "road to death" concept, an action-oriented means of gathering information on how and why maternal deaths occur, can directly lead to an improvement in service delivery. It may also improve efforts to remove barriers to care. Such an undertaking raises awareness among health professionals about those avoidable factors in health facilities and in the community which, if addressed, may prevent maternal deaths in the future.

4.2 Trends of maternal death reviews, 2011-2015

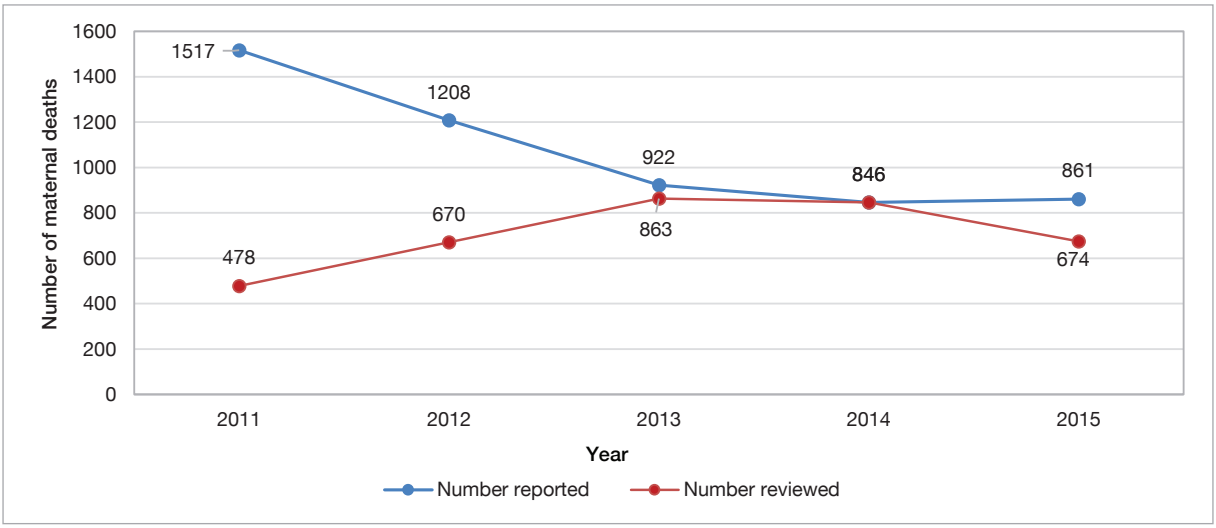
Figure 4 shows the estimated number of maternal deaths, the number reported, and the number reviewed by the MDR between 2011-2015, using data provided by the Maternal and Reproductive Health Division, under the Ministry of Health and Sports. There is clearly an excellent performance in 2013 (more than 90 per cent of reported deaths were reviewed) and more so in 2014 (all 846 deaths reported were reviewed) but less encouragingly the review rate declined in 2015.

This trend of a decline in the review rate was also observed in the MDRs of 2011 and 2012 in the MDR 2013 report.

Table 4. Trends of maternal death reviews in Myanmar, 2011-2015

	Number of maternal deaths estimated	Number reported	Number (%) reviewed
2011	2,000	1,517	478 (31.5%)
2012	2,000	1,208	670 (55.5%)
2013	1,900	922	863 (93.6%)
2014		846	846 (100%)
2015		861	674 (78.2%)

Figure 4. Trends of maternal death reviews in Myanmar, 2011-2015



There has been a consistent attempt to conduct MDRs since 2011 up until 2014. However, there has been a wide variability in the uptake and quality of the MDR process in Myanmar. The MDR process ends with the review, and further follow-up action based on the findings of the review is weak (Matthews Mathai a, 2015). In other words, the MDR does not often achieve its intent and objective, which is to uncover the causes and the circumstances surrounding maternal deaths that allow for the identification of strategies to prevent future maternal deaths due to similar causes and circumstances.

It is important to focus on the responses that follow the findings and recommendations of the MDR, and to put in place a more active surveillance system of maternal deaths. It was for this reason that the MDR transitioned into the Maternal Death Surveillance and Response (MDSR) system at the end of 2015 in Myanmar, as a component of the COIA road map, and it is expected to be implemented nationwide[7]. Therefore reports on maternal mortality after the MDSR system is introduced will incorporate significant information on response and surveillance components.

[7] At the time of writing this report, the MDSR system was introduced nationwide and was officially launched in January 2017.

Chapter 5.
Maternal mortality in 2015 – an overview

5.1 The global situation in 2015[8]

In 2015, the global maternal mortality ratio (MMR) was estimated at 216 per 100,000 live births, a decline of 44 per cent from 385 per 100,000 in 1990. In absolute terms, this translates into 532,000 maternal deaths in 1990 compared to 303,000 in 2015. Almost all of these deaths occurred in low resource settings, and most could have been prevented (WHO 2016).

Almost a quarter (23.5 per cent or 68,000) of these deaths occurred in countries in the South-East Asia Region of WHO[9]. As in previous years, the highest burden, with almost two thirds of global maternal deaths in 2015, occurred in countries in the African region (WHO, 2015). The unacceptable stark differential between developed and developing regions remained – MMR in the former in 2015 was 12 per 100,000; while in the latter it was 239 per 100,000.

Besides this unacceptable burden of maternal deaths, the reduction in the MMR did not meet the target set out in MDG 5, which was to reduce the MMR by three quarters (or 75 per cent) from 1990 to 2015; the achieved reduction was only 44 per cent. The average annual rate of reduction (AARR) was only 2.3 per cent, which fell short of the required 5.5 per cent; and this is far below the required average annual rate of reduction of at least 7.3 per cent to meet the SDG target of a MMR not higher than 70 per 100,000 live births. Attaining this ratio requires a marked acceleration in progress in this area. In the South-East Asia Region, the AARR of the MMR was particularly slow in Indonesia, the Philippines and Myanmar (Acuin CS, 2011).

Several reasons can be cited for this dismal global situation and trend. The report of the MMEIG (see footnote 8) specifically mentions in its executive summary the contribution of humanitarian settings and situations of conflict, post-conflict and disaster, as significantly hindering the progress of maternal mortality reduction. It is significant that the MMEIG report has a paragraph on the MDSR system as one the three tools[10] to improve data collection.

5.2 The situation in Myanmar in 2015

In 2015, according to the estimates made by the MMEIG, the number of maternal deaths in Myanmar was 1,700, and the MMR was 178 per 100,000 with a range of 121 to 284 (see Table 5). The trend of maternal mortality in Myanmar from 1990 to 2015 using the estimates from the same source is depicted at Figure 5. While this decline appears encouraging, the rate of decline has not been sufficient to meet the requirement to bring about a three-quarters (75 per cent) reduction in the MMR from 1990 to 2015 as called for by MDG 5, Target 5A; the rate for Myanmar was only 3.7 per cent which was below the required 5.5 per cent.

As in previous years, the MMEIG places countries in four categories in terms of progress made to achieve MDG 5, Target 5A, using a standardized criteria. Myanmar was placed in the second category of "making progress". The four categories are based on two criteria: (i) Reduction (per cent) in the MMR point estimate; and (ii) Probability (per cent) of a further MMR reduction. These categories and the

[8] Data in this section is derived from the report of the MMEIG: "Trends in Maternal Mortality: 1990 to 2015: Estimates by WHO, UNICEF, UNFPA, WB Group and UNDP".
[9] The South-East Asia Region (SEAR) of WHO consists of eleven member states – Indonesia, Sri Lanka, Thailand, Timor-Leste, Bangladesh, Bhutan, the Democratic People's Republic of Korea, India, the Maldives, Myanmar and Nepal.
[10] The other two are the Confidential Enquiry into Maternal Deaths (CEMD) and digital innovations.

number of countries in each category for 2015 are:

1. Achieved MDG 5, Target 5A (9 countries).
2. Making progress (39 countries).
3. Insufficient progress (21 countries).
4. No progress (26 countries).

For the SEAR countries, Bhutan, the Maldives and Timor-Leste are in the "Achieved" category; the countries which are "Making progress" are Bangladesh, India, Indonesia, Myanmar and Nepal; while the Democratic People's Republic of Korea, Sri Lanka and Thailand are classified as "Not available" (it should be noted that these three countries have achieved very low levels of MMRs), and the reason they were placed as not available is related to data and statistics. For countries that have achieved very low levels of MMRs (Sri Lanka and Thailand are in this category), it is difficult (if not impossible) to reduce the MMR by 75 per cent. No SEAR country is in the "Insufficient progress" or "No progress" categories.

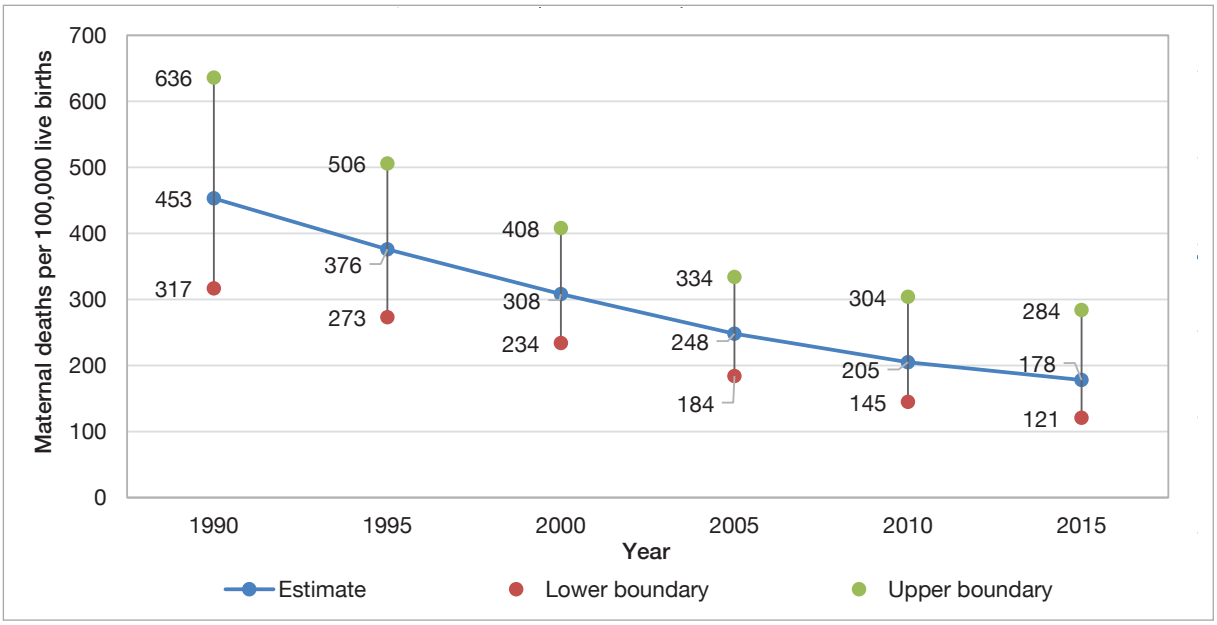
In Table 5, Myanmar, with an MMR of 178, is compared with the MMR of the South-East Asia Region (WHO SEAR classification) (MMR 110) as well as developing countries (MMR 239).

Table 5. Estimates of the MMR, number of maternal deaths, and lifetime risk, by United Nations MDG 5 in three areas, 2015

MDG Region/ Country	MMR	Range of MMR uncertainty (80% UI)		Number of maternal deaths	Lifetime risk of maternal death
		Lower estimates	Upper estimates		
South-East Asia	110	95	142	13000	380
Developing regions	239	229	275	302000	150
Myanmar	178	121	284	1 700	260

Figure 5 shows the trend of the MMR in Myanmar from 1990 to 2015. The decline is steady and is encouraging but MDG 5, Target 5A, has not been met, and the annual rate of decline is not adequate to meet this goal.

Figure 5. Trends in the MMR, Myanmar, 1990-2015



Source: United Nations: Trends in Maternal Mortality: 1990-2015.

It was mentioned in the preamble of this report that in 2014, Myanmar carried out a Population and Housing Census that incorporated questions on deaths among women (aged 15-49) in households, and if these women were pregnant or in the postpartum period at the time of their death. These were therefore pregnancy-related deaths and not maternal deaths by definition; but for all intent and purposes, this is often cited as “maternal mortality”; and with the high reliability and accuracy of the Census data compared to other sources of data, this is deemed an excellent proxy for the MMR in Myanmar. The MMR for 2014 obtained from the 2014 Census data is 282 per 100,000 live births; it should be noted that this figure lies just within the 95 per cent confidence range that was given by the MMEIG, which estimated the MMR for Myanmar at 178 per 100,000 live births, with a range of 121-284, in 2015.

From the 2014 Census thematic report on Maternal Mortality, the distribution by state/region shows a profile not different from that found in the analysis of the MDR 2015 (See Section 7.1).

Chapter 6.
Maternal death review in Myanmar 2015

6.1 Aim

As in previous years, this present review was to identify, and describe the events and circumstances surrounding maternal deaths that occurred in Myanmar in 2015; so that the findings can be used to identify strategies to reduce maternal mortality, and improve maternal health.

6.2 Objectives of the analysis of the MDR 2015

As in MDRs in previous years, there were four objectives:

1. To describe the characteristics (profile) of the maternal deaths reviewed.
2. To assess the main causes and contributing factors of maternal deaths.
3. To identify any avoidable or preventable factors that contribute to maternal deaths, both in the community and in the health system.
4. To make recommendations for remedial actions to address preventable factors.

6.1 Data sources and methodology

Essentially all data and information for a MDR report in any particular year comes from the MDR reports generated at all levels of the MDR system – from the site where the death occurred (health facility or community) which is then notified to different levels where the review/audit is carried out according to the technical guidelines. The MDR system obtains notification of a maternal death from various sources, mainly from the vital/civil registration system (which does not have full coverage), as well as direct reports from a health facility where the death occurred (this often supplements the vital/civil registration system but in general is still incomplete). The problems related to obtaining data for measuring the MMR have been mentioned in Section 3.2.

In the MDR, the death notification or report received is subjected to methods of a maternal death review. The WHO guidelines: "Beyond the numbers: reviewing maternal deaths and complications to make pregnancy safer" provides guidance on the different methods[11] for the review of maternal deaths and morbidity. In Myanmar, the MDR uses two of these five methods; a facility-based maternal death review and a verbal autopsy in the community. It is often the case that a facility-based investigation is followed by a verbal autopsy when a family member of the deceased woman needs to be interviewed to obtain more detailed information on the circumstances surrounding the maternal death.

> **Community-based maternal death reviews (verbal autopsies):** This is a method to establish the medical causes of death and ascertain the personal, family or community factors that may have contributed to the deaths of women who died outside of a medical facility. The verbal autopsy identifies the death that occurred in the community and consists of interviewing people who are knowledgeable about the events leading up to the death, such as family members, neighbours and traditional birth attendants. It may also be used to identify contributing factors in the community for deaths that occur at a health facility.

[11] This guideline describes five methods for conducting a maternal death review or audit: (i) A community-based maternal death review by verbal autopsy; (ii) A facility-based maternal death audit/review; (iii) A Confidential Enquiry into Maternal Deaths; (iv) Clinical audits; and (v) Audits of severe maternal morbidity or near-miss cases.

Facility-based maternal death reviews: This is a qualitative, in-depth investigation of the causes of, and circumstances surrounding maternal deaths, occurring at health facilities. Deaths are initially investigated at the facility level, but where possible, these reviews are also concerned with identifying a combination of factors at the facility and in the community that contributed to the death, as well as which factors were avoidable.

Verbal informed consent is obtained from the respondent after explaining the purpose of the investigation, which is to identify the basic problems in the local context, and to design an action plan for the prevention of maternal deaths in the future.

The findings from the maternal death review are relayed to the various levels of the health system and finally reach the MRH Division, Department of Public Health. It is the data collected by the MRH Division that is analysed in this report, to produce a profile of maternal deaths that occurred in 2015.

Chapter 7.
Profile of maternal deaths in Myanmar, 2015

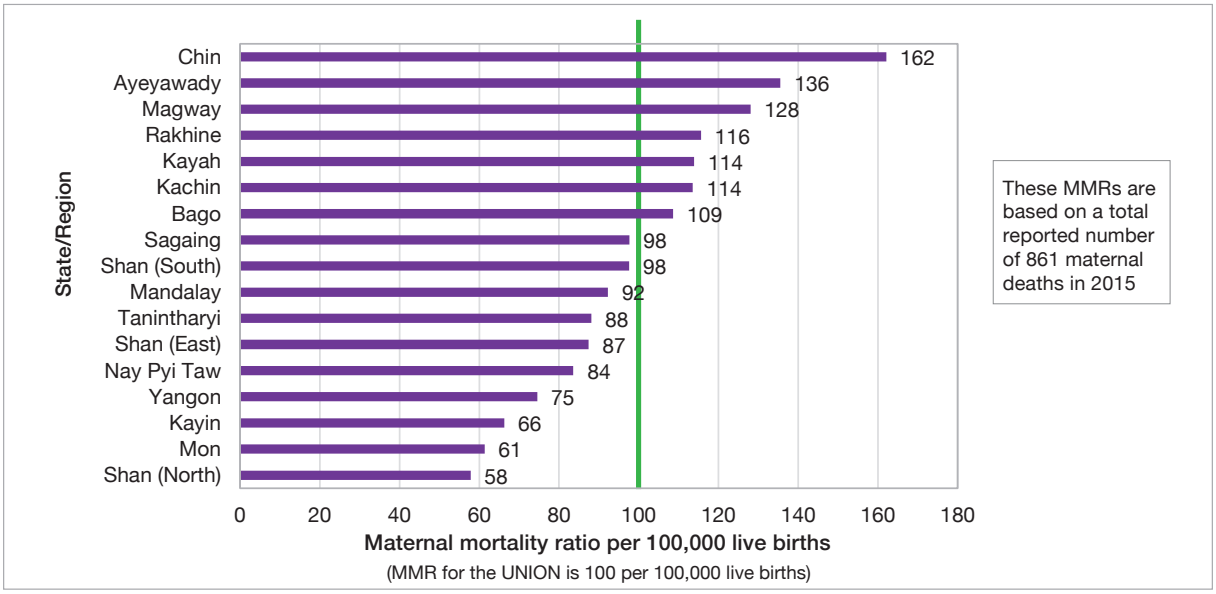
In the following sub-sections, observations are made for each of the variables/parameters analysed, and where appropriate these observations are accompanied by some inferences. These inferences may be repeated or further elaborated in Chapter 8. Although the variables in this profile may be able to predict or suggest risks that contribute to maternal deaths, at the outset, it is useful for the reader to take note of a basic principle or axiomatic expression which was mentioned earlier and which will be elaborated in Chapter 8: "There is no such thing as a no-risk pregnancy".Although this may be the case, the profile obtained from the MDR can still give an idea of what risk factors contribute to maternal deaths, and this knowledge can be used to develop preventive measures.

7.1 The maternal mortality ratio in different states and regions

Maternal mortality measures were obtained from maternal deaths reported to the MRH Division from all 17 states and regions in 2015. Data was collected on the number of deaths, and from this the MMR was computed using the number of live births (obtained from the Central Statistical Organization) as the denominator. As expected, states/regions with larger populations have greater numbers of maternal deaths. The MMR, however, shows a wide variation among states and regions. Both the absolute number of deaths and the MMR are shown at Table 7.1 below. These maternal deaths and MMR figures are depicted graphically at Figure 7.1 and Figure 7.2 respectively, in descending order. In absolute numbers, the highest number of maternal deaths were reported in Ayeyawady, Mandalay, Bago and Sagaing (Figure 7.2). This profile is comparable to the previous three years - 2012, 2013 and 2014.

As in previous years, the states/regions reporting the highest MMR exceeding the Union average of 100 per 100,000 live births[12] are Chin, Ayeyawady, Magway, Rakhine, Kayah, Kachin and Bago. The ranking in 2013 was Magway, Ayeyawady, Chin, Shan South, Yangon, Bago, and Kachin which exceeded the Union MMR of 103 per 100,000. Sagaing and Rakhine at that time had a MMR which was less than this Union average but slightly higher than 100 per 100,000 live births.

Figure 7.1 Maternal mortality ratio by state and region, MDR 2015

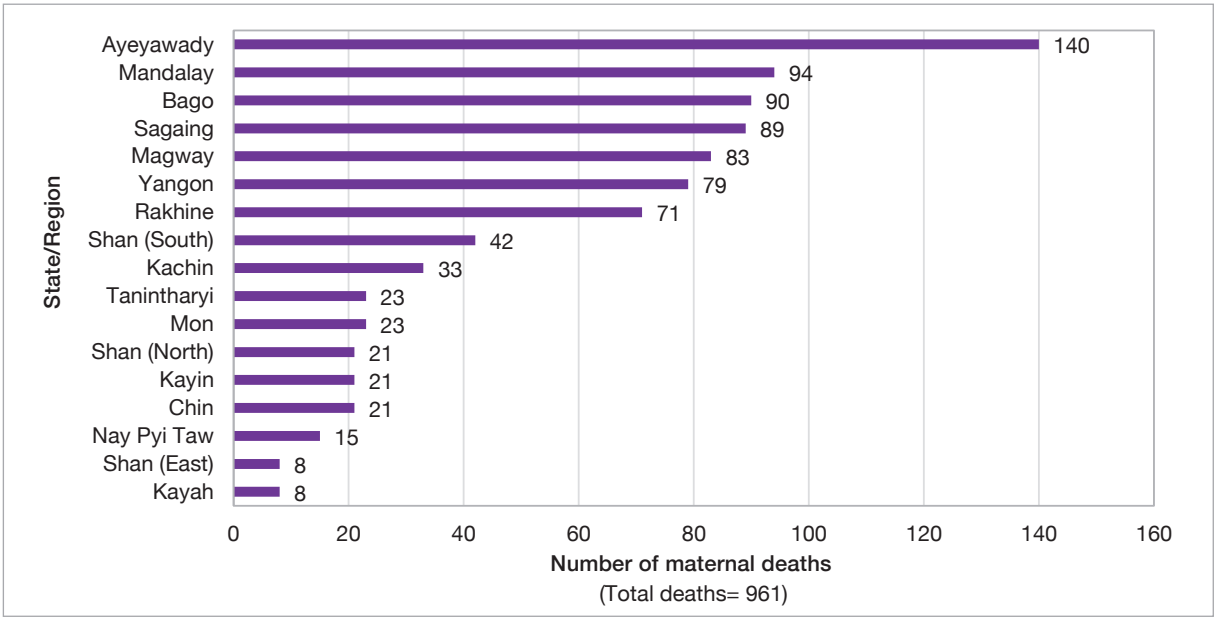


[12] Note that this MMR of 100 per 100,000 live births for Myanmar is much lower than the MMR estimated by the MMEIG which is 178 per 100,000 live births.

Table 7.1 Reported number of maternal deaths by state and region, MDR 2015

2015 reported data				
Sr. No	State/Region	Reported No. of live births	Reported No. of maternal deaths	MMR
	Union	**862048**	**861**	**100**
1.	Ayeyawady	103288	140	136
2.	Bago	82846	90	109
3.	Chin	12956	21	162
4.	Kachin	29069	33	114
5.	Kayah	7025	8	114
6.	Kayin	31695	21	66
7.	Magway	64810	83	128
8.	Mandalay	101855	94	92
9.	Mon	37501	23	61
10.	Nay Pyi Taw	17948	15	84
11.	Rakhine	61398	71	116
12.	Sagaing	91110	89	98
13.	Shan (East)	9152	8	87
14.	Shan (North)	36294	21	58
15.	Shan (South)	43034	42	98
16.	Tanintharyi	26107	23	88
17.	Yangon	105960	79	75

Figure 7.2 Number of maternal deaths by state and region, MDR 2015



As mentioned earlier, the MMR was captured in the 2014 Myanmar and Population Census, and the figure recorded was 282 per 100,000 live births. The distribution by state/region is shown below, and it is noted that the profile is not dissimilar from the MDR findings in previous years, with Chin, Ayeyawady and Magway consistently reporting the highest MMRs.

Table 7.2 The five states/regions with the highest maternal mortality ratio, 2014 Census

State/Region	MMR in Census	Ranking in MDR 2015
Chin	357	1
Ayeyawady	354	2
Magway	344	3
Bago	316	7
Rakhine	314	4

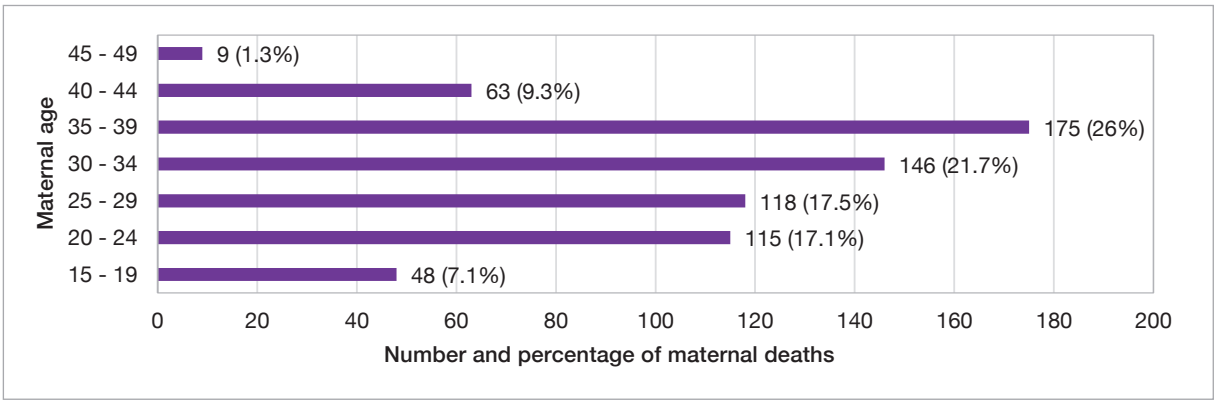
7.2 Socio-demographic characteristics of deceased women

The variables that are relevant to the risk of maternal death are maternal age, and the education and occupation of the deceased woman. The last two variables are proxy measures of the economic status of the woman (and poverty is known to be a very strong determinant of maternal mortality).

7.2.1 Age

The distribution of maternal deaths by age-group as shown at Figure 7.3 does not provide much detail in terms of the relative risk of maternal death for each of the age groups, because these are proportions (percentages) and not age-specific mortality rates, which require the number of live births in each of these age groups. Notwithstanding this, the highest number of deaths occur among women aged 30 to 39 years. It is noteworthy that teenage pregnancies accounted for 48 deaths (7.12 per cent of the total maternal deaths in 2015). Mothers aged 40 years and over contributed to 10.6 per cent of maternal deaths. Although these are proportions and not rates or ratios, it can still be considered as a demonstration of the well-documented relationship between maternal age and maternal mortality, which should be an important consideration for pregnancy risk management.

Figure 7.3 Distribution of maternal deaths by age group, MDR 2015



7.2.2 Education and occupation

Most of the women who died were of low education. More than half of the women (53.1 per cent) had received primary education and 13.9 per cent were illiterate. Nearly one fourth of them (24.2 per cent) had a higher level of education; secondary education and above. Only a few (3.4 per cent) had completed university (Figure 7.4).

Regarding the occupation of the deceased women, more than half of them were housewives (53 per cent); followed by farmers (22.6 per cent); manual labourers (14.2 per cent); and vendors (5.9 per cent) (Figure 7.5). As mentioned earlier, these two measures by themselves are quite limited in their usefulness. An assessment of economic status requires other information such as household income

which would include the deceased woman's and her husband's income. It is to be noted that as in age distribution, these proportions do not adequately depict the risk of maternal death because the appropriate denominator for the population at risk is not available.

Figure 7.4 Distribution of maternal deaths by education, MDR 2015

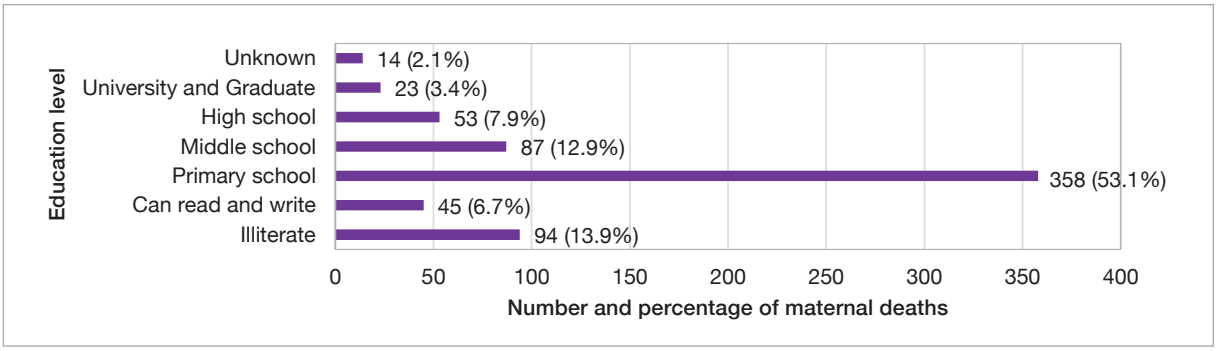
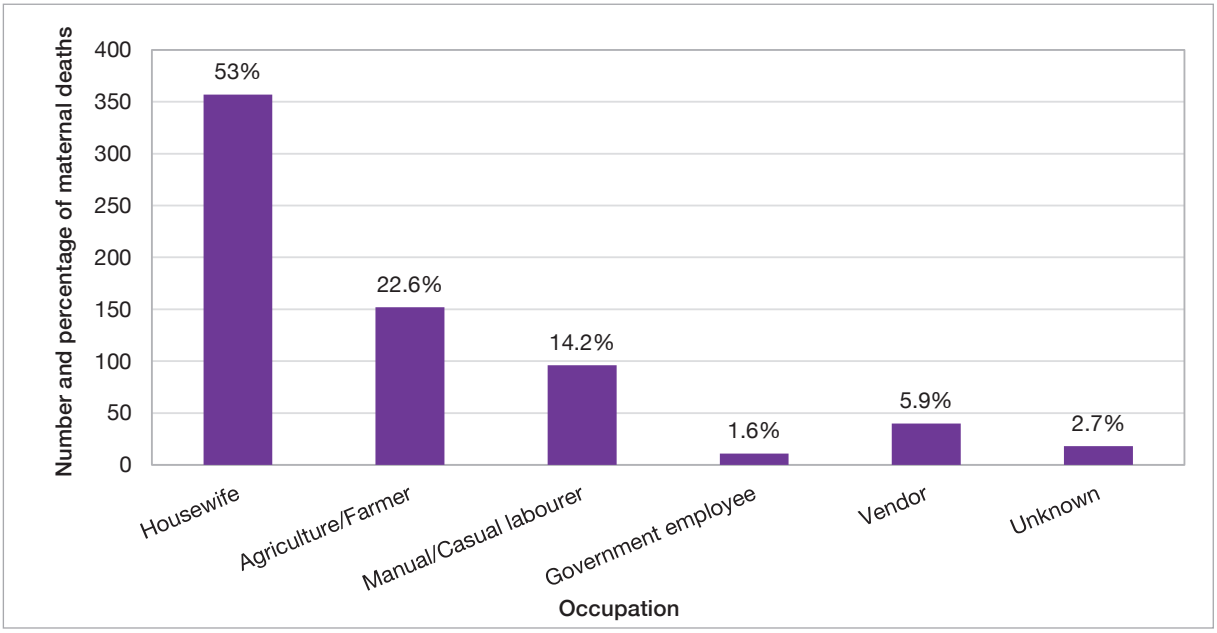


Figure 7.5 Distribution of maternal deaths by occupation, MDR 2015



7.3 Obstetric characteristics of the deceased women

The relevant variables are gravida/parity; antenatal care (ANC) (measured by the number of ANC visits); protection from tetanus by vaccination; the health care provider who first attended to the woman and who attended to her before her death; and the stage of pregnancy/parturition/puerperium.

7.3.1 Parity

Primigravida (gravida 1) and grand multigravida (gravida 5 and above) are at higher risk of maternal death than the category of 2 to 5 gravida. In this analysis the highest maternal mortality (as a percentage distribution, not as a rate) is seen in multigravida (42.4 per cent), see Figure 7.6. This is consistent with global trends in maternal mortality as most women are pregnant two to four times. (WHO, 2015).

Figure 7.6 Distribution of maternal deaths by gravida, MDR 2015

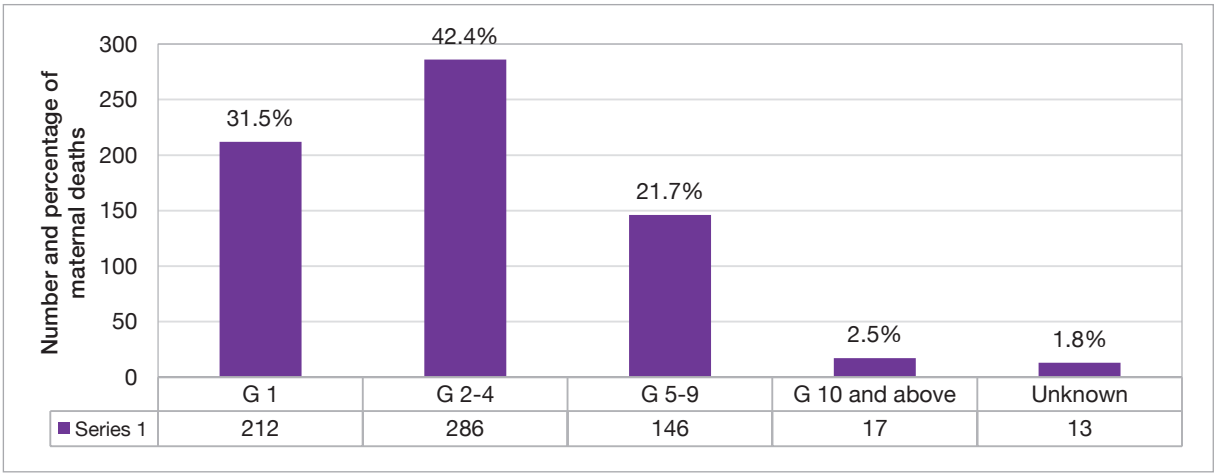
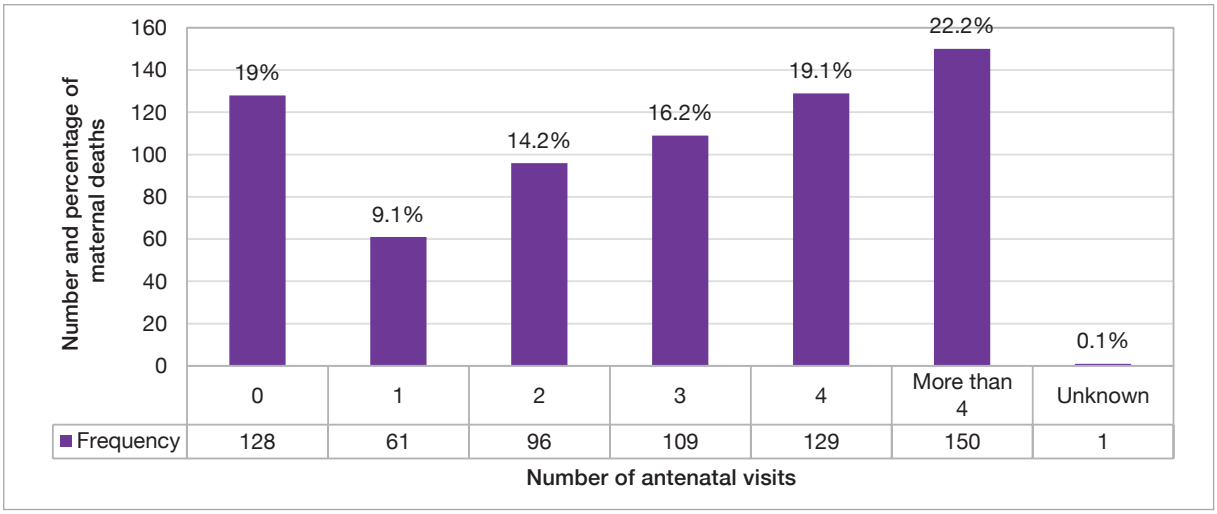


Figure 7.7 Distribution of maternal deaths by number of antenatal visits, MDR 2015



7.3.2 Antenatal care

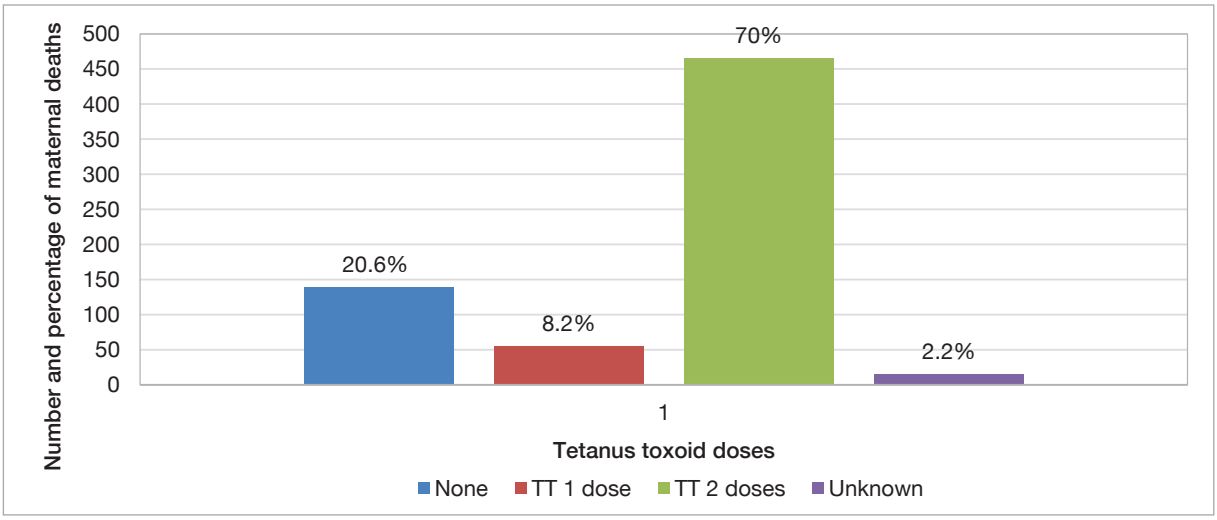
In the MDR, antenatal care is assessed by the number of antenatal visits that the deceased woman made. The standard used is prescribed by MDG 5, now SDG 3, of at least one and at least four visits[13]. Nineteen per cent of the deceased women made at least four antenatal visits and 22.2 per cent made more than four antenatal visits. One to three antenatal visits were made by 40 per cent of the women who died. Only 19 per cent of the deceased women made no antenatal visits at all (Figure 7.7). An inference can be made here - although these women made regular antenatal visits, they were not aware of the complications during delivery as well as in the postnatal period. Therefore, it is observed that the correlation between the number of antenatal visits and the risk of maternal death has to be explored in further studies to obtain a more qualitative aspect in the next review.

7.3.3 Tetanus toxoid immunization

It is observed that as many as 70 per cent of deceased women received two doses of the tetanus toxoid (TT) immunization; 8.2 per cent received one dose of TT; and only about one fifth of deceased women did not receive any TT immunization at all (Figure 7.8). This lack of association between receiving the TT immunization and maternal death is not unexpected and is not paradoxical, because the TT immunization is intended to prevent tetanus neonatorum.

[13] This standard has undergone a recent review, which will be discussed in Chapter 8 of this report.

Figure 7.8 Distribution of maternal deaths by number of tetanus toxoid doses, MDR 2015



7.3.4 First health care provider

There are various types of health care providers who provide first care to the deceased woman. Figure 7.9 shows the distribution of maternal deaths by the first provider of care. There were 209 women (31 per cent) who received first care from a doctor, of whom six (2.87 per cent) were obstetricians. Almost 150 (22.26 per cent) of deceased women were provided first care by midwives or lady health visitors (LHVs); 135 women were provided first health care by midwives and 11 by LHVs, who along with doctors are deemed to be skilled birth attendants (SBAs). This means that as many as 52 per cent of the deceased women had a SBA as their first health care provider. Traditional birth attendants (TBAs) were the first health care provider for 156 women (23.15 per cent) (Figure 7.9).

7.3.5 Health care provider before death

The distribution of deaths by health care provider before death (Figure 7.10) were doctors (384 or 56.97 per cent) and midwives (74 or 10.98 per cent), or skilled birth attendants. This finding is not unexpected; women with severe complications during pregnancy and childbirth are those who are referred to higher levels of professional care, including hospital care. The remaining number of deceased women were provided care before death by unskilled traditional birth attendants (5 or 8.61 per cent) and family members (94 or 13.95 per cent) (Figure 7.10).

Figure 7.9 Distribution of maternal deaths by type of first health care provider, MDR 2015

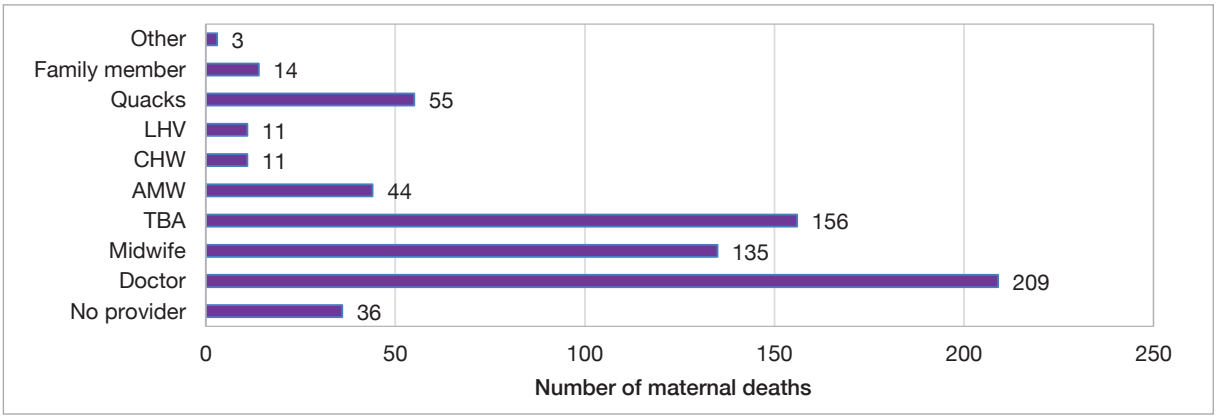
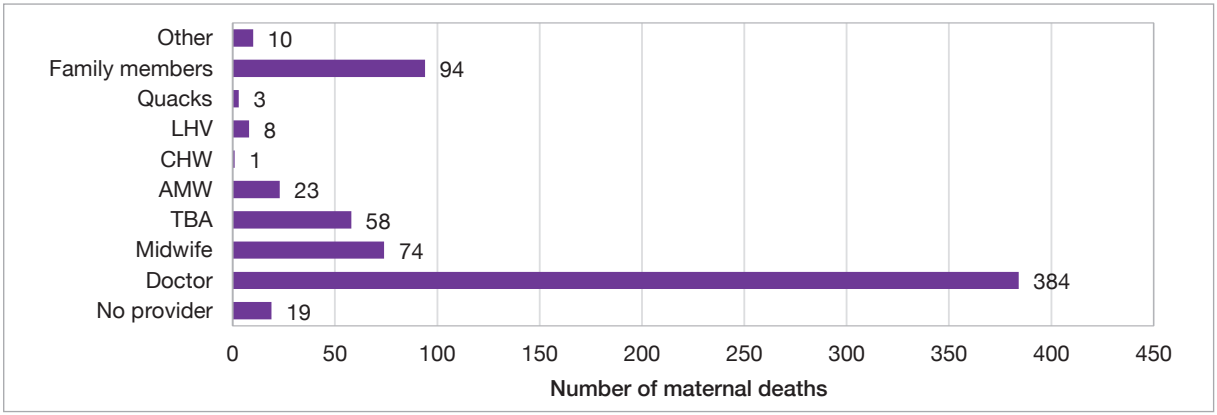


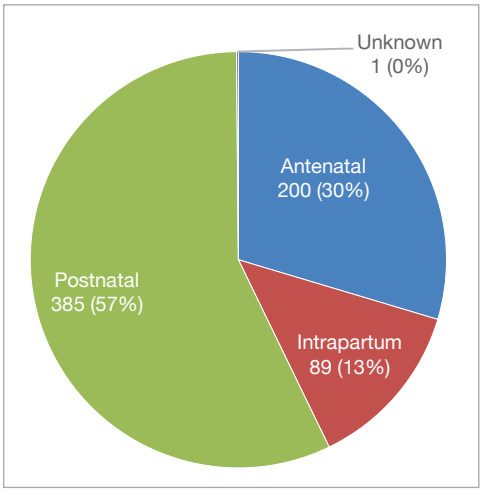
Figure 7.10 Distribution of maternal deaths by type of health care provider before death, MDR 2015



7.3.6 Stage of pregnancy/parturition/puerperium

More than half (57 per cent) of maternal deaths occurred in the postnatal period, while deaths in the antenatal period accounted for 30 per cent of maternal deaths and intrapartum deaths for 13 per cent. This reflects the cause of death (to be described later) and it underscores the importance of postpartum interventions to prevent such deaths (Figure 7.11).

Figure 7.11 Distribution of maternal deaths by stage of pregnancy, MDR 2015



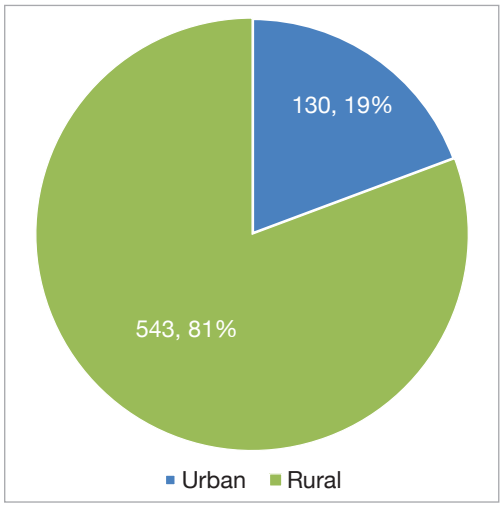
7.4 Geographic characteristics

The risk of maternal death is linked to urban-rural residence (not as an independent variable, but as an indicator of other contributing factors such as wealth and ease of access to services). The place where death occurs is relevant for the same reason, as is the distance to, and time needed to reach the nearest health facility. Unfortunately as in the 2013 MDR report, the variable for place of delivery (for intrapartum and postpartum deaths) was not captured in the MDR of 2015.

7.4.1 Residence

More than three quarters (81 per cent) of deceased women resided in rural areas, which probably is a reflection of the general population (Figure 7.12). This finding is consistent with the profile of maternal deaths each year. It is relevant to note that the total fertility rate (TFR) is also higher in rural areas than in urban areas. Like the other parameters, this requires further analyses in order to establish access to health facilities and to compare the risk of maternal death by using rates instead of proportions.

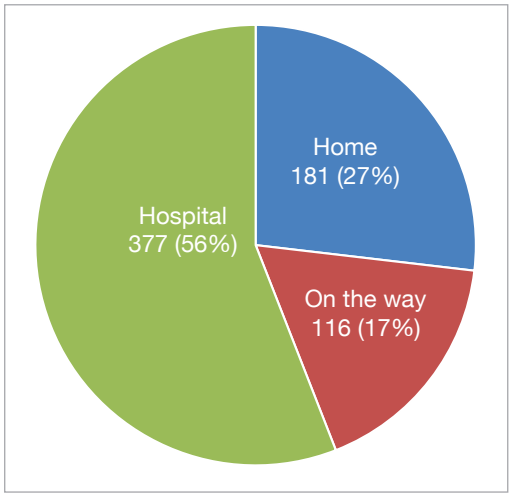
Figure 7.12 Distribution of maternal deaths by residence, MDR 2015



7.4.2 Place of death

Figure 7.13 shows the place of maternal death, which may be at home; on the way to health facilities or hospitals; or at health facilities, including hospitals. More than half of the deceased women (56 per cent) died at hospital, while 27 per cent died at home and only 17 per cent died on their way to a health facility. Again the interpretation of this finding should be linked with the severity of the condition or complication that needed facility/hospital care and the higher risk of death in such cases.

Figure 7.13 Distribution of maternal deaths by place of death, MDR 2015



7.4.3 Distance, and time needed to travel from residence to health facility

These are proxy indicators for accessibility to services, especially for basic emergency obstetric care (BEmOC) and comprehensive emergency obstetric care (CEmOC). In Table 7.3, two types of health facilities are shown; the nearest health centre (urban health centre/rural health centre/sub-rural health centre (UHC/RHC/SC)) and the nearest hospital. This review suffers from a large number of missing values. With the available data and notwithstanding the missing values, it can be seen that the majority of the deceased women (76 per cent) lived within five miles of a health centre (UHC/ RHC/SC). Of these 76 per cent, 17.4 per cent lived within one mile of a health centre. Only 23.4 per cent lived more than five miles from a health centre. Most of the deceased women (70.6 per cent) could reach the health centre within one hour. More than one fourth of the deceased women (26.7 per cent) took one to three hours to reach the nearest health centre, and only 1.9 per cent took more than three hours to reach the nearest health centre (UHC/RHC/SC).

Table 7.3 Distribution of maternal deaths by accessibility to emergency obstetric care (health facility and hospital), MDR 2015

	Frequency	%	Valid %	Cumulative %
Nearest Health Centre				
0 - <1 mile	117	17.4	17.4	17.4
1- <5 miles	395	58.6	58.6	76.0
≥ 5 miles	158	23.4	23.4	99.4
Unknown	4	.6	.6	100.0
Total	674	100.0	100.0	100.0
Duration (hours) to reach nearest health centre				
<1 hour	476	70.6	70.6	70.6
1 to 3 hours	180	26.7	26.7	97.3
>3 hours	13	1.9	1.9	99.3
Unknown	5	.7	.7	100.0
Total	674	100.0	100.0	100.0
Nearest Hospital				
0 - <1 mile	90	13.4	13.4	13.4
1- <5 miles	203	30.1	30.1	43.5
≥ 5 miles	378	56.1	56.1	99.6
Unknown	3	.4	.4	100.0
Total	674	100.0	100.0	100.0
Duration (hours) to reach Hospital				
<1 hour	426	63.2	63.2	63.2
1 to 3 hours	199	29.5	29.5	92.7
>3 hours	31	4.6	4.6	97.3
Unknown	18	2.7	2.7	100.0
Total	674	100.0	100.0	100.0

7.5 Types of delay to seek care

The seeking of care, and seeking care in a timely manner obviously significantly determines whether a woman survives or dies due to a complication during pregnancy and childbirth. Indeed access to emergency obstetric care (EmOC) - both basic (BEmOC) and comprehensive (CEmOC) - is a critical determinant for maternal survival. Hence the importance of profiling maternal deaths by the delay experienced using the Three Delays Model developed by Thaddeus and Maine. Analysis was carried out to identify these three well-known delays. The first delay is the failure to recognize: the mother, the family and the deceased woman's immediate community are not aware of the need to seek care, either out of a lack of awareness or out of unwillingness; the second delay is the failure to reach care: most often due to geographical and financial barriers, such as transport, distance and cost; the third delay is the failure to respond: this occurs when a health facility provides poor quality care because it is understaffed, underequipped or not able to provide adequate care.

It was found that more than half (54 per cent) of the deceased women did not seek care on time because either the woman or her family members were not aware of the need to seek care or were unwilling to seek care (first delay). Notably a very small proportion of deceased women (only 3 per cent) did not seek care because of the second delay: the woman wanted to seek care but was unable to

do so due to barriers; the most common barriers are remoteness and/or difficulty in getting transport, with or without accompanying financial barriers. A similar proportion (3 per cent) experienced the third delay: these are women who had no barriers to reach the point of care but did not receive the needed intervention or treatment.

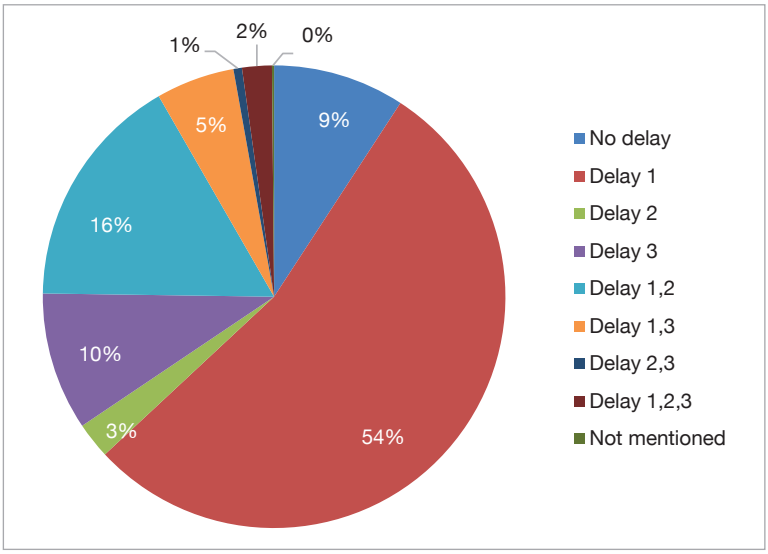
There are also reports of a combination of delays.

- There were 16 per cent of deceased women who experienced a combination of the first and second delay. These women were not aware that they needed to seek care, or did not want to seek care, and at the same time they had problems in seeking care - this situation is conceptually difficult to understand.
- Five per cent of deceased women experienced a combination of the first and third delay. They were not aware or did not want to seek care, yet when they did reach the point of care they did not receive the needed intervention or treatment. This is another conceptually difficult situation to understand.
- Between 2 to 3 per cent of deceased women were reported to have experienced all three delays. They were not aware of the need to seek care, experienced barriers to accessing care, and did not receive the necessary care when they reached the point of care.

Without any further details, it is not possible to understand these seemingly irreconcilable situations. However, regardless of this conceptual difficulty, the findings can be used to make the inference that all three delays existed to a varying extent, and therefore steps need to be taken to reduce or eliminate the delays.

These same issues were encountered during the 2013 MDR analysis which posed conceptual difficulties in making inferences and interpretations. The 2013 MDR report only described the profile and highlighted the difficulty in understanding the profile and in making interpretations. For this current report, an attempt is made to interpret this profile, which is discussed in Chapter 8.

Figure 7.14 Distribution of maternal deaths by type of delay, MDR 2015



7.6 Causes of maternal deaths

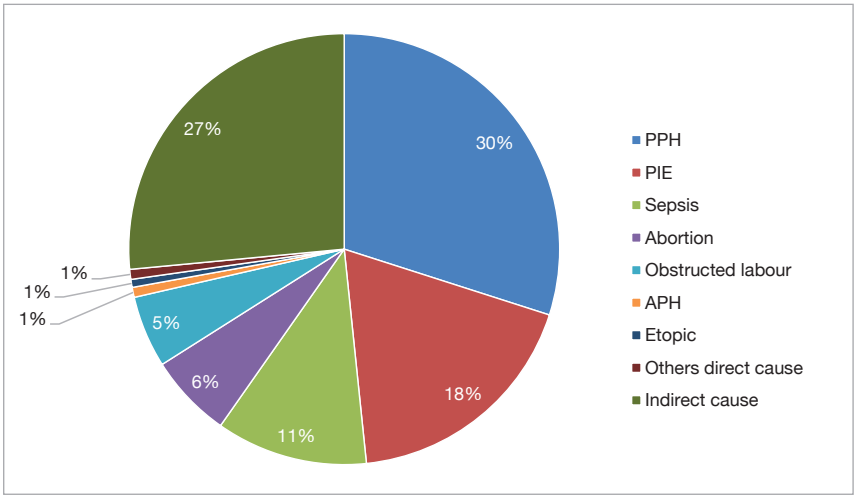
All but six of the total deaths (674) that were reviewed had an identified cause of death assigned to them. Table 7.14 and Figure 7.15 show the distribution of these 668 deaths by cause. It can be seen

that direct maternal causes accounted for 74 per cent of all maternal deaths; and out of these, the leading causes were similar to those in previous years with PPH being the leading cause (30 per cent); followed by PIH (18 per cent); sepsis (11 per cent); and abortions (6 per cent). Indirect causes accounted for 26 per cent of maternal deaths.

Table 7.4 Distribution of maternal deaths by all causes of death, MDR 2015

Causes of maternal deaths	Number	%
PPH	200	30%
PIH	123	18%
Sepsis	76	11%
Abortions	42	6%
Obstructed labour	36	5%
APH	5	1%
Ectopic	4	1%
Other direct causes	5	1%
Indirect causes	177	26%
Total	**668**	

Figure 7.15 Distribution of maternal deaths by all causes of death, MDR 2015



Chapter 8.
Discussion

Since its introduction as a pilot in 2003 and its gradual scaling-up to reach nationwide implementation, the MDR system in Myanmar has progressed, and continues to progress well, with the commitment and leadership of the Ministry of Health and Sports (MoHS). This is especially the case since 2013 when the road map for the Commission on Information and Accountability (COIA) was developed in which the Maternal Death Surveillance and Response (MDSR) (an extension of the MDR) is one of the seven priority areas of the COIA road map.

The analysis shows an encouraging trend in the number and percentages of reported maternal deaths that undergo review by the MDR system, with especially impressive review rates exceeding 90 per cent in 2013, and an even more impressive review rate of 100 per cent in 2014; however this declined to 78 per cent in 2015. There is insufficient information to explain the possible reasons for this trend. One plausible hypothesis could be the extra emphasis and attention given to the MDR as part of the COIA road map in 2013, accompanied by a strong political commitment, which served as an impetus for the MDR to be conducted with rigour. Like many initiatives, such initial rigorous efforts tend to decline with the passage of time, which might explain why the review rate in 2015 declined. It will be interesting to see what will happen from 2016 onwards, especially after 2017, when the MDSR system is implemented.

In terms of identifying the sources for obtaining the number of maternal deaths for the estimation of maternal mortality, especially in the context of tracking progress towards the achievement of MDG 5, Myanmar has made steady progress, especially in implementing the recommendations made in the COIA road map to improve the CRVS. However, there is insufficient evidence to suggest that significant progress has been made in this area. Myanmar made great strides recently with the implementation of the Population and Housing Census in 2014 (which captured maternal mortality) and the Demographic and Health Survey in 2015. However the reports from these two impressive initiatives were not available when the analysis of the MDR 2015 was conducted.

In terms of the trends of the MMR, the figure obtained from the MMEIG (178 per 100,000 live births) shows an improvement since 1990. But Myanmar has not achieved MDG 5, Target 5A of a 75 per cent reduction in the MMR from 1990 to 2015, and its average annual rate of reduction of 3.7 per cent was lower than the required 5.5 per cent. As in previous years, in 2015, Myanmar was placed in the category of countries that are “Making progress” in achieving MDG 5, Target 5A. While this is encouraging, efforts need to be further strengthened to ensure that the target will be met - although with the introduction of the Sustainable Development Goals (SDGs) that have replaced the MDGs, the target has now moved and the challenge is even greater. The implications for Myanmar to achieve a MMR of not more than 70 per 100,000 live births (as set out in SDG 3) are daunting, but with enhanced efforts, progress can be accelerated. The MDSR system, which has replaced the MDR, is one of the inputs that will contribute to this acceleration. Therefore it cannot be over-emphasized that a careful analysis of the MDR findings of 2015 and the preparation of a meaningful comprehensive report are a crucial component in these efforts. The next reports - 2016 and 2017 - are expected to enrich the accuracy of MMR estimates together with the data from the Population and Housing Census, 2014 and the Demographic and Health Survey, 2015. In addition, with the MDSR taking over from the MDR, the understanding of the causes of maternal deaths will also be enhanced.

The profile of maternal deaths by various variables described in Chapter 7 above should, in theory, at

least be able to assess the risk of maternal death, and should allow for the identification of measures that can prevent future maternal deaths. However this is not necessarily the case due to two issues.

(i) The problem with the MDR itself, especially the verbal autopsy form, is that the number of variables captured in the MDR forms is inadequate (several important variables are not captured); and even for the variables captured, there are no denominators to enable the calculation of rates or risk.
(ii) Even if rates can be calculated to assess the risk of maternal death, the prediction of risk that leads to a maternal death is underscored by a harsh reality, which is expressed in the axiomatic expression: "There is no such thing as a no-risk pregnancy". All pregnancies face the possibility of complications which can emerge at the pregnancy/parturition/puerperium stages[14].

While the MDGs and SDGs focus on national averages for MMRs, it has to be noted that subnational figures and trends are equally important. A review of the maternal deaths in 2015 shows that the profile by state and region has not changed over the years, with three states and regions registering the highest MMRs – Chin, Ayeyawady, and Magway; closely followed by Rakhine, Kayah and Kachin. The lowest MMRs were observed in Shan (North), Mon and Kayin. As in previous years this variable (state/region) is the only variable with an available denominator that allows for the computation of state/region-specific MMRs, because the number of live births by state/region is easily available. The same analysis cannot be conducted for the other variables captured in the MDR. Even if they could be, there is still the problem of the possibility of underreporting of maternal deaths, and if the denominator (number of live births) does not suffer from a similar underreporting, the MMRs derived are underestimations of the real situation. This problem is not unique to Myanmar, almost all countries in the world, including some developed countries, suffer from the underreporting of maternal deaths[15].

Of the socio-demographic variables associated with maternal health, survival and death, the most important are age and socioeconomic status. Age is captured adequately in the MDR with appropriate age groupings. The influence of age on maternal mortality is so well-known that it is not necessary to discuss it further here. Suffice it to say that the findings show a fairly large number of teenage pregnancies that end in maternal deaths. As in previous years, the interpretation of the age distribution is limited, in the absence of denominators to allow for the calculation of a rate or ratio as a valid measure of risk. However, the percentage distribution of maternal deaths by age groups can still offer some insight into the overall picture, and enable the formulation of strategies.

Another socio-demographic variable that can be useful (but may be less useful in the Myanmar context) is marital status. This observation was made in the 2013 MDR report in which the author suggested that an unmarried mother in Myanmar may face less stigmatization compared to other countries and cultures, such as India and Pakistan, where a woman's unmarried status is likely to increase her risk of maternal death. It would be useful to determine whether teenage mothers who died due to maternal causes were married, because this finding has implications for recommended strategies and interventions. It may also reveal trends over the years.

The socioeconomic status of women is not adequately reflected in the data available. The information captured is only on the education and occupation of the deceased women. As stated in the 2013 MDR report, it would be useful if additional data were collected on other variables to measure socioeconomic

[14] It is this principle that has made WHO not recommend the "high-risk approach" which was introduced in the early 1970s. However, Malaysia opts to continue to use this approach, and records of all pregnant women are tagged with a colour code to indicate their level of risk.
[15] So serious and so real is this problem of the underreporting of maternal deaths that the MMEIG applies an adjustment factor for each country to the MMR derived from various sources which is subjected to estimation methodologies.

status, such as the occupation of the deceased woman's husband and the household's income. For example, it is possible for an illiterate uneducated woman to be wealthy because her husband may have high earnings, or she herself may have had undeclared informal income such as rental income from a property. Conversely a highly educated woman may not have an income-generating occupation.

The number and percentage of maternal deaths in the socio-demographic groups did not show any significant differences over the years, and this persistent feature suggests that there is no significant change in the inequality gaps over this period of time.

Of the obstetric characteristics of the women who died in 2015 in Myanmar, again there are no observable differences from the profile of previous years. The percentage distribution has remained the same for gravida/parity; number of ANC visits; and ATT immunizations (although this last variable has no direct association with maternal mortality). The other two characteristics under this category, the first health care provider and the attendant before death, have also not shown any significant change. The percentage of deceased women who had a doctor (including obstetricians) as the first health care provider was not insignificant – almost a third or 31 per cent; and when the percentages for midwives and lady health visitors are added, they contribute another 22 per cent. This means that as many as 53 per cent of the deceased women had a SBA[16] as their first health care provider. Traditional birth attendants, who are unskilled birth attendants, were the first health care provider for 156 of the deceased women (23.15 per cent) (Figure 7.9). It can be inferred that this high percentage of SBAs as first health care providers does not suggest a lower risk of the occurrence of a maternal death. Many things can happen from the first time a woman is seen by a doctor or SBA to the time that she dies.

As to the health care provider just before death, again the profile is very similar to previous years. Doctors were the health care providers for 57 per cent of deceased women prior to death and midwives for 11 per cent – meaning that 68 per cent of deceased women had a SBA as a health care provider before their death. As observed in the MDR report 2013, this finding is not unexpected; it is women with severe complications during pregnancy and childbirth who are referred to higher levels of professional care including hospitals with doctors.

Another obstetric characteristic is parity, with the well-known fact that the highest risk of maternal deaths are in primigravida and muti-gravida, especially grand multi-gravida who have had five or more previous pregnancies. This essentially means that only gravida 2 to 5 are considered as "low-risk". There is nothing significant in these findings; 42 per cent of maternal deaths were among multigravida, and one third were among primigravida. This is a reflection of the profile of pregnant women generally. In spite of the overall policy not to tag mothers according to their risk level (based on the axiomatic principle of "no pregnancy is risk-free") in many maternal health programmes, mothers who are primigravida and grand multigravida (more than five) are classified and followed up as "high risk" mothers. For instance, this is done in Malaysia - see footnote 14.

The number of antenatal visits can be used to gauge the risk of complications, but there are several caveats to make this a meaningful statement. The optimal number of antenatal visits is something that is often debated, raising the frequently asked question "how many is too many, how few is too few?" Universally, and in the indicators for MDG 5 (now SDG 3), the coverage for at least one and at least four ANC visits still apply. It is noteworthy that WHO in its latest guidelines on antenatal care has revised this recommendation to at least eight antenatal visits. This is contained in the WHO recommendations on antenatal care for a positive pregnancy experience, 2016. The revised recommendation is that: "A minimum of eight contacts are recommended to reduce perinatal mortality and improve women's

[16] In some countries, a debate is sometimes raised as to whether it is correct to recognize all doctors as SBAs; the argument being that there are doctors who lack midwifery competencies.

experience of care." This recommendation is significant in two aspects: that it is antenatal "contacts" and not "visits"; and that it emphasizes the woman's "experience" of care. Both of these have implications of the quality of antenatal care, and not just the number of visits. This recommendation is further elaborated to cover the schedule as follows:

Contact 1: First trimester, up to 12 weeks
Contact 2: Second trimester, 20 weeks
Contact 3: Second trimester, 26 weeks
Contact 4: Third trimester, 30 weeks
Contact 5: Third trimester, 34 weeks
Contact 6: Third trimester, 36 weeks
Contact 7: Third Trimester, 38 weeks
Contact 8: Third Trimester 40 weeks.

Needless to say, these guidelines will have implications for SDG 3 targets since the number of antenatal visits (one and four visits) is one of the indicators for SDG 3.

The same seemingly paradoxical relationship seen in 2013 is again visible in 2015.A higher proportion of mothers (80 per cent) who died had made antenatal visits (of varying frequency), and only 19 per cent of deceased women did not make any ANC visits at all. The differential in 2013 was less marked; the percentage of deceased women who made ANC visits was 35 per cent (compared to 80 per cent in 2015) and 15 per cent did not make any ANC visits at all. This apparent paradox can be explained from two viewpoints: (i) mothers who had more risk factors and complications (and were therefore more likely to be at risk of a maternal death) were more likely to make more visits, while low risk mothers (likely to survive) did not find it necessary to make many visits; and (ii) the number of visits does not sufficiently measure the care given. There have been numerous studies to show that antenatal visits are often of inadequate quality.

The majority of deceased women (70 per cent) received two doses of tetanus toxoid immunization. As mentioned earlier, this has little, if any, bearing on maternal death, because the toxoid is intended to prevent neonatal tetanus and not maternal morbidity or mortality.

The distribution of maternal deaths by stage of pregnancy revealed that more than half of maternal deaths occurred in the postpartum period of pregnancy (within 42 days of delivery) (Figure 7.11). This corroborates the finding that the leading cause of maternal death is PPH. This finding is observed to be consistent both spatially (in almost all developing countries) and temporally (this pattern has not changed over several years; PPH remains the leading cause each year).This highlights the need to focus on postpartum interventions; it is very important to continue postpartum monitoring, not only when the mother is still in the institution/hospital (the first 24 hours are the most critical) but also after she goes home. It is important for health staff in the community outside of the hospital to be made aware that a mother has been discharged and for her to be given postpartum care.

The maternal death profile on place of death showed a similar pattern to previous years. The high number of maternal deaths in hospitals (almost half) has been explained several times in previous reports. The higher the risk and the more serious the condition is, the more likely a woman is to be referred to a hospital, where the death occurs. This is compounded by the fact that many serious cases arrive at a hospital at such a late stage that the woman is already in a moribund state and the death is almost impossible to avert. This is why the analysis of the three delays is important, and why the analysis has to be correct, clear and unambiguous. Equally important is the need for maternal

health programmes to have a clear understanding of the situation of the availability of EmOC facilities, preferably with a geographical mapping that is updated from time to time. This is relevant to two other variables studied, the distance of the deceased woman's house to the nearest health facility and the time needed to reach the nearest facility.

In the MDR report 2013 it was highlighted that the MDR captures the place where the death occurred; but not the place where the delivery took place for mothers who had delivered (the majority of deaths are in the postpartum period). The mode of delivery is also pertinent information. It should be noted that many deliveries (almost two-thirds) in Myanmar are home deliveries.

This discussion on the place of death, and the place and mode of delivery has a bearing on the ease of access to services, especially emergency obstetric services. In this regard it is useful to initially look at the rural-urban profile. As expected, women from rural areas have a higher risk of maternal death than urban women. And it is not their residence per se that places them at high risk. There are multiple factors that interact in complex ways that lead to a difference in socioeconomic status (and its proxy, education). These include the distance from a health facility; the remoteness of the area where a woman lives; the terrain; and the higher total fertility rate (TFR) in rural areas than in urban areas. Thus it is vital to improve services in rural areas (especially facilities that provide EmOC services), and equally important to encourage women to deliver in institutions.

The MDR mechanism collects data on two parameters that are proxy measures for ease of access to health services; the distance to the nearest health facility and the time needed to travel from the house to the health facility. The data specifies two types of facilities, the nearest health centre (which presumably encompasses rural/urban/sub-rural health centres (UHC/RHC/SC)), and Maternal and Child Health clinics, and the nearest hospital (presumably this encompasses all types and levels of hospitals; station, township, district, state/region/national). It is assumed that data collectors and investigators in the MDR were given clear instructions on the facilities that needed to be captured in the MDR. For this parameter, there are many missing values. Notwithstanding this weakness, it is apparent that the majority (76 per cent) of deceased mothers lived within five miles of a health centre (UHC/RHC/SC); and only 23.4 per cent lived more than five miles from a health centre. A large percentage of deceased women (70.6 per cent) could reach a health centre within one hour; and only 1.9 per cent took more than three hours to reach the nearest health centre. This absence of any correlation between ease of access to health services and maternal death is another consistent pattern in the analysis since the MDR was introduced and analysed. This paradoxical finding is not easy to explain and it is difficult to postulate the reasons for it.

In Chapter 2 the preventability of maternal deaths was highlighted; and this is the basis of the global initiative of Ending Preventable Maternal Deaths (EPMM). It was also highlighted that a MDR is able to reveal the profile of deaths, which can suggest why the death occurred. In other words knowing the cause of death is crucial. There are interventions for the medical causes of maternal death, such as the management of PPH, eclampsia, sepsis etc. For women to receive these interventions, they must have the opportunity to access these interventions. Therefore they must seek care, and the care must be provided to them. This, however, can be compromised, because the seeking of care can be delayed as depicted by the Three Delays Model. Therefore the profile of maternal deaths by cause of death and type of delay is a critical element of a MDR.

The seeking of care in a timely manner is a major determinant of maternal survival, especially in seeking and receiving emergency obstetric care (EmOC), which can seriously be compromised by any delay in seeking care. In Chapter 7, it was highlighted that the findings on the type of delay in seeking care

poses a great difficulty in this report, as it did in the 2013 MDR report.

The problem encountered in the 2013 analysis and again in this current analysis is a conceptual problem. Looking at it from a "purist" viewpoint, the three delays should be independent of each other and mutually exclusive, in other words a woman should encounter only one type of delay. Either Delay 1 (she is not aware of the need to seek care or does not want to seek care); Delay 2 (she is aware and wishes to seek care but is unable to do so because of barriers); or Delay 3 (she wants to access care, finds the means to access care, but on reaching the point of care she does not receive the intervention that can save her life, for example due to a lack of life-saving medications).

However, the data collected in the MDR shows women experienced a combination of delays; and in Chapter 7 it was stated that this has made interpretation conceptually difficult. These combinations are depicted below. In 2013, no attempt was made to make any interpretation of these apparently irreconcilable findings. As this problem seems to persist in 2015, it is useful to make some interpretations of these combination of delays.

Delay (frequency)	Meaning	Possible interpretation
1 + 2 (16 per cent)	She was not aware of the need to seek care or did not want to, but somehow she got to the stage of facing a barrier to seek care.	At some point she changed her mind and decided to seek care but faced a barrier to do so.
1 + 3 (5 per cent)	She was not aware of the need to seek care or did not want to, but she did get to the point of care which unfortunately did not respond to her needs.	Since there was no Delay 2, it can be assumed that after changing her mind and deciding to seek care, she was able to do so and reached the point of care.
1 = 2 + 3 (2-3 per cent)	She was not aware of the need to seek care, but after being made aware of the need to seek care, she faced a barrier, and after overcoming this barrier she reached the point of care, which did not respond to her needs.	There was an effective strategy that overcame all three delays.

Even if the concept of a combination of delays is accepted, and this leads to the above scenarios, a question remains: "Would it have been possible for the respondent (family member of the deceased) and the investigator (mainly midwives) to have been able to articulate and record these situations during the verbal autopsy?" When compared with other findings of this study it seems unlikely. For instance, there have been consistent reports of health staff who conduct the verbal autopsy stating that the completion of this form is a tedious and time-consuming procedure. These difficult to interpret findings are more likely to be due to the incorrect completion of forms.

For the causes of maternal deaths, the data obtained is less controversial and does not lack clarity. Unlike the type of delay, the concept of cause of maternal death is quite straightforward, except for the need to understand the classification of the cause of death, which can be difficult to comprehend. It is often not recognized that a death review does not start with a "maternal death", it starts with a "pregnancy-related death" or even more proximal than this, with a "death of a woman of reproductive age" (sometimes referred to as a WRA death). It is only after the audit or review is completed that the death can be classified as a maternal death and gets counted in the MMR estimation, while "incidental" deaths are excluded. The next step in the review is to take all the "maternal deaths" and categorize them into either direct maternal deaths (caused by obstetrical complications) or indirect deaths (caused by non-obstetrical medical conditions such as an underlying heart disease which became worse because of pregnancy). From here on, assigning a specific diagnosis to the direct cause is relatively simple – PPH, eclampsia etc.

Of the 674 cases that were reviewed, almost all of them (except six) had an identified cause of death assigned to them. Of these, 491 (73 per cent) were direct maternal deaths, which means they were due to obstetric complications, and 177 (26 per cent) were indirect maternal deaths, which means they were caused by associated existing medical conditions which influenced (or were influenced by) the pregnancy. It is encouraging that the frequency of unknown causes was relatively small (only six deaths or 1 per cent). As mentioned earlier this profile is a consistent profile, both spatially (the same profile as seen in most developing countries) and temporally (the profile has remained relatively unchanged over the years since MDRs were introduced). This consistency is even true of the specific causes, with the three leading causes of PPH, eclampsia/PET and sepsis remaining unchanged. There will be implications of this profile in the recommendations for interventions, which will need to address the clinical causes and the non-clinical (social) causes as elicited by the findings on the three delays.

In countries in transition such as Malaysia, Thailand and Sri Lanka, the pattern has begun to change, and indirect causes have overtaken direct causes. The leading causes of maternal deaths in Sri Lanka in 2013 were heart diseases, respiratory diseases, hypertensive disorders and other medical disorders. Similar indirect causes such as cardiac diseases, thrombosis and thromboembolism, indirect neurological conditions, indirect sepsis and influenza were found to be the leading causes of maternal death in the Confidential Enquiry into Maternal Deaths (CEMD) in the United Kingdom 2015 report.

Chapter 9.
Actions taken on recommendations in previous MDR reports

A MDR report, whether annually (as in Myanmar) or any other frequency (triennially as in the CEMDs of the United Kingdom and Malaysia) can only have value if the weaknesses found in the previous reports are addressed and recommendations made are acted upon. For the purposes of this report, a review is carried out on the recommendations in the 2013 and 2014 MDR reports. Although this report does not attempt to procure documented evidence that actions on the recommendations have been taken, it is reasonable to assume that indirect methods and sources are valid, such as observations, interactions with programme managers and implementers, and reports made on progress in related programmes and activities.

9.1 Recommendations from the MDR report, 2013

In summary the recommendations and related response/actions from the MDR 2013 report were as follows:

1. **Respond to the findings of the MDR report, and document them**
   It can reasonably be assumed that actions have been taken, and continue to be taken on the specific recommendations of the 2013 MDR report. These activities are continuously being carried out as part of the Maternal and Reproductive Health programme, but based on the recommendations of the MDR report, additional and deliberate efforts should have been made to:
   - Encourage women to access antenatal care and to deliver in a health facility.
   - Strengthen family planning services to address unmet contraceptive needs which lead to unwanted pregnancies.
   - Strengthen health services at every level, in terms of quantity and quality.
   - Continue efforts to create an enabling environment to address the two commonest causes of maternal deaths – PPH and PIH - from the aspect of the availability of appropriate drugs.
   - Strengthen the currently available interventions - family planning and post-abortion care - for the third commonest cause; complications arising from unsafe abortions.
   - Learn from the experiences of other countries with restrictive abortion laws on how to advocate for a review of the law, and how the existing law can be used to allow for some degree of flexibility (this has probably not been acted upon).
   - Recognize medical conditions that lead to indirect maternal deaths, and ensure that these are followed-up closely, in a combined inter-team approach.
   - Conduct more health education, provide more information and raise public awareness, and advocate to community leaders about the importance and need to reduce maternal deaths.
   - Work closely with the GAVI Alliance-funded Health Systems Strengthening (GAVI-HSS) and the 3 MDG Fund to implement the demand-side financing schemes for maternal and child health, and emergency obstetric referrals.
   - Work closely with other agencies and sectors especially to improve the socioeconomic status of women who experience the second delay by improving transportation services and building roads.

2. **Sustain current progress and optimize strengths**
   This has been commendably acted upon, with commitment and leadership from the highest authorities at the Maternal and Reproductive Health Division, especially in reducing the MMR. This commitment has led to the scaling-up of the MDR pilot to all townships; the development of the COIA country road map; and the transition from the MDR to the MDSR.

3. **Improve the MDR process by filling in information gaps**
   This remains a persistent problem, and will be addressed again in Chapter 10 below. Of particular importance are improvements in the recording of the cause of death; the classification of deaths; a clearer, unambiguous analysis of the type of delay; and reviewing the variables to be analysed. It may be useful to expand the variables beyond education and occupation to generate a more complete picture of a household's income levels, on which an analysis can be conducted by wealth quintile, and to ensure that the variables and their categorization is the same every year to allow for comparison of data over time.

4. **Conduct a more comprehensive MDR**
   While it is acknowledged that Myanmar is not yet ready for this level of comprehensiveness, the current community-based MDR using a verbal autopsy and the facility-based MDR in some hospitals can be made more comprehensive with a little extra effort and resources. A sample of deaths could be further analysed by each of the causes, and documented as cases studies. A profiling of maternal deaths at the sub-state/region level could be undertaken (likely to have been done) and included in the national MDR.

5. **Utilize evidence andfindings from other sources**
   There are several other initiatives by other agencies and development partners (United Nations agencies, international non-governmental organizations etc.) that are targeting women and children, and some of these, either directly or indirectly, are relevant to reducing maternal deaths, and also to contributing and enhancing the MDR. Information and evidence from these other initiatives will enhance the MDR carried out by the MoH. Of particular relevance are the emergency obstetric referrals and financing schemes introduced by the 3 MDG Fund.

6. **Implement the COIA road map - from MDRs to the MDSR**
   This has been adequately acted upon; guidelines, training manuals and advocacy kits for the MDSR have been developed, and the MDSR was successfully launched in January 2017. One of the thematic areas of the COIA road map is e-health and innovation. Advantage must be taken of this to optimize the use of information, communications and technology in MDRs and in the MDSR, such as the use of text messages via mobile phones for the rapid reporting of maternal deaths. With the introduction of e-health by the MoHS (with support from WHO), it is hoped that maternal and reproductive health and the MDR/MDSR will be incorporated into the overall e-health initiative.

7. **Strengthen inter-agency collaboration**
   The MRH Division and health authorities at other levels of administration collaborate on a continuous basis. But there is a need to initiate efforts to involve the private sector, and collect information on the number of deliveries and maternal deaths in private clinics and hospitals. In addition, approaches need to be developed to engage the private sector in the review of maternal deaths and to reduce maternal mortality. The MDR report of 2014 mentioned that the private sector participated at a stakeholder meeting (date not indicated). Similar collaboration is also imperative with other donor agencies such as GAVI-HSS, recognizing that health systems strengthening is an important strategy for reducing maternal deaths.

8. **Use MDRs/the MDSR for ending preventable maternal mortality (EPMM)**
   This has been acted upon and a strategy paper is being developed for EPMM by the MoH with support from WHO. Needless to say, this elimination strategy can only be achieved if every maternal death is notified, reviewed, analysed, and recommendations made are acted upon.

9.1 Recommendations from the MDR report, 2014

From the unpublished 2014 MDR report the following recommendations were made, and without analyzing each of these, it can be assumed that actions have been taken or initiated in some of these areas.

1. The National Guidelines for the Maternal Death Surveillance and Response (MDSR) system should be revised after conducting a pilot study. This assessment is being planned and a proposal to conduct operational research to evaluate the MDSR has been prepared.

2. The communication gap between basic health staff and health personnel from hospitals should be narrowed, and a focal person should be assigned to provide feedback and communicate between the Department of Public Health and the Department of Medical Services.

3. Maternal deaths in hard-to-reach areas: the high travel costs for basic heath staff and midwives could be solved by providing financial assistance for transportation and others necessities for maternal death reviews, and also delivery kits and maternity care services as an incentive.

4. MDR committees formed at all levels are weak in their performance, with poor coordination of MDRs with other sectors. There is a need to improve teamwork and coordination between hospitals and public health programmes, and with teaching hospitals that conduct MDRs. The Central Statistical Organization, as the responsible agency, should collaborate effectively with health agencies. The private sector has committed to MDRs as they understand that their participation will be beneficial.

5. Joint monitoring plans (organization responsible, indicators, tools, coordination and feedback mechanisms) should be developed among the different agencies involved in MDRs.

6. Financial assistance for conducting meetings, field visits as well as for establishing a focal person and assigning teams for monitoring and evaluation of MDRs should be provided at the central, state/region and district levels.

7. MDSR committees should be reformed at all levels and provided with specific term of references including the assignment of a focal person, and establishing a feedback mechanism to facilitate communication between the Department of Public Health and the Department of Medical Services. The National Steering Committee for the MDSR should be chaired by the Minister of Health.

Chapter 10.
Recommendations of MDR report, 2015

The recommendations of the MDR report 2015 are presented in two sets:

- The first set of recommendations are to improve the current MDR system, and address the major weaknesses identified in the 2013 analysis – the incompleteness of data and information, and the lack of clarity of some of the data.
- The second set are recommendations to respond to the problem of high maternal mortality, and use the findings to suggest appropriate interventions.

10.1 Improving the MDR system

The weaknesses to be addressed still largely relate to poor information/data. The other weaknesses are insignificant when compared to the problem of information gaps, and will not be addressed here.

10.2 To ensure adequacy of variables/parameters captured in the verbal autopsy form

One of the most difficult decisions in any study or surveillance system is how much information is needed to meet the objectives of the study/initiative/system. The question "how much is too much and how little is too little" is never easily answered. In the MDR there appears to be problems at both ends from the feedback received from the staff involved. One of the findings of the evaluation of the MDR implementation conducted in 2011-2012 by SEARO was that midwives found the 32 page verbal autopsy form far too long and too much information needed to be collected. Notwithstanding this, the review in 2013 and the current review found that a few variables are not collected that need to be collected. These are:

- Indicators for the socioeconomic status of the deceased woman: in addition to the information currently obtained on education and occupation, data on the occupation of the husband and household income should be collected.
- The marital status of the deceased woman should be known.
- Data on the place of delivery and mode of delivery for deaths that occur after delivery should be collected.

10.3 Variables currently collected that are not useful should be discarded

While the above recommendation is to increase the number of variables to be collected, a few variables collected in the current MDR are not useful. Besides adding to the work of the data collectors, an extra burden is also placed on the person/committee that conducts the analysis – and the policymaker and programme manager who need to make sense of the findings. Currently one variable that is not relevant is the ATT immunization. In addition, information on the first health care provider has not been used very meaningfully.

10.4 Obtain denominators to calculate rates and assess risk

It was explained earlier that the MDR profile can give an indication of the risk of a maternal death, and that this is the basic foundation of a MDR which identifies risk factors to prevent future deaths.

However, this cannot be assessed because the rate of maternal mortality for the specific variable cannot be calculated (except by state/region) because the denominator needed to calculate the rate is not available.

Analysis is limited to a comparison of percentages, which is inappropriate and inadequate. It is recognized that this is an extremely difficult exercise without improvements in the current HMIS. Therefore it is recommended that efforts be made to obtain the denominator for selected variables which are important in the identification and assessment of risk. The main denominator is the number of pregnant women, and it is suggested to collect this for: different age groups; by socioeconomic status (education or income or both); and by parity/gravida.

10.5 Ensure clarity and understanding

This report and the MDR report of 2013, have highlighted problems encountered in understanding certain concepts that have a bearing on the collection of data (and its later analysis). The three major areas for which clarity is needed are:

- The concept of risk and its role in preventing future deaths, which needs the rate and not merely the proportions/percentages; this is already addressed above under the need for a denominator.
- The definitions and classification of the causes of maternal deaths. Every health staff involved needs to understand that the audit/review does not start with a maternal death but with a pregnancy-related death, and that it is only after the review is conducted that the deaths are assigned as either a maternal death or an incidental death (which is not included as a maternal death and is not counted in the calculation of the MMR[17]). The maternal deaths are then assigned as being direct or indirect according to the definitions. The recommendation is to conduct training and briefing sessions, and provide feedback on findings that are unclear.
- The concept of the Three Delays Model: some investigators take the "purist" view and see the three delays as being independent of each other and mutually exclusive. This means one woman can have only one type of delay. However some investigators, as in the MDR of 2013 and 2015 collected data on deceased women which showed that they experienced a combination of delays, for which any interpretation is extremely difficult and is more likely to be inaccurate. The recommendation is to develop a policy decision, preferably after consulting with experts, and then to conduct trainings/briefing sessions based on the policy decision. Another recommendation is to conduct studies on cases where there were multiple delays, and then to discuss these cases.

10.6 Include a summary of findings from a MDR at the state/region level

One issue that has been raised at the global level, especially when discussing the transition from the MDGs to the SDGs is the lack of meaningful data that is collected that goes beyond the national average (which can be misleading). It is assumed that in the MDR system in Myanmar, analysis is conducted at the state/region and township levels. It is recommended that a brief summary of the MDR findings at the state/region level is included in the MDR report for the whole country. This could be the first step in identifying inequality and inequity.

[17] In some countries such as Malaysia, although deaths are incidental (the term "fortuitous death" is used in the CEMD), these deaths are fully audited and included in the CEMD reports. They are not included in the calculation of the MMR, and if they are included, the report explains that this is the rate for pregnancy-related deaths

10.7 Recommendations to prevent maternal deaths and reduce maternal mortality

The second set of recommendations is derived from the findings of the MDR 2015 that has given some insights into why women died, and how these insights can be used to prevent future maternal deaths.

10.8 Ensure early antenatal care registration

A well-structured community health education strategy should be put in place to improve early antenatal care registration. This will require the involvement of male partners, family members and community leaders.

10.9 Overall improvements in the quality of service

Quality antenatal care services should be improved and basic equipment and supplies such as weighing machines; stethoscopes; blood pressure cuffs; haemoglobin colour scales; urine testing kits; and rapid tests to screen for syphilis should be provided at all health facilities. Adequate nurses and midwives should be posted at each health facility.

10.10 Provide adequate emergency obstetric and neonatal care services

This recommendation is made to target specific causes of maternal deaths.

Postpartum haemorrhage
Health personnel assisting in the delivery of children must be adequately trained in the active management of the third stage of labour. Before the implementation of the active management of the third stage of labour, health planners must weigh the benefits of the new policy against its costs, bearing in mind the difficulties to be overcome. Misoprostol, and PGE1 analogue have been recommended as an alternative for the prevention and management of postpartum haemorrhage for all skilled birth attendants (Basic health Staff). This means if oxytocin is not available or if postpartum bleeding does not respond to oxytocin, four misoprostol tablets should be administered orally in the case of the absence of administering three misoprostol tablets orally during the third stage of labour.(Ministry of Health (MoH), 2015). Shifting specific tasks to auxiliary midwives should be promoted and their role and responsibility in administering misoprostol should be defined.

Severe PET or Eclampsia
There is an urgent need to operationalize the use of magnesium sulphate for the care of women with severe PET or eclampsia, which was associated statistically and clinically with significant reductions in the recurrence of convulsions, and a reduction in maternal deaths, compared with the use of diazepam, phenytoin and a lytic cocktail.

Unsafe abortions
In developing countries, unwanted pregnancies and induced abortions are much more common than in developed countries owing to a lack of access to family planning methods and the availability of reproductive health services. In the MDR 2015, unsafe abortions were the most common reason for maternal deaths in deceased women who died before 22 weeks of pregnancy and accounted for 9 per cent of all maternal deaths. When complications related to abortions occur, such as severe haemorrhaging or sepsis, the amount of time and resources required to manage them escalates rapidly, such as parenteral antibiotics and blood transfusions.

Use of partograph recording

Partograph recording must be put in place for all women with active labour pains to identify early prolonged labour, obstructed labour and an impending ruptured uterus.

10.11 Provide comprehensive emergency obstetric care at all secondary and tertiary hospitals

So that comprehensive emergency obstetric care can be provided at all secondary and tertiary hospitals, the necessary equipment and personnel need to be in place with a fully operational theatre and laboratory. This will reduce the number of referrals and counter referrals that currently exist. The provision of quality obstetric care services in emergency situations is a fundamental pillar in the reduction of maternal mortality. To that effect, standard guidelines and protocols for the management of emergency cases need to be present at all health facilities; essential supplies such as misoprostol, magnesium sulphate, gloves, intravenous fluids, blood bags, and delivery sets, to name but a few items, must be available; transfusion services should be improved by ensuring the availability of blood; an electricity supply should be assured; and above all medical doctors should be readily available and accessible.

10.12 Improve transportation, provide funds and social support for obstetric emergencies

To improve the transport situation at the community level, local commercial transport owners and community members need to be mobilized by community awareness programmes. Community health education on the danger signs of pregnancy, labour and during the postpartum period should be carried out to reach as many people in the community as possible. It should target both men and women and specifically those significant figures in the family who make decisions on when and where to seek medical care, such as family heads and mother in-laws. The information provided should also highlight where care is available.

Advocacy should reach relevant community and local help groups. If there is an emergency, financial support should be provided to cover the costs involved by local people as well as by professionals, NGOs, INGOs and support providers.

Additional funds and staff for community level follow-up should be included right from the onset of the planning stage. Social support should complement other interventions focused on changing policies and providers' preferences and practices even in places where resources are limited. The Department of Health should consider the need for river ambulances at river crossing points to facilitate quicker access to obstetric referral facilities.

Chapter 11.
Conclusion

There has been a global movement to address the problem of maternal mortality for which there is a wide range and plethora of causes. Despite this global attention, and the number of initiatives that have been introduced in the past decade, this preventable tragedy has still not been fully alleviated, especially in the developing world, where the majority of maternal deaths occur, and which reflects the gross and unacceptable inequity between the developed and developing world.

The tragedy of maternal death is not only in its magnitude and its portrayal of social inequity and injustice; it is especially heart breaking because most of these maternal deaths are preventable, if only the women at risk of dying were given the services and interventions needed. To identify women at risk of a maternal death, information is needed. Routine information systems cannot provide this information, at most they can provide the number of maternal deaths (and often these are inaccurate and unreliable) and not the reasons why these deaths occurred. This has been the overriding rationale for developing systems and approaches to better understand these deaths, and the most common approach is through a maternal death review (MDR).

Myanmar started the MDR more than ten years ago, and the system has undergone gradual improvements and scaling-up over the years, with several commendable milestones along the way. The findings of the MDR is a valuable source of information on the circumstances as to why the deaths occur, and what can be done to prevent similar deaths in the future. To ensure that these findings are available so that they can be translated into recommendations for appropriate responses, including the formulation of policies and strategies, they have to be disseminated to all stakeholders so that they can take the much needed action. These actions and responses will contribute to the prevention of maternal deaths and the reduction of the MMR which was a MDG goal (MDG 5) and which is now a SDG goal (SDG 3). Furthermore the findings of the MDR (and in the coming years the MDSR) will play a pivotal role in ending preventable maternal mortality (EPMM), and in contributing to sustainable human development.

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