NATIONAL MDSR ANNUAL REPORT 2008 EFY

EPHI

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World Health Organization
Ethiopia Country Office

The Federal Democratic Republic of Ethiopia
Ministry of Health

E4A Evidence for Action
Saving the lives of mothers and babies in Africa

FOREWORD

This is the second Ethiopian national Maternal Death Surveillance and Response (MDSR) report, providing analysis and interpretation of data reported for maternal deaths occurring in the Ethiopian fiscal year (EFY) 2008.

The MDSR system has been rolled-out across all regions in the country, representing a huge achievement for a system that was introduced in mid-2006 EFY. In addition to full national coverage, the MDSR database now receives reports and case summaries from a growing number of hospitals ensuring that the cycle of identification, notification, reporting, review, and response occurs at both community and facility levels. This is important as it will ensure that action is taken both to increase demand-side use of MNCH services and improve supply-side quality of routine and emergency obstetric care.

In the first 3-5 years of a national MDSR system the data will reflect the fact that implementation of the system is still being established and strengthened. In 2008, reporting increased and expanded, and the balance between community and facility reports changed from previous years. For these reasons, it is too early to start comparing MDSR data from year to year. This 2008 annual report should be considered a stand-alone document, reflecting the data received and leading to key recommendations based on the evidence. In future years, however, these annual reports will be used to track changes in patterns and trends of maternal mortality over time.

In this MDSR annual report a new section has been added to highlight responses to the review of maternal deaths. The aim of MDSR systems is to learn from every death and identify feasible means to prevent avoidable deaths in future. Examples of actions taken in facilities and communities are provided to illustrate how the MDSR system is about more than the collection and analysis of information – it is fundamentally a tool for change.

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ACRONYMS AND ABBREVIATIONS

ANC	Antenatal Care
AWD	Acute Watery Diarrhea
EFY	Ethiopian Fiscal Year
EPHI	Ethiopian Public Health Institute
FBAF	Facility Based Abstraction Form
FMOH	Federal Ministry of Health
HSTP	Health Sector Transformation Plan
ICD-10	The 10th International Classification of Diseases
IDSR	Integrated Disease Surveillance and Response
PHEM	Public Health Emergency Management
LARC	Long Acting Reversible Contraception
MDRF	Maternal Death Report Format
MDSR	Maternal Death Surveillance and Response
MMR	Maternal Mortality Ratio
MNCH	Maternal Neonatal and Child Health

EXECUTIVE SUMMARY

This is the second National report from the Maternal Death Surveillance and Response system (MDSR) and it reports on the maternal deaths reported to the National database in 2008. It presents a summary of progress of implementation, MDSR analysis, examples of evidence-based responses, and recommendations

Information included in the report has been anonymized and is included to be used for learning purposes. The majority of maternal deaths in Ethiopia could be prevented using existing knowledge, human resources, and quality improvement tools. As a result, MDSR data should help select appropriate actions for each level of the health system rather than to dwell on the mistakes of the past. This report highlights different responses put into place following review of MDSR evidence.

The Ethiopian MDSR system is based on the collection of data from both community and health facilities thereby engaging the community within the system. In 2008 EFY the number of reports from health facilities increased significantly so that facility-based data now makes up close to 40% of reviewed cases. This means that the MDSR data in this annual report cannot be directly compared to the 2006-2007 national MDSR report. However, understanding the different patterns of maternal deaths reported from facilities and the community helps to provide a more comprehensive understanding of the determinants of maternal mortality.

A new feature of this report is the inclusion of a Response chapter. This gives examples of good practice in Response which is internationally considered to be the most difficult component of MDSR.

The number of deaths reported in 2008 is 633, roughly 6% of expected deaths. This is an increase from 387 in 2007 which was 3% of the expected deaths, mostly resulting from the increases in facility reporting. MDSR systems take time to develop, but efforts to accelerate coverage of MDSR throughout Ethiopia are important so that the MDSR system can be used in future as a reliable source of information on the number and distribution of deaths.

Hemorrhage remains the major cause of death with 42% of the women dying of Obstetric hemorrhage. The majority of these deaths occur in the postpartum period. Obstetric hemorrhage is avoidable.

All health facilities should have trained staff and equipment to deal with Obstetric hemorrhage.

All women should be encouraged to use ANC and should be offered Iron in pregnancy to help prevent hemorrhage in the first instance.

INTRODUCTION

During the last two decades, maternal mortality levels declined significantly in Ethiopia; reducing by 69% from its level in 1990 (1400/100,000 live births). However, this achievement still fell short of the country target to reach and MMR 267/100,000 live births by 2015. Hence, maternal health continues to be a public health priority a new national target has been set to reduce maternal mortality to 199/100,000 live births by the end of 2020. Improving the quality and equity of maternity services is thus the primary focus in the Health Sector Transformation Plan strategy for the period 2016 to 2020.

The MDSR Annual report is a key component of the national MDSR program, serving as a mechanism for disseminating empirical evidence and resulting recommendations. This report is the second national MDSR report and covers maternal deaths reported for the 2008 Ethiopian fiscal year (EFY). Data from a total of 633 maternal deaths, reported to EPHI from all regions of the country, are analyzed in this report. Even though this number represented the 'tip of the iceberg' in terms of the magnitude of the maternal mortality (6% of the estimated number of maternal deaths for 2008), it provides adequate information regarding patterns of maternal mortality and the main contributing factors, from which lessons can be learnt.

Unlike the first national report, this year`s report also includes selected responses that have been implemented at different levels of the health service. Therefore, the Annual Report includes 3 sections: first, a very brief summary of current MDSR implementation in order to highlight where gaps remain in ensuring all maternal deaths are identified and included in the national database, followed by presentation of the data on causes, determinants and contributing factors of maternal mortality. The third section provides examples of actions put into place in response to analysis of maternal mortality data. The report concludes with some basic evidence-based recommendations.

MDSR SYSTEM IMPLEMENTATION

The MDSR has been formally expanded to cover the entire country to some degree, although full implementation and integration with PHEM have not yet been achieved everywhere. MDSR integrates surveillance by the Public Health Emergency Management (PHEM) system with broader MNCH expertise during the case-based review and reporting process. First, health extension workers and facility-based surveillance staff routinely include maternal deaths in weekly surveillance reports, and each death should be followed by a verbal autopsy and case-based review organized by the health centre responsible for the area where the woman died. The summarized data are then sent up the system for inclusion and aggregation in regional and national MDSR databases. Hospitals report both weekly and case-based reports on deaths occurring within their own facilities, while health centres are responsible for reporting and reviewing deaths occurring within the health centre but also in transit or in the community within each health centre's catchment area.

One way to assess the functionality of the MDSR system is by comparing weekly PHEM reports of maternal deaths with the number of case-based reporting forms (MDRFs) entered into the database following review. How closely these numbers match gives some indication of whether PHEM and MDSR systems are properly aligned. Some gaps are to be expected as it is not possible for all identified deaths to be reviewed (due to some families being difficult to locate following a death or refusing to participate in a verbal autopsy). However, over the year, weekly notifications should roughly match the number of MDRFs received for each region and if there is a discrepancy, the number of weekly notifications should be greater than the number of MDRFs.

Comparing these figures in Ethiopia shows that there is under-reporting across the country for both weekly PHEM notification of maternal deaths and completion of the review and MDRF reporting process. As it is seen in Figure 1, at national level only 7% of the expected cases were notified through weekly reporting in 2008 EFY (714 of 10,661 estimated maternal deaths) ranging from 3% in SNNPR to 9% in Amhara Region. In pastoralist Regions, although implementation of the system started in 2008, there relatively better performance of notification, for example, Gambella (37%), Afar (6%), Benshangul Gumz(3%) and Somali (6%) although the rate of case-based review and reporting has not caught up yet.

There are multiple reasons for under-reporting of maternal deaths, including sociocultural factors, health system challenges, and low awareness of the program in some areas. Furthermore, throughout 2008 there were numerous competing health priorities such as AWD outbreaks, widespread drought management, and Ebola preparedness efforts.

In general, weekly notifications are higher than MDRFs, and where this is not the case it is likely that the PHEM system has not yet fully integrated maternal death as one of the 21 reportable conditions. Comparing case based reporting with weekly notification, nearly 83 % of the notified cases were reported at national level, while cased based reporting in Amhara and Tigray, and Dire Dawa Regions exceeds the notified cases in the year. Figure 2 shows the distribution of notifications and reviews over the 2008 EFY.

Figure 1 Proportion of reported maternal deaths against the expected by region

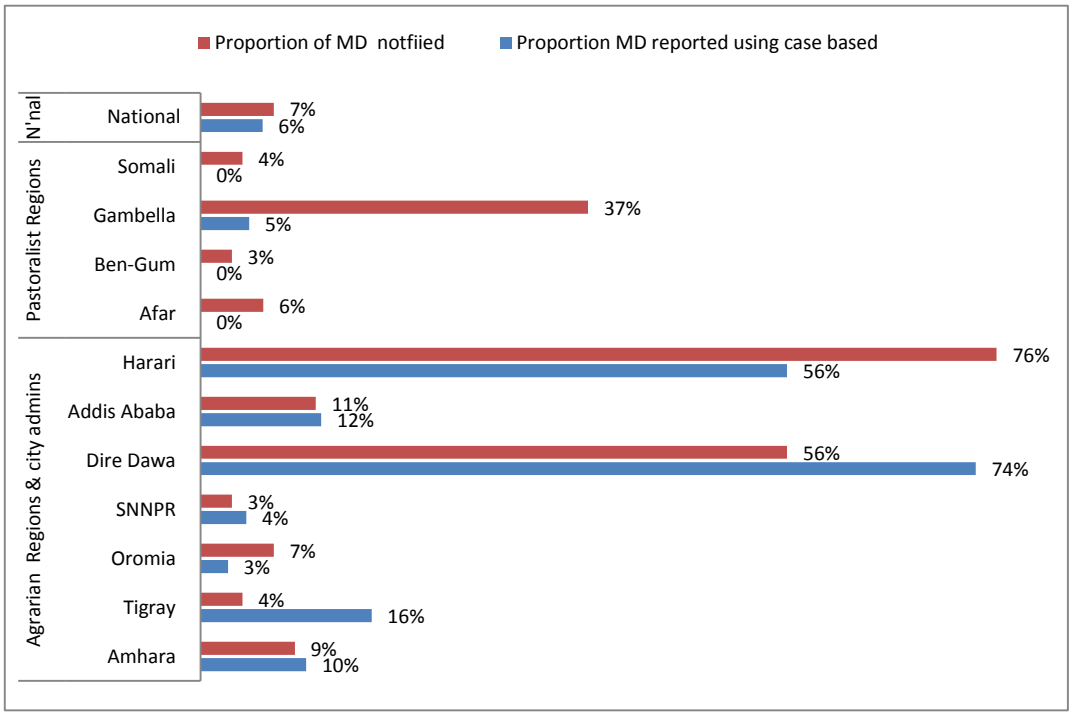
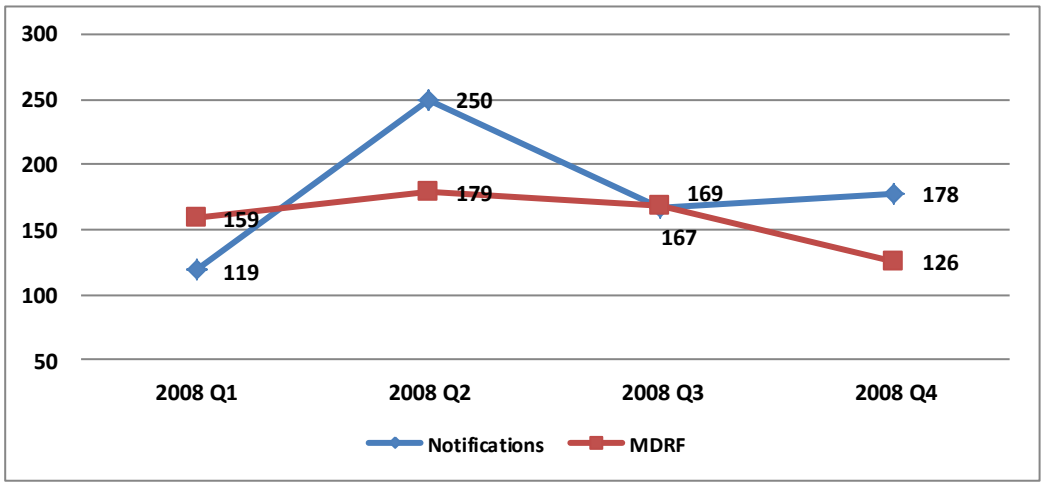


Figure 2: Trends in reporting maternal deaths over 4 quarters (notification & case based)



MATERNAL DEATH DATA

The analysis covers a total of 633 maternal deaths that were reviewed and reported through the case-based format to the national MDSR database at EPHI in 2008 EFY (Hamle 2007 to Sene 2008). This is an increase in reported and reviewed deaths from the last report covering 2006/2007, which numbered 387.

Among the maternal deaths reported to the database, 61% come from Verbal Autopsies while 39% of cases were reported by Facility Based Abstraction forms sent by hospitals. All reporting heath facilities are public health facilities, health centers or Hospitals. In 2008 EFY there was a large increase in reports from facilities.

BACKGROUND CHARACTERISTICS

SOCIO-DEMOGRAPHIC PROFILE

Figures 3-5 illustrate that the majority of maternal deaths occurred to women who were between the ages of 20 and 34 years (71%), married (91%), and had four or fewer pregnancies (69%). This socio-demographic distribution of maternal deaths generally conforms to the pattern in the population of pregnant women. For example, pregnancy is most common during the early and middle period of the childbearing years (15-49), and in the Ethiopian context, most pregnancies occur within marriage. Thus it is expected that the majority of maternal deaths would also occur among married women in the 20-35 age range.

Figure 3: Age groups for all reported maternal deaths N=633

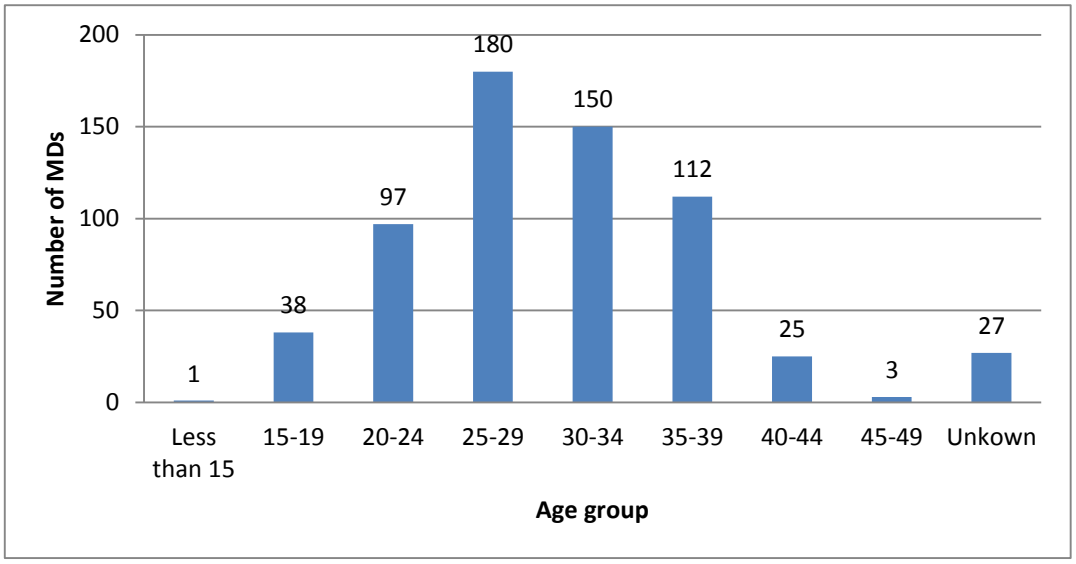
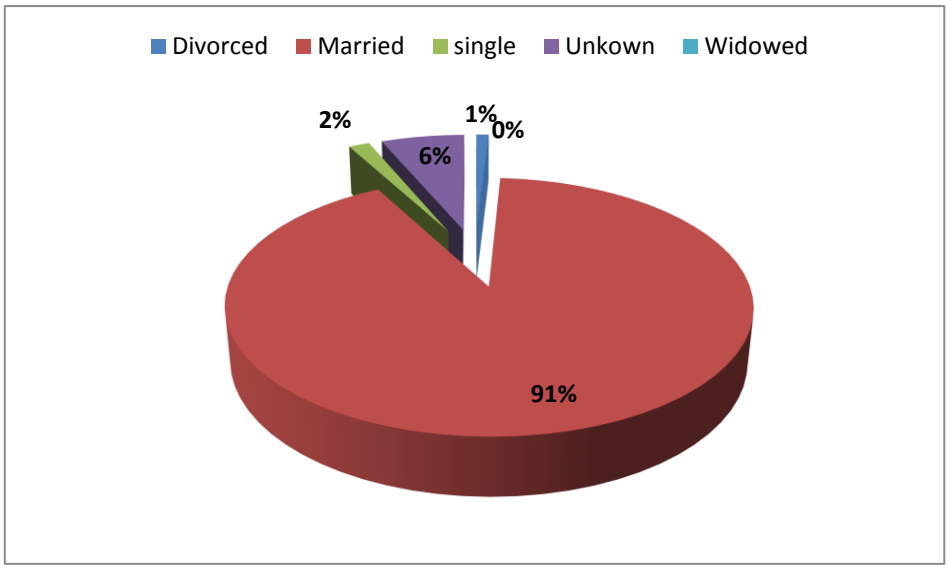


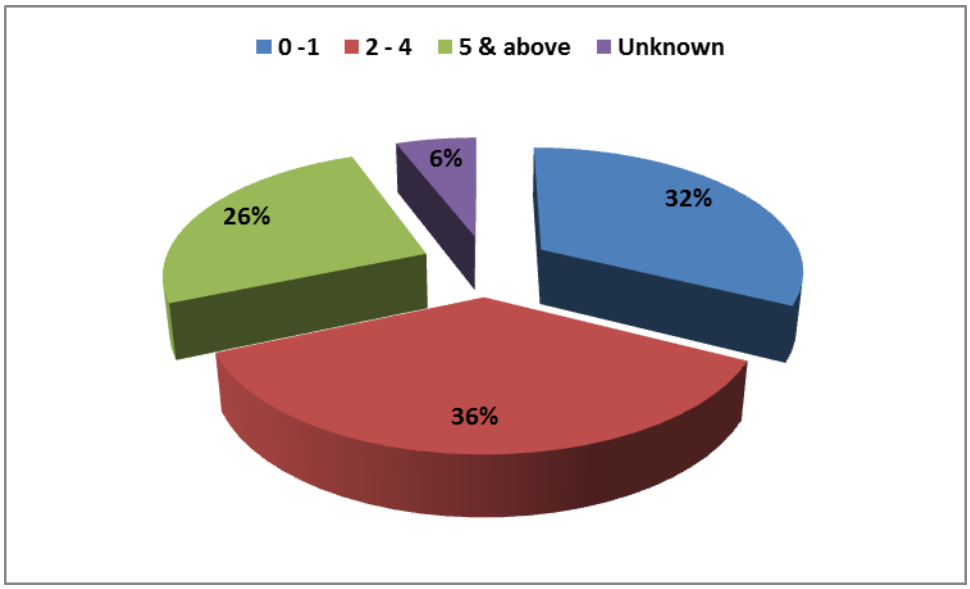
Figure 4: Marital status for all reported and reviewed maternal deaths



However, there are some anomalies. For example, among the 80% cases that included data on educational status, 69% were illiterate, 9% were able to read and write, 11 had completed elementary school, and 11 % had attended secondary school and above. The concentration of maternal deaths among women with lower education suggests heightened risk. Illiteracy or curtained education may represent a mix of risk factors including: inadequate awareness of risk factors in pregnancy, low use of medical facilities, higher parity, rural/remote location, poverty and poor decision-making power among women.

Similarly, the distribution of maternal deaths by parity (Figure 5) can be difficult to interpret. It is know that women are at greater obstetric risk at first and higher parities. In particular, women with high fertility (5 or more pregnancies) are at particularly high risk, and thus represent a disproportionately large share of maternal deaths.

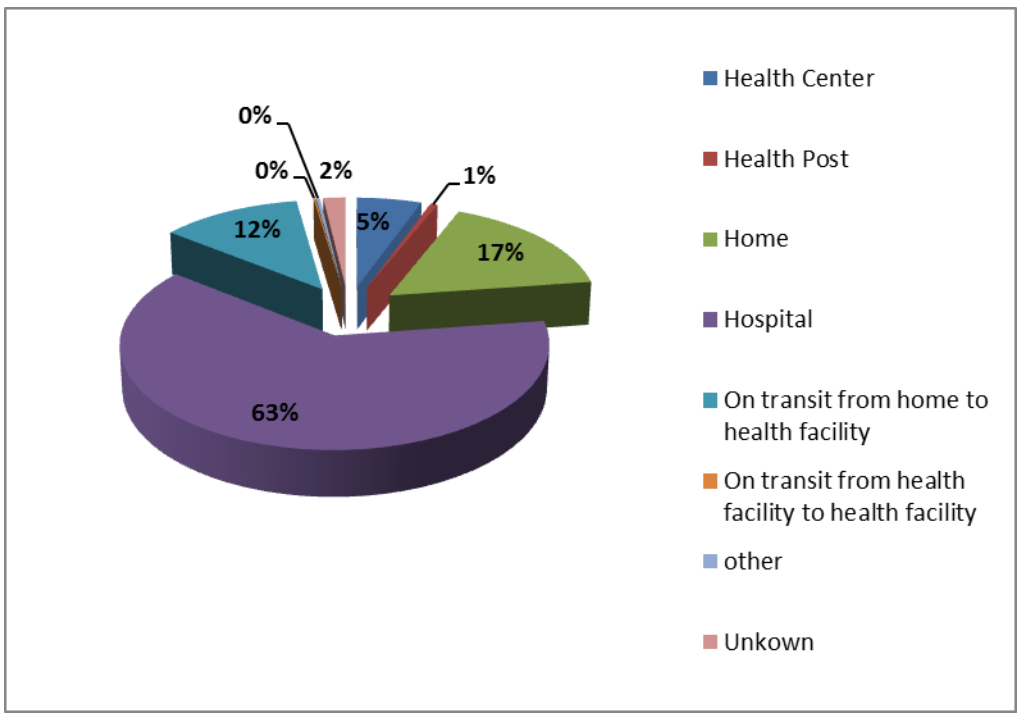
Figure 5: Parity for all reported and reviewed maternal deaths



PLACE OF DEATH

The majority of reported deaths (68%) occurred in health facilities with the following distribution: 63% in hospitals and 5% in health centres. Reported home deaths accounted for 17 % of reported cases while 12 % of deaths occurred in transit. Four maternal deaths were reported to have occurred at health posts (less than 1%).

Figure 6: Place of death



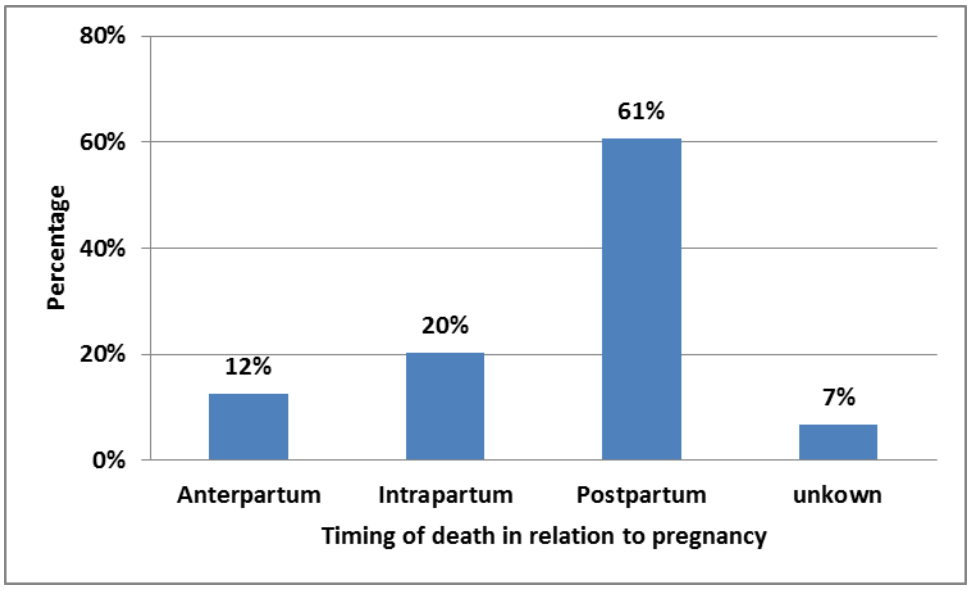
In 2008, significant efforts were made to increase MDSR reporting and review in health facilities. As previously mentioned, 39% of the deaths entered into the national database were reported from facilities (mostly hospitals), which increased the overall share of facility-based deaths in the annual data as hospitals are responsible for reporting only those deaths that occur on their premises.

Therefore comparisons cannot be made between the data in 2008 EFY and the previous national MDSR report for 2006-7 EFY.

TIMING OF DEATH

Figure 7 shows that over half of maternal deaths occurred in the post-partum period. This reflects the fact that the main cause of death in Ethiopia continues to be hemorrhage, which is heavily concentrated in the post-partum period throughout Ethiopia, as discussed below. Higher parity women are at particular risk of hemorrhage, and these may be older women who do not have a history of attending health facilities at the same rate as younger cohorts. Also, even if women deliver in facilities, they may return home without receiving adequate monitoring and being unaware of the potential risks of hemorrhage following delivery.

Figure 7: Timing in relation to pregnancy for reported and reviewed maternal deaths N=633



CAUSES OF MATERNAL DEATHS

Figure 8 summarizes the causes of death provided for 633 cases. A large majority of deaths (82%) were attributed to direct causes, while indirect causes were reported for 13%. In 32 (5%) cases the cause of death was not specified (reported as "unknown") except for the fact that it was unequivocally obstetric.

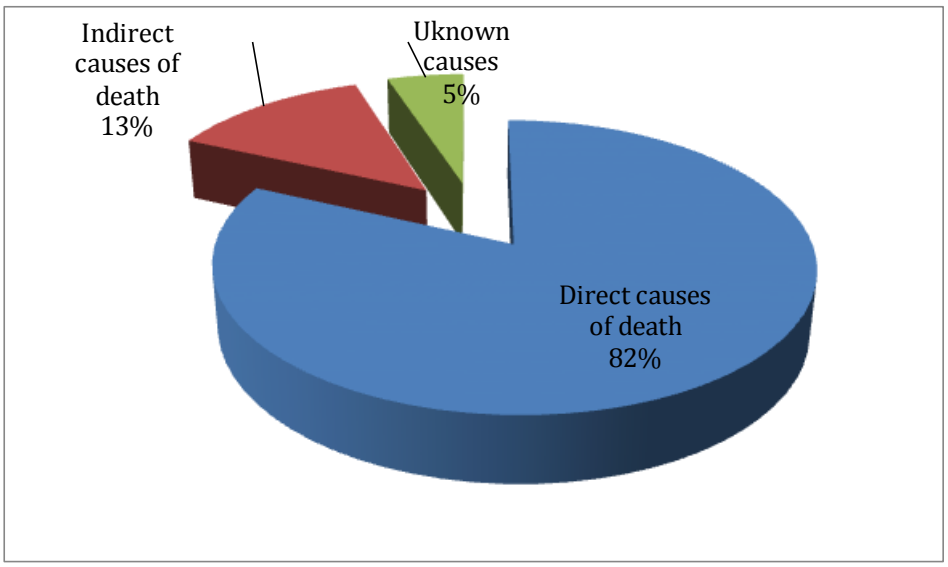
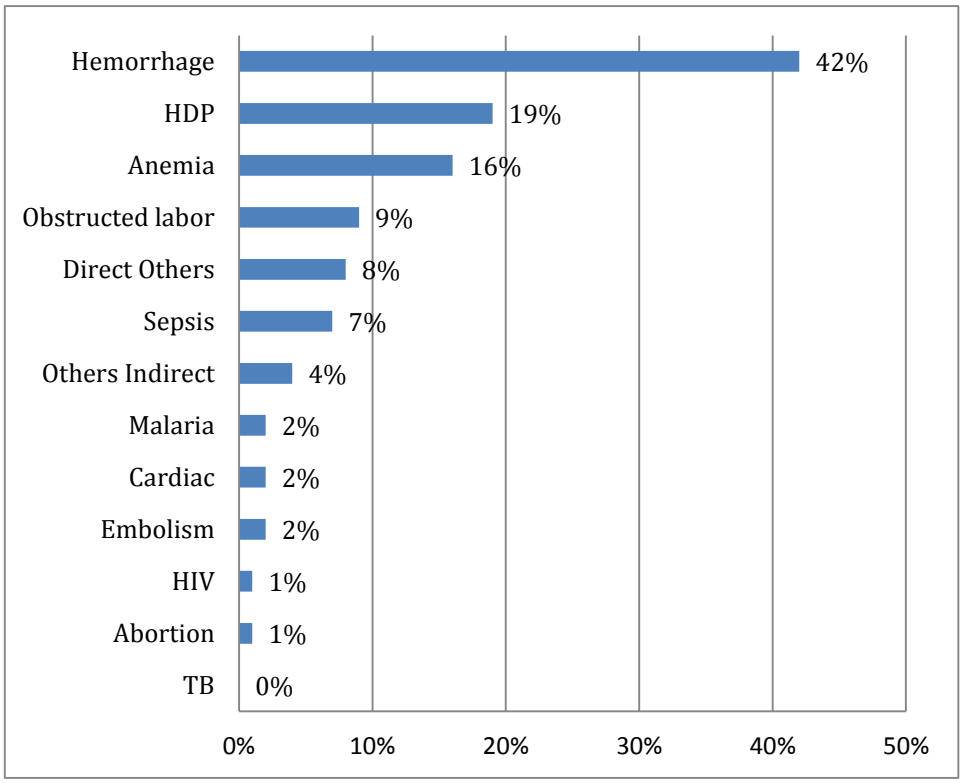


Figure 8: Direct and indirect causes of maternal deaths, N=633

Figure 9 shows the causes assigned to maternal deaths. Although only 1 cause of death should be assigned to every case, in the 2008 data there were roughly 40 maternal deaths for which more than one cause was reported on the MDRF, making accurate classification difficult and complicating data analysis. On some forms it was possible to re-assign the cause of death, for example if "eclampsia" or "pre-eclampsia" was written down in the "other" category, it would be changed to "HDP" (Hypertensive Diseases of Pregnancy), which include pre/eclampsia.

Figure 9: Specific direct and indirect causes of maternal death



Tables 1 and 2 provides a summary of the distribution of Direct and Indirect causes separately. Hemorrhage was the leading direct cause of death, accounting for 49% of direct causes and 42% of all causes, followed by pre-eclampsia/eclampsia (19%), obstructed labor/ruptured uterus (9%) and infections (7%).

Anemia was the most frequent indirect cause of maternal death with 86 cases which is 62% of all indirect causes and 16% of all the causes of maternal deaths. Cardiac, malaria and Embolism contributed for 2% each for the maternal deaths of indirect causes. 16

Table 1: Distribution of maternal deaths by cause of deaths (Direct, Indirect & Unknown)

Indirect Causes of Death			**Direct Causes of Death**		
No Indirect cause of Death attributed	443	70%	No direct cause of Death attributed	83	12%
One Indirect cause attributed as a cause	149	24%	One direct cause attributed as a cause	485	77%
More than one Indirect cause attributed as a cause	9	1%	More than one direct cause attributed as a cause	33	5%
Unknown	32	5%	Unknown	32	5%
Total	**633**	100%	**Total**	**633**	100%

Table 2: Types of Maternal death causes from Direct and Indirect causes

Direct maternal causes of death classifications			
	2008 EFY		
Direct causes	Frequency	Percent from direct causes	Percent from all maternal deaths(N=633)*
Hemorrhage	264	49%	42%

HDP	119	22%	19%
Obstructed labor	57	11%	9%
Sepsis	44	8%	7%
Abortion	7	1%	1%
Embolism	11	2%	2%
Direct Others	50	9%	8%
Total	**552**	**100%**	**NA**
Indirect maternal causes of death classifications			
Indirect causes	2008 EFY		
	Frequency	% from indirect causes	% from all maternal deaths(N=633)*
Anemia	104	62%	16%
Others Indirect	28	17%	4%
Cardiac	14	8%	2%
Malaria	12	7%	2%
HIV	9	5%	1%
TB	0	0%	0%
Total	167	100%	NA

* Note: Proportions of total maternal deaths do not add up to 100% as there are deaths with more than one causes assigned.

DISTRIBUTION OF CAUSES OF DEATH

Tables 3-6 provide sub-analyses of the different causes of maternal death, showing distribution by region, place of death, reporting source, time of death, and age and parity. The aim of these tables is to highlight the following:

(1) The national maternal mortality profile is reflected across regions, with little variation. Thus, throughout Ethiopia, hemorrhage remains the most serious contributor to maternal mortality in all regions. The only real exception in the data (Dire Dawa) almost certainly reflects the fact that the overall number of deaths is low, given the small and urban nature of this city administration. ALL regions will need to prioritise the top 3 direct causes of death, which also include HDP and obstructed labour. In terms of indirect causes, anemia clearly stands out across regions as well.

(2) In terms of place of death, the rate at which the cause of death leads to death is a determinant of the pattern. For example, once a woman begins to hemorrhage, the time to death can be as short as 2-4 hours. Therefore, the fact that 100% of reported deaths occurring at health posts were due to hemorrhage demonstrates that it is likely the health post was unable (or delayed) in making a referral to a higher level of the health system where appropriate treatment was available. High rates in transit or at home also reflect the fact that women who start to bleed outside a facility will be much more likely to die before they reach one. In hospitals, however, the distribution of deaths is more variable. Women with other, less urgent conditions will have had the time to arrive from lower down the system.

(3) Table 5 shows the different kinds of data reported from verbal autopsies and from facility abstraction forms. This partly is for reasons similar to point 2 above, as hospitals tend to see a greater diversity of causes of death. But it also can show that data quality and completeness might be different when information is obtained from facilities (from medical notes and providers) than from verbal autopsies (when community members try to piece together the woman's pathway to death). It is normal for these types of data collection to contain slightly different information and needs to be considered when interpreting MDSR annual reports.

(4) Finally, table 6 provides breakdown for each cause of death across age groups. This table highlights some of the obstetric risks known to be associated with age. For example, deaths among women in the *highest* age group demonstrate the highest concentration of hemorrhage deaths, reflecting their increased risk.

Table 3: Causes of death by region*

Region	Hemorrhage	Obstructed labor	HDP	Abortion	Sepsis	others Direct causes	Embolism	Anemia	Malaria	HIV	TB	other indirect causes	Cardiac	Total MDs
Addis Ababa	32%	3%	6%	3%	13%	16%	3%	3%	0%	6%	0%	3%	16%	31
Amhara	46%	7%	21%	2%	6%	7%	2%	14%	1%	2%	0%	5%	1%	244
Dire Dawa	19%	19%	19%	0%	11%	3%	11%	32%	3%	0%	0%	0%	0%	37
Gambella	50%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	2
Harari	43%	14%	36%	0%	0%	0%	0%	21%	0%	0%	0%	0%	0%	14
Oromiya	50%	9%	22%	1%	8%	6%	0%	36%	5%	0%	0%	3%	2%	108
SNNP	36%	11%	18%	0%	6%	15%	0%	9%	1%	1%	0%	3%	1%	97
Tigray	39%	8%	13%	1%	7%	5%	2%	5%	1%	1%	0%	8%	3%	100

* Note: Proportions of total maternal deaths do not add up to 100% as there are deaths with more than one causes assigned

Table 4: Causes of death by place of death*

Places of Death	Hemorrhage	Obstructed labor	HDP	Abortion	Sepsis	others Direct causes	Embolism	Anemia	Malaria	HIV	TB	other indirect causes	Cardiac	Total MDs
Health Center	46%	9%	14%	3%	17%	11%	0%	9%	0%	0%	0%	6%	3%	35
Health Post	100%	0%	0%	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	4
Home	61%	6%	8%	0%	5%	7%	0%	18%	2%	2%	0%	7%	1%	105
Hospital	33%	10%	25%	1%	7%	8%	3%	16%	2%	2%	0%	5%	3%	398
On transit	51%	9%	5%	1%	4%	5%	0%	22%	3%	0%	0%	1%	1%	76
On transit from health facility to health facility	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	1
Other	50%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2
Unknown	54%	0%	8%	0%	0%	15%	0%	15%	8%	0%	0%	0%	0%	13

* Note: Proportions of total maternal deaths do not add up to 100% as there are deaths with more than one causes assigned

Table 5: Causes of death by data source

Data source	Hemorrhage	Obstructed labor	HDP	Abortion	Sepsis	others Direct causes	Embolism	Anemia	Malaria	HIV	TB	other indirect causes	Cardiac	Total MDs
Facility based maternal death abstraction from	33%	10%	30%	2%	9%	9%	3%	16%	2%	1%	0%	3%	2%	249
Verbal autopsy	48%	8%	12%	1%	6%	7%	1%	17%	2%	2%	0%	5%	2%	384

* Note: Proportions of total maternal deaths do not add up to 100% as there are deaths with more than one causes assigned

Table 6: Causes of death by age group

Age group	Hemorrhage	Obstructed labor	HDP	Abortion	Sepsis	others Direct causes	Embolism	Anemia	Malaria	HIV	TB	other indirect causes	Cardiac	Total MDs
Less than 15	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1
15-19	29%	16%	16%	0%	8%	11%	3%	8%	0%	0%	0%	8%	3%	38
20-24	32%	2%	33%	0%	9%	6%	0%	21%	4%	0%	0%	5%	1%	97
25-29	37%	8%	22%	3%	6%	7%	2%	21%	3%	1%	0%	3%	4%	180
30-34	49%	11%	16%	1%	8%	7%	2%	15%	1%	3%	0%	5%	2%	150
35-39	49%	15%	8%	0%	4%	9%	1%	14%	1%	2%	0%	4%	2%	112
40-44	40%	4%	16%	0%	8%	12%	4%	16%	0%	0%	0%	4%	0%	25
45-49	67%	0%	33%	0%	0%	0%	33%	0%	0%	0%	0%	0%	0%	3
Unknown	52%	0%	11%	4%	7%	11%	0%	7%	0%	0%	0%	7%	0%	27

CONTRIBUTORY FACTORS: THE DELAY MODEL

Delays in seeking, accessing and receiving care during obstetric emergencies are usually classified into three categories. Delay 1 refers to the time from the start of a woman's illness to the time the problem is recognized as requiring care; Delay 2 refers to the time from acknowledging a problem to reaching an appropriate health facility; and Delay 3 refers to the time from arrival at a care facility to receiving the requisite treatment.

The review committee is tasked with identifying which of these delays appear to have occurred during the course of the woman's illness and death; more than one delay is likely as many deaths result from a chronological series of contributing factors that can compound each other.

In 2008, Delay 1 was reported for 210 (65.5%), Delay 2 for 127 (39.8%) and Delay 3 for 111 (34.8%) cases. Note that while Delay 1 and Delay 2 can potentially occur for any death (due to poor recognition of the problem and difficulties in accessing a facility), Delay 3 can only be recorded for deaths while (or after) the woman has reached a facility and thus by definition will occur among a smaller proportion of all reported deaths.

In roughly half of the cases (49.5%) only one delay factor was recorded on the MDRF as a contributory factor, of which 92 (28.8%) were Delay 1 only, 23(7.2%) Delay 2 only, and 43 (13.5%) Delay 3 only. In the remaining 51.5% of case based maternal death reviews reported, more than one delay factor was attributed as a contributory factor to the death.

Figure 10: Distribution of the Three Delays by data source

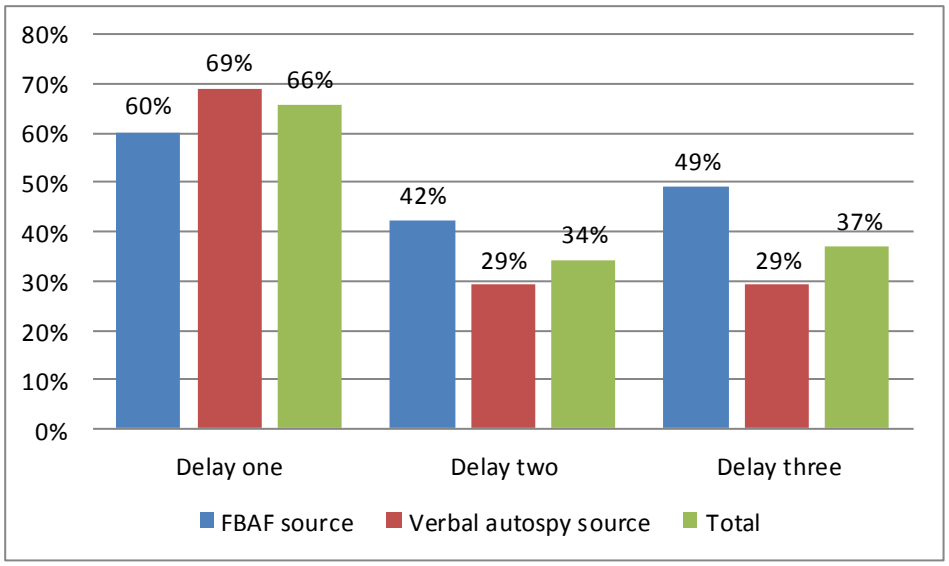
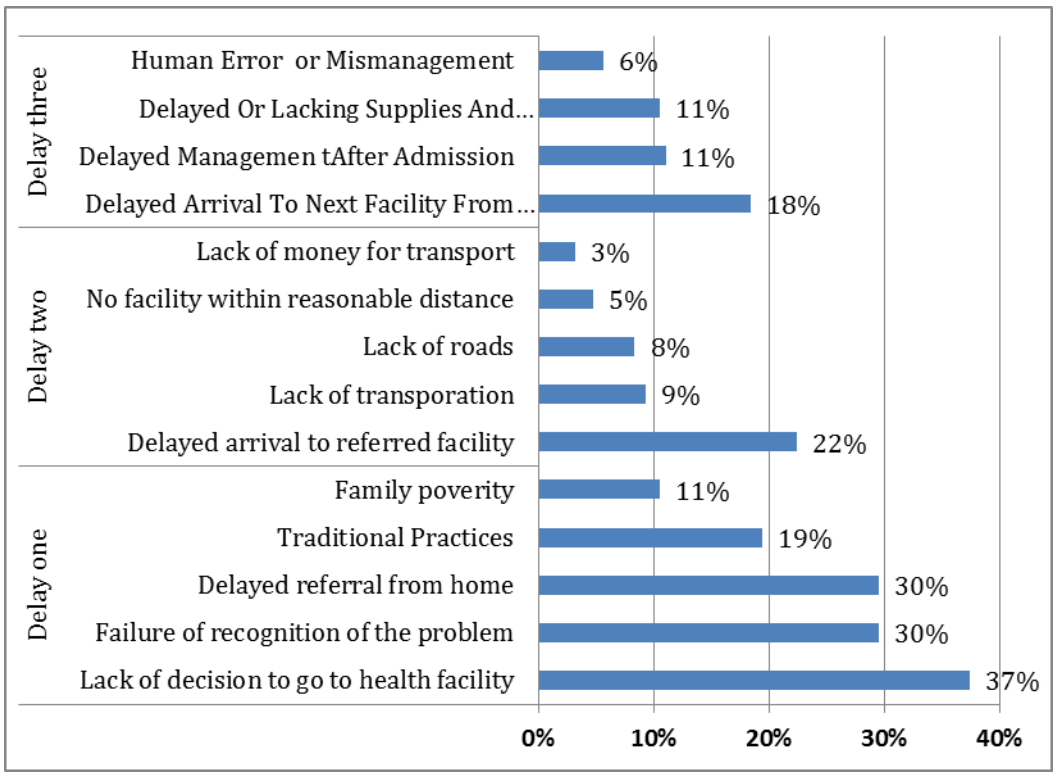


Figure 11: Distribution of the three delays by specific determinant



RESPONSE

Taking action in response to maternal death is the primary function of the MDSR system. Responses to MDSR data should take place at all levels of the health system including the community, all health facilities, and all administrative levels i.e. Woreda, zonal, regional and national.

So far there is no national mechanism to capture responses that have been put in place throughout the country as the MDSR system evolves. However, it is clear that over time, and once fully operational, the MDSR system will generate data and analysis to guide improvements to MNCH quality and ultimately improve health outcomes themselves.

As MDSR data accumulates in Ethiopia, there is a growing number of responses that have already been taken. In this section, real time examples from the start of MDSR in Ethiopia through 2008 are provided.

COMMUNITY LEVEL RESPONSES

Community interventions can have a substantial impact on improving maternal health.

Examples of effective interventions include;

- **Improving Community knowledge** of the need for health seeking behaviour
- **Health education** including risk factors and dangers signs through antenatal care and pregnant women conferences
- Ensuring **iron supplements** are provided to all women attending ANC
- Increasing uptake of **ANC and birth preparedness** plans, such as using maternity waiting homes or arranging transport to health facilities during labour
- Availability of **family planning services** with particular focus on availability to high parity and young women
- Support for accessible **transport**
- Identification and **safe referral** of women with complications

COMMUNITY EXAMPLE 1 :
IMPROVING COMMUNITY KNOWLEDGE AND ARRANGING TRANSPORT

A 35 year old woman delivered her 6th baby at home unattended by a skilled birth attendant. Following delivery she haemorrhaged but the family were unable to obtain transport to take her to the health centre 10kms away. She died at home 6hours after delivery.

In response to this death 2 members of staff from the health centre travelled to her home to carry out a verbal autopsy. During the verbal autopsy the village leader was informed and after discussion he agreed all pregnant women should travel to the health centre for delivery . He also agreed to arrange local traditional transport.

This story demonstrates how the process of MDSR can improve communication between health centres and community. This story of good practice is from Oromia

COMMUNITY EXAMPLE 2: HEALTH EDUCATION AND BIRTH PREPAREDNESS

In one month at one health centre 2 women arrived from different kebeles in shock and died from post-partum haemorrhage. The health centre staff reviewed the deaths and discussed the causes with women attending the pregnant women conferences. This has helped to raise the awareness of the need for health seeking behaviour in the community.

The health centre staff also discussed with the community leaders the need for a waiting home, which has now been completed.

In addition the health centre has also designed a T-shirt for men with the logo "No women should die giving birth to me". The T-shirts are for sale for 100 birr.

This story of good practice is from a community and health centre in Amhara

COMMUNITY EXAMPLE 3 : IMPROVED TRANSPORT AND BIRTH PREPAREDNESS IN RESPONSE TO 2 DEATHS FROM ONE KABELE IN A SHORT PERIOD OF TIME

There were 2 maternal deaths from the same kebele, one woman died of eclampsia and the other of Haemorrhage. Both lived in a very remote and mountainous area and arrived in the Health Centre in critical condition and were referred to a nearby hospital. But both died in transit.

The contributing factors that were identified when the deaths were reviewed included lack of transport and poor awareness of danger signs at community level

Following review of these two cases, changes have been implemented, including creation of a maternity waiting area at the health centre ,awareness in the community of danger signs and traditional transport. This story of good practice happened in Tigray

FACILITY LEVEL RESPONSES

If properly reviewed, each death should identify systemic problems that contributed it and can be corrected. Responses at this level include:

- **Staffing levels**- is there sufficient staff to meet the demands for quality maternal health care including EmONC?
- **Knowledge and skills-** are the staff adequately trained to work as a team and deliver safe obstetric emergency care?
- **Infrastructure problems** including supplies of blood, essential drugs and equipment
- **Referral mechanisms between facilities**

Facilities that regularly review maternal deaths develop an institutional memory, making recurrence less likely. One common observation is that once MDSR starts, the level of documentation improves. Good documentation leads to better, more organised care.

All the cases detailed here are real cases of maternal deaths that have taken place in the 2006/7 period. They have been selected for this report as they demonstrate evidence of good MDSR practice in response at facility level. They are also all commonly occurring cases across the country.

The first case described here demonstrates the need to look at the context of the death as well as the clinical management. Staffing numbers and allocation become an increasing challenge as health seeking behaviour increases and facilities become over crowded.

FACILITY EXAMPLE 1:
INCREASE IN STAFFING, REDISTRIBUTION OF STAFF AND CORRECT USE OF SENIOR STAFF PRIORITIZED IN RESPONSE TO A DEATH FROM PPH

A woman of 27 years having her second baby was admitted to her local health centre at 37 weeks of pregnancy. She was transferred to the Referral Hospital because of suspected fetal distress. At the hospital, she delivered a healthy baby uneventfully. Following delivery, she was transferred to the postnatal ward. 6 hours after delivery she was found collapsed with a major hemorrhage. Attempts to save her were unsuccessful and she died on the postnatal ward.

At the time of her collapse there was a staff shortage as several midwives were at a training meeting. There were only 2 nurses/midwives for the entire ward. This led to a delay in recognising the haemorrhage .

The following actions were identified: (1) In future, ward staffing will be prioritised over training and (2) in an emergency situation, senior members of staff must be informed immediately.

The second case described here demonstrates the willingness of the clinical team to honestly review cases and make changes to their clinical practice.

FACILITY 2:

STAFF TRAINING AND INCREASE IN KNOWLEDGE FOLLOWING A DEATH FROM HELLP SYNDROME

A 20 year old in her first pregnancy was admitted to Hospital at 32 weeks of her pregnancy with an antpartum haemorrhage and mild pre eclampsia. She was treated with Magnesium Sulphate and Hydrallazine,and dexamethasone but the baby died.

Induction of labour was carried out and she delivered a stillborn baby vaginally. Immediately following delivery, she had profuse vaginal bleeding and was promptly treated with fluids, oxytocics and blood transfusion. However, the bleeding persisted and a hysterectomy was done by the senior gynaecologist. Disseminated Intravascular Coagulation (DIC) occurred with bleeding from all puncture sites and haematuria. She died shortly after completion of surgery. This type of bleeding (HELLP syndrome) is a well recognised but relatively rare complication of severe pre-eclampsia.

Actions

The case was discussed in detail at the facility MDSR meeting. The woman had been an inpatient at the hospital for more than 1 week.

- *It was agreed that good care was given following delivery and the correct steps were taken in a timely fashion .*
- *The decision to deliver her should have been taken earlier in order to avoid the development of HELLP syndrome and DIC.*
- *Subsequent cases of severe pre-eclampsia have been treated more aggressively.*
- *The hospital has become an 'Institution with a memory', and will treat similar situations differently.*

This third case was the subject of a very thorough review that has resulted in significant improvements to the quality of care at that facility.

Facility 3:
Death from PPH, a case review that identified skill gaps and infrastructure problems

A 25 year old in her first pregnancy was admitted to the referral hospital for Induction of labour because of post maturity. Labour proceeded rapidly and she delivered a healthy baby.

Third stage of labour was actively managed but haemorrhage started immediately after delivery, she was shocked within 10 minutes of delivery and despite 2 iv lines and repair of vaginal tears and episiotomy she remained in a critical condition. Senior help was sought and she underwent Examination under Anaesthesia 2-3 hours after delivery. Despite suturing of cervical tears, further resuscitation and a 3 unit blood transfusion she suffered a cardiac arrest in the CS room and died on ICU 1 hour later.

Substandard care Many strands of substandard care were identified by the review team including lack of adequate training of junior staff, poor documentation of times, lack of essential equipment including oxygen and ventilators, lack of coordinated team work and lack of timely senior support.

In addition to reviewing the major event the review team also looked at the antenatal care and identified improvements needed in the Induction process, management of tocolysis, availability of lab results prior to induction and documentation issues.

***Actions**:*

- *Strengthening supervision of interns and junior midwives*
- *Improving availability of essential equipment on labour ward and ICU*
- *Regular in service staff training focussing on emergency preparedness*
- *Making guidelines and protocols available including FMOH clinical protocols,*

In this fourth example the MDSR committee at a referral hospital realised that there were common features to a number of recent fatal cases and made responses accordingly.

Facility Example 4:
Responses to a series of cases of uterine rupture at one hospital: revised guidelines & staff training together with change of practice

A referral hospital MDSR committee recognized that there were common problems after analyzing 3 maternal deaths from complications of ruptured uterus at their institution.

All cases involved highly parous women and induction of labour. One of the three cases was also complicated by severe pre-eclampsia, but all women suffered a ruptured uterus.

Actions

- *The hospital MDSR committee reviewed and revised the guideline for induction and augmentation of labour and ensured that the revised guideline was available on the labour ward.*
- *The correct follow up of patients on oxytocin with regular pulse, blood pressure, fetal heart and assessment of contractions was emphasised.*
- *The need for a high level of clinical suspicion of uterine rupture in women who are being induced was included in discussions with all medical and midwifery staff.*
- *Improvements in the recovery care and post-op follow up were made.*
- *Awareness of the danger of induction of labour in highly parous women has resulted in caesarean section being considered as an alternative mode of delivery in these women.*

The fifth example demonstrates how prompt actions at facility level can lead to immediate improved care. All facility deaths should be reviewed promptly, there is nearly always some immediate response that can be made.

Facility5:
Maternal Death and Near-Miss that demonstrate how MDSR can improve quality of care and infrastructure can be improved

Case 1 Maternal Death Eclampsia

A 22yr old woman in her first pregnancy was referred from a health centre to the district hospital. On arrival she was at full dilatation with obstructed labour and having abnormal body movements. She was delivered with forceps shortly after admission. She collapsed very soon after delivery with much bleeding despite a reasonably well contracted uterus. The conditions were difficult as there was a power failure and no functional generator.

The case was discussed at the hospital MDSR committee meeting and it was agreed that senior help should have been called.

Both an Electricity generator and a biochemistry machine were purchased by the hospital in response to this case.

Case 2 Near-Miss Eclampsia

This case was at the same hospital 14 days later.

A 27yr old woman delivered at home and was admitted to the district hospital on day 1 post partum. There was some delay in admission due to the lack of an ambulance. On arrival she had abnormal body movements and was unconscious.

All resuscitative measures were done and senior staff including the Emergency Surgical Officer, the Gynaecologist and Internist were called and attended. So the response from case 1 had been learned and remembered by the hospital staff and contributed to preventing another death.

The final example is of a case of sepsis with late referral and inadequate treatment. This is a commonly recurring scenario seen in all Regions of Ethiopia in this 2006/7 period. This means that there is a national lack of recognition of women at risk of sepsis.

Facility 6:
Changes in the referral system and increase awareness of National Guidelines to control infection

A 20yr old woman in her first pregnancy had had 2 ANC visits. She was admitted to the Health Centre in false labour. She stayed overnight at the Health Centre and the following day was in true labour. On day 3 of her admission she was found to be in obstructed labour and transferred to the Hospital.

On admission to the hospital she was fully dilated with prolonged ruptured membranes. A vacuum delivery was attempted and unsuccessful so 2 hrs after admission she underwent a C/S. At C/S pus was found and she was given i/v ampicillin. She had a normal temperature until day 4 when she had a temperature of 40 degrees Centigrade and medical review was requested. Metronidazole was commenced but her condition deteriorated and she died on day 6 of her admission.

Comments/discussion at the Hospital MDSR Committee meeting

- *There was delay in referral from the Health Centre and the significance of prolonged ruptured membranes was not recognized*
- *She had the C/S done without delay*
- *The need for triple antibiotics in a woman with obvious infection at delivery was missed.*
- *This woman was at risk of puerperal sepsis and a routine medical review should have taken place prior to day 4*

***Actions** recommended at the hospital MDSR Committee meeting*

- *Discussion and feedback to Health Centre staff. Criteria for referral to be agreed with Health Centre staff. Telephone communication to be encouraged between Health centre and hospital. The gynaecologist will visit the health centre in the next 3 weeks.*
- *Discussion and feedback to hospital staff. National guidelines 2010 FMOH 'Selected Obstetric Topics' to be distributed to all medical staff and a copy made available on labour ward. If this guideline had been followed, the correct antibiotic regime would have started 6 days earlier.*
- *A Handover Manual has been developed to inform temporary or new staff of Hospital Guidelines and Protocols including review of high risk patients.*

WOREDA/ SUB CITY/ ZONAL RESPONSES

Responses from administrators at this level are crucial for the improved access to and availability of quality maternal healthcare . Responses at this level include

- Devising strategies to address **barriers for health seeking behavior** by using cultural and community sensitive issues by using such interventions as community dialogue and HDA
- Check existing **transport** options functioning optimally and address any gaps (eg ambulance maintenance and fuel availability)
- Equipping health facilities with all **essential supplies** and equipment and needed **health care workers**

Many health administrations at this level have started to discuss MDSR data at zonal meetings including zonal and woreda government officials, Woreda Health Office heads and Women Affairs and women leagues, representatives of NGOs and youth groups.

Zonal Case study: Collaboration between Regions to reduce maternal mortality

The Head of East Harege Zone hosted a special meeting of CEOs and Medical Directors from all 5 referral hospitals in Dire Dawa and Harar. The majority of women who die in hospitals in Dire Dawa and Harar are from East Harege.

After a presentation of maternal death data by the PHEM officer of East Harege Zone there was a fruitful discussion between the participants.

In total 22 recommendations were made which included

- *Improve the referral process such as pre transfer discussion by phone between clinicians*
- *Early transfer of critical patients*
- *All transfers to be accompanied by a relevant referral note*
- *Stop ambulance abuse and prioritise maternity patients*
- *Orientate ambulance drivers to maternity patients needs including smooth transfer*

REGIONAL LEVEL RESPONSES

Responses at this level are the slowest to be determined and implemented for a combination of reasons including conflict of other emergency health issues and lack of capacity at Regional level. Strong leadership is required to prioritise the MDSR process.

Responses at this level need to be prioritised on their

- potential impact on reducing maternal mortality,
- feasibility including costs, resource requirements
- ease of implementation

NATIONAL LEVEL RESPONSES

Longer term strategic plans are expected at this level to focus on key priorities.

At National level there have been the following responses to MDSR data:

Coordination of National MDSR Committee which met in Bishoftu in April 2008 to review maternal death data, analyse the data in consideration of other data sets eg DHS (2011 & 2014), Census data and SPA data.

As a result of this inaugural meeting the first National MDSR Report was finalised and released in August 2016 by EPHI.

The national TWG for MDSR released four policy briefs in response to this early MDSR data. These 4 briefs make recommendations relevant to

- Quality of MNH care
- Community participation and engagement in MNH
- Appropriate use of blood and blood products
- Strengthening surveillance in MDSR

The FMOH MNCH Directorate is now working towards forming a special task force to accelerate the elimination of preventable deaths from Obstetric Haemorrhage.

Other on-going responses are aimed at extending implementation of MDSR nationwide and improving functionality of MDSR at facility and Regional levels.

CONCLUSIONS AND RECOMMENDATIONS

The objective of MDSR system is to provide accurate, real time information that can be used for planning actions at all level of health system to address avoidable problems that contribute to maternal deaths in the Ethiopian health system context. Despite under-reporting of maternal deaths in the system, data from the deaths of 633 women has been collected at National level. This gives useful information about the characteristics of the women who died, where they died and how and why they died. This information must be used to raise awareness around leaders and policy-makes, as well as community members. The information can inform hospital administrators to improve the quality of maternity care, strengthen referral networks, lead to better medical supply management, identify areas for re-skilling and refresher training, and assist in developing health promotion messages.

One of the main gaps of the system is underreporting due to low level of identification of maternal deaths through community and facility based surveillance system. A large number of maternal deaths have been missed or misclassified. Unless every maternal death is identified and reviewed, the quality of information (representativeness of the data) will be negatively affected. This in turn diminishes the effectiveness of policy and programmatic responses for preventing similar deaths, improving the quality of maternal services along the continuum of care and ultimately contributing to the achievement of the HSTP goal of ending preventable maternal deaths by 2030. In addition to the problem of identification, the level of reviewing suspected maternal deaths and using the review process for identifying appropriate responses also remains low at both health center and hospitals.

The final section of the annual MDSR report presents some basic recommendations based on the data presented and analysed during 2008 EFY.

RECOMMENDATIONS TO IMPROVE THE SURVIELLANCE FUNCTION OF THE SYSTEM

- To improve the coverage of the health facilites the scale up of the system has to be accelerated to the uncovered zones and health facilities in 2009EFY. In addition the possibility of including the private health facilites also need to be considered.
- Strengthen the implementation of MDSR/IDSR Integration initiative at all levels
- Monitoring and support for Maternal deaths Review committees at all levels has to be strengthened
- Strong and continous advocay activities must be planned and implemented focusing on alleviating the fear of blaming at community and health care facility levels.
- Development and distribution of Job aids for health extension workers and health facilites
- Regional, zonal and woreda adminstrators must take responsibility for ensuring adequate provision of reporting formats and guidelines at all facilities.
- Reasons for poor quality of implementation of key processes of MDSR system has to be investigated and solutions has to be proposed.

RECOMMENDATIONS CONCERNING THE R IN MDSR

- Every health facility should summarize its maternal mortality findings annually.
- All Regional Health Bureau should present aggregated maternal death data and recommendations to reduce regional maternal mortality annually
- The Regional level MDSR data should inform policy and planning
- National level MDSR data should inform policy and planning
- Regular review of cases, data analysis , and development of actions plans (Responses) at all levels has to be strengthened through sharing best practice.
- At national level there should be an annual symposium at which the latest National data on maternal death is presented with appropriate analysis . At the meeting there will be capacity building of participants including improving the standards of death reviews and improving the standards of responses.

APPENDIX: DETAILED DATA BREAKDOWN

Characteristics		Frequency	Percent	Valid Percent
Data source	Facility based maternal death abstraction from	249	39.3	39.3
	Verbal autopsy	384	60.7	60.7
	Total	633	100.0	100.0
Region	Addis Ababa	31	4.9	4.9
	Amhara	244	38.5	38.5
	Dire Dawa	37	5.8	5.8
	Gambella	2	.3	.3
	Harari	14	2.2	2.2
	Oromiya	108	17.1	17.1
	SNNP	97	15.3	15.3
	Tigray	100	15.8	15.8
	Total	633	100.0	100.0
Data source	FBAF	249	39.3	39.3
	Verbal autopsy	384	60.7	60.7
	Total	633	100.0	100.0
Places of Death	Health Center	35	5.5	5.6
	Health Post	4	.6	.6
	Home	105	16.6	16.9
	Hospital	398	62.9	64.1
	On transit	76	12.0	12.2
	On transit from health facility to health facility	1	.2	.2
	other	2	.3	.3
	Total	621	98.1	100.0
	Missing	12	1.9	
	Total	633	100.0	
Marital status	Divorced	6	.9	1.0
	Married	577	91.2	97.3
	single	10	1.6	1.7
	Total	593	93.7	100.0
	Missing	40	6.3	
	Total	633	100.0	
Level of Educations	No Education	357	56.4	64.0
	Only able to read and write	47	7.4	8.4
	Elementary	59	9.3	10.6
	High school	28	4.4	5.0
	College and above	22	3.5	3.9
	Unkown	45	7.1	8.1
	Total	558	88.2	100.0
	Missing	75	11.8	

Characteristics		Frequency	Percent	Valid Percent
	Total	633	100.0	
Timing in relation to pregnancy	Anterpartum	79	12.5	13.4
	Intrapartum	128	20.2	21.7
	Postpartum	384	60.7	65.0
	Total	591	93.4	100.0
	Missing	42	6.6	
	Total	633	100.0	
Delivery outcome	Live birth	64	10.1	57.1
	Still birth	44	7.0	39.3
	NA	4	.6	3.6
	Total	112	17.7	100.0
	Missing	521	82.3	
	Total	633	100.0	
Preventability of Death	Preventable	454	71.7	80.1
	Non Preventable	60	9.5	10.6
	Unkown	49	7.7	8.6
	Total	567	89.6	100.0
	Missing	70	11.0	
	Total	633	100.0	
Age group	Less than 15	1	.2	.2
	15-19	38	6.0	6.3
	20-24	97	15.3	16.0
	25-29	180	28.4	29.7
	30-34	150	23.7	24.8
	35-39	112	17.7	18.5
	40-44	25	3.9	4.1
	45-49	3	.5	.5
	Total	606	95.7	100.0
	Missing	27	4.3	
	Total	633	100.0	
Parity group	0-1	205	32.4	34.4
	2-4	229	36.2	38.4
	5 & above	162	25.6	27.2
	Total	596	94.2	100.0
	Missing	37	5.8	
	Total	633	100.0	
Gravidity group	0-1	160	25.3	27.1
	2-4	227	35.9	38.4
	5 & above	204	32.2	34.5
	Total	591	93.4	100.0
	System	42	6.6	
	Total	633	100.0	
Delays	Delay one	415	65.6	65.6
	Delay two	217	34.3	34.3
	Delay three	234	37.0	37.0
	Total	633	100.0	100.0