



MATERNAL DEATH REVIEW (MDR) IN MYANMAR

2016

The Republic of the Union of Myanmar
Ministry of Health and Sports
Department of Public Health
Maternal and Reproductive Health Division

July 2018



**World Health
Organization**
Myanmar

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MRH Division believes that the health personnel will learn the profile and analysis of maternal deaths in their states and regions from this report. In further linkage with the maternal death surveillance and response system, they will be able to identify the most effective response strategies and activities for reducing preventable deaths of mothers, thereby fulfilling the Sustainable Development Goal of eliminating preventable maternal mortality for Myanmar by 2030.

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LIST OF ACRONYMS

AMW	-	Auxiliary midwife
ANC	-	Antenatal care
APH	-	Antepartum haemorrhage
BEmOC	-	Basic emergency obstetric care
CEmOC	-	Comprehensive emergency obstetric care
CHW	-	Community health worker
COIA	-	Commission on information and accountability
CRVS	-	Civil registration and vital statistics
CSO	-	Central statistical organization
DHS	-	Demographic and health survey
EPMM	-	Ending preventable maternal mortality
HMIS	-	Health management and information system
LB	-	Live births
LHV	-	Lady health visitor
LTR	-	Lifetime risk
MDG	-	Millennium development goal
MDR	-	Maternal death review
MDSR	-	Maternal death surveillance and response
MICS	-	Multiple cluster indicator survey
MMEIG	-	UN Maternal Mortality Estimation Group
MMR	-	Maternal mortality ratio
MRH	-	Maternal and Reproductive Health
PE	-	Pre-eclampsia
PIH	-	Pregnancy induced hypertension
PPH	-	Postpartum haemorrhage
PMFD	-	Proportion of maternal female deaths
RAMOS	-	Reproductive age mortality studies
SBA	-	Skilled birth attendant
SDG	-	Sustainable development goal
SES	-	Socio economic status
SPR	-	Short programme review
SRS	-	Sample registration system
TBA	-	Traditional birth attendant
TFR	-	Total fertility rate
VA	-	Verbal autopsy
WRA	-	Women of reproductive age

CHAPTER 1.

INTRODUCTION

This current Maternal Death Review (MDR) report for 2016 is the fourth in a series of a formal report written on MDR in Myanmar. A complete analysis of the MDR findings was first conducted in 2014¹ for maternal deaths that were reported and reviewed in 2013 in the MDR system. A formal comprehensive MDR report² was published based on these findings. For maternal deaths reported and reviewed in 2014, analysis was again carried out and a report was prepared, but it was not published and disseminated widely, and was used internally. The third MDR report was prepared and published in 2016 for maternal deaths that were reviewed in 2015³.

Maternal mortality is a very important public health problem that urgently needs to be addressed and reduced. The progress of this reduction can be measured by various statistical measures but the universally used measure is the maternal mortality ratio (MMR). For getting a reliable and accurate estimate of this, all maternal deaths must be identified and counted. In all the three previous MDR reports it was emphasized that getting the number of maternal deaths as accurately as possible is only one part of the process, there is a need to “go beyond the numbers” to get the profile of the maternal deaths – which is the basis for conducting a MDR. These previous reports also pointed out that WHO has played a significant role in guiding Myanmar (and other member states) in conducting MDR, especially through the guidelines developed in 2004, *“Beyond the Numbers - Reviewing Maternal Deaths and Complications To Make Pregnancy Safer”*. To go back a bit into the history, MDR in Myanmar started in 2005 as a pilot project in 30 townships and it gradually underwent geographical expansion. It also underwent improvement following the evaluation carried out by WHO/SEARO in 2011 on the implementation of MDR in five countries⁴. In 2012 when the country developed its road map as a response to the recommendations of the Commission on Information and Accountability (COIA)⁵ on Women and Children Health, plans were put in place to transform the MDR into MDSR.

The previous reports also highlighted the urgency of the need to reduce maternal mortality, which was the goal of MDG5 (to reduce MMR by three quarters from 1990 to 2015), and this is retained as a goal in the SDG as part of SDG5 (to achieve by 2030 MMR of not more than 70 per 100,000) In addition, the global imperative now also includes the “Ending Preventable Maternal Mortality (EPMM)” initiative. This is based on a basic concept of disease prevention and control used in Public Health practice – if the causes of a disease (or any health problem) are known, then prevention is feasible, and with extra concentrated efforts prevention can lead to elimination (and in some diseases even to eradication); and a large majority of maternal deaths are preventable. Therefore the concept of cause of maternal death is crucial. Nearly two-thirds of maternal deaths worldwide are caused by direct obstetric causes such as

- 1 Previous to this, there were several reports including by senior obstetricians but these were not based on a complete and comprehensive analysis of all the maternal deaths reported to the MDR system
- 2 Maternal Death Review (MDR) in Myanmar 2013. Maternal and Reproductive Health Division, Department of Health (MOHS, WHO, 3MDG Fund)
- 3 This report is still under publication at the time of writing
- 4 The study by SEARO on the implementation of MDR was conducted in India, Indonesia, Myanmar, Nepal and Sri Lanka; these countries had been provided technical support by SEARO in MDR using the guideline “Beyond the Numbers” between 2003 and 2005
- 5 This Commission was established in Dec 2010 as a complement to the UN Secretary General’s Global Strategy on Women and Children Health

haemorrhage, eclampsia, obstructed labour, sepsis and complications of unsafe abortion. The indirect causes of maternal deaths are mostly due to interaction between preexisting medical conditions (mostly cardiac⁶ diseases) and pregnancy. These are *medical* causes of maternal death, for which there are effective interventions. However to end preventable maternal deaths there is need to elicit and understand the *social* causes as well, and this can be achieved through a MDR (and now MDSR). These causes are related to the access of women to a skilled professional/attendant in her pregnancy, at childbirth and immediate postpartum period, and to a functioning and responsive health system. For this, the well-known “Three Delay Model” of Thaddeus and Maine is used in the verbal autopsy conducted in MDR. The first delay is the lack of awareness on the need to seek care (failure to “recognise”); the second delay is after having awareness and desire to seek care, the woman 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 the woman has arrived at the place where care is provided, she is not given the care needed (there are many reasons for this failure of the of the health system to “respond”).

⁶ So significant is the cardiac cause that the Confidential Enquiry into Maternal Deaths (CEMD) conducted in Malaysia classifies indirect causes of maternal deaths into cardiac cause and non-cardiac cause

CHAPTER 2.

THE SIGNIFICANCE OF THE YEAR 2016, AND IMPLICATIONS ON MDR 2016

The year 2016 is noteworthy for three events; 2016 was year when MDG is replaced by SDG; it was the last year for MDR when it was replaced by Maternal Death Surveillance and Response (MDSR) in 2017; and it was the year when the findings of the National Population and Housing Census and Demographic Health Survey (DHS) were made available. In addition, in MDR itself, 2016 is seen to be significant because in this last year of the MDR before MDSR takes over, the findings from previous MDR reports need to be revisited, and the recommendations are collated and presented in the current report (This was done for MDR 2015 in which recommendations from 2013 and 2014 were revisited). These four have implications in the report of MDR 2016. In addition at the time of writing of this report, the MRH Division with support from WHO had just conducted a Short Programme Review (SPR)⁷ on Maternal Health Programme; and several findings on the review have relevance to MDR. More specifically some of the recommendations (19 in total) are related to MDR.

2.1. From MDGs to SDGs

The year 2016 is the first year of the Sustainable Development Goals (SDG), and Myanmar like all other countries have started working towards meeting the goal of having Maternal Mortality Ratio (MMR) of less than 70 per 100,000 by the year 2030. Many countries including Myanmar have the challenge of the “unfinished agenda” of MDG5a which called for the reduction of MMR by three quarters between 1990 and 2015, and they did not achieve this goal. Therefore for these countries, there will need to be acceleration of efforts, to be able to achieve the target MMR of 70 or less. Only with this achievement can the ambitious goal of Ending Preventable Maternal Mortality (EPMM) be realized.

Implication: This 2016 MDR Report will briefly revisit the progress of MDG5a from 1990 to 2015. It will also mention that in the years from now and 2030, interim MMR targets will need to be determined, and each year MDSR report will need to take note of the target.

2.2. From MDR to MDSR

Myanmar has moved forward to transform MDR to MDSR, which was launched for nationwide implementation in January 2017. Therefore the year 2016 is the last year for the investigation/review/audit of maternal deaths using the MDR approach/methodology.

Implication: Henceforth from 2017 onwards the reports shall be on MDSR instead of MDR, which will have a stronger focus on RESPONSE (the “R”) besides analysing and profiling the maternal deaths as in MDR. MDSR report must contain recommendations for robust actions/ responses that need to be diligently documented, tracked or monitored. The other feature of MDSR that is an improvement over MDR is the “S” component – SURVEILLANCE.

⁷ The SPR was conducted on 28 August to 1 September 2017

2.3. The National Population and Housing Census (2014) and Demographic and Health Survey (2015-2016)

In September 2016, the reports of the National Population and Housing Census carried out in 2014 and the Demographic and Health Survey (DHS) carried out in 2015-2016 were published and released. The census was carried out after a very long gap (the last census was in 1982) and the DHS was the first to be conducted in Myanmar. Both these sources provided valuable and reliable information on maternal mortality.

- *Implication 1: This offers a timely and excellent opportunity for this MDR 2016 report to incorporate findings from two reliable sources which previous MDR reports did not have the advantage of. The findings are presented as a separate section (Section 4.2) and also incorporated in the findings of the profile of MDR 2016 under the relevant variables under Section 6. In addition, the Census report on Maternal Mortality also has definitions and concepts, and these are included in Section 3 of this report.*
- *Implication 2: The conventional source of MMR data is from the estimates made by the joint UN Maternal Mortality Estimation Group⁸ (MMEIG) which receives the MMR figure from each country, and based on the source of this data, it is then subjected to any of several specific statistical methodologies to arrive at the final MMR. For the next estimation by MMEIG, the estimate for Myanmar will use the Census and DHS findings; a source of data that has never been provided before. The MMEIG is likely to review past estimates of MMR for Myanmar from 1990⁹.*

In Section 8 on Recommendations, subsection 8.2 makes recommendations on these four significant events of 2016 to optimise opportunities provided by these events to strengthen MDR - use the SDG platform, ensure smooth transition from MDR to MDSR, collate and use recommendations from previous MDR reports, and use data from Census and DHS optimally.

2.4. Moving forward from previous MDR Reports

It is important that this MDR 2016 report highlights the importance of reporting of actions on recommendations of previous MDR reports, which was already highlighted in MDR report 2015; and suggesting how to take these recommendations forward. A section (Section 9) in the 2015 report covered this, summarizing the recommendations made in the 2103 and 2014 reports. The report itself had its own recommendation from the findings of the review.

Implication: It is unlikely and not feasible that the MDR of 2016 would have addressed these recommendations, because (i) a response system has not been properly institutionalized in the MDR, and a mechanism has not been created for it (ii) there has been very little time between the availability of MDR reports of 2014 and 2015 and the analysis of MDR 2016. In this context, there is a plan to conduct an operational research to assess the implementation of MDSR after its introduction in January 2017, and this is the best opportunity for improvements to be made to the MDR/MDSR system.

⁸ The MMEIG is made up of experts from WHO, UNICEF, UNFPA, The World Bank and the Population Division of the UN, and makes MMR estimates for all countries since 1990 for tracking progress of MG5a. The MMEIG has to date produced four reports – for 190-2008; 1990-2010; 1990-2014 and 1990-2015. Therefore there is as yet no report for 2016

⁹ Each time the MMEIG makes a new estimate it makes corrections to the previous estimates it had made, based on new and updated source of information that a country may have. Therefore the finding from Census and DHS is expected to produce significant corrections to the MMR figures in the previous 4 reports of MMEIG.

CHAPTER 3.

BASIC CONCEPTS – DEFINING AND MEASURING MATERNAL MORTALITY

These concepts have been described in previous MDR reports, and are repeated here, because to fully appreciate the findings of any MDR, it is useful to understand the definitions related to maternal mortality, and the sources of data and methods of measuring MMR. In addition to what was reported in previous years, this current report will also provide information obtained from the Census 2014 and DHS 2015-2016 reports.

3.1. Definitions

There are standardized definitions which are universally adopted, and which are used by the UN Maternal Mortality Estimation Interagency group (MMEIG).

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 the deaths due to accidental or incidental causes. (Note : There is also the concept of deaths of women in reproductive age (WRA) group, regardless of their pregnancy status, often referred to as WRA-death).

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 disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiologic effects of pregnancy.

Incidental maternal deaths

These are deaths from unrelated or incidental/accidental causes that happen to occur in pregnancy or the puerperium. These deaths therefore will be included in pregnancy-related deaths, but not in maternal deaths.

Note: Information obtained from census and surveys (such as DHS) can only be obtained on pregnancy-related deaths (derived from the number of deaths of females of reproductive age), and not maternal deaths. But generally for all intent and purpose, and as practiced universally the number obtained is cited as maternal deaths (and it is a valid proxy for ma-

ternal deaths). In the Myanmar case, the Census 2014 report clearly explains this, and it uses the figure as “maternal death”. On the other hand, the DHS 2015 - 2016 report cites this as “pregnancy-related deaths”.

Late maternal death

There is universal agreement that the puerperium ends 42 days after childbirth. There are countries that also conduct 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 termination of pregnancy. These are not included in the calculation of maternal mortality ratio for which there is international agreement to limit it to 42 days. The DHS 2015-2016 counts pregnancy-related deaths from pregnancy to 60 days after childbirth.

There is another concept **Lifetime Risk (LTR)** of a maternal death, which is the risk that a woman who survives age of 15 will die of maternal death at some point during her reproductive lifespan (which ends at age 49), given the current rates of maternal mortality and morbidity. (Note : In previous MDR reports, this measure was not included because it is a measure that cannot be derived from MDR, and when it is available from other sources, it is seldom used. The National Population and Housing Census 2014 and the Demographic and Health Survey 2015-2016 included this measure, and reference to this will be in Section 4.2).

Arising out of these definitions, there are the relevant measures used in describing maternal mortality

- ♦ **Maternal Mortality Ratio (MMR)** which is the number of maternal deaths divided by the number of livebirths (LB) expressed as per 100,000 LB. This is the measure that is universally used for assessing and comparing the magnitude of maternal mortality.
- ♦ **Maternal Mortality Rate (MMRate)** is the number of maternal deaths divided by the number of women aged 15-49, usually expressed as per 1,000. This is seldom used, although it is a more valid measure of risk compared to MMR.
- ♦ **Pregnancy-related Mortality Rate** - As for MMRate above, the same can be calculated for pregnancy related mortality rate; the number of pregnancy related deaths divided by the number of women aged 15-49 (Both the Census 2014 and the DHS 2105-2016 report have this measure).
- ♦ **Proportion of adult female deaths due to maternal causes (PMFD)**, which is the number of maternal deaths divided by the number of deaths among women aged 15-49, most conveniently expressed as %. This is comparable to “case fatality” in other diseases (The Census 2014 report has this measure).

3.2. Sources of data for measuring Maternal Mortality

Measuring maternal mortality is notoriously difficult. Maternal deaths are hard to identify precisely and a maternal death is a relatively rare event. In addition, it is not easy to get accurate and reliable data for calculating the maternal mortality. Added to these difficulties, the methods for MMR determination are statistically complex and sophisticated, and are resource intensive. The starting point - for whatever method - is of course the source of the data. In the 2015 report, efforts were made to briefly describe these sources, bearing in mind the need for health managers to understand these, particularly with MDSR having been introduced, and that EPMM has become a goal. The following sections on sources of data for maternal deaths are taken from the MDR 2015 report.

7) Specialised studies

These are seldom cited in maternal mortality reviews and literature but can and have been used.

8) Records in health facilities

Where health systems are relatively strong with reliable information system, records from health facilities can be a useful source of maternal death.



CHAPTER 4.

SITUATION OF MATERNAL MORTALITY IN MYANMAR

4.1. Situation Using Data from Conventional Source

In previous reports of MDR, the current situation of maternal mortality in Myanmar was given, with comparison made spatially, comparing Myanmar with the global situation and countries of the SEA Region. Comparison was also made temporally, tracing the trend of MMR in Myanmar from 1990 to the year of review. As mentioned earlier, the data that has been consistently used for valid universal comparison is the estimates given by the MMEIG. Unfortunately at the time of writing this MDR 2016 report, the MMEIG has not published the report for 2016; the most recent report is for 1990 – 2015. This being the situation, this current report is unavoidably deficient and the best description will have to be based on what was reported in 2015, when the MMR was 178 per 100,000 live births.

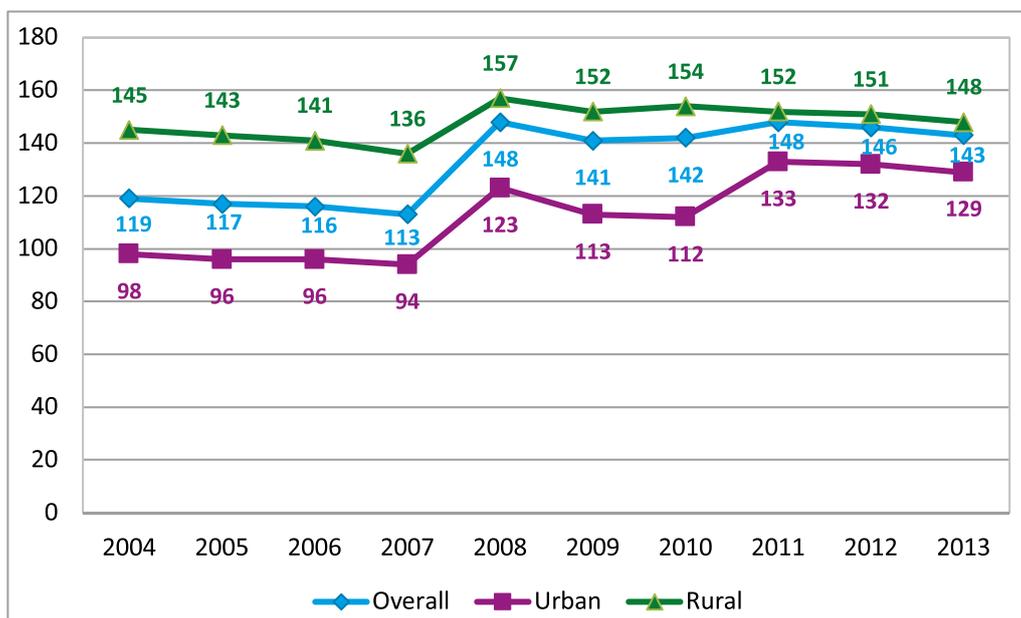
The data from HMIS is well-known to be a gross under-count; and the data from the MDR although is slightly better than HMIS, is still an under-count. One conventional source that had not been used in previous reports (because focus has been on data provided by MMEIG) is the MMR reported in the Myanmar Statistical Yearbook, which publishes data collected by the Central Statistical Organisation (CSO). As expected, the figures are lower than the MMEIG estimates. Data taken from the 2015 Yearbook gives the following trend from the year 2004 to 2013, for the whole country, and for urban and rural areas.

Table 1: MMR estimates from the Myanmar Statistical Yearbook 2015

Year	Number of reporting townships	Maternal Mortality Ratio (MMR) per 100,000 LB		
		Overall	Urban	Rural
2004	154	119	98	145
2005	165	117	96	143
2006	188	116	96	141
2007	198	113	94	136
2008	280	148	123	157
2009	281	141	113	152
2010	286	142	112	154
2011	287	148	133	152
2012	287	146	132	151
2013	287	143	129	148

An interesting feature of this trend is the gradual narrowing of the gap between rural (either static or declining) and urban (increasing) figures. This is clearly depicted in Figure 1 below. Interestingly this same trend is observed in the MDR analysis. This will be seen in Section 6.1 in PART II of this report.

Figure 1: MMR estimates from the Myanmar Statistical Yearbook 2015, showing urban and rural trends



The year 2106 is however is marked by a very positive development with the release of findings from the National Population Census 2014 and the DHS 2015 – 2106, and this is dealt with in the section below.

4.2. Situation from Findings of Census 2014 and DHS 2015-2016

Two major events occurred in Myanmar that provided information on maternal mortality – the National Population and Housing Census in 2014, and the Demographic and Health Survey 2015-2016. The reports of both these valuable sources of information were released into public domain in September 2016, in time for inclusion in this MDR 2016 report. Because of the significance of both these sources of data on maternal mortality (which persistently suffers from paucity of reliable data), this report elaborates on these two sources. Before the findings on the levels of maternal mortality found in these two sources are presented, it is useful to understand some background information - the methodology of these two sources, the conceptual frameworks, and the variables studied.

4.2.1. Background (Methodology, Conceptual Framework, Variables)

a. Methodology/questionnaire (Census, DHS)

The Census elicited information in the last 12 months (30 March 2013 to 29 March 2014¹⁰), while the DHS used the 7 year period¹¹ before the survey (roughly from mid-2009 to mid-2016). Both incorporated questions on deaths among women in the households, and if these women were pregnant or in childbirth or in the post-partum period at the time of death.

¹⁰ The census date was on 29 March 2014, and it was a *de facto* census (based on where a person was on that day, not necessarily at the place of his/her residence) and not *de jure* (based on the usual residence of the person, regardless where he/she is on the day of census)

¹¹ This period was used to ensure a sufficiently large number of adult deaths (which are relatively rare events) to generate a robust estimate; and it is a compromise between the desire for the most recent data and the need to minimize sampling error (see page 236 of the DHS report)

The 2014 Census asked the questions directly under item 41 of the questionnaire

- Name of the deceased
- Was the deceased male or female?
- Age at death (if age is unknown, estimate age using historic calendar)
- If female death aged 15 – 49, did the death occur during pregnancy, delivery, the first 6 weeks after delivery?

The DHS used the sibling method (as in sisterhood method, but it included brothers). All siblings whether alive or deceased are named. For any deceased female sibling the following questions were asked.

- Was (NAME of deceased) pregnant when she died?
- Did (NAME of deceased) die during childbirth?
- Did (NAME of deceased) die within two months after end of pregnancy or childbirth?

Therefore both elicited information on one variable for describing maternal mortality – the time of death (antenatal, intra-natal and post-natal).

b. Conceptual frameworks used in analysis of maternal mortality

The applies only to the census in which two familiar conceptual frameworks were used

- The first is the three delay model of Thaddeus and Maine 1994. The MDR also elicits information on the three delays, which is used in the analysis of maternal deaths (delay in deciding to seek care, delay in reaching care and delay in receiving care).
- The second is the intermediate model of Mac Carthy and Maine 1992, which stipulates that a maternal death is the third in a series of events; it is preceded by life-threatening complications, which is in turn is preceded by pregnancy. These three events – pregnancy, complications and death are preventable; and each is influenced by several determinants – the woman's health status; her reproductive health status and behavior which includes fertility, access to and use of services; and other unknown factors.

c. Variables studied

Like all Census and DHS conducted anywhere, one parameter that is included is the data from sub-national entities. Both the census and DHS analysed information for State/Region with urban-rural categorization. In addition the age of the deceased woman is collected, and both sources use the same 5-year age groups. The findings on these will be compared with the MDR findings in PART II - Section 6 (Section 6.1 for state/region, Section 6.2 for age).

Although other variables concerning the maternal deaths were not collected, the census indirectly analysed the maternal mortality in each state/region with respect to six variables, and tested them for any correlation with the MMR, using two statistical measures - the correlation coefficient and coefficient of determination. Five of these six variables were selected because of their known role as barriers to the three delays in the three delay model; and the sixth (TFR) for its role in the intermediate model.

Variable	Delay 1 (awareness to seek care)	Delay 2 (ability to reach care)	Delay 3 (inadequate or poor quality care)
1. Percentage of illiterate females	Yes	No	No
2. Percentage of women with no education or have primary education only	Yes	No	No
3. Percentage of households with electricity	No	Yes	Yes – it may apply to health facility
4. Percentage of households with means of communication – landline, mobile, internet	No	Yes	Yes – it may apply to health facility
5. Percentage of households with motorized vehicle	No	Yes	No
6. Fertility (TFR)	does not contribute to three delays but to the risk of pregnancy in the intermediate model		

In the DHS, although the 23 maternal deaths were not correlated with pertinent variables, there is a wealth of information on maternal health care in Chapter 9 of the report (respondents were women 15 – 49 years old who had given birth to a live child in the past 5 years). While these are not linked to maternal deaths, they provide useful background information. These are incorporated under each of the pertinent profiles in Section 6 – antenatal care, attendance at childbirth and postnatal care; and some of these are correlated with education and socio-economic status.

4.2.2. Findings - Measures and Profile of Maternal Mortality Elicited

As explained earlier, these did not detect maternal death (and therefore did not measure maternal mortality), but pregnancy-related deaths and pregnancy-related mortality, but for all intent and purpose it is deemed as valid proxy measure of maternal mortality. Indeed both these sources recognize and mention this distinction, but the census refers to the measure as maternal mortality and explains that it uses these two synonymously. Unlike the MDR, the report of the Census and DHS calculate three other measures related to maternal mortality.

- ◆ RATE¹² : Pregnancy-related mortality rate (with the denominator the number of women aged 15-49) unlike the MMR which is a RATIO, with live births as the denominator) and therefore is a more valid measure of risk

¹² In previous reports, it was highlighted that one weakness of MDR is the absence of denominator which is needed to calculate specific rates, which can assess risk

- ♦ PROPORTION : The PMFD (proportion of adult female deaths due to maternal causes), which is the number of maternal deaths divided by the number of deaths among women aged 15 – 49 (the census not the DHS has this measure)
- ♦ RISK : Lifetime risk (LTR) of maternal death

The findings from these two sources corresponds quite favourably with each other as seen in Table 2 (Census) Table 3 (DHS).

Table 2: Maternal (pregnancy-related) mortality indicators, 2014 Census

Age group	No of maternal deaths	MMRatio (*)	MMRate (#)	PMFD (^) %	LTR
15 – 19	171	228.6	0.077	8.3	0.4
20 – 24	512	224.6	0.242	21.1	1.2
25 – 29	505	187.9	0.245	17.9	1.2
30 – 34	562	260.1	0.287	16.4	1.4
35 – 39	584	422.5	0.322	14.0	1.6
39 – 44	334			6.6	1.0
	592.0				
	0.196				
44 – 49	129	1,134.4	0.084	2.2	0.4
Total	2,797	281.6	0.209	9.8	7.3 (^ ^)

*) per 100,000 live birth

(#) per 1,000 women aged 15 - 49

(^) number of maternal death divided by number of deaths among women aged 15-49 (for the purpose of this report this has been changed from a fraction to be expressed as % for easier comprehension)(^ ^) the LTR is derived by multiplying the MMRate by 35 (the number of reproductive years from 15 to 49)

The interpretation (using the total) of the above statistics:-

1. There were a total of **2,797** (after adjustment¹³ from 2,034 unadjusted) maternal deaths during the period – this is considerably higher than the number reported to civil registration and captured by HMIS. It is also very much higher than what gets reported to the MDR system which is around 800. It is noteworthy that the MMEIG has been estimating it at between 1,500 to 2,000; and now with the data revealed by the census even this is clearly an undercount.
2. There were 282 pregnancy-related deaths (and taken to be maternal deaths) for every 100,000 live births – MMR was **282/100,000**. Again not surprisingly this is much higher than the MMR reported by HMIS or MDR, and even by MMEIG (178/100,000 in 2015). The census report makes reference to these differences – see *NOTES (*) below*.

13 Adjustment was made to account for some segments of the populations not covered by the census in three states (Rakhine, Kayin and Kachin)

3. Out of all deaths (all causes) in women 15 – 49 years, maternal deaths contributed to **9.8%** (PMFD).
4. For every 1,000 women 15 – 49 years old, there were 0.209 pregnancy related/maternal deaths, or about **2 per 10,000** (MMRate).
5. From this MMRate of 0.209 per 1,000 per year, it works out to be **7.3** per 1,000 for 35 years – therefore a woman in Myanmar during the course of her life from 15 to 49 years had a risk of a maternal death of 7.3. Conventionally LTR is expressed as odds or probability – for example LTR of 1 in 190 means that for every 190 women aged 15 – 49 who become pregnant one will die of a maternal death. The LTR of 7.3 from the census is translated into a probability of 1 in **137**¹⁴. This compares quite favourably with LTR estimates cited by other sources.

NOTES(*) : The 2014 Census report makes reference to the difference in MMR derived from two different sources the UN Interagency (MMEIG) estimate and the MDR report 2013 - and these are cited below (italics added).

Note 1 (page 15 – 16): An important comparative source of data on maternal mortality is the effort to estimate maternal mortality in most countries in the world undertaken by the WHO, UNICEF, UNFPA, The World Bank and the UN Population Division. This interagency undertaking includes countries with complete and reliable data, countries with incomplete or deficient data, and countries with no data at all; Myanmar is among the latter. For these countries the MMR is modelled. according to this model, the MMR in Myanmar was 200 per 100,000 live births in 2013. This ratio is lower than that derived from the 2014 census data (282). However this difference may not be statistically significant considering that it is within the confidence interval computed with the 2014 census data (176 – 387). Similarly, the range of uncertainty established in the interagency estimate ranged from 120 to 350. The census estimate is thus within this range. it is important to emphasise that, as these two methods and data sources of these two estimates are completely different, they would not be expected to produce the same results.

Note 2 (page 16): A second maternal mortality estimate and analysis was published by the Maternal and Reproductive Health Division (2013)¹⁵, using data based on computed births provided by the Ministry of Health the MMR estimate was 103 per 100,000. This value is outside the confidence interval corresponding to the census estimate as well as the inter-agency estimates, it is derived using actual maternal death data and not on pregnancy-related deaths, this difference however cannot explain the large difference from the estimate obtained from the 2014 Census. The Ministry of Health data are likely to be affected by serious under- estimation, as clearly and explicitly acknowledged in the publication.

¹⁴ The writer derived this by using the following – if out of 1000 women 0.209 die each year, in 35 of reproductive life years this works out to be 7.3. The odds/probability for one woman is therefore 1000 divided by 7.3 which is 137

¹⁵ This is the MDR report 2013

Table 3: Pregnancy-related mortality data from DHS 2015-2016

Age	Number of pregnancy related deaths	% of female deaths that are pregnancy-related (PMFD)	Pregnancy-related mortality rate (per 1,000)
15 - 19	0	2.6	0.02
20 - 24	3	7.7	0.13
25 - 29	4	8.2	0.15
30 - 34	8	14.2	0.33
35 - 39	4	10.4	0.18
40 - 45	4	7.0	0.26
45 - 49	0	0.0	0.00
Total	22 (*) or 23	8.1	0.16

(*) there seems to be an error in recording, this table records a total of 22 deaths, but the frequencies in the cells above total to 23 deaths.

The findings from the DHS are summarised in the report as follows:

1. The number of pregnancy-related deaths in the 7 year period was **22 (or 23)**, and since this was from a sample (unlike the census which was a total count for the country), this compares favourably with the census figure of 2,797; because the livebirths in the DHS was about 1% of the live births in the census (and 22 is slightly over 1% of the unadjusted number from the census – 2,034; and slightly lower than 1% of the adjusted number 2,797.
2. The pregnancy related mortality ratio (not shown in Table 2) - the DHS does not equate pregnancy-related mortality to maternal mortality, but for the purpose of this MDR report, this is taken as MMR - was **227 per 100,000 live births** for the 7 years before the survey which compares quite favourably with the census finding of 282 (in fact if the number is taken as 23 and not 22 deaths, assuming 23 is the correct number, the MMR will be higher than 227 – it will be 237).
3. The percentage of female deaths in age 15 - 49 that were pregnancy-related (PMDF) was **8.1%**, and this compares favourably with the census finding of 9.8%.
4. The MMRate was **0.16 per 1,000** (compared to 0.209 in the census), i.e. 1.6 for 10,000 women compared to 2 per 10,000 in the census – again these two sources do not differ in their findings.
5. The lifetime risk of maternal death was **1 in 200** (not shown in Table 2, but reported in the summary findings).

4.3. Comparing the MMR from Available Sources

Against the situation described in 4.1 and 4.2 above, the current situation on maternal mortality can be described in terms of comparing the figures derived from these sources. The following table summarises the MMR obtained from the Census, DHS, the MMEIG (for 2015), the Myanmar Yearbook 2015, the current MDR report, and HMIS.

Table 4: Maternal deaths and MMR estimates from conventional sources

	Census	DHS	MMEIG	Yearbook 2015	MDR	HMIS
Year	2014 (a)	2016 (b)	2015	2013	2016	2016
Estimated number of maternal deaths (c)	2,797	(d)	About 1,7000	Not available	823	796
MMR (e)	282	227	178	143	94.9	91.8

- (a) The Census taken on 29 March 2014 covered the period 30 March 2013 to 29 March 2014.
- (b) The DHS was conducted in 2015 – 2016, but the question on death (including maternal death) in the household was asked for the 7 years period before the date of the interview.
- (c) The Census and DHS collected pregnancy-related deaths and not maternal deaths.
- (d) The exact number can be determined by calculating, based on 22 deaths in a sample of the population in the past 7 years; but the writer did not attempt this.
- (e) These MMR are derived using different figures for live births - census and DHS collect the number of livebirths in the period under study, the Yearbook and HMIS uses the live births provided by the Central Statistical Organisation (CSO), the MDR uses livebirth figures provided by HMIS of MOHS.

The very significant disparities among these MMR figures can be explained to some extent, as follows:

1. Reporting of deaths is well-known to be low in most developing countries where CRVS (Civil Registration and Vital Statistics) system is weak and poorly developed. The HMIS which relies heavily on CRVS provided by the CSO therefore recorded a very low figure of only 796 deaths (only 28% of the 2,797 deaths found in the census). The Yearbook which presumably uses a different methodology.
2. The number of maternal deaths reported to the MDR system (823) is higher than the number in HMIS (796), because the midwife serving a catchment area monitors the pregnant women under her care; and with the MDR in place the midwife is likely to actively go and find out if maternal deaths have occurred. But this is still a grossly under-count of the real number of maternal deaths.

Besides the significant difference in the number of maternal deaths (numerator) the great variance in the MMR is also contributed by the difference in the number of livebirths recorded by each of these sources - see note (e) in Table 4 above.

In summary therefore, the situation of maternal mortality in Myanmar in 2016 is best represented by the finding from the Census. But this does not allow this report to describe the trend over time since 1990 which can only be done with MMR estimates provided by the MMEIG.

CHAPTER 5.

MATERNAL DEATH REVIEW (MDR) IN MYANMAR

5.1. The Beginning

The MCH section in Department of Health started maternal death notification from all over the country in 2003, which besides the getting the number of deaths, also collects information on pertinent variables such as place and time of death, type of providers and cause of death. In 2005, following technical assistance from SEARO/WHO, in the use of the guidelines *“Beyond the Numbers – Reviewing Maternal Deaths and Complications to Make Pregnancy Safer”*, Myanmar introduced maternal death review (MDR) as a pilot in Sagaing Region. Of the five methods of MDR, described in this guide, two methods were conducted in Myanmar; a community-based MDR in the pilot townships in Sagaing (which has since then been scaled up nationwide), and a facility-based MDR conducted in the three teaching/university hospitals (Yangon-1, Yangon-2 and Mandalay) and a few other hospitals.

The verbal autopsy in the community-based MDR used a 32-page reporting form which elicits information on socio-demography, medical history, and past and present obstetric history. The community-based MDR also includes a review of the home-based maternity record. In the case of hospital deaths, there are additional processes - review of the patient records, post mortem examination findings, and comments from the hospital doctors and other staff. The filled form is then reported by the township health office to State/Region level and feedback is given to Basic Health Staff. Maternal death review team members from State/Regional level review these forms, make comments and note the actions taken, and forward it to the central level. At the central level, maternal death audit teams review the reported deaths and provide feedback.

5.2. The Progress

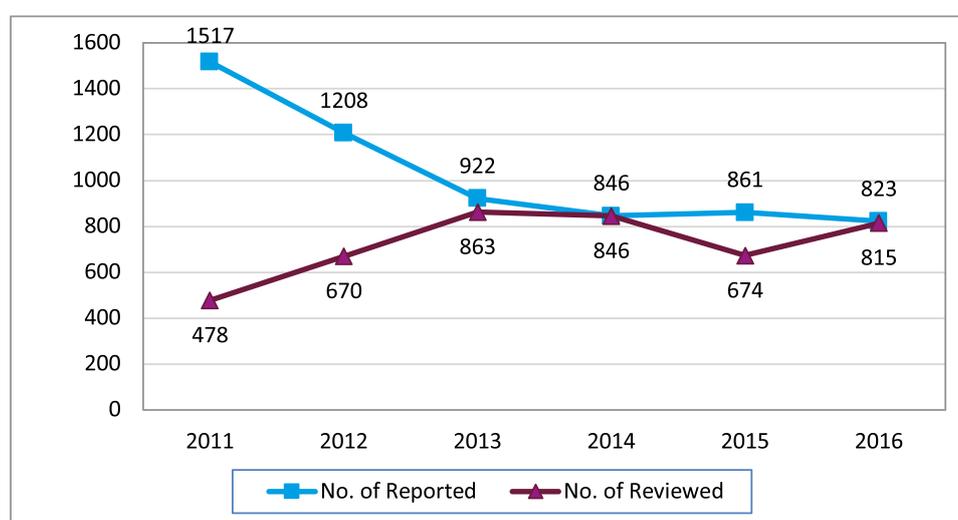
Overall, this first well-organised effort for MDR was a suitable starting point for Myanmar. The performance of this effort was evaluated in 2011, when the Regional Office for the South East Asia Region of WHO (SEARO) conducted a study in five countries (one of which was Myanmar which conducted the study in 10 townships) on the implementation of MDR. The objectives were to elicit information on the implementation of MDR in the country, document the experiences of the MDR initiatives, recommend strategies for strengthening of MDR, and draw lessons and share the country’s experience with each other and with other countries in the Region. The study in Myanmar revealed useful findings that led to efforts to improve and strengthen the MDR.

The MDR progressed in terms of increasing number (proportion) of maternal deaths reported that were reviewed. This increase in review rate was reported in previous MDR reports. In 2016, out of 823 maternal deaths reported to the MDR, review was conducted in 815 (99%), this maintaining the high rate of review. In the MDR 2015 report, a table showed the progress from 2011 to 2015, and it made the observation that there was a notable decline in the review rate in 2015. This table is reproduced below with the addition of the performance in 2016, and it shows that the review rate has increased appreciably from 2015.

Table 5: Trend of maternal death reviews (MDR) Myanmar 2011 - 2016

	Number of maternal deaths (source)	Number reported	Number (%) reviewed
2011	2,000 (MMEIG)	1,517	478 (31.5%)
2012	2,000 (MMEIG)	1,208	670 (55.5%)
2013	1,900 (MMEIG)	922	863 (93.6%)
2014	Not available	846	846 (100%)
2015	Not available	861	674 (78.2%)
2016	2,797 (Census)	823	815 (99.0%)

Figure 2. Trend of maternal death review (MDR), Myanmar 2011 – 2016



5.3. The Strengths and Weaknesses

In the past MDR analysis and reports, the strengths, weaknesses and challenges of the MDR were highlighted. The major strength was the progress made in scaling up the MDR from a pilot to nationwide implementation, and to make it ready to be transformed to MDSR. In terms of the progression in the MDSR itself, the increase in the rate of review is encouraging and impressive (but this is offset by the small number of maternal deaths being reported to the MDR system, less than one third of estimated number of maternal deaths are reported).

Some of the strengths that have led to this good progress identified since early in its inception, were - committed and effective leadership was demonstrated from the beginning; competence and motivation of staff has gradually improved since the MDR started; the formal evaluation of MDR in 2011 helped in identifying shortcomings and institutionalization of remedial measures; the developing and implementing the COIA roadmap a year later in 2012 gave further visibility to MDR and MDSR; the continuing technical support from WHO since the introduction of the guide “Beyond the numbers”, to the evaluation, to the development of a roadmap to make MDR move towards MDSR provides sustainability to the initiative; and finally there has been effective and coordination among stakeholders.

Most of the weaknesses in the MDR are relate to gaps in information. These include - under-reporting of maternal deaths which was always suspected and now confirmed by the findings of the census

finding; lack of information on population at risk (denominator) which makes it impossible to derive rates that can portray risks unlike proportions and percentages which are resorted to; issues related to causes and classification of maternal death (there is still lack of understanding on the classification of pregnancy-related deaths and maternal deaths, as well as lack of knowledge in the ICD-10); lack of information on circumstances surrounding the death with poor understanding of the concept of the three delays in seeking care; and inadequate number of variables studied in the MDR (such as no information to assess socio-economic status, information on place and mode of delivery).

CHAPTER 6.

PROFILE OF MATERNAL DEATHS 2016

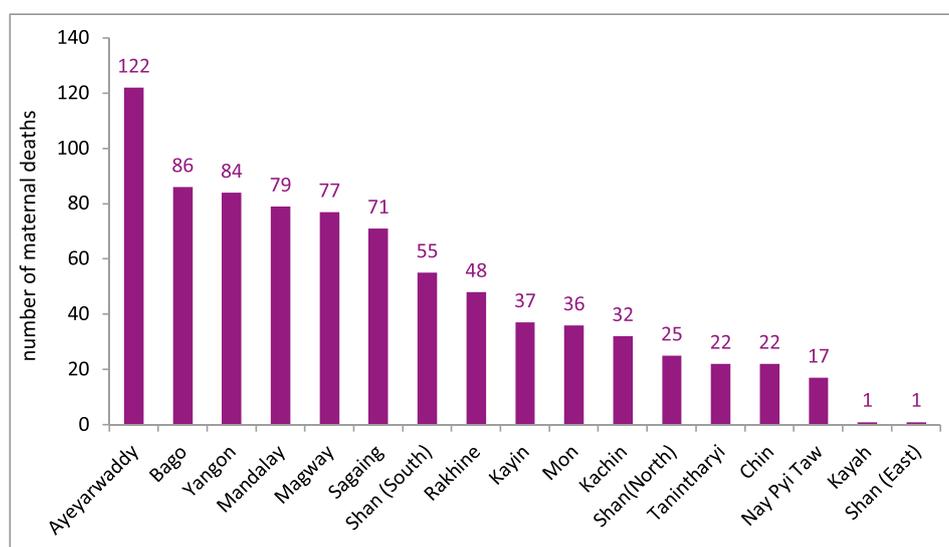
There were 823 maternal deaths reported to the MDR in 2016, out of which 815 were reviewed. The MMR from this number (823) is 94.9 per 100,000 live births. Earlier, in Section 4, a description was given on this number vis-à-vis the burden of maternal mortality elicited by other sources, in particular the Census 2014 and the DHS 2015-2016; unfortunately there is as yet no report from the MMEIG which is the conventional and consistent source of MMR estimates that allow comparison among countries and gives trend over time since 1990.

The following subsections describe the distribution of these 815 deaths by the relevant variables collected in the verbal autopsy of the MDR.

6.1. Maternal Deaths by Geographical Area (Region/State, Urban-Rural)

The 815 maternal reviewed in 2016, in absolute numbers are distributed by State/Region as shown in Figure 3. The largest numbers exceeding 70 were reported from six states/regions – Ayeyarwaddy, Bago, Yangon, Mandalay, Magway and Sagaing. Notably Kayah and Shan East had only one death each.

Figure 3: Number of maternal deaths 2016 by State/Region



This ranked order based on absolute number is not valid for comparison and indication of risk, which requires either maternal mortality rate (which is not easily available for lack of denominator) or the more easily and universally accepted measure of maternal mortality ratio (MMR) with number of livebirths as the denominator. In Table 6, these absolute numbers are shown against the maternal mortality ratio (MMR); the States/Regions are listed in ranked order. The MMR found in the 2014 Census is shown in the last column with the category in parenthesis. The Census categorises the States/Regions into four levels of MMR – low (157-230), medium-low (230-277), medium-high (227-315) and high (315-357). Shan State is considered as one entity in the Census instead of three entities as in MDR.

Table 6: Ranking and distribution of maternal deaths and MMR 2016, by State/Region, and MMR in 2014 Census by State/Region

Rank	State/Region	Livebirths	Number of maternal death	MMR /100,000 LB	MMR from census (category)
1	Chin	12,091	22	182.0	357 (high)
2	Shan (South)	44,911	55	122.5	278 (medium high) – Shan state (*)
3	Magway	64,707	77	119.0	344 (high)
4	Ayeyawady	104,485	122	116.8	354 (high)
5	Kayin	33,222	37	111.4	276 (medium low)
6	Tanintharyi	20,601	22	106.8	157 (low)
7	Bago	83,318	87	104.4	316 (high)
8	Kachin	30,840	32	103.8	270 (medium low)
	UNION	867,410	815	94.9 (**)	282
9	Mon	37,880	36	94.0	217 (low)
10	Nay Pyi Taw	18,151	17	93.7	198 (low)
11	Rakhine	64,150	52	81.1	314 (medium high)
12	Sagaing	90,414	71	78.5	271 (medium low)
13	Yangon	104,706	84	80.2	213 (low)
14	Mandalay	104,196	79	75.8	280 (medium high)
15	Shan (North)	36,809	25	67.9	
16	Shan (East)	10,296	4	38.9	
17	Kayah	6,633	1	15.1	276 (medium low)

(*) If the three Shan states are combined as one entity in 2016 data, the number of deaths (84) would derive MMR of 91.3 per 100,000 which would rank it in eleventh place between Nay Pyi Taw and Rakhine

(**) The MMR for Myanmar is based on 823 maternal deaths (the number reported), not 815 (the number reviewed)

This distribution of MMR by state/region is depicted graphically in Figure 4.

Figure 4: Maternal Mortality Ratio (MMR), 2016, by State/Region

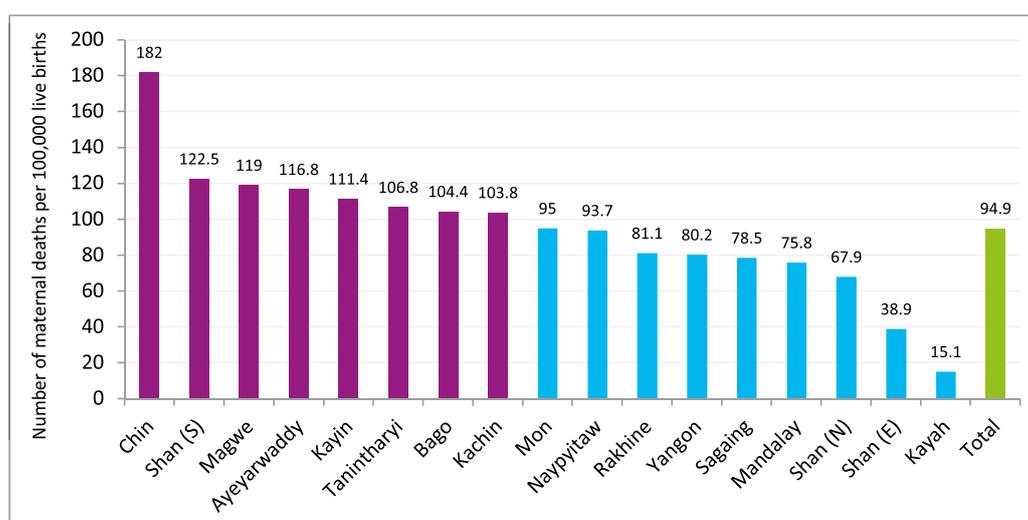


Table 7 shows the state/regions with the highest MMR for 2103, 2015, 2016, and as found in the 2014 Census. What is seen is the almost consistent profile in terms of the state/regions reporting the highest MMR – Chin, Magway, Ayeyawady as the three states consistently with high MMR; followed by Bago and Rakhine.

In 2016, the MMR Tanintharyi (which in previous years had reported low MMR) showed a dramatic increase with 22 deaths and MMR of 106.8, one of the eight states that surpassed the national figure of 94.9 per 100,000. In the Census, Tanintharyi is one of four states that were in the low category (along with Nay Pyi Taw, Yangon and Mon). On examining these 22 deaths there appears to be no common feature shared by them. Therefore the reason for the dramatic increase in Thanintyari (whether real or spurious) remains unknown.

Another state that reported a higher than usual number of deaths in the MDR 2016 was Shan South, with 55 deaths, and the MMR of 122 placed Shan South as number two in the ranked order, second only to Chin. This MMR was almost equal to the MMR of this state in 2013 (123) when it was ranked in fourth place, but in 2015, Shan South was ranked eighth with MMR of less than 100 (98), lower than the national MMR of 100. In the census 2014, which counted Shan as one entity, the MMR (276) was lower than the national figure of 282, and it ranked seventh (in the absence of the raw data, it is not possible to derive the MMR of the three Shan entities separately).

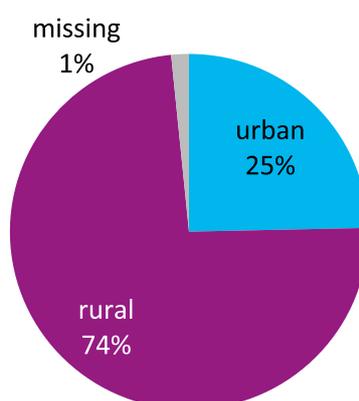
Table 7: Comparing MMR (per 100,000 livebirths) of states with high MMR, 2013, 2015, 2016 and Census 2014, with highlights for Shan and Tanintharyi

	2013	2015	2016	Census 2014
MMR for country	103.3	100.0	94.0	282
1	Magway (145.9)	Chin (162)	Chin (182.0)	Chin (357)
2	Ayeyawady (144.8)	Ayeyawady (136)	Shan South (122.6)	Ayeyawady (354)
3	Chin (126.2)	Magway (128)	Magway (119)	Magway (344)
4	Shan South (123.4)	Rakhine (116)	Ayeyawady (116.8)	Bago (316)

	2013	2015	2016	Census 2014
5	Yangon (112.7)	Kachin (114)	Kayin (111.4)	Rakhine (314)
6	Bago (108.1)	Kayah (114)	Tanintharyi (106.8)	Mandalay (280)
7	Kachin(103.7)	Bago (109)	Bago (104.4)	Shan (278)
8		Shan South (98)	Kachin (103.8)	Kayin, Kayah (276)

By urban-rural residence – As stated in previous MDR reports 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. In 2015, the deaths in rural area accounted for 81%. In this MDR 2016 analysis, there is still preponderance of rural deaths (74%) as seen in Figure 5, but this is lower than the 81% in 2015. Earlier, in Section 4.1 (Table 1) it was observed that there has been a gradual narrowing of the gap between rural (which has declined) and urban (which has increased) figures. Therefore there is coherence in this feature between the Statistical Yearbook and the MDR. This trend if it continues, is something that needs further study.

Figure 5: Maternal mortality 2016, by urban-rural residence



Earlier in Section 4.2, it was mentioned that Chapter 9 (Maternal Health) of the DHS 2015-2016 contain information on maternal health care. While these are not related to maternal deaths but women of reproductive age (the sample was on women 15-49 years old who gave birth to a live child in the past 5 years), the information offers background information, and to some extent can be perceived as population at risk. This chapter in the DHS report has several information related to antenatal care especially for skilled attendance, and on place of delivery, therefore this is presented in Section 6.5 and Section 6.7.

6.2. Socio-economic status (education and occupation)

There are only two variables to assess socio-economic status (SES) – education and occupation of the deceased woman. This has been repeatedly referred to as being insufficient as proxy measures of SES. Figure 6 shows the educational level attained by the deceased women, and Figure 7 shows their occupation. The profile is no dissimilar from that observed in previous years, and the distribution is likely to be similar to that of the women who became pregnant and underwent childbirth. The numbers in Figure 6 are transformed to 11% illiterate (93 deaths), and 54% could read/write and had completed primary education (50+393 deaths), and the 197 who had higher than primary education equals 24%. These figures do not differ from 2015, when 14% of the women who died were illiterate, 53% had up to primary education, and 24.2 % had education higher than primary level.

This year, with the advantage of the Census 2014 findings, this profile can be studied slightly more in depth – by which correlation can be attempted with the educational profile of females in the whole country. The percentage of females who were illiterate is 13%, and those with no education and only primary education was 66%. This profile can be interpreted as in coherence with the MDR findings, although there is some difference in categorization (the census lumped no education with primary education, thus giving 66% which is higher than the 54% of MDR).

Similarly, the occupation profile does not differ from MDR in previous years. Slightly less than half (395 or 48.5%) were housewives – in 2015 this percentage was slightly more than half (53%). Those engaged in agricultural work is the same for both years – 22%, as well as manual worker (115 in 2016 and 14% in 2015).

Chapter 9 (Maternal Health) of the DHS 2015-2016 gives information on the influence of education and socio-economy on antenatal care (see Section 6.5) and place of delivery (See Section 6.7). While these are not on maternal deaths, but on women who had a livebirth in the past 5 years, it provides useful background information.

Figure 6: Maternal mortality 2016, by education status of the deceased

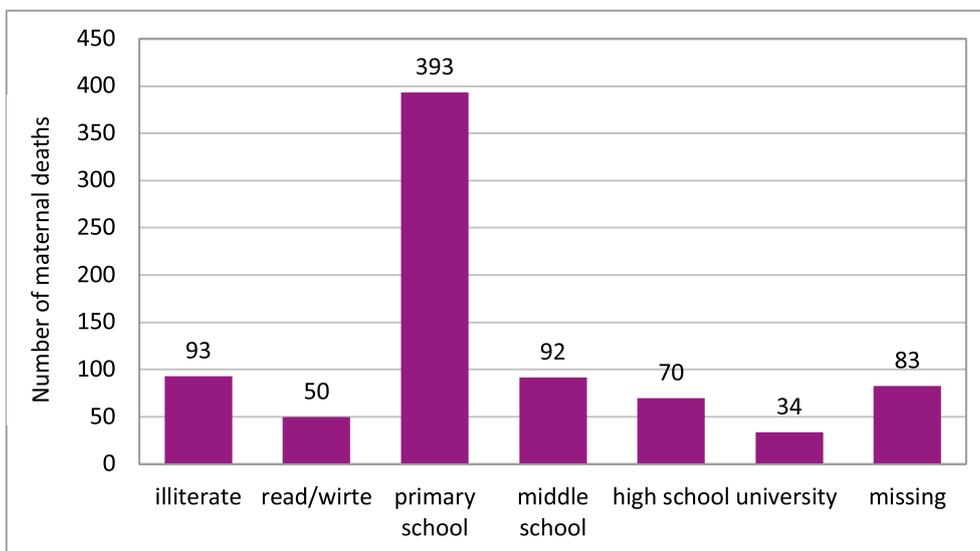
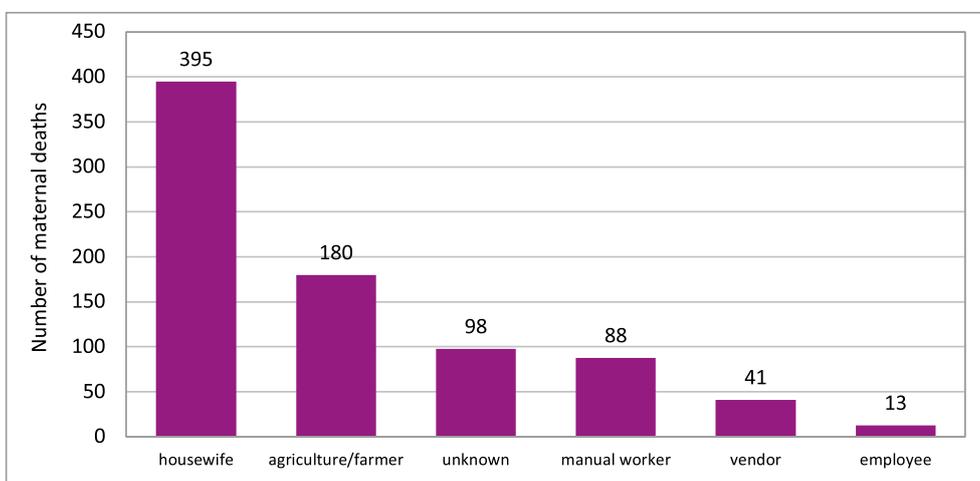


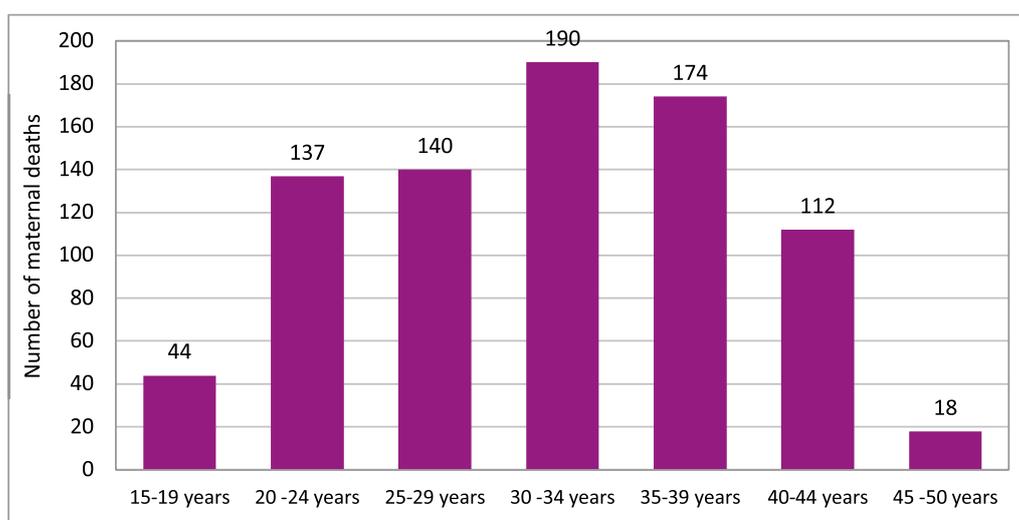
Figure 7: Maternal mortality 2016, by occupation of the deceased



6.3. Age

The well-established relationship between maternal age and maternal mortality provides the basis for family planning and child spacing, and is an important consideration in assessing risk and managing high-risk pregnancy. The analysis revealed that the mean age of women who died was 31.3 years (the youngest was 15 and the oldest was 50 years old). As expected, the most number and highest proportion of maternal deaths in 2016 were in women aged 30 to 39 (365 deaths or 44.8%). See Figure 8. There were 44 (5.4%) teenage deaths – in 2015, this frequency was 48 deaths or 7%. Women above 40 years old who died of maternal death numbered 140 (16%); this was 11% in 2015.

Figure 8: Maternal mortality 2016 by age



Age is one variable that was studied in the Census 2014 which provides opportunity for comparison of their findings with MDR. The DHS also studied age of the pregnancy-related deaths but because there were only 23 deaths in the sample, this small number is not included for comparison here. Table 8 shows this comparison between MDR 2016 and Census in terms of percentage distribution. There is very close coherence between these two sources.

With the availability of a denominator (number of live births for each of the age groups), the Census has the additional useful data of age-specific MMR shown in the fourth column. This reveals the age-related risk to maternal deaths, with the extremely high MMR of more than 1,000 in the age group 45 – 49, and the lowest MMR is for the age group 25 – 29.

Table 8: Comparing age distribution of maternal deaths in MDR 2016 and Census 2014

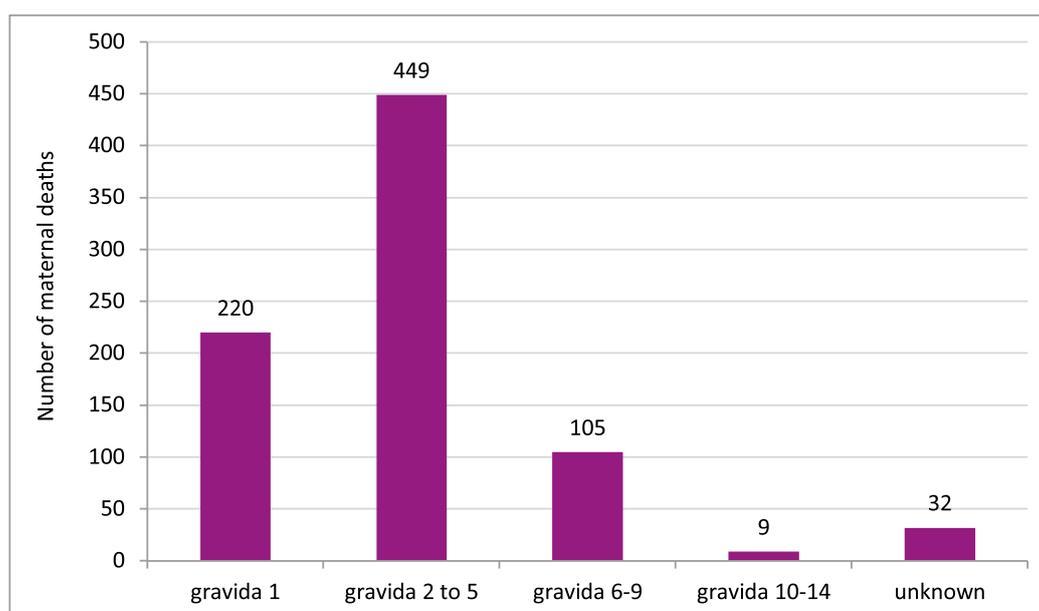
Age group	MDR 2016 Number (%)	Census 2014 Number (%)	Census 2014 MMR	Remarks
15 - 19	44 (5.4)	171 (6.1)	228.6	Teenage pregnancy has high risk, and if unmarried risk is higher because of social stresses
20 - 24	137 (18.8)	512 (18.3)	224.6	This age is still considered young for motherhood but lower risk than 15-19
25 - 29	140 (17.1)	505 (18.0)	187.9	This age group is considered as the lowest risk for childbearing

Age group	MDR 2016 Number (%)	Census 2014 Number (%)	Census 2014 MMR	Remarks
30 - 34	190 (23.3)	562 (20.1)	260.1	The risk is higher than 25-29 group, but the risk is still relatively low, and is lower than the overall MMR of 282
34 - 39	174 (21.3)	584 (20.9)	422.5	The risk is higher, and first time pregnancy women after age 35 are termed as "elderly primigravida" and managed as high risk/precious pregnancy
40 - 44	112 (13.7)	334 (11.9)	592.0	This age is high risk age for childbearing, the increase from 422.5 to 592.4 is significant
45 - 49	18 (2.2)	129 (4.6)	1,132.4	The risk increase significantly at this advanced age, and the MMR of 1,132 is extremely high
Total	815 (100)	2,797 (100)	282	

6.4. Gravida/Parity

Besides age, the order of pregnancy (closely associated with age) is related to risk of obstetric complications and maternal death. A primigravida especially at advanced age, and grand multigravida (gravida 5 and above) are at higher risk of maternal death compared to the category of 2 to 5 gravida. In 2016 (Figure 9) the distribution of maternal deaths by parity does not appear to be different from the distribution of women who were pregnant; with 449 deaths (55%) being in gravida 2 – 5; 220 (27%) in gravida 1; and 105 (12.9%) in gravida 10-14. A very small number (only 9) were women who have had more than 10 pregnancies.

Figure 9: Maternal mortality 2016 by gravida/parity



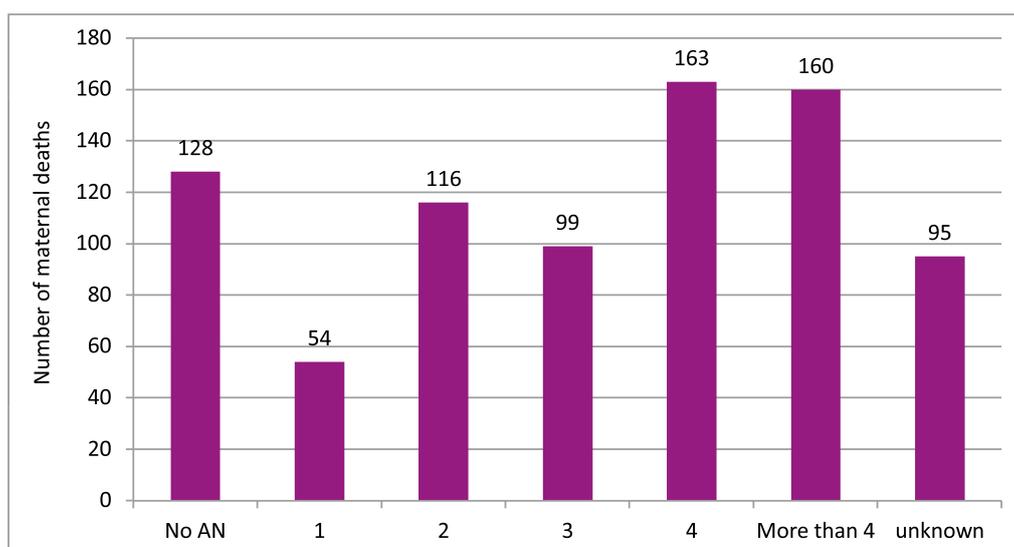
6.5. Care during Pregnancy (Antenatal Visits, Tetanus Immunization)

The number of antenatal visits is an indicator of reproductive health in MDG5b and now in SDG3 – with two standards prescribed - at least one and at least four visits¹⁶. In previous MDR reports, no correlation was observed between the number of antenatal visits and maternal deaths (based on proportions, not on rates). See Figure 10. In the 2016 review, there is a large number (128) deaths that had no ANC visits, and a similarly high number among those who had four (163) and even more than four ANC visits (160). There were fewer deaths among those who had one or three visit. This profile can be explained by the likelihood that women who were identified as high-risk pregnancies (and therefore had a higher risk of maternal death), to have made more visits compared to women who had lower risks.

Antenatal care by skilled attendants is a major domain covered in Chapter 9 of the DHS 2015-2016 (on all women of reproductive age, not on maternal deaths). The findings related to ANC are summarised briefly below.

- ◆ *State/region:* The coverage of ANC by skilled attendants ranged from 68% in Shan state to 95% in Yangon region.
- ◆ *Number of ANC visits:* 81% of women had at least one antenatal visit from a skilled attendant; this national average is broken down to urban-rural as follows – 94% among urban women and 77% among rural women. Fifty-nine percent (59%) of women had 4 or more ANC visits from skilled attendants; 84% in urban areas and 51% in rural areas; 16% of rural women compared to 4% of rural women had no ANC visit.
- ◆ *Education:* Women who had completed secondary education are twice as likely compared to women with no education to have had ANC by a skilled attendant; had 83% coverage for institutional deliveries compared to 13%; and 95% had births attended by SBA c to 28%.
- ◆ *Economic status:* Women in the highest wealth quintile had 98% coverage of ANC by SBA while in the lowest wealth quintile, the coverage is 67%.

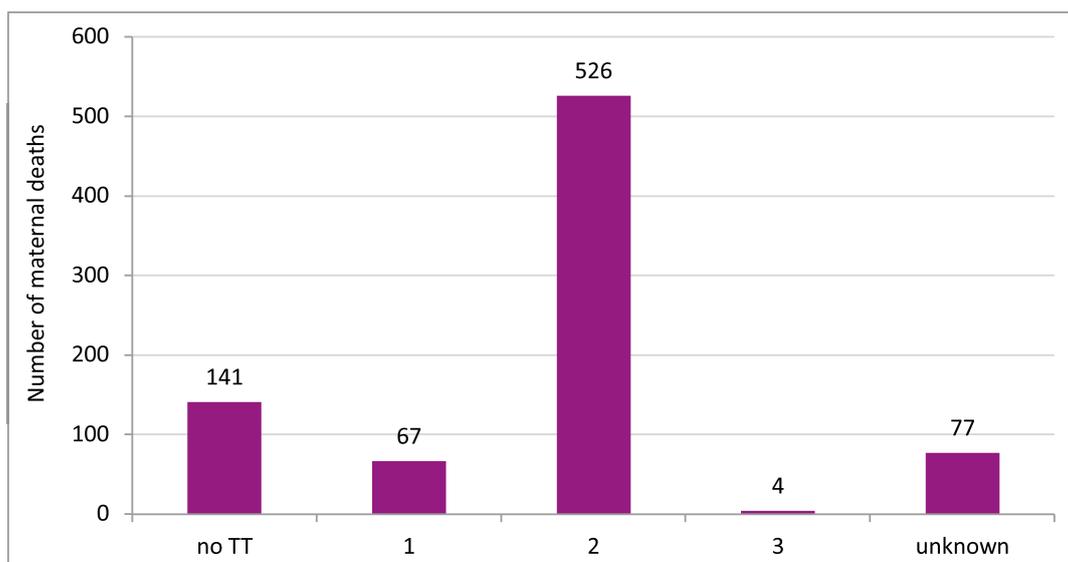
Figure 10: Maternal mortality 2016, by number of antenatal visits



¹⁶ This has been recently updated, in the publication *WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience (2016)*, the recommended number of antenatal “contacts” is eight (8)

Immunization against tetanus is aimed to prevent tetanus neonatorum, and it has no influence on the health of the mother or her risk of maternal complications and death (and therefore this information is not needed in a MDR). The finding in 2016 (Figure 11) was the same as in previous years – the most number of deaths were among women who had two injections of the anti-tetanus toxoid, which is the profile of all pregnant women. Taking the number of women who died who had adequate TT immunization (2 or more injections) as 530, the coverage for protection against tetanus neonatorum is 65%. In the DHS, it was found that of women in reproductive age 72% had adequate protection with ATT injections.

Figure 11: Maternal mortality 2016, by tetanus immunization status



6.6. First Provider of Care

Figure 12 shows the distribution of maternal death by first provider of care. As expected the largest number (235) received first care from midwives, but even this constitutes only 29% of the deaths. The is very closely followed by doctors (230 or 28%). This means that both midwives and doctors who are skilled attendants accounted for 57%. It is also not unexpected that 123 or 15% sought first care from a TBA, and 67 women or 8% had the AMW as the first provider of care. Another 8% (63 women) did not receive care at all. This profile has not changed from previous years.

Because of absence of denominator (the number of pregnant women – who survived and who died - who were first provided care by each of these category of health provider), it is not possible to assess the role of the first provider on the risk of maternal death.

Figure 12: Maternal mortality 2016, by first provider of care (cadre of health provider)

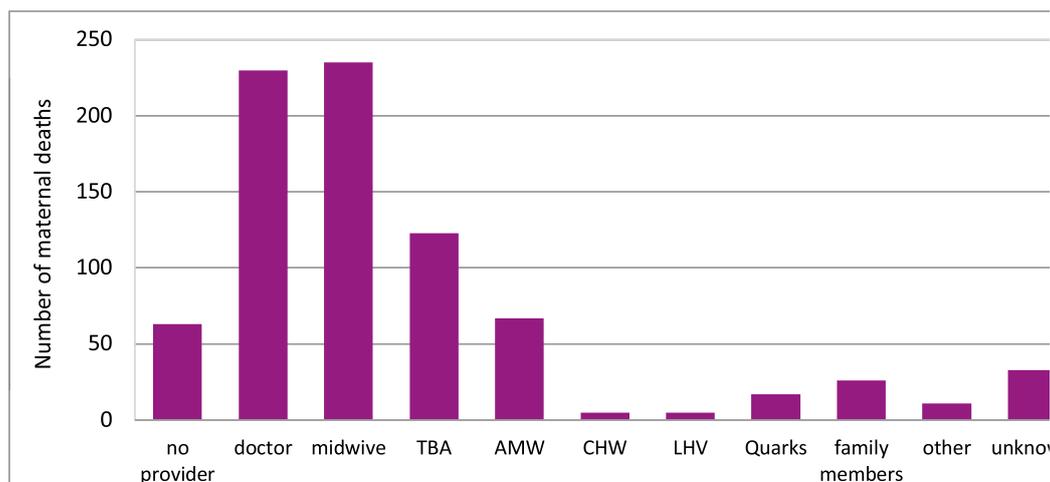
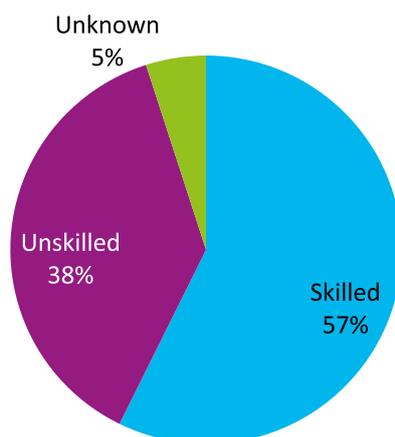


Figure 13: Maternal mortality 2016, by first provider (skilled and unskilled)

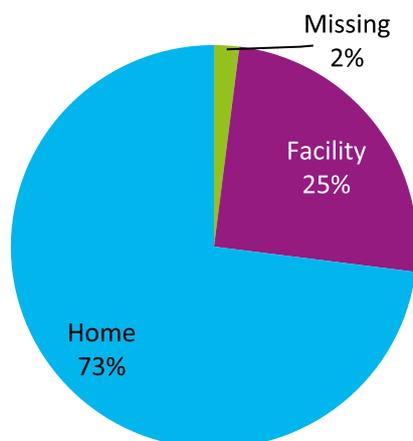


The first provider is also correlated with place of death (see Section 6.10), and the delay in seeking care (see Section 6.12).

6.7. Place of delivery

Place of delivery was made available for the first time in MDR 2016 review; it was not available in the data from the reviews in previous years. In 2016, 73% of childbirths were at home, and only a quarter (25%) were in a health facilities.

Figure 14: Maternal mortality 2016, by place of delivery



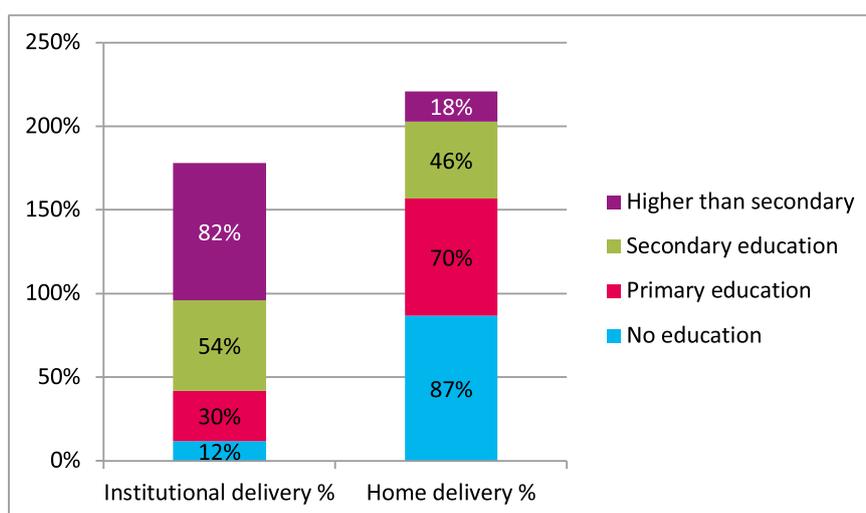
The background information from the DHS 2015-2016 profile on women of reproductive age – the percentage for home deliveries was 63% and institutional deliveries 37%.

The DHS findings also reveal the relationship between education and socio-economic status with place of delivery, which serves as useful background information (and proxy denominators) for maternal deaths. The proportions are shown in Table 9 and Figure 15. The role of education is very clear, with an almost inverted profile between the no-education and higher-than-secondary education groups.

Table 9: Institutional and home deliveries among women of reproductive age (DHS 2015-2016) and education status

Education status	Institutional delivery %	Home delivery %
No education	12	87
Primary education	30	70
Secondary education	54	46
Higher than secondary	82	18

Figure 15: Institutional and home deliveries among women of reproductive age (DHS 2015-2016) and education status



6.8. Attendant at delivery

In terms of attendant at delivery, as also the place of delivery, there is no data in the analysed profile of MDR, and this is one of the variables that will be added after the MDSR is reviewed/ evaluated and improvements will be made.

The DHS however has detailed information on deliveries, especially in comparing skilled and unskilled attendant at birth. The findings show 60% of the births were attended by skilled personnel or SBA (doctor, nurse, midwives), 29% by TBA, 6% by AMW and 4% by others. Unfortunately there is no information on this variable in the MDR for comparison. One variable that can possibly be used is the attendant before death (Section 6.6) but these includes all deaths – not only during childbirth but antenatal and postnatal deaths as well (Section 6.9).

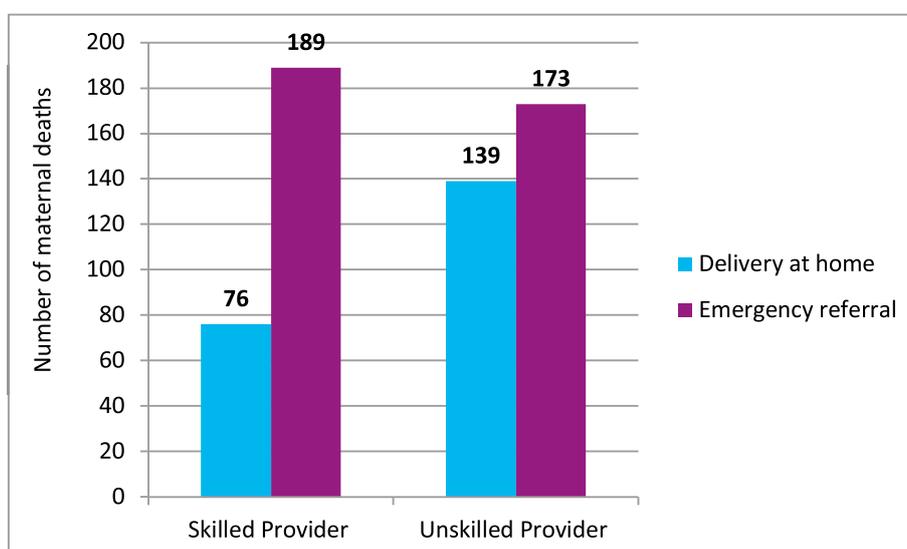
6.9. Emergency Referral

In MDR 2016, data was available for emergency referral, which was not analysed in 2013 and 2016. Overall, the distribution of deaths having had a referral was almost equal – 47% had referral, 51% did not and in 2% there was missing data. The data suggests that there is a relationship between the attendant at the delivery (skilled or unskilled) in making emergency referrals and delivery at home (assumed that no referral was made). See Table 10 and Figure 16. It is observed that a skilled attendant tended to make more emergency referrals (189 or 71%) and conducted less home deliveries (76 or 29%). Unskilled attendants also tended to make more emergency referrals (173 or 55%) than conduct deliveries at home (139 or 45%), but the difference between these frequencies is smaller than that for skilled attendants. Needless to say, some caution needs to be exercised in interpreting this finding. In the absence of more information (which cadre of skilled attendant, which level of care where delivery took place, which level was the referral made), the interpretation is limited.

Table 10: Attendant at birth and emergency referrals/home deliveries delivery

Attendant at birth	Emergency referrals	Home deliveries	Total
Skilled attendant	189 (71%)	76 (29%)	265 (100%)
Unskilled attendant	173 (55%)	139 (45%)	312 (100%)

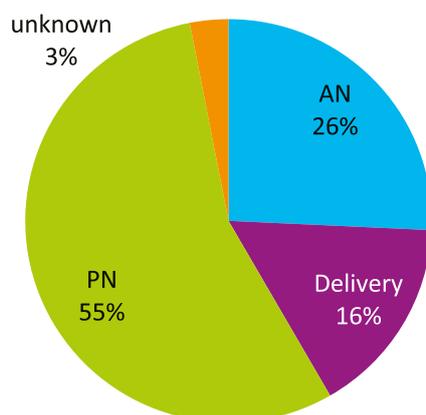
Figure 16: Maternal mortality 2016, first provider of care and emergency referrals



6.10. Time of Death

The MDR 2016 showed that 16% of the maternal deaths were in the antenatal period, 26% in the intra-natal period (during delivery), 55% in the post-natal period; and in 3% there is no information. In 2015 (Figure 17).

Figure 17: Maternal mortality 2016 by time of death



The time of death was a variable collected in the Census and DHS. The DHS however did not include this in the report; probably because of the very small number of deaths (23 in the past 7 years). Table 11 and Figure 18 compare the profile seen in MDR 2013, 2015 and 2016 and the Census. The observations are:

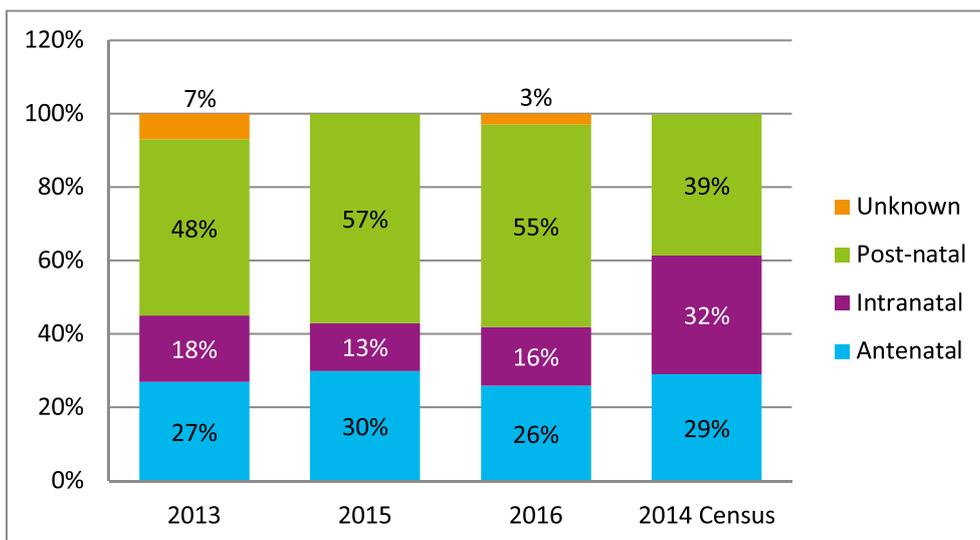
- ◆ the three MDR profiles (2013, 2015, 2016) show a consistently similar profile
- ◆ the Census data show the same percentage for antenatal deaths as the MDR, but there are more intra-natal deaths and less post-natal deaths compared to the MDR findings.

It is difficult, if not impossible, to find an explanation for this difference between MDR and Census, and there is no reason or assumption that can be made as to which of these two is the more reliable.

Table 11: Maternal Mortality (%) by time of death in 2013, 2015, 2016 and Census

	2013	2015	2016	2014 Census
Antenatal	27	30	26	29.1
Intranatal	18	13	16	32.4
Post-natal	48	57	55	38.5
Unknown	7	<1	3	
Total	100	100	100	100

Figure 18: Maternal Mortality (%) by time of death in 2013, 2015, 2016 and Census



6.11. Provider of Care before death

As to the provider of care before death (Figure 19 and 20), more than half (465 or 57%) were doctors, and the same was observed in the previous year, in 2015 this proportion was also 57%. Midwives were the providers for 65 deaths or 8% (this was 11% in 2015). Therefore skilled personnel accounted for two-thirds (66%) of attendants before the death. This profile is expected because complicated pregnancies and deliveries are more likely to be attended to by skilled personnel especially doctors. There were 44 women or 5% who died with no attendant.

Figure 19: Maternal mortality 216, by provider of care before death

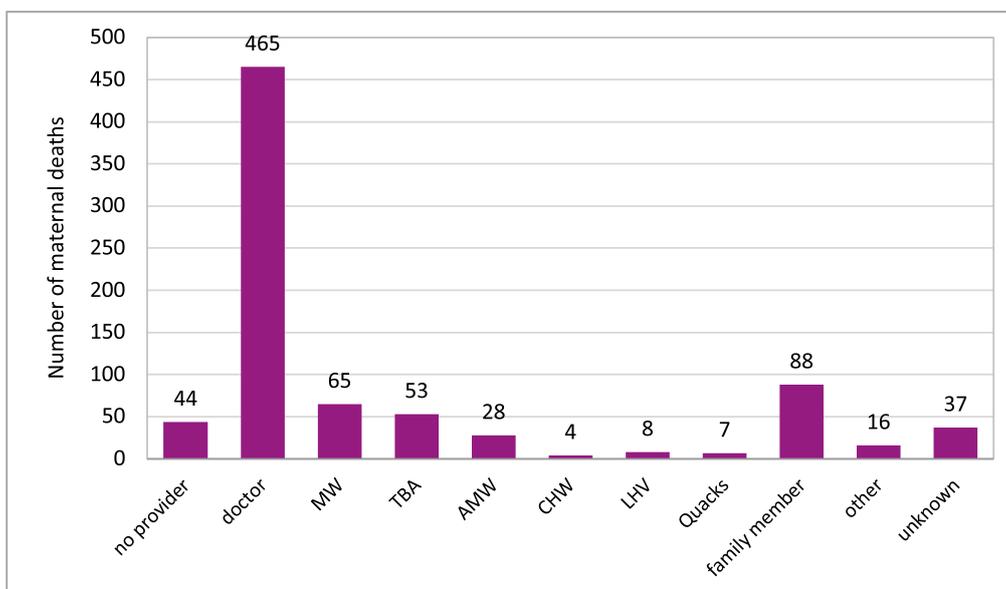
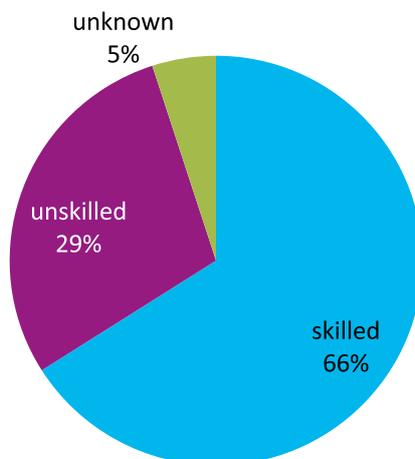


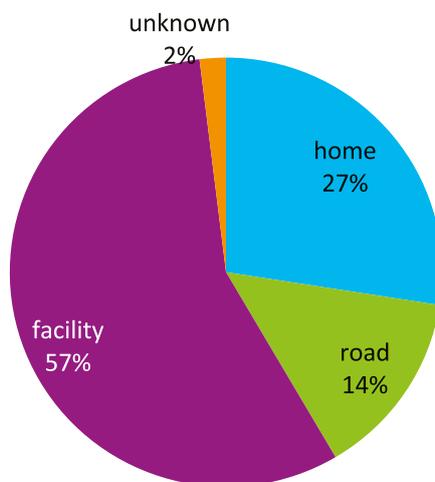
Figure 20: Maternal mortality 216, by provider of care before death (skilled and unskilled)



6.12. Place of death

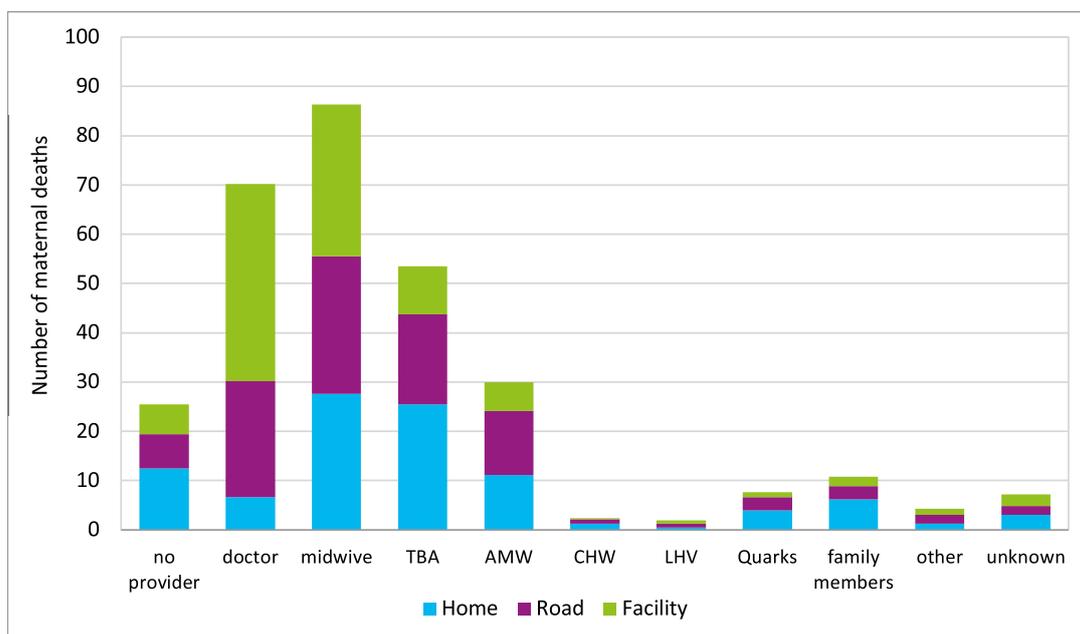
Fifty-seven percent (57%) of maternal deaths were in facilities, 27% at home, 14% on the road and in 2% there was no information (Figure 21). This is similar to the profile in 2015 when 56 % died at the hospital while 27 % died at home and 17 % died on the way to health facility.

Figure 21: Maternal mortality 2016 by place of death



The place of death was also cross-analysed with the first provider of care. This is shown in Figure 22 which shows that there is no relationship between these variables; regardless of which cadre of health provider was the first provider, the proportion of deaths that occurred in facility or home or on the road were the same.

Figure 22: Maternal mortality 2016 – place of death and first provider of care



Besides linking it to referral and first provider of care, the place of death is also analysed in relation to the distance and time to the nearest health centre and hospital.

6.13. Distance and Time to a Health Facility and to Hospital

This variable is a reflection of the ease of getting to a health facility for services (antenatal, childbirth and postnatal); and very importantly the ease of getting to emergency obstetrics care (EmOC) when complications arise. The health facilities are categorized into health centres (which include urban health centres, rural health centres, rural health subcentres) and hospitals. The findings are not different from previous years, and as in previous years there are a lot of missing data, and the reader is reminded to exercise caution in interpreting this data.

HEALTH CENTRE (Figures 23 and 24) : In terms of distance from a health centre, a majority (576 or 70%) of women who died lived within five miles of a health centre, and among these 199 or 24.4% lived within a mile, and only 88 or 10.8% lived more than 5 miles away. In 2015, 76 % lived within 5 miles from a health centre, and 17.4 % lived within one mile from health centers, and 23.4 % lived more than 5 miles away. In terms of the time needed to reach a health centre, a similar paradoxical relation is observed – as many as 526 or 64.5% could arrive at a health centre in less than an hour; 139 or 17% within 3 hours and only a very small number (19 or 2.3%) needed more than 3 hours. In 2015, the corresponding percentages were 70.6% (within one hour), 26.7% (1 to 3 hours) and 1.9% (more than 3 hours).

Figure 23: Distribution of maternal death by distance (in miles) to health facilities

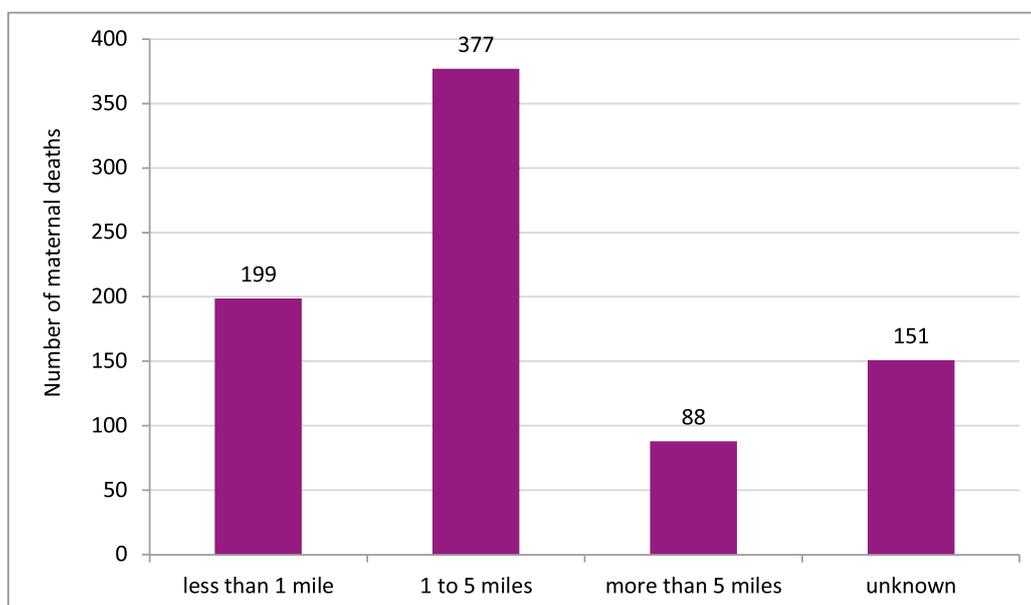
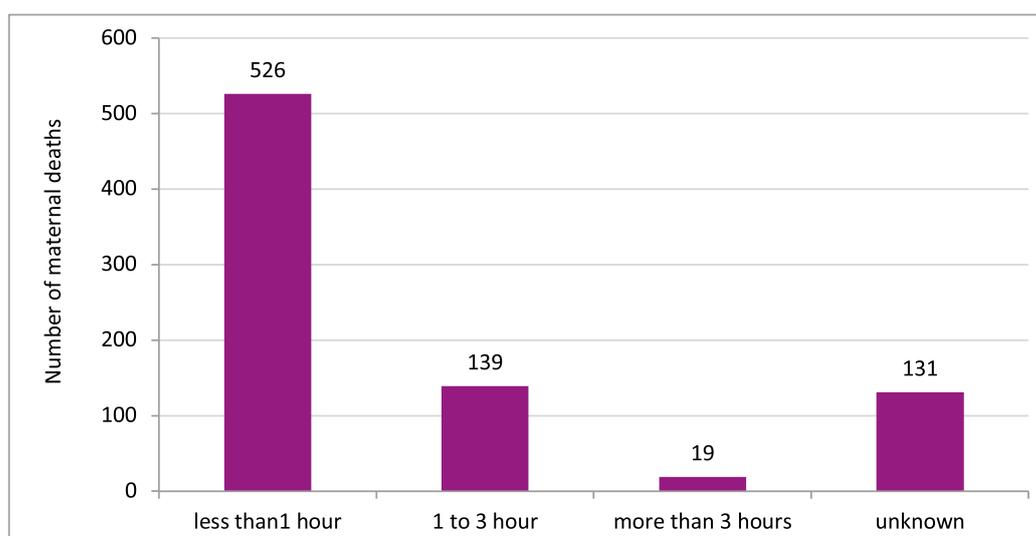


Figure 24: Distribution of maternal death by time taken to health facilities



HOSPITAL (Figures 25 and 26) : Taking 10 miles as an arbitrary cut-off point, the profile again shows a paradox - more women (357 or 43.8%) lived less than 10 miles away from the nearest hospital, and less women (223 or 39.6%) lived more than 10 miles away. More details of the distribution by the distances are shown in Figure 25. In terms of time to reach the nearest hospital, the same paradoxical relationship is even more marked; as high as 92.3% or 763 deaths could reach a hospital in less than 3 hours, and only 50 or 6.1% needed more than 3 hours. This profile suffers less from missing data.

Figure 25: Distribution of maternal death by distance in mile to hospital

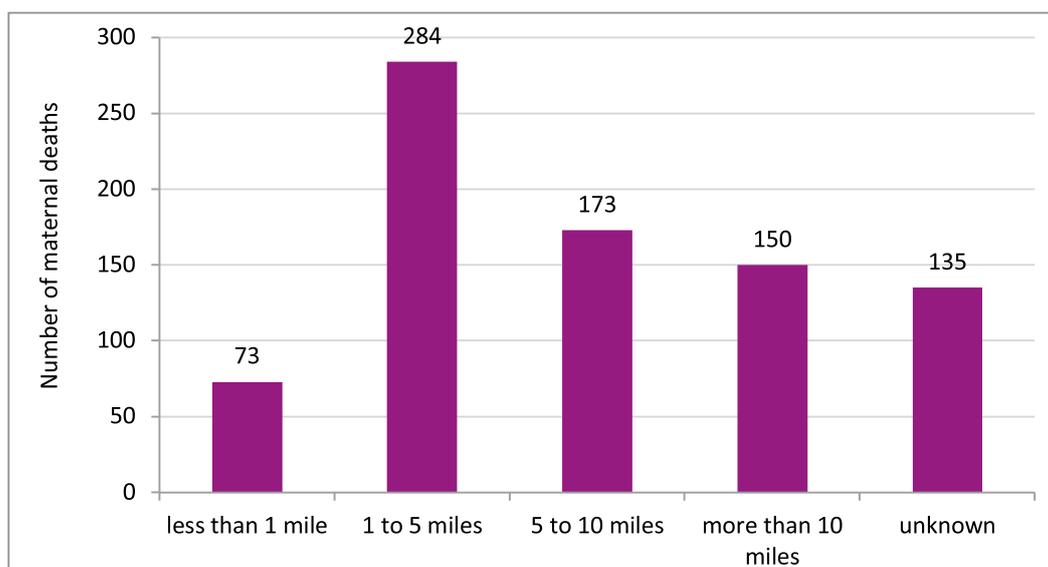
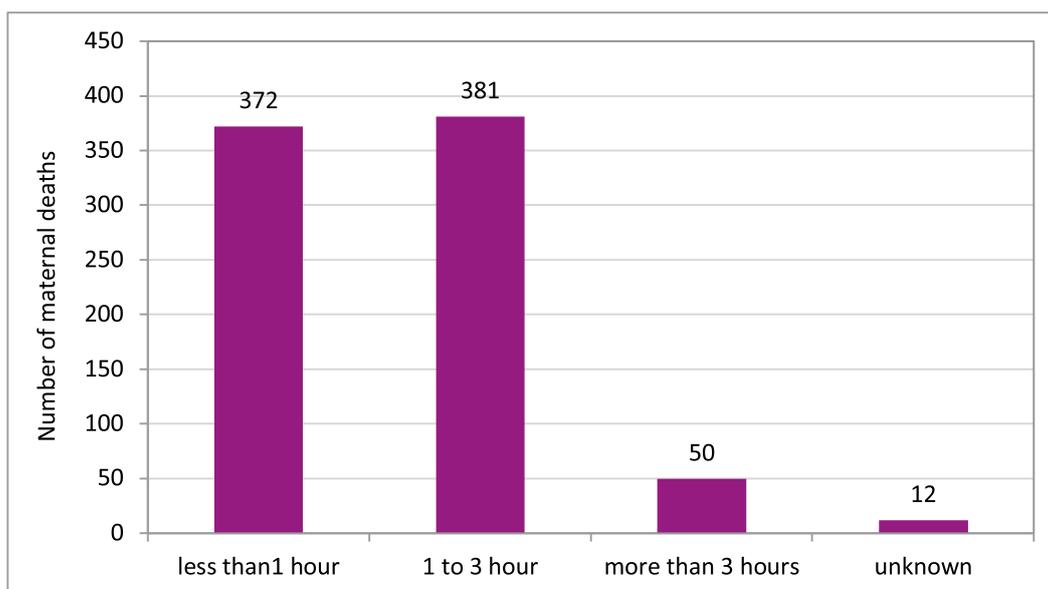


Figure 26: Distribution of maternal death by time taken to hospital



The place of death (home, facility, road) can be cross-analysed with the distance and time needed from the residence of the woman to reach the nearest health facility (health centre, hospital), with the hypothesis that a maternal death that occurred at home lived further away from a health facility compared to a maternal death that occurred in a health facility. Excluding the deaths that occurred on the road and taking only deaths at home and in facilities, the findings are summarised in Table 12, where it suggests that this hypothesis is supported (with the caution that there is no test conducted for statistically significant difference). The observed difference between deaths at home and deaths in facility is greater for the nearest hospital than for the nearest health centre.

Table 12: Maternal deaths 2016, by place of death and the distance/time to nearest health facility

Place of death	Home to nearest health centre		Home to nearest hospital	
	Distance in miles	Time in minutes	Distance in miles	Time in minutes
Home	3.8	73	11.7	127
Facility	2.3	31	6.3	58

6.14. Delay in Seeking Care

This is one variable that has posed a lot of difficulty in interpretation the findings from the MDR 2013 and 2015; the difficulty is in the understanding of the three delays of the Three Delay model of Thaddeus and Maine. This model is most easily and clearly understood if used with the assumption that the three delays are independent of one another and are mutually exclusive. The data collectors in the verbal autopsy for the MDR collect this information that leads to combination of delays. To recapitulate the three delays, the definitions are shown below.

- ◆ The first delay is the failure to RECOGNISE: the mother, the family and her immediate surrounding are not aware of the need to seek care, either out of 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 costs)
- ◆ The third delay (the failure to RESPOND: this happens when a health facility provides poor quality care because it is under-staffed, under-equipped or not able to provide adequate care).

The seeking of care, and seeking care in a timely manner clearly determines whether a woman survives or succumbs to a complication of pregnancy and childbirth. Indeed the access to emergency obstetrics care (EmOC) – both Basic (BEmOC) or Comprehensive (CEmOC).

In 2016, the profile of the delays experienced by the women who died is shown in Figure 27.

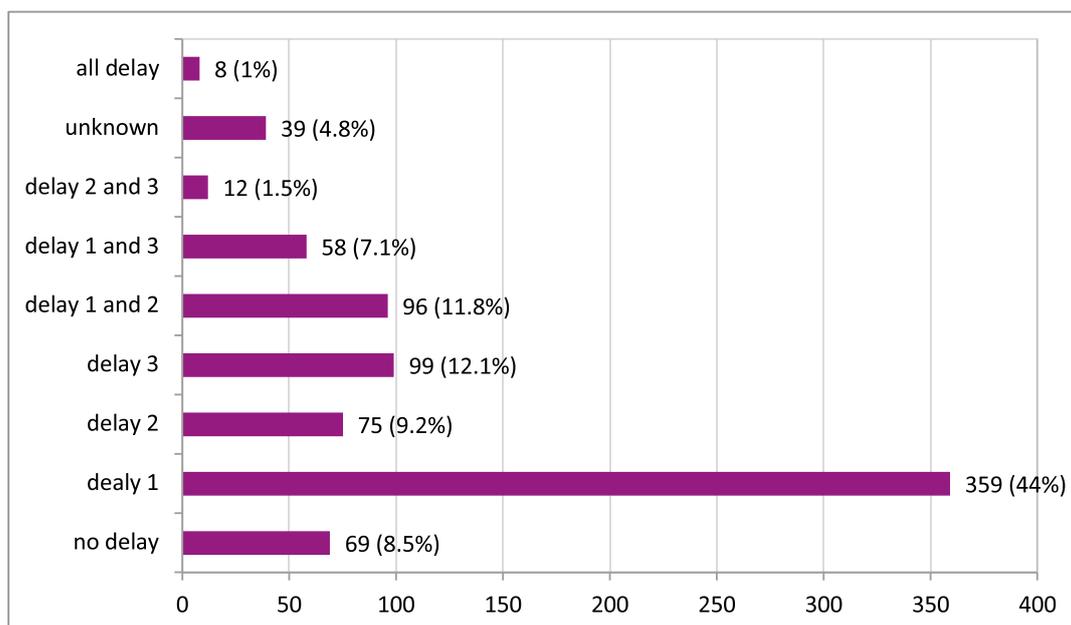
- ◆ A very small number (8.5%) had no delay at all
- ◆ An almost similar number (9.2%) had the second delay, which means they could not access care because of barriers which may be geographical, socio-cultural or financial. In 2015 this proportion was 3 %
- ◆ 12.1% had the third delay – they sought care but the care/service that were provided to them was inadequate. In 2015, 3% had this delay
- ◆ Almost half (44%) of them had the first delay – they were not aware they needed to seek care; in 2015 this proportion was 54%

Like in previous years, there were maternal deaths associated with a combination of the delays as seen in Figure 27. These are not easy to interpret as highlighted in 2015 MDR report in which these situations were simulated and these are summarised below.

- ◆ Those who had the both first and second delay in combination (11.8%) – these women were not aware that she needed to seek care, or did not want to seek care for some reason(Delay 1), and at the same time she had problem in seeking care (Delay 2) .

- ◆ Those who had the combination of first and third delay (7.1%) – they were not aware (or did not want to seek care, Delay 1), yet they did reach the point of care which was not responsive to save their lives (Delay 3).
- ◆ The 12 deaths or 1.5% who had second and third delay – they had barrier to access (Delay 2), and yet they got the care that unfortunately did not respond adequately (Delay 3).
- ◆ Those who had all three delays (8 deaths or 1%) – they were not aware (Delay 1), had barrier to access (Delay 2), and yet they got the care that unfortunately did not respond adequately (Delay 3).

Figure 27: Maternal deaths 2106, the profile of the three delays

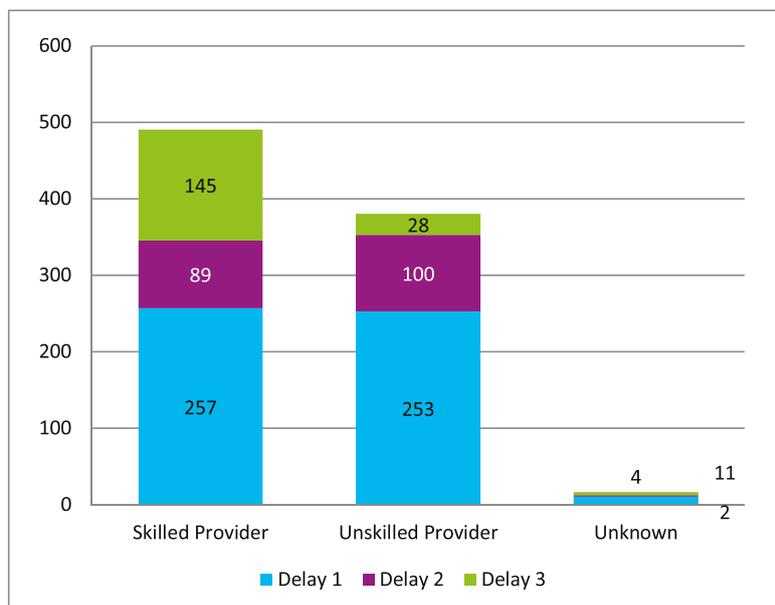


In the 2016 MDR analysis, the findings on delay to seek care was cross-analysed with the first provider of care. Table 13 and Figure 28 show this profile. There is little meaningful interpretation that can be made from this relationship without making several assumptions which may not be correct. The first delay was associated with about half of women who had a skilled provider had the first delay, and about two-thirds of the women who had an unskilled provider. This therefore suggests that an unskilled provider is more likely to be associated with a higher incidence of the first delay, further suggesting that an unskilled provider had more chance of dealing with women who are unaware of need to seek care. The third delay suggests that a skilled provider is associated with a higher incidence of the third delay (29.5%) compared to unskilled provider (7.4%). With no other information on the circumstances of the delay and the death, no meaningful interpretation can be made.

Table 13: Maternal deaths 2016, type of delay and first provider of care

Delay	Skilled first provider	Unskilled first provider
	Number (%)	Number (%)
Delay 1	257 (52.3)	253 (66.4)
Delay 2	89 (18.2)	100 (26.2)
Delay 3	145 (29.5)	28 (7.4)
Total	491 (100)	381 (100)

Figure 28: Maternal deaths 2016, type of delay and first provider of care

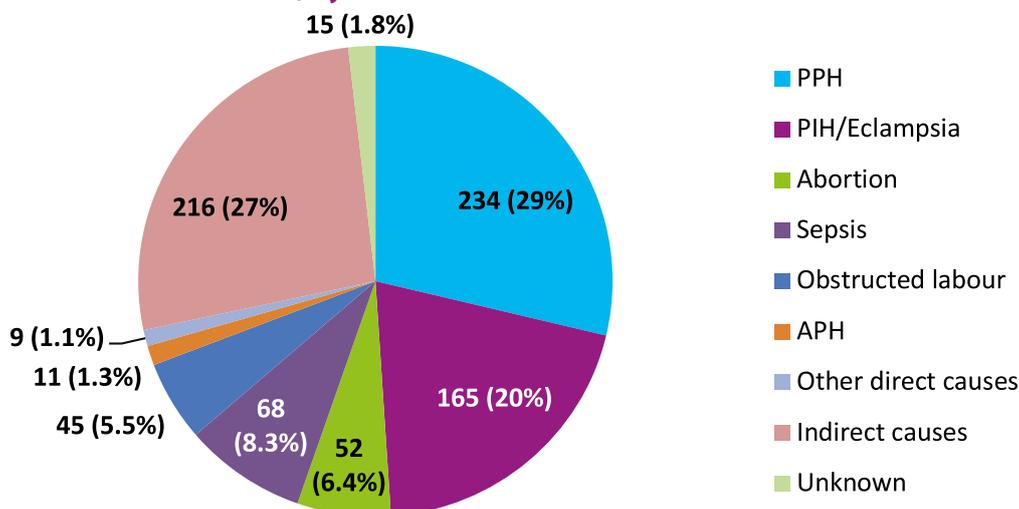


6.15. Cause of death

See Figure 29. As in previous years, the leading cause of maternal death in 2016 was postpartum haemorrhage (PPH) with 234 deaths (28.7%) followed by indirect cause (205 deaths or 25.1%), and eclampsia or hypertensive disease of pregnancy (PIH)/eclampsia with 165 deaths (20.3%). These three leading causes therefore accounted for three quarters (74.1%) of all maternal deaths in 2016. They are followed by sepsis (68 deaths or 8.3%) and abortion (52 deaths or 6.4%). The other causes contributed to far fewer numbers, but some of these causes appear like they could have been classified under indirect causes; and if the disease did not cause or contribute to the death it could have been an incidental death (in which case it was a pregnancy-related and not a maternal death).

Abortion as a cause of maternal death is something that needs attention including further study. While the proportion on about 6% in 2015 and 2016 is lower than in previous years, it is still the fifth leading cause, and is higher than other countries in the region.

Figure 29: Maternal death 2016, by cause of death



This profile is very similar to what was seen in 2015 when PPH alone as the leading cause accounted for 30%. The following (Table 14) is a comparison between 2015 and 2016 to illustrate the consistency of the profile of cause of death, with data for the five leading causes of death.

Table 14: Leading causes of maternal deaths in MDR 2015 and MDR 2016

Cause of maternal death	MDR 2015	MDR 2016
	Number (%)	Number (%)
Postpartum haemorrhage (PPH)	200 (30.0)	234 (28.7)
Indirect causes	177 (26.0)	205 (25.1)
Pregnancy induced hypertension (PIH)	123 (18.0)	165 (20.0)
Sepsis	76 (11.0)	68 (8.3)
Abortion	42 (6.0)	52 (6.4)

Bivariate analysis was conducted for age and cause of death, on the assumption that some causes are more likely in older than in younger women, and vice versa. The causes of death among younger women is shown in Figure 30.

Figure 30: Causes of maternal deaths 2016, among women aged 15 to 24 years old (Youth)

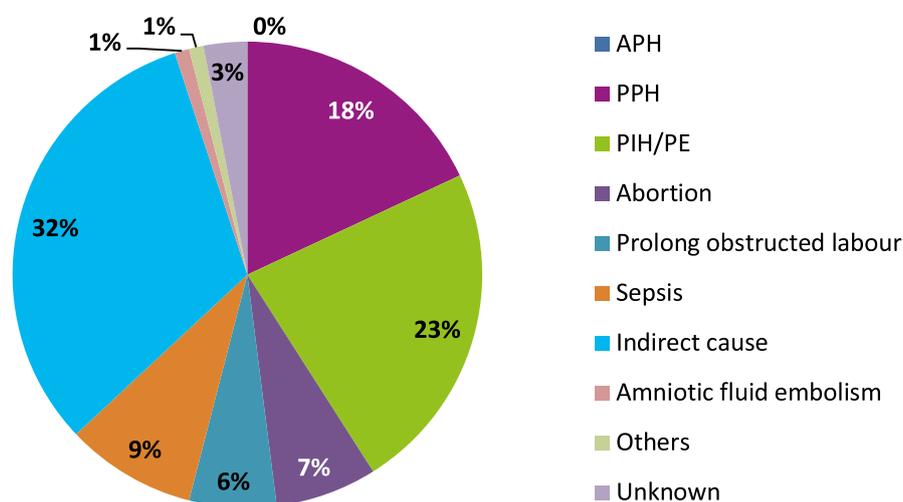


Table 15 shows the comparison between women all ages and younger women. The data suggests that the leading cause among the younger women was indirect causes, followed by PIH, and the third cause was PPH.

Table 15 : Leading causes of maternal deaths 2016, among all ages and among young women

Cause of maternal death	Women all ages	Women aged 15 – 24
	Number (%)	Number (%)
Postpartum haemorrhage (PPH)	234 (28.7)	33 (18.2)
Indirect causes	205 (25.1)	58 (32.0)
Pregnancy induced hypertension (PIH)	165 (20.0)	41 (22.7)
Sepsis	68 (8.3)	17 (9.4)
Abortion	52 (6.4)	14 (7.7)

The proportion of deaths ascribed to sepsis and abortion is higher among younger women. There is no other information that can explain this profile. It may deserve further study. One profile that may need further study is abortion deaths, bearing in mind that there is a possibility that these may be unmarried young girls who are more likely to avail of illegal means of termination of an unwanted pregnancy. Of the 14 deaths due to abortion among young women, 4 were aged 15 to 19 years, and 10 were aged 20 to 24 years.

CHAPTER 7.

DISCUSSION

The discussion is divided into four parts - the trend of maternal mortality in Myanmar; sources of data for maternal mortality and the long-standing problem of under-reporting; the trend in conducting MDR in Myanmar; the findings from the MDR 2016 profiling; and finally some unresolved issues (besides the long-standing problem of under-reporting of maternal deaths).

7.1. The trend of maternal mortality in Myanmar

For trend analysis, the convention has been to use data provided by the MMEIG which all countries use. Since 1990, the MMEIG has regularly published reports; the latest is the report for the period 1990 – 2015, which is the period covered by the MDG, and this report therefore provided very useful important data in terms of trends, and progress made by countries in achieving MDG5a (to reduce MMR from 1990 to 2015 by three quarters). Unfortunately at the time of writing this MDR 2016 report, the report from MMEIG has not been published; therefore the situation in 2016 (and comparison with previous years) could not be done. While the findings of the Census 2014 and DHS 2015-2016 provide valuable reliable data for Myanmar, they cannot be used for comparison. In this report, comparison and trending was based on 2015 data from MMEIG – which essentially makes this report a repeat of 2015 MDR report. The MMR for 2015 was 178 per 100,000 which is an improvement over previous years, but Myanmar has not achieved the MDG target of 75% reduction, and its average annual rate of reduction of 3.7% was lower than the required 5.5%. Myanmar was placed in the category of countries that are “making progress” for achieving MDG5a.

In addition this year use was made of MMR data from the CSO reported in the Myanmar Statistical Yearbook that showed MMR levels of between 113 to 148 per 100,000 in the decade 2004 to 2013. Expectedly this is lower than what MMEIG estimates, and certainly much lower than the census (282 per 100,000) and DHS (227 per 100,000). The MMR derived from the MDR was even lower, 94.9 per 100,000 for obvious reason.

7.2. Sources of data, and measures for maternal mortality: under-reporting

As mentioned several times in this report the year 2016 was marked by the two events that provided for the first time, reliable valid data on maternal mortality - the National Census 2014 and the DHS 2015-2016. These have been very useful in revealing the real burden of maternal mortality in Myanmar. While it has always been known that conventional sources of data depend on inaccurate incomplete data, thereby giving rise to MMR estimates that are lower than the real situation. This MDR 2016 is being used as an opportunity to discuss this in a more in-depth manner compared to previous MDR reports. This report has compared the MMR from various sources – what is referred to as “conventional” sources which include the Myanmar official statistical yearbook, the HMIS and whatever is obtained from the MDR which give MMR values that are lower expected because of under-reporting of maternal deaths and under-developed CRVS.

While the deaths revealed in the Census and DHS these are pregnancy-related deaths and not maternal deaths, they are of immeasurable value for their accuracy and completeness and therefore validity. The Census (quite justifiably) takes this pregnancy-related deaths as synonymous with maternal-death. The DHS however refers to this as pregnancy-related deaths.



This rare opportunity of having these two “unconventional” (in the sense it has never been available before) sources of data made it possible to see maternal mortality in Myanmar in a more complete manner, especially from the Census which is a complete enumeration. The government of Myanmar has to be lauded for making maternal mortality (and also fertility and nuptiality) a theme of the census. There are several information collected by the Census that are not available in the MDR. The DHS however with the small number of maternal deaths (23 in the past 7 years) found in the sample does not provide as much information on maternal deaths. But the MMR it derived (227 per 100,000) is an extremely significant piece of information.

These two sources provided another advantage. They have background information on women of reproductive age that can be used as background information to be related to the findings on maternal death. The Census provided useful background data on socio-economic status, while the DHS has several information on maternal care that can be indirectly applied as background data to the data on maternal deaths.

Much has been said about the problems of lack of complete and accurate information which a census and DHS can alleviate to some extent. They can solve one of the two problems that are consequence of incomplete inaccurate information.

- (i) Incompleteness of reporting of maternal death – this is the problem that the Census and DHS can alleviate
- (ii) Misclassification in assigning the correct cause of death, and the classification of death into maternal deaths and pregnancy-related deaths – this can only be done by a MDR

The MMEIG report on maternal mortality provides useful definitions on this matter.

- ◆ *Incompleteness* refers to incomplete death registration, and includes both the identification of individual deaths in each country and the national coverage of death registration
- ◆ *Misclassification* refers to incorrect coding in civil registration, due either to error in the medical certification of cause of death or error in applying the correct codes
- ◆ *Under-reporting* is a combination of incompleteness and misclassification

The main reason for incompleteness (that leads to under-reporting) is an under-developed civil registration and vital statistics (CRVS) system, with very low coverage of death registration. This is the problem that is remedied by the National Census and the DHS. But these two sources can only be conducted with long intervals in between. It is encouraging that the report of the Census 2014 has made a strong recommendation that Myanmar with continue with the decennial census (every ten years).

The MDR collects only about 800 maternal deaths a year; the MMEIG had always contended that the number of maternal deaths in Myanmar should be between 1,700 to 2,000. The 2014 Census was a real eye-opener, it revealed that the number of deaths in the year under study was as high as 2,797, giving MMR of 282 per 100,000. The DHS does not provide this absolute number, but from the 23 pregnancy-related deaths in the 7 years, the MMR was computed to be 227 per 100,000.

The problem of misclassification cannot be solved by Census or DHS. To some extent the MDR can alleviate this problem. This problem is largely caused by poor understanding of the ICD-10 rules; even if death reporting is adequate, the pregnancy status is not known and not mentioned in the death certificate; deliberate wrong assignment of cause of death fear of litigation; and deliberate suppression of information such as often happens in death after an illegal abortion.

There is however “the reverse side of the coin” that can lead to an over-estimation – some pregnancy-related deaths can be erroneously classified as maternal death. In fact this information is derived from a properly conducted MDR, and there are several situations in which it is not easy to label a death as pregnancy-related or maternal death. Because of this vagueness in separation and because pregnancy related deaths which are not maternal deaths (incidental deaths) are assumed to be smaller in number, very often these two types of deaths are taken as synonymous, as is done in the Census and DHS.

7.3. Trend in conducting MDR – high review rate, low reporting rate

In 2016, the impressive rate of review was maintained with 815 out of 823 deaths being reviewed. Looking back at the past several years, high review rates began in 2013, with phenomenal 03.6% increase from 2012 to 2013, as compared to 55.5% in 2012 and 31.5% in 2011. While there is insufficient empirical evidence to explain the possible reasons for this trend, this increase can be attributed to the priority accorded by the top management in the Ministry of Health to MDR, and especially in 2012, when MDSR was a component in the COIA roadmap, to which Myanmar made commitment to, which resulted in the scaling up the existing pilot in 30 townships to the whole country. It is likely that this review rate in 2017 will be maintained, when the MDR is transformed to MDSR. This encouraging trend is off-set by the very low rate of reporting/notification of maternal deaths (see below).

While there has been a consistent attempt at conducting MDR since 2011, the response is variable; overall the MDR process ends with the review and there is weakness for further follow-up action based on the findings of the review. This is not unique to Myanmar, MDR in other countries have this same feature. In other words, the MDR has often not achieved its intent and objective, which is to uncover the causes and the circumstances surrounding the maternal death that allows for identification of strategies to prevent future maternal deaths with similar cause and circumstances. This imperative on ensuring responses will become even more important with MDSR – the “R” of MDSR stands for “response”. There is need to strengthen this element – in MDSR, the responses need to be carried out, they need to be robust so as to make a difference, these responses need to be documented and monitored.

Getting adequate numbers of maternal deaths reported to the MDR system is a persistent challenge. The number of maternal deaths reported (823) in 2016 has not increased from previous years, and this is an extremely low number compared to the real situation. While review rates as described above, have been impressive, the overall value and benefit of MDR/MDSR is compromised by this very low rate of reporting/notification. Indeed the reporting of all deaths is low because the coverage of civil registration/vital statistics (CRVS) especially of deaths, in Myanmar is low. The MMEIG has consistently estimated that for Myanmar the expected number of maternal deaths is between 1700 to 2000 a year. Now with the findings of the census 2014 report, even this is an under-estimate; the number revealed by the census is 2,797. There is therefore a real need to improve the CRVS. In the thematic report of the Census on Fertility and Nuptiality¹⁷, it is stated on page 3 *“The development of a civil registration system where they do not exist, or are incompletely developed, is therefore of great importance. Population census and surveys provide expedient methods in the interim, but there is no substitute for a fully developed registration system”*. While a fully developed CRVS is needed by all sectors, the health sector in particular has great need for it. The same report on page 59 states *“The health sector should raise similar expectations of national capacity to produce vital statistics”*.

This quest for a more complete reporting of maternal death has an implication on MDR and MDSR - if the reported number of maternal (and pregnancy-related) deaths increases, the MDR/MSR system has

¹⁷ Thematic Report.. volume 4a,

to be modified in some aspects. By international consensus and policy, all maternal deaths have to be reviewed. The MDR/MDSR system must be ensured of having the capability of conducting the reviews of a potentially large number of maternal deaths. An evaluation of MDR/MDSR (see recommendation in Section 8.2) will give some information on the current capacity of the MDR system.

7.4. Profile of maternal mortality in 2016

Region/state : The three state/regions that usually report high MMR - Chin, Magway, Ayeyawady continue to report high MMR in 2016. But this year Shan South surpassed Magwe and Ayeyawady and was second only to Chin. This trend is not really surprising because the conditions in Shan state overall are risk factors to poor maternal health and to maternal death – geographical and socio-political features render the state vulnerable to unstable health service. It is notable that the Census considers the three Shan states counted in MDR (South, North, East) as one entity, and the MMR of Shan was 278 per 100,000 which places Shan below, albeit very slightly, from the national MMR of 282 per 100,000. When the three Shan entities are counted as one in the MDR the number of deaths is 84 (Shan South contributing to 55, while Shan North contributed 25 and Shan East only 4), the MMR for the one joined state is 91.3 per 100,000 which also is slightly below the national figure of 94.8, and which would rank it in eleventh place between Nay Pyi Taw and Rakhine.

The unusually high number of maternal deaths in Tanintharyi – 22 deaths and MMR of 106.8 per 100,000, cannot be explained with the information that is available. On examining the profile of these 22 deaths, no common feature is found. In previous years this region reported low maternal mortality, as also reported by Census 2014, in which Tanintharyi is one of four states that were in the “low” category (along with Nay Pyi Taw, Yangon and Mon).

Urban-rural residence: The urban-rural profile still shows as in previous years a rural preponderance accounting for 74% of maternal deaths, but this is slightly lower than in 2015 when it was 81%. This small difference however deserves note because it is observed that there has been a gradual narrowing of the gap between rural (which has declined) and urban (which has increased); and this trend is also seen in the Statistical Yearbook. As stated earlier, this trend if it continues, is something that needs further study. It is very tempting to postulate that conditions (social economic, geographical, and especially health services) in rural areas in Myanmar is improving to an extent that the risk to maternal death is reduced. As stated earlier, urban-rural residence is not as an independent variable, but as an indicator of other contributing factors such as wealth and ease of access to services. At the same time there is need to examine the conditions in urban areas that may have increased the risk of maternal death.

Age: The high risk of maternal death for very young and very old women is well-known and established. Young girls are at increased risk because they are biologically, emotionally and socially not ready for pregnancy and motherhood. Age is captured adequately in the MDR with appropriate age groupings. From the limited data in the MDR analysis from 2013 to 2016, even though age-specific rate could not be calculated, it did suggest that very low age (below 20) was associated with higher risk. Both the MDR and the census showed a fairly large number of teenage pregnancy. The Census is an excellent source for getting the age-specific MMR which cannot be obtained in the MDR in the absence of the denominator. The data from the census showed very clearly the influence of age on maternal death showing an excessively high MMR after the age of 45. While maternal health services have already put in place policies related to age and childbearing, especially through health education and through maternal health services that manage high-risk pregnancies, this evidence from the Census adds further strength for such policies and strategies. The role of family planning/contraception is clear.

Socioeconomic status: The MDR uses only two proxy measures for socio-economic status (SES). Just as in age distribution, the absence of denominators makes it impossible to calculate rates and ratios (and therefore risk) for socio-economic status of the deceased women. The Census too did not collect information on these variables for maternal death, but it could use some other data to see the association of SES and maternal death. It had information on the education profile of females in the country - the percentage of females who were illiterate, those with no education and only primary education. These were used as background information that can be indirectly linked to maternal deaths. Although the MDR analyses did not have the advantage of a denominator to calculate rates and risk, the profile from the MDR is in agreement with the findings from the Census that link maternal death to education. Similarly, the DHS 2015-2016 gives information on the influence of education and socio-economy on some aspects of maternal care – including on antenatal care and place of delivery. While these are not on maternal deaths, but on women who had a livebirth in the past 5 years, and the DHS report did not link maternal deaths to these variables, this MDR report 2016 makes use of these data on maternal care and attempts to make some meaningful logical linkages.

The fact that the MDR collects only education and occupation as proxy measure for SES has been commented upon in previous MDR reports. Clearly they are seriously inadequate. There is need to collect information on income of the deceased women or of her husband and family. As stated in previous report, it is possible for a poorly educated woman to have an income herself through informal work or property; and conversely a highly educated woman may have no income generating activity. Like most traditional families and culture in Asia, the husband is the main income earner, and it is useful to have information on his occupation and income. The DHS has done something very meaningful in this regard; every parameter or characteristic studied can be analysed by wealth quintiles. In this regard, the Census used some proxy indicators to link to maternal death – percentages of households with electricity, with access to means of communications and with motorized transport.

Gravida/parity: This profile in 2016 has not changed from that of previous years. As for SES, it is not possible to calculate the gravida-specific mortality rates or ratios due to absence of denominator. However, the analyses using proportions shows that gravida/parity does not appear to be different from the observed distribution of women who were pregnant, suggesting that there is little correlation between parity and risk of death. However, in theory there is an association – a primigravida especially at advanced age, and grand multigravida (gravida 5 and above) are at higher risk of maternal death compared to the category of 2 to 5 gravida. The same profile was seen in 2013 and 2015. It is unfortunate that neither the Census nor the DHS collected information on this variable. There is however an indirect (and not a very accurate) way of assessing this – by using the age specific MMR from the Census, based on the assumption that older women tend to have higher parity.

Antenatal visits – Unlike previous MDRs, the 2016 MDR had the advantage of background information from the DHS. This information was not collected for maternal deaths (after all there were only 23 pregnancy related deaths reported in the DHS in the past 7 years), but there is a chapter on maternal health in the DHS (Chapter 9) which provided useful information especially on antenatal care. Therefore although this was not linked to maternal deaths, it gives some ideas of the behavior of women of reproductive age who had delivered a live child.

The lack of correlation between number of antenatal visits and maternal death has been a consistent feature in all MDR reports thus far. The most rational explanation for this paradox is that women who were identified as high-risk pregnancies (and therefore had a higher risk of maternal death), to have made more visits compared to women who had lower risks. No number of antenatal visits would have been able to counteract the fatal complication, especially PPH (the commonest cause) which can

happen without warning, and which antenatal care could not have prevented. Of course, the question of the quality of ante-natal care is still a valid question; but this cannot be of such poor quality as to cause death. This can only be proven if a direct correlation can be established between the death and the quality of ANC (which is an extremely difficult aspect to assess and measure).

The issue of quality versus quantity (number of antenatal visits) raises the oft-repeated question “*how many is too many, how few is too few*” regarding optimal number of ANC visits. The long-standing recommendation of at least 4 visits has been recently amended with the WHO new recommendations in 2016 that requires 8 “contacts” (not necessarily a visit to the facility). The new recommendations requiring one contact in the first trimester, two contacts in the second trimester and five contacts in the third trimester was based on evidence that had been elicited by the WHO through a thorough review including meta-analyses. The implications of this new recommendation have been referred to earlier. These implications include:

- ◆ Firstly, it will take countries some time before they can operationalize this new recommendation because it will require policy changes, amendments to strategic plans, newer health education and communication materials; and not least there will be implications on human resources
- ◆ Beside the above implications for countries to take into account, they will also need a more detailed guideline on how to operationalize this new recommendation – for instance what really constitutes a “contact” which needs a clear unambiguous definition
- ◆ The MDG and now the SDG has four indicators¹⁸ for access to reproductive health and one of these is the number of antenatal visits (at least one and at least four visits); therefore there is need to amend this to take into account the new recommendation of 8 “contacts”.

While the DHS did not study the variables for maternal death, it does have a chapter on maternal health care (Chapter 9) which covered several domains of maternal health care including care (antenatal, intra-natal and postnatal) in the context of skilled attendants. The findings on antenatal care can only serve as background information that can indirectly be linked to maternal death, and explain to some extent on the differences in profiles. Because the number of deaths found in the DHS is extremely small (23 only in 7 years) – which is not unexpected because unlike the census, the DHS was on a sample¹⁹, which although was not very large, was representative, as seen from the coherence of its findings with the census. It is not surprising that the coverage of ANC by skilled personnel differs among state/region. The lowest (68%) was in Shan state, and the highest was in Yangon region with 95%; and the reasons and circumstances in this difference between these two state/regions is clear. The urban-rural difference (94% urban women and 77% rural women having skilled attendant for ANC for at least one visit) is also not unexpected. The same can be said for the data on at least 4 visits. The DHS also showed that women who had completed secondary education are twice as likely compared to women with no education to have had ANC by a skilled attendant. The role of economic status is also suggested by the DHS findings - women in the highest wealth quintile had 98% coverage of ANC by SBA, compared to only 67% of women in the lowest wealth quintile.

The place of delivery and attendance at delivery: For unexplained reason, this important variable was not made available in MDR 2103 ad 2015. It cannot be argued that the place and attendance at

18 The other three indicators are contraceptive prevalence rate (CPR), unmet need for family planning and adolescent (15-19 years old) birth rate

19 The DHS used the sampling frame of the Census, which had 76,990 primary sampling units (census area, ward or village tract), from which 4,000 was sampled (using a two stage stratified sampling); and this gave 13,260 households

deliveries constitutes one the most important strategies to prevent maternal death and ensure maternal survival. Delivering in a facility or hospital carries a much lower risk than delivering at home especially if there is no skilled personnel in attendance. Countries which were and are working hard to reduce MMR and achieve MDG 5a (now replaced by SDG3) have paid attention to the two very critical determinants of maternal survival – skilled birth attendance, and deliveries in institutions. In the MDR 2016, home deliveries accounted for almost three quarters (73%) of deliveries. This is slightly worse than what was found in the DHS (67%). The DHS show that 60% of the births were attended by skilled personnel or SBA (doctor, nurse, midwives), and 40% by unskilled personnel (29% by TBA, 6% by AMW and 4% by others). Unfortunately there is no information on this variable in the MDR for comparison. One variable that can possibly be used is the attendant before death but this includes all deaths – antenatal, intra-natal and post-natal deaths.

Myanmar is still lagging behind many other countries in the region in getting deliveries to be conducted in institutions, and this is a major impediment to reaching the SDG3 goal of MMR not higher than 70 per 100,000, and for eliminating preventable maternal mortality (EPMM).

In countries that have achieved much progress in reduction of maternal mortality – examples are Thailand, Sri Lanka and Malaysia, a major contributor of this success is ensuring institutional deliveries – and if deliveries are at home, they have to be attended to by a skilled attendant In Table 16, using data from World Health Statistics 2017, the eleven countries of SEA Region are listed in order of MMR, and for each of them the SBA rate at delivery is shown. The correlation between MMR and SBA is clear.

Table 16: MMR and SBA rates in countries of the SEA Region (WH Statistics 2017)

Country	MMR	SBA rate
Thailand	20	100
Sri Lanka	30	99
Maldives	68	90
DPR Korea	82	100
Indonesia	126	87
Bhutan	148	75
India	174	81
Bangladesh	176	75
Myanmar	178	60
Timor Leste	215	29
Nepal	258	56

The relationship between place of delivery with education and socio-economic status is revealed in the DHS findings which interviewed women of reproductive age who had delivered a live child in the past 5 years. For women with no education, 12% delivered in public institutions and 87% at home; for those with primary education, the respective percentage is 30% institutional and 70% home; for those with secondary education it is 54% and 46%; and for higher than secondary it is 82% and 18%. But as mentioned earlier, caution needs to be exercised before making any conclusion on this profile, because there are several other variables that determine referral, such as the cadre of skilled /unskilled attendant, which level of care where delivery took place, which level was the referral made).

Emergency referrals: This parameter was analysed for the first time in MDR 2016 – there was no information on this in previous MDR. It was found that the distribution almost equal, slightly more than

half (51%) did have referral, and a little less than half (47%) had no referral (2% had missing data). There is also data that suggests the role of the attendant at the delivery (skilled or unskilled) in making emergency referrals (as opposed to delivery at home). A skilled attendant tended to make more emergency referrals and conducted less home deliveries. Unskilled attendants also tended to make more emergency referrals than conducted the delivery at home, but the difference between these frequencies is smaller than that for skilled attendants. As warned earlier, caution needs to be exercised in interpreting this finding, which is necessarily limited in the absence of more information – such as which cadre of skilled attendant, which level of care where delivery took place, which level was the referral made.

The findings on emergency referral from this MDR can support in providing further evidence for an initiative that has been place in selected townships. Survival of mothers who have complications depends on the availability of EmOC services, and the ease to reach these services. There is an initiative in selected areas in Myanmar that supported referrals to a higher level of care for obstetrics and child emergencies. This is funded through 3 MDG Fund in 6 townships in the Delta (Ayeyawaddy) – which was initiated soon after the Nargis cyclone tragedy of 2008, and now the MDG Fund provides support in another 43 townships in other states (including Rakhine). The support is in terms of reducing the second delay due to financial barrier; a woman with obstetric complications is referred to a facility with adequate EmOC (either BEmOC or CEmOC) and she is given money for transport, meals and purchase of medications or doing of investigations. In other words this is one type of demand side financing – through conditional cash transfer (CCT)²⁰. There has been impact from this initiative. Till December 2016, a total of 44,924 mothers or 16% of all expected pregnant women have benefited from this support²¹. Besides the number of referrals, impact is also seen by the case fatality rates of these referred cases with obstetric complications.

The place of death: The high numbers (almost half) who died in hospitals can be explained by the fact that hospitals are called upon to manage the more serious and life-threatening cases.

Time of death: The highest number of deaths were in the postnatal period, and this is largely accounted for by PPH being the leading cause of death. The comparison between the MDR and the Census revealed that the three MDR (2013, 2015 and 2016) do not differ from each other in this profile; but the Census revealed that while the proportion of antenatal death is similar to MDR, there is less post-natal deaths and more intra-natal deaths. It is not possible to find an explanation for this difference in profile between MDR and census.

Distance and time to a health facility and to hospital: The ease of getting to a health facility for services, and very importantly the ease of getting to a facility with emergency obstetrics care (EmOC) when complications arise, is a major determinant of maternal survival. In all the MDR reports thus far, there is a paradoxical relationship between ease of access and maternal death – and this is explained by what has been repeated earlier – that women who were having complications and life threatening conditions were more likely be brought to the health facility, especially if they had barriers to access. But this assumption cannot be tested with the data available. This phenomenon therefore requires further study. This is also more so because this variable has a lot of missing data, which compromises interpretation.

²⁰ While this initiative has proven to be effective and has led to desirable outcome and impact, there is the problem of financial sustainability (it is all donor funded), and in Sept 2017, a Core Working Group was established to identify a model to make it sustainable

²¹ This initiative also includes children as beneficiaries, and as on Dec 2016 more than 35,000 children had benefitted

Delay in seeking care :The report has elaborated on the difficulty of interpreting the findings from the MDR, with the main problem being the difficulty is in the understanding of the three delays of the Three Delay model of Thaddeus and Maine, that has led to several maternal deaths showing a combination of delays, some of which are extremely difficult to understand the scenario. The epidemiological and statistical principle of independence and mutual exclusivity appears to be not understood or appreciated by the staff conducting the verbal autopsy. These combinations lead to questions that need to be answered.

Combination of Delay 1 and Delay 2 - women who were not aware that she needed to seek care, or did not want to seek care for some reason(Delay 1), and at the same time she had problem in seeking care (Delay 2) . The question one can ask is – did they at some point change their mind and decided to seek care but faced a barrier to do so

Combination of Delay 1 and Delay 3 - women who were not aware (or did not want to seek care, Delay 1), yet they did reach the point of care which was not responsive to save their lives (Delay 3). The question that arises is - since there was no Delay 2, can it be assumed that after changing their mind and decided to seek care, they were able to do so and reached the point of care

Combination of all three delays – they were not aware (Delay 1), had barrier to access (Delay 2), and yet they got the care that unfortunately did not respond adequately (Delay 3). The question one asks is - was there was an effective strategy that overcame all the three barriers

These are questions that cannot be answered from the verbal autopsy carried out in the MDR, and will require a separate study.

Cause of death : PPH remains the leading cause of death. In most developing countries, the “big three” causes of maternal deaths are PPH, PIH and sepsis; which indeed was the profile in Myanmar for several years. However, the proportion of deaths attributed to indirect causes is increasing. In fact indirect cause accounted for 27% of deaths, was second to PPH (29%) exceeding PIH (20%). A sub-analysis of cause of death by age group shows some differences between younger and older women. There appears to be more deaths from PIH than from PPH in younger women. One inference we can make is PPH is more likely in older women whose uterine health is less robust than in younger women, and can older women are less able withstand loss of blood. Also older women who have had repeated childbirths are more likely to be anaemic than younger women. Sepsis and abortion are more frequent causes of maternal deaths among the younger women compared to older women. This profile needs further study especially with the possibility that abortion is sought after by unmarried young women, who are more likely to seek abortion from unlicensed illegal quacks” and are therefore likely to be unsafe and unhygienic, with high risks of morbidity (especially sepsis) and mortality. Since marital status is not a variable collected in the MDR, it is not possible to comment on this further.

As in older women, indirect cause is the leading cause. This increasing proportion of indirect causes need to be examined further, and the MDR has to improve its data collection, because there appears to be lack of clarity (possibly with underlying lack of understanding) of the classification of maternal deaths, and the need to further classify indirect causes (in the CEMD in Malaysia), indirect causes are categorized as cardiac and non-cardiac, in recognition that existing cardiac diseases is the commonest medical condition that complicates a pregnancy and leads to maternal death. The difficulty in the MDR related to cause of death is covered in Section 7.5 below as an unresolved issue.

7.5. Unresolved issues

Previous reports MDR reports detected some weakness. Besides the problem of under-reporting of maternal deaths, and the issues of the gaps in information collected by the MDR as in Section 7.2., there are other issues related to MDR. It is expected that these have not been addressed since this will require a formal evaluation of the MDR and the tool used especially the variables captured in the verbal autopsy. Hence there is an urgent need to carry out this evaluation (which now will be the assessment of the MSR which started in January 2017).

In this report, only two of these unresolved issues are revisited – firstly the inability to identify and assess risk to maternal death because of absence of denominators for the variables studied, and also the absence of some other variables ; and secondly the misunderstanding on some concepts – principally on the three delay model in seeking care and classification of cause of maternal death.

a) Inability to identify and assess risk

The adage “there is pregnancy that is without risk” is well accepted. Complications can occur with no prior warning during pregnancy, childbirth and the puerperium. This as it may, the “high risk” concept (and even adopted as approach in several settings), still has value. The MDR which uses verbal autopsy collects variables that are deemed useful to find out risk factors for a maternal death, and to address these factor in order to prevent future maternal deaths with the same circumstances. In previous reports, it was repeatedly emphasised that this identification and measurement of risk factors has not been possible because of the absence of data to be used as denominator for calculation of variable-specific rates (and profiling was only by proportions).

MMR itself (although this is a ratio and not a rate, it is the accepted measure for making comparisons) is available for State/Region because the live births figures are available. This problem of not having denominators for the variable under study is not unique to Myanmar; it exists in almost all MDR systems in developing countries, which also resort to using proportions in the analysis.

Besides the absence of denominators, which is a universal problem faced by almost all MDR systems in developing countries, the MDR in Myanmar also has the weakness of the MDR not capturing adequate number of variables, and several useful variables that can portray risk are not included. This included:

- ◆ Measures of socio-economic status – the MDR has two variables that reflect SES – besides education and occupation of the deceased mother. More indirectly SES can be assessed by other variables included in MDR - urban-rural residence; distance and travel time to a facility; the type of delay. The role of poverty in maternal death is well-known. It would be more useful if the household income (which can be reflected by occupation of husband) was collected. In the 2013 report it was pointed out that it is possible for an illiterate uneducated woman to be wealthy; and conversely a highly educated woman may not be having an income-generating occupation.
- ◆ Another variable not captured in the MDR is marital status of the mother. This may be explained by the assumption that this social determinant is not significant culturally in Myanmar society, and being unmarried does not increase her risk. However it is still important to elicit this and not go only by assumption.

- ◆ The MDR collects information on place of death. For post-natal deaths, the place of delivery is not collected. There is also no information on mode of delivery.

In terms of inappropriate variable collected by MDR, this is not a major problem. The only variable that has no correlation with maternal death is tetanus immunization for the mother, which is intended to prevent neonatal tetanus, and therefore possible neonatal deaths.

b) Poor understanding of some concepts

Two concepts are poorly understood and need to be improved.

- ◆ The most glaring is the understanding of the three delay model, leading to findings for which interpretation is either very difficult or impossible with illogical situations. This has been elaborated considerably under the findings in Section 6 and discussion under Section 7.4. therefore there is no necessity to dwell on this further except to recognise it as long standing unresolved issue and will need a recommendation to address it.
- ◆ The other concept that appears to pose some problem is the classification of causes of maternal death. This was also highlighted in the 2013 and 2015 reports, and deserve to be repeated here. There is need for data collectors and reviewers of MDR to know very clearly the classification of pregnancy-related deaths (which includes incidental deaths) and maternal deaths (which excludes incidental deaths). As was pointed out in MDR 2015, a death review does NOT start with a “maternal death”, It starts with “pregnancy-related death” or even more proximal than this, with “death in woman of reproductive age” (sometimes referred to as WRA death). It is only AFTER the audit or review is completed can the death be deemed to be a maternal death and gets counted in MR estimation, and “incidental” deaths are excluded. The next step in the review is to take all the “maternal deaths” and categorise 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 the pregnancy, and the commonest is cardiac disease). Assigning specific diagnosis to the direct causes is relatively simple – PPH, eclampsia etc. In spite of this, there were 9 deaths in 2016 that were classified as “other direct causes”.

CHAPTER 8.

RECOMMENDATIONS

The recommendations are in three sets described in the following sections. While improving information collected by MDR is a long-standing problem that requires specific recommendations, there are other issues in the MDR that needs a formal evaluation. Recommendations are also made to respond to the findings of MDR 2016 (and previous MDR). Finally there is need to optimize the significant events that occurred in 2016.

8.1. Improve information collected by MDR

In terms of weakness in information captured by MDR, the four recommendations in 2015 still are valid, and these have to address the details below.

- ◆ Ensure adequate number of variables to be included – especially household income to assess SES (occupation of the deceased is insufficient and misleading); marital status of the deceased; mode of delivery.
- ◆ Discard currently collected information that are not useful – the only variable that can be discarded is tetanus immunization.
- ◆ Obtain denominator for some important variables – this is challenging, therefore attempts most will start with denominators for selected variables – priorities are age, parity, education status, which can lead to meaningful interventions.
- ◆ Improve clarity and facilitate understanding of concepts - this problem has been elaborated under DISCUSSION (unresolved issues) Section 7.5.2. The recommendation is improving the knowledge of health staff involved in MDR/MDSR at all levels, with special attention to data collectors who conduct the verbal autopsy, and members of the MDR/ MDSR review teams at all levels.
- ◆ Include summary of findings from analysis at state/region level – the national picture is at risk of hiding differences and showing only “averages”, therefore it will be useful if the MDR/MDSR report in future is appended with the salient findings from each state/region. In the 2016 review, the situation in Tanintharyi with such a dramatic increase in maternal deaths deserves explanation.

Other issues related to information in the MDR to be addressed are:

- ◆ The unacceptably large number of missing data , which was most serious in the data is that related to ease of access (distance and time to the nearest health facility – health centres and hospitals).
- ◆ Related to this, there may need to be an assessment and a decision whether these facilities should include private health facilities (if it is not yet included).
- ◆ The observed trend of reversal of urban-rural distribution of maternal deaths (increasing proportions of deaths in rural areas) may need to be studied. A possible hypothesis is there has

gradually been an increase in access to health care with less barriers (Delay 2) in rural areas.

- ◆ The data provided to the writer had several bivariate and multi-variate analysis, which is commendable. In fact more attempts should be made for this to enrich the profile of maternal deaths from which lessons can be learned. One bivariate analysis done was the first provider correlated with place of death and the delay in seeking care.
- ◆ Related to this is the need for staff involved in the compilation, collation and analysis of data to be prudent in making these correlations and conducting multivariate analysis to ensure that the relationships and associations to be studied make sense and are logical; and they must be preceded by a plausible hypothesis. In addition these relationships are useful if they are intended to test existing hypotheses or questions to which answers are needed. An example – with abortion contributing to a relatively large (compared to other countries) proportion of maternal deaths, are these abortions occurring in young unmarried women, who have little education, and belonging to a certain SES class?
- ◆ There was in MDR 2016 attempt to correlate attendant at birth with making of emergency referral, which is a commendable effort, but little value can be obtained from this because in the absence of more information (which cadre of skilled attendant, which level of care where delivery took place, which level was the referral made), the interpretation is limited.

8.2. Conduct an evaluation of the MDR/MDSR to improving weaknesses

Besides the problems with information above, it is reasonable to believe that there are several issues related to MDR, which needs a formal assessment or interim evaluation. Because the time is optimal for evaluating (assessment) the MDSR which was launched in January 2017 to discover operational problems in a timely manner, the Division of MRH with support from WHO has drafted a research proposal for this purpose. This needs to be taken forward as soon as possible.

The general objective of this operational research is to find out the progress of implementation, and to see its “success” and “failures” so that recommendations and remedial actions can be identified to improve the performance of MDSR. The specific objectives are:

- (1) To gain insight in the implementation of MDSR, from all aspects as outlined in the Technical Guidelines and other relevant documents
- (2) To identify the strengths and opportunities, as well as the weaknesses and constraints; and to see “what works” and “what does not work” in the current implementation
- (3) To identify areas for improving the MDSR system

8.3. Use the findings of MDR 2016 and previous MDR to reduce maternal mortality

The aim of an MDR is to elicit the profile of maternal deaths and looking at this profile as “going beyond the numbers” in order to identify the factors and circumstances that lead to the deaths, so that remedial measures can be instituted. Because the findings in the MDR 2016 were not different from previous years, the recommendations are not very different. Thus, the recommendations made in MDR 2015 are still valid – these are ensure early antenatal registration; overall improvement in quality of services; provide adequate emergency obstetrics and neonatal care; provide CEmOC services at all secondary and tertiary hospitals and improve transportation; and provide funds and social support for obstetric emergencies. The findings of MDR 2016 while they still support these recommendations, they reveal

the need to conduct further studies and research, which are addressed in the above subsections 8.1 and 8.2.

Because of the importance of the availability of EmOC services, it is recommended that a task force be established to review the EmOC services in the country. This recommendation is backed by two imperatives in 2017.

- ◆ Reference was made under discussion on referrals of an initiative by 3MDG Fund that implements a conditional cash transfer scheme for emergency obstetric referrals by paying for the transport, meals and medications cost of the woman being referred. This initiative needs to be reviewed to ensure sustainability, and a Task Force to look into this will be useful.
- ◆ The short programme review (SPR) for Maternal Health Service that was conducted in August 2017, which made a strong recommendation on reviewing EmOC including making it possible for the BHS staff to carry out all the signal functions of BEmOC. This is a difficult area that has controversies, and will need professional deliberation among experts before a policy is made=

8.4. Optimise opportunities of recent and current events to strengthen MDR=

The four events in 2016 that need to be optimised to improve MDR are the SDG platform the MDSR that replaced MDR and the Census and DHS.

8.4.1. Use the SDG platform

There is global commitment to the SDGs, and SDG3 on health throughout the life cycle addresses maternal health, indeed the indicator is MMR, with a target that by 2030, countries should have an MMR not higher than 70 per 100,000. In fact this is extended further to EPMM which aims to eliminate preventable maternal mortality. Clearly the role of MDR/MDSR is critical in this. The SDG movement should also be used as driver for getting more accurate number of maternal deaths with improvement in the performance of CRVS. The Census in 2014 was a significant event but census can only be carried out infrequently (not more frequent than every 10 years), and it cannot take the place of a well- functioning CRVS.

8.4.2. Ensure smooth transition from MDR to MDSR

The MDR has been replace by the MDSR in January 2017. This transition is likely to face some problems, besides the many weaknesses that have been identified with the MDR. A recommendation was made earlier to conduct an assessment or interim evaluation of the MDSR which essentially is an evaluation of the MDR as well. Besides the amendment and improvement to ensure optimal information, the evaluation will also find out the strengths and weaknesses of the MDR and MDSR.

8.4.3. Use data from Census and DHS optimally

The findings of the Census and DHS are a wealth of information. The Census has a thematic area and report on maternal mortality. It has elicited several findings that the MDR is not able to elicit. The DHS has a Chapter on maternal health (Chapter 9) that focus on health characteristics and behavior of women of reproductive health. This 2016 MDR report has attempted as much as possible (and as relevant as possible) to use these findings and link them to maternal mortality. Very critically these two sources of reliable accurate data has confirmed and quantified the extent of under-reporting of maternal deaths not only in the MDR but also in the CRVS from

which the HMIS and the national statistical yearbook is based on. The programme managers of all relevant programmes in the Ministry of Health and Sports, in particular the MRH and HMIS must use these findings optimally.



CHAPTER 9.

CONCLUSION

While the trend in MMR in Myanmar is encouraging, efforts need to be further strengthened to ensure the MDG target will be met (which was not met), and now there is the additional challenge of meeting the SDG3 goal of MMR not exceeding 70 per 100,000. The implications for Myanmar to achieve this MMR are daunting, but with enhanced efforts, the progress can be accelerated. The MDSR which has replaced the MDR is one of the inputs that will contribute to this acceleration. Therefore it cannot be over-emphasised that the careful analysis of the MDR findings and the preparation of a meaningful comprehensive report is a crucial component in these efforts. Myanmar started the MDR more than years ago, and from a pilot it has been scaled up nationally with several commendable milestones along the way, the most significant is the transformation from MDR to MDSR, and which will be the platform towards achieving EPMM. This 2016 report is enriched by comparison made to the findings of the two reliable sources of information – the National Population Census 2014 and the DHS 2015-2016. The information from these two is extremely valuable.

For the next report for 2017, it will be on MDSR that was introduced in January 2017 to replace the MDR. But realistically there will be no major changes because the tool (verbal autopsy) is essentially the same as in MDR. In this context, the assessment /evaluation of MDSR through an operational research is very important. There is urgent need to study the strengths and weaknesses of the current system for instituting remedial measures. In addition, plans must be made immediately on the “R” (RESPONSE) and “S” (SURVEILLANCE) components of MDSR.

A country’s MDR (now MDSR) system will take several years before the system has matured and perfected itself, when it will contribute to a more accurate counting of maternal deaths, by numbers, causes and classification, thus remedying the problem of under-reporting/incompleteness and at the same time of misclassification. The MDSR is expected to alleviate some of these problems, but it will still take some years to be completely properly functioning.

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