



National Maternal and Perinatal Death Surveillance and Response (MPDSR) System Annual Report 2012 EFY



Ethiopian Public Health Institute
Public Health Emergency Management Center (PHEM)

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Acknowledgments

This 2012 EFY Maternal and Perinatal Death Surveillance and Response (MPDSR) system annual report is prepared by the Ethiopian Public Health Institute (EPHI) with the participation of the national Maternal and Perinatal Death Surveillance and Response (MPDSR) Technical Working Group (TWG) members from different stakeholders at various levels of the health system.

The Ethiopian Public Health Institute (EPHI) - Public Health Emergency Management center (PHEM) would like to express its appreciation and gratitude to all those who were involved in the preparation of this annual report.

Acronyms and Abbreviations

ANC	Antenatal Care
CAC	Comprehensive Abortion Care
CBNC	Community-Based Newborn Care
CPAP	Continuous positive airway pressure therapy
CUAMM	Collegio Universitario Aspiranti Medici Missionar
EDHS	Ethiopian Demographic Health Survey
EFY	Ethiopian Fiscal Year
EmONC	Emergency Obstetric and Neonatal Care
ENC	Essential Neonatal Care
EPHI	Ethiopian Public Health Institute
FBAF	Facility Based Abstraction Form
FMOH	Federal Ministry of Health
HMS	Helping Mothers Survive
HSTP	Health Sector Transformation Plan
ICCM	Integrated Community Case Management
IHI	Institute for Healthcare Improvement
IMCI	Integrated Management of Childhood Illness
IMNCI	Integrated Management of newborn and Childhood Illness
KMC	Kangaroo Mother Care
MBB	Mini Blood Bank
MDG	Millennium Development Goal
MDRF	Maternal Death Report Format
MDSR	Maternal Death Surveillance and Response
MMR	Maternal Mortality Ratio

MNCH	Maternal Neonatal and Child Health
NASG	Non-pneumatic Anti-Shock Garment
NICU	Neonatal Intensive Care Unit
PFSA	Pharmaceutical and Food Standards Agency
PHEM	Public Health Emergency Management
PNC	Post Natal Care
PPH	Post-Partum Hemorrhage
QI	Quality Improvement
RHB	Regional Health Bureau
RMC	Respectful Maternity Care
RRT	Rapid Response Team
SNNP	Southern Nations Nationality and Peoples
TWG	Technical Working Group
UBT	University Based training
UNICEF	United Nations International Children's Emergency Fund
VSO	Voluntary Service Overseas

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Forward

This 2012 EFY Ethiopian Maternal Death Surveillance and Response System report marks the seven year of the national system's implementation, which was initiated in Ginbot 2006 E.C. During these implementation years, over 4000 maternal deaths have been identified, notified, reviewed and reported to the national Public Health Emergency Management Center database. As always, the response to maternal and perinatal mortality data is the most important step of MPDSR. This report offers both programmatic responses and recommendations based on information's generated from the system for how the health system can learn from MPDSR data at different levels and use the evidence to avert future deaths.

In this report, findings regarding the causes and determinants of maternal deaths are compared across the last implementation years to provide an indication of prevailing trends over time. Trends need to be interpreted with caution, as the MPDSR system is still young and earlier years experienced significant under-reporting (for example, there were fewer than 100 maternal deaths reported in 2006 E.C).

Nonetheless, it is interesting to review the data chronologically: some statistics prove fairly constant over time, such as the fact that hemorrhage remains the leading cause of maternal deaths, mainly occurring in the postpartum period. Changes can be seen in other areas, such as the proportion of reports coming from facilities (rather than community-based verbal autopsies) is increasing. Furthermore, it is a positive development that facility-based reports increasingly cite "delay 3" factors (which correspond to delay in receiving care once arriving in a facility) as contributing to maternal deaths. This may reflect the culture of fear for reporting may be abating, and providers are willing to consider weaknesses in their health facilities and identify these for quality improvement measures.

Since the beginning of perinatal death surveillance system, three regions namely Oromia, Amhara and Addis Ababa city administration have been reporting to the national PHEM system. Lately, in this year Dire Dawa city administration and Benishangual Gumuz region reported for the first time since the beginning of system implementation. With all limitations, the annual report comprises the three years performances and progress of the system: however, more emphasis is given for 2012 EFY report in this report.



Aschalew Abayneh

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Executive Summary

The national Maternal Death Surveillance and Response (MDSR) system has been implemented for the last seven years nationwide. This is the Sixth annual report to present description of reported deaths and trends in surveillance data reporting since introduction of the system in 2006 EFY.

During 2012 EFY, the system captured 1025 maternal deaths using weekly notifications system and 289 maternal death case-based reports. This represents 8% of maternal deaths captured by weekly notification and 2% captured by case-based reports against the estimated 13,297 maternal deaths according to Ethiopian Demographic and Health Survey (EDHS) 2016. This report is lower compared to previous year system performance in capturing maternal deaths. The political instability happened during the reporting fiscal year may contribute for the lower-level system performance in detecting and reporting maternal deaths from community and facility level. Besides, effect of the COVID-19 pandemic leading to interruption in essential health services resulted delayed review of notified maternal deaths at health facility level and delayed reporting may have significant contribution. However, the Facility-based maternal death reporting continues to rise, currently accounting for over half of all case-based reports for which source of data was recorded.

There remain significant variations in regional levels of reporting, ranging from 63% of expected deaths captured by the system in Hareri to 0% in Afar, Dire Dawa, and SNNPR regions. In addition to the attention to be paid to high-reporting zones and woredas for response, low-reporting areas also require more intensive technical assistance to bring their reporting levels comparable to the estimated maternal deaths from their locality.

The leading causes of maternal death identified by the MDSR system for this reporting fiscal year were Hemorrhage (37 %), Hypertensive Disorders of Pregnancy (HDP) (11%), Anemia (16%), and sepsis (6%). This pattern is broadly similar with the previous years, although there is a notable decline in HDP related deaths. Hemorrhage remains the major cause of maternal death through all 7 years 40% in 2011 and 37% in 2012 EFY. Anemia is the second leading cause of death contributing to 13% to 16% of maternal deaths in 2011 and 2012EFY. In the last five years (2006-20110EFY) hypertensive disorders in pregnancy (HDP) have also persisted as the second leading cause of maternal death accounting for more than, however, it was declined in 2011(10%) and 2012(11%) of the deaths. Most maternal deaths continue to occur in the post-partum period, with high parity women at the highest risk.

In 2012 EFY, delay one, delay two and delay three was cited for 41.2%, 29.3% and 29.5 % reviewed maternal deaths respectively. These proportions do not add up to 100% as more than one delay can be recorded for any maternal death report.

It is also worth highlighting that although perinatal death surveillance was added to the system in 2009 EFY, roll out of training and data collection tools have only recently been completed and the number of perinatal deaths reported is too low to analyze for this report. However, with all limitations, the perinatal deaths were included for general insight into the progression of the system.

The system captured only 656 (0.4%) of the expected perinatal death, which is 97,000 perinatal deaths, in the nation during 2012 EFY. Of the reported death 52% of them were from the Amhara region followed by Addis Ababa and Oromia each were contributed 27 % and 20% of reviewed respectively. Regarding socio-demographic characteristics, 398 (60.7%) of parents of the deceased were living in a rural area. Regarding the age of mothers of deceased, the three years aggregated data showed that about 411(29.9%) were aged between 25 and 29 years. Out of reported perinatal deaths during 2012 EFY, a total of 204 (32.3%) mothers of deceased were in similar age category. Similarly, the last three years' perinatal death case-based report shows that 1011 (73.6%) of perinatal death were happened at hospital, and in 2012 EFY about 3/4th (493) of perinatal deaths happened at hospital level.

Based on the analysis result, the leading cause of reported perinatal deaths was Prematurity 459 (30.1%), Asphyxia 449 (29.5%) and Sepsis, Pneumonia & meningitis 317 (20.8%) respectively. The causes of perinatal deaths from reporting regions had shown a similar trend during the last implementation years. A total of 171 death of mothers of the deceased perinate was reported since the start of system implementation in the nation. The analysis showed that, mothers of the deceased perinate died due to obstructed labor, pre-eclampsia and eclampsia, and Ante Partum Hemorrhage (APH) which accounts for 27.1%, 26.3%, and 20.3% of deaths respectively. Among 656 perinatal deaths review reports, delay one was cited for 327(50.3%) followed by delay three which is 190(29.2%) and delay two cited for 132 (20.3%) perinatal deaths.

Responses for reported maternal and perinatal deaths is expected to take place at all levels of the health system; which is at community, all health facilities, and all administrative levels i.e. Woreda, zonal, regional, and national. During 2012 EFY, commitment of the Ministry of Health was reflected through a Programmatic response based on evidenced generated from the system.

For significant reduction of preventable maternal mortality due to major causes of deaths, different actions were taken to improve the basic emergency care for obstetric cases before arrival at a hospital. This includes, improving quality of ANC care of a health center, improve access to blood transfusion at a primary hospital, expansion of CEmONC health facilities, strengthen catchment-based mentorship program, strengthen the referral system, availing anticonvulsant treatment and uterotonic drugs and commodities including NASG and monitoring of severe HDP at a Referral Hospital and improve access for Ambulance service were the major ones. Among the programmatic actions Implemented for reduction of perinatal deaths in the nation, improving neonatal resuscitation at health facilities, availing essential lifesaving commodities for newborn and expansion of kangaroo mother care were the major ones.

To strengthen the Maternal death surveillance system and improve the health status of mothers in the nation, (1) improving levels of reporting and review by strengthening leadership and committing adequate resources within EPHI and the Technical Working Group; (2) making antenatal care a national MOH priority with intensive supervision to standardize services offered to pregnant women at community-level; (3) Ensuring facility managers take responsibility for the availability and use of critical job aids and supplies in labour wards such as the Safe Childbirth Checklist, Partograph, uterotonic agents, NASGs, anticonvulsant and antibiotics drugs (4) increasing health system capacity including functional facility-to-facility referral systems, the establishment of mini blood banks and training staff inefficient use of blood products (E.g. frozen plasma instead of whole blood where appropriate), (5) introducing / strengthen routine audit and quality improvement procedures, including Quality Improvement (QI) officers representation on MPDSR/ RRT review committees and (6) increasing the system uptake of MPDSR information for health system improvement is crucial. Hemorrhage action plan, catchment mentorship, identifying and mapping of vulnerable communities and sub population groups for prevention and preparedness.

To improve the surveillance and response for perinatal death nationally; (1). Improving the geographical coverage of the system beyond the five actively reporting regions and city administrations in the nation (2). Strengthen / Establish the perinatal death database at national and regional level to improve the data management and information generations for decision making process at all levels (3). Improve the data quality management and cause of death assignment for the collected perinatal deaths using standardized ICD-10 causes of deaths for perinatal deaths (4). Making neonatal mortality a national health priority and develop a neonatal health driven national newborn and child survival strategy for 2020/21-2025, (5).

Closely monitor neonatal mortality indicators and share the findings of the quarter DHIS-2 data review to the national and regional leadership (6). Expansion of CBNC to selected woredas of emerging regions specifically Afar, Somali & Gambella regions to improve access to newborn health services (7). Provide technical support to roll out neonatal content of the IRT for HEWs (8). Strengthening the “P” in Maternal and Perinatal Death Surveillance and Response through program reviews, joint supportive supervisions and capacity building are recommended.

Introduction

Ethiopia has made remarkable achievements in reducing maternal and child mortality by more than two thirds from its baseline during the MDG era. Despite this, around 13,900 maternal deaths and 120,000 perinatal deaths were estimated to occur in the year 2019 GC.

Maternal and perinatal death surveillance and response (MPDSR) is introduced as a system that tracks and measures all maternal and perinatal deaths in real-time. This enables understanding of underlying causes and contributing factors of the deaths and can stimulate further action to prevent similar deaths in the future. Furthermore, it provides information on the number of deaths, their place and timing, and whether or not they were preventable.

Maternal and perinatal death surveillance and response system (MPDSR) is the process of identification, notification, quantification, determination of causes, contributing factors, and preventability of maternal and perinatal deaths happening in community and facility level to respond to prevent future deaths.

This annual report aims to provide the progress of the surveillance and response for 2012 Ethiopian fiscal year. Therefore, this annual report emphasizes on system performance which will compare the notified death with reviewed one. Besides, the national maternal and perinatal death reports is described disaggregated by socio-demographic characteristics, cause, and contributing factor of reviewed deaths. The programmatic response provided by Ministry of Health (MOH) is also included in the report.

About the Program

Reducing maternal mortality and improve maternal health status is the top priority of the federal ministry of health of Ethiopia as reflected in the health sector transformation plan and reproductive health strategy for 2008 - 2012 E.C. As part of reducing preventable maternal mortality, Ethiopia introduced the MDSR system as parallel program under ministry of health in 2006 then integrated to Public Health Emergency Management system in 2007 E.C. Perinatal death reporting through the PHEM system was also started in 2009 EFY. Since then, more than 1300 perinatal deaths were reported to national PHEM.

The MPDSR system has been designed and is being implemented as integrated into the existing Integrated disease surveillance and response (IDSR) system in all parts of the country within the existing Public Health Emergency Management (PHEM) system as one among many notifiable cases or events. The MPDSR death notification system has been incorporated into the national District Health Information System (DHIS-2) platform. As a result, the health system is expected

to notify each maternal and perinatal death from the community through DHIS-2 database routinely.

Ethiopia is also currently implementing quality improvement efforts that link the MPDSR information and quality improvement processes from local to national levels focused on improving effective coverage of quality care in equitable manner through scaling evidence-based intervention to reduce preventable maternal and perinatal morbidity and mortality in the nation. This initiative is promoting best practices and learning opportunity among facilities, ensure lasting improvements of quality of care, and move facilities towards sustainable standardized practice regarding Maternal, Newborn and Child Health (MNCH) care at health facility level.

Part I: MPDSR System Performance

Chapter Description

This chapter describes the national MPDSR system performance and characteristics of Maternal and perinatal Deaths report received through the National Maternal Death Surveillance and Response system during the reporting period.

In this chapter, a description of the reporting year system implementation status and performance, report completeness and timeliness for maternal and perinatal death notification and case-based report, regional variation and by comparing with previous implementation years.

Summary of Findings

- Only 8% and 2% maternal deaths were captured by the system when compared with the estimated maternal deaths for notifications and case-based reporting respectively.
- Proportion of active zones/sub-cities/town administration for weekly maternal death notification has improved during 2012 EFY reporting year compared to previous year (2011 EFY) to 86%. However, this year reporting declined in terms of case-based reporting to 68% against previous reporting year (2011 EFY).
- A total of 1025 maternal deaths were notified and 289 (28%) of them were subsequently investigated, reviewed and reported to national level - EPHI
- The national MDSR system completeness and timeliness for Maternal death notification was 89% and 85% respectively. Variable completeness for case-based reports of Maternal death during the reporting year was 71%.
- Mean number of days for maternal death case-based report reaching national level since the date of notification was 41 days.
- The highest proportion of maternal death notification against the expected was from Harari region, which is 113% out of the estimated Maternal deaths. While, Somali and SNNPR notified only 5% and 3% of the estimated maternal deaths respectively.
- During 2012 EFY, in addition to those three regions which started PDSR in 2009 EFY, Benishangul G and Dire-Dawa started PDSR reporting through case-based formats.

1.1 Maternal death surveillance and response system performance

1.1.1. Geographical coverage of the system

Geographical coverage of the MPDSR system depicts the extent of MPDSR system implementation across the country for the given year that will help to inform the national surveillance system strengthening efforts through monitoring the existence of silent surveillance levels. It is estimated by comparing death reporting status from the total 116 zonal structures/town administration/sub-cities expected to report under the current PHEM reporting system.

During 2012 EFY, coverage of the MPDSR system in terms of notification was 86% indicating there is successive improvement in the number of silent zones compared to previous implementation year (Figure 1). These 17 silent zones were located in the five regions of the country, namely Oromia (7), SNNPR (2), Afar (2), Somali (5), Gambela (1). The remaining regions and city administration including Tigray, Amhara, Addis Ababa, Benishangul Gumuz, Harari, Dire Dawa regions have no silent zones for the reporting period.

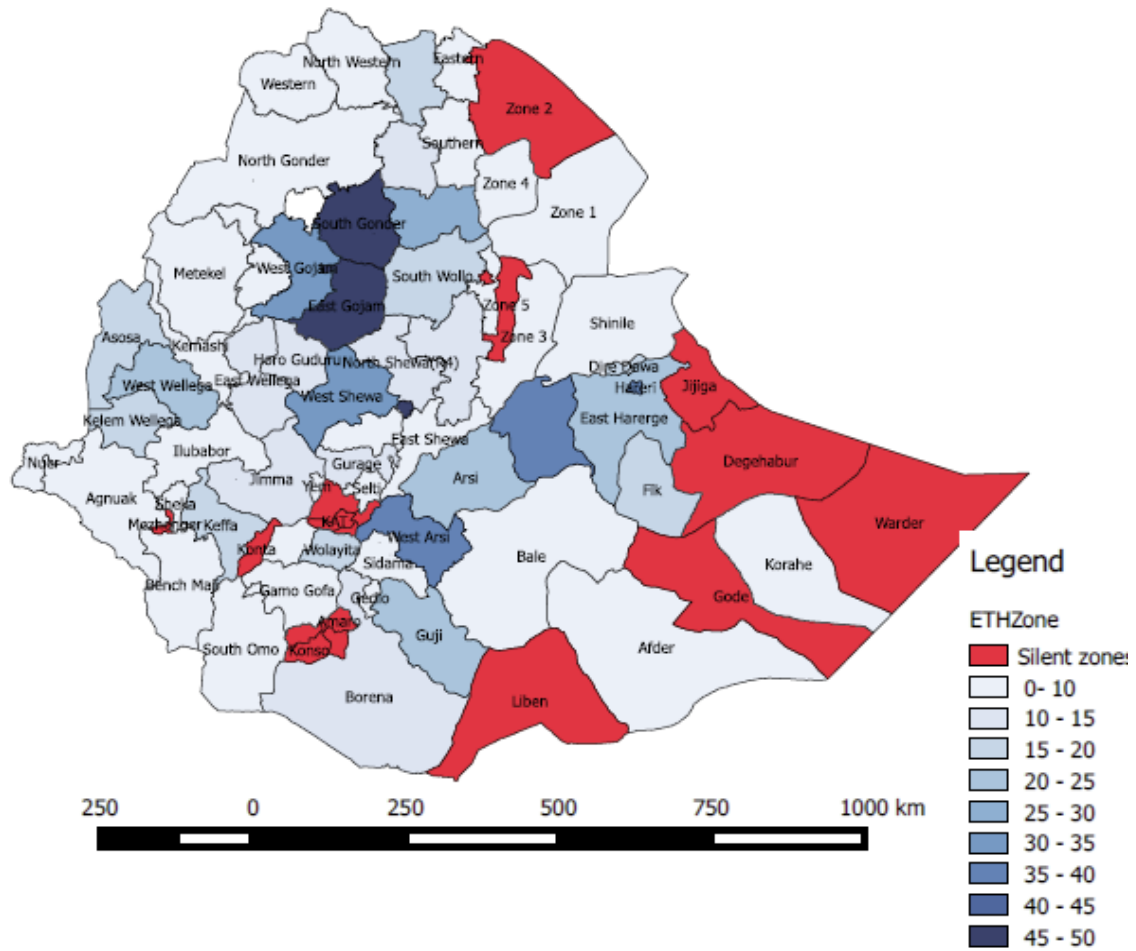


Figure 1- Coverage of Maternal death reporting, weekly notification by Zones/sub-cities, 2012 EFY, Ethiopia

On the other hand, Coverage of MDSR system in terms of case-based reporting indicated that more than 2/3 (68%) of the expected sites did not review and report case-based maternal deaths or remained silent for the reporting year. All zonal structures of three reporting regions namely Afar, Dire Dawa, and SNNPR were silent for Maternal Death casied based report during 2012 EFY (Figure 2).

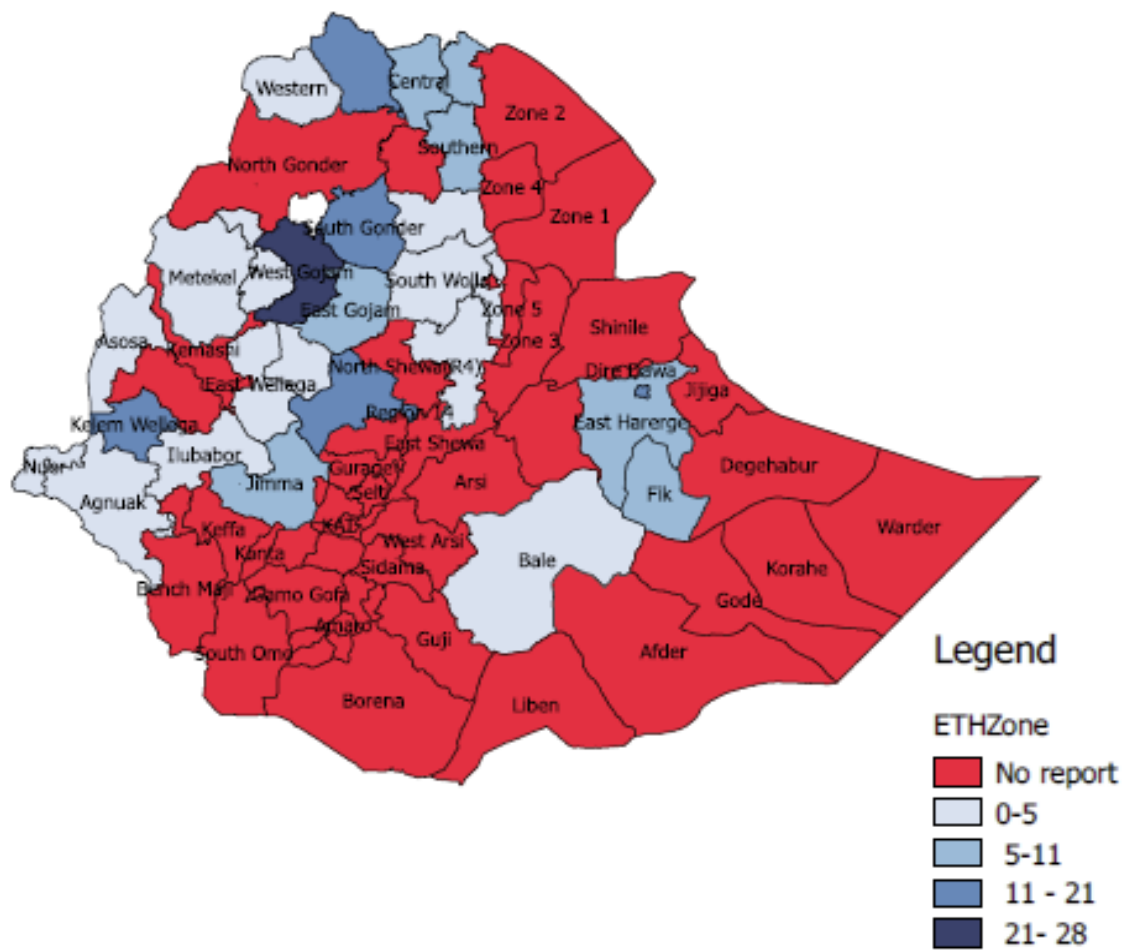


Figure 2: - Coverage of Case-based Maternal death reporting by Zones/sub-cities, 2012 EFY, Ethiopia

1.1.2. Weekly and case-based reporting of Maternal Deaths

During 2012 EFY reporting year (from 4th Quarter of 2011 EFY to 3rd Quarter of 2012 EFY), the national MDSR system captured 1,025 maternal deaths through weekly notification and 289 maternal deaths case-based reporting. Among case-based reports received nationally, 130 (45%) of the reports were abstracted from verbal autopsy, and 159 (55%) of them were abstracted from facility-based abstraction.

In general, from the estimated number of deaths expected to occur in the country, 8 % of the deaths were notified through the weekly notification and only 2% reported as death review summary (case-based), based on EDHS 2016 estimate, which is 412 maternal deaths per 100,000 live births.

This year report shows, there are regional differences in reporting of maternal death through weekly PHEM report as compared to the estimated numbers of maternal deaths. As shown in Figure 3 below, Harari region notified 113% of Maternal deaths compared to the estimated number, which may partially be inflated due to the occurrence of maternal deaths referred from in neighboring catchment regions. On the other hand, the remaining regions notified fewer deaths compared to expected deaths, Dire-Dawa city administration and Benshangul Gumuz regions notified 27% and 21% expected maternal deaths respectively. Lower reporting rates were observed from Somali and SNNP regions, which were 5% and 3% respectively.

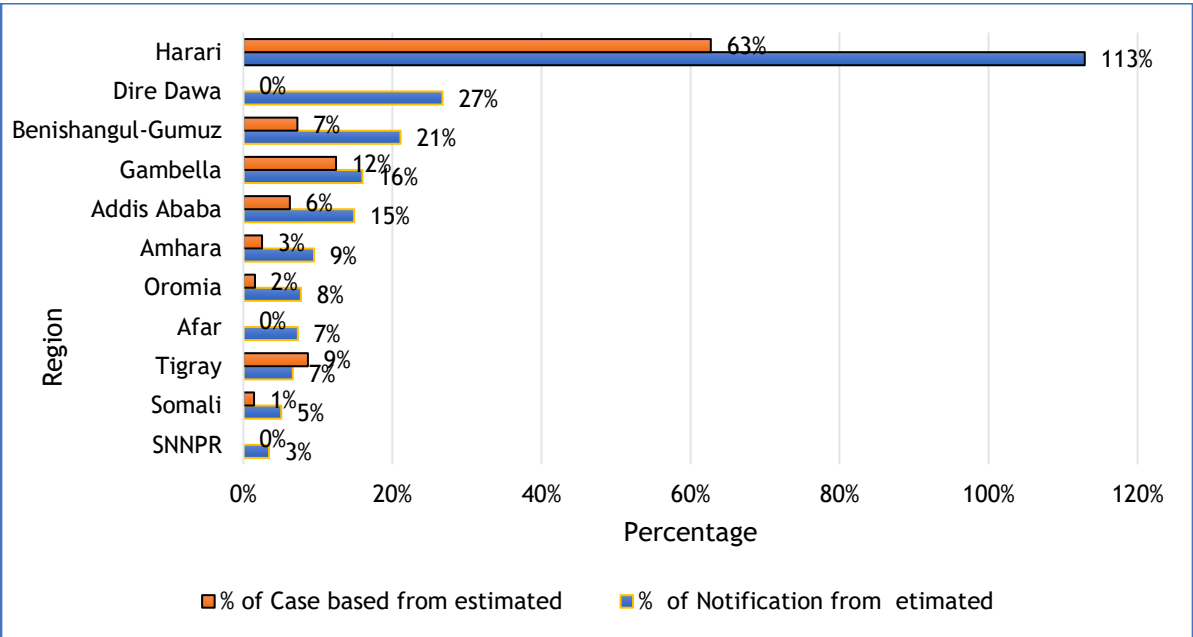


Figure 3: The proportion of reported maternal deaths against the estimated number of deaths by region based on EDHS 2016 of 412 per 100,000 LBs, 2012 EFY

All maternal deaths reported through the weekly reporting system are expected to be reviewed and reported by MDRF within one month after weekly reporting. In a well-functioning system, nearly the same number of MDRFs and weekly reported maternal deaths should be received. Some discrepancies between surveillance and review reports are expected, as not all weekly reported maternal deaths will be eligible for investigation, reviewing, and report by final case-based reporting format. Furthermore, investigation for some deaths may not be carried out due to some household being difficult to locate following a death, refuse to participate in a verbal autopsy, or suspected maternal deaths reported weekly may be turned to be accidental or incidental deaths during verification. Thus, the number of MDRFs is likely to be smaller than the total number of MDs reported through weekly surveillance.

As shown in Table 1 below, among the 1025 weekly notified maternal deaths during the 2012 EFY, an aggregate of 289 (28%) were subsequently reviewed and reported to the national level (EPHI-PHEM). There is regional variation in reviewing and reporting of maternal deaths following initial death notifications. Of the total 9 regions and 2 city administrations, Tigray region had 131% performance, indicating there is case-based reporting without initial notification of deaths through the weekly PHEM reporting system.

On the contrary, three regions namely Afar, Dire Dawa, and SNNPR had no case-based reporting at all indicating the notified maternal deaths either not subsequently being investigated and reviewed or reported at all. On the other hand, Gambella and Harai regions had relatively good performance with reviewing and reporting of notified maternal deaths with 78% and 56% of performance respectively. The remaining regions had below 50% performance. Availability and functionality problem of rapid response team (RRT) at health centers and/or Maternal Death Surveillance and Response committee at hospitals for reviewing and responding to the death may be responsible for the discrepancy.

Table 1: - Reported maternal deaths versus estimated maternal deaths and Weekly Vs MDRF reports-based UN 2019 est., 2012 EFY

Region	Live births*	Expected Maternal deaths**	Reported MD notification	Reported MDRF	% of notified MDs reported with MDRF	% of notification against the estimate	% of MDRF against the estimate
Harari	7,951	32	36	20	56%	113%	63%
Dire Dawa	15,863	64	17	0	0%	27%	0%
Benishangul-Gumuz	37,836	152	32	11	34%	21%	7%
Gambella	14,040	56	9	7	78%	16%	12%
Addis Ababa	83,919	337	50	21	42%	15%	6%
Amhara	736130	2,952	280	74	26%	9%	3%
Oromia	1,295,183	5,194	401	81	20%	8%	2%
Afar	54,577	219	16	0	0%	7%	0%
Tigray	184,242	739	49	64	131%	7%	9%
Somali	191,209	767	39	11	28%	5%	1%
SNNPR	694,995	2,787	96	0	0%	3%	0%
Grand Total	3,315,945	13,297	1025	289	28%	8%	2%

* Health & Health-related indicators, FMOH,2019

**MMR of 401 per 100,1000 live births (WHO and World Bank).

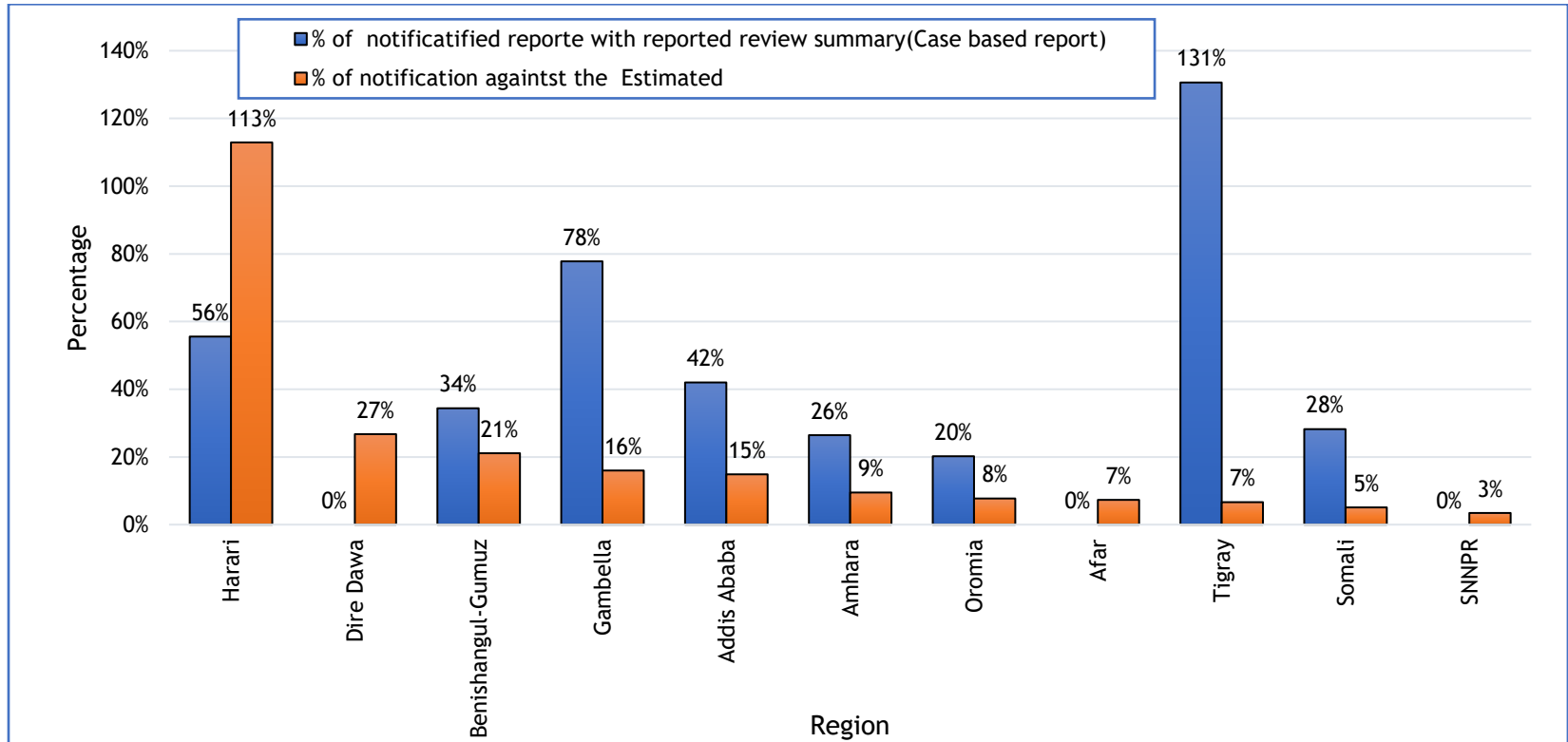


Figure 4: Notification and case-based reporting performance by region in 2012EFY, Ethiopia

Since the implementation of MDSR system, 2,206 (55%) of the total reported maternal deaths were reported from the 20 high maternal death reporting zones. Majority (9) zones were from Amhara region, Oromia (6), Tigray (4) and SNNP (1) (Table 2). Caution should be taken during interpretation of this as this may reflect the status of reporting rather than the actual burden of maternal deaths in the indicated zonal / town structures.

Table 2: - Twenty high maternal death reporting zonal/ town structures, 2006 -2012 EFY, Ethiopia

S.N.	Zone name/Town admin	Region	Number of maternal D	Reported Vs regional total	Reported Vs National total
1	West Gojjam	Amhara	207	18%	5%
2	South Gondar	Amhara	196	18%	5%
3	East Hararge	Oromia	194	16%	5%
4	West Arsi	Oromia	179	15%	4%
5	Hawassa	SNNP	154	28%	4%
6	East Gojjam	Amhara	132	12%	3%
7	Central Tigray	Tigray	120	23%	3%
8	North Gondar	Amhara	115	10%	3%
9	Arsi	Oromia	99	8%	2%
10	South Tigray	Tigray	97	18%	2%
11	North Western Tigray	Tigray	92	17%	2%
12	North Shewa	Amhara	79	7%	2%
13	Jimma	Oromia	76	6%	2%
14	Western Tigray	Tigray	73	14%	2%
15	South Wolo	Amhara	72	6%	2%
16	Borena	Oromia	67	6%	2%
17	West Shewa	Oromia	65	5%	2%
18	Awi	Amhara	64	6%	2%
19	North Wollo	Amhara	64	6%	2%
20	Bahir Dar	Amhara	61	5%	2%

1.1.3. Trend of maternal death reporting

Both weekly and case-based maternal death reporting performance showed a decreasing trend for the 2012 EFY compared to the 2011 EFY reporting period. Though both notification and case-based reporting are in declining direction since 2010 EFY, maternal death case-based (MDRF) reporting, showed significantly declining trend as compared to the 2010 EFY performance. Parallel decline was observed between VA and FBAF sourced maternal death case-based reporting (Figure 5-7).

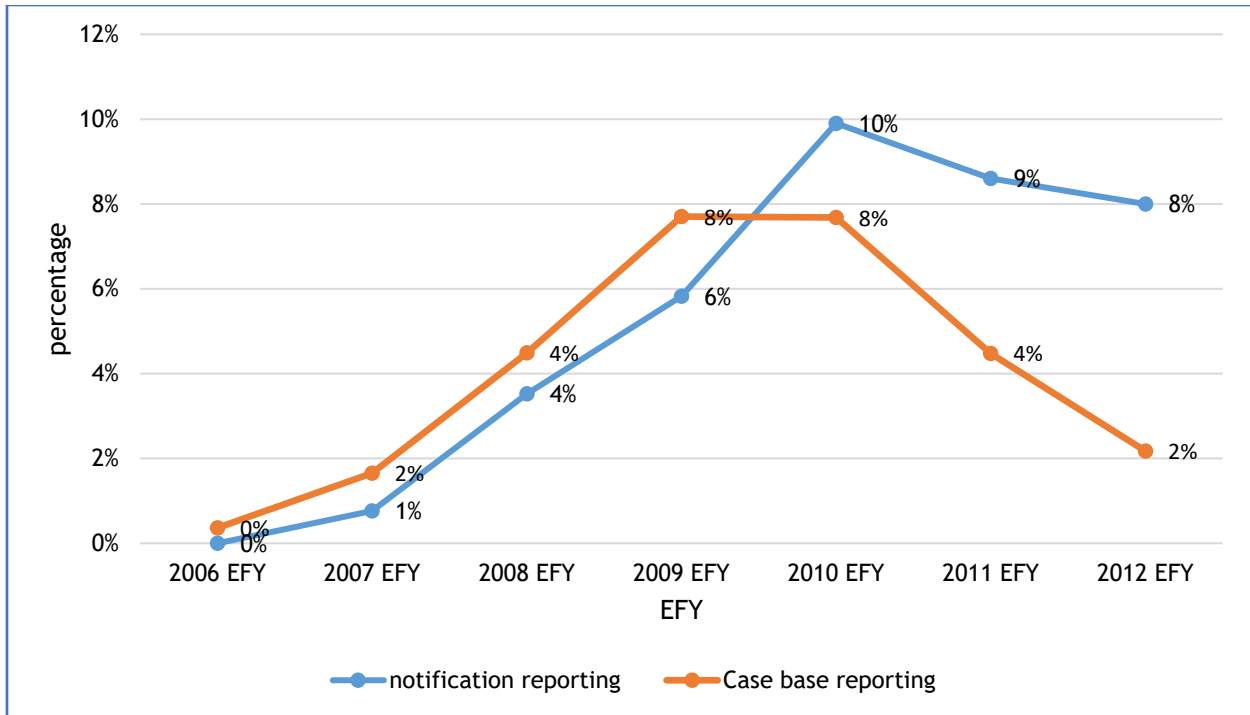


Figure 5: Maternal death reporting trend from 2006 EFY to 2012 EFY by reporting years,

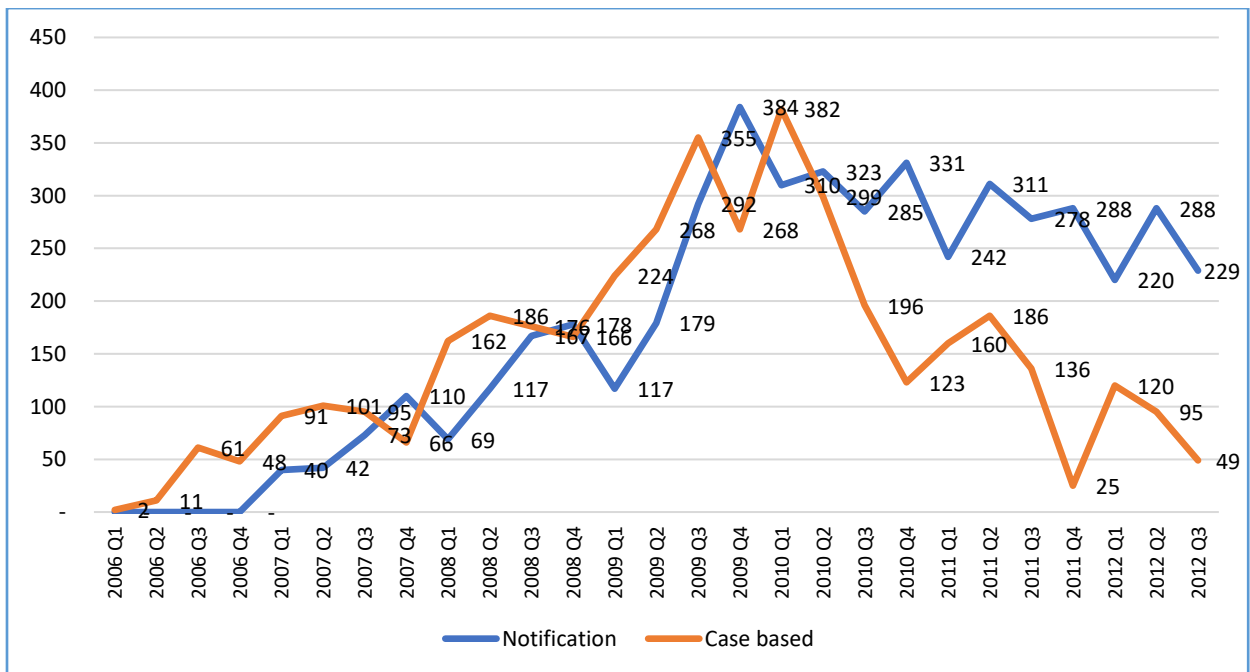


Figure 6: Maternal death reporting trend from 2006 EFY to 2012 EFY by quarter,

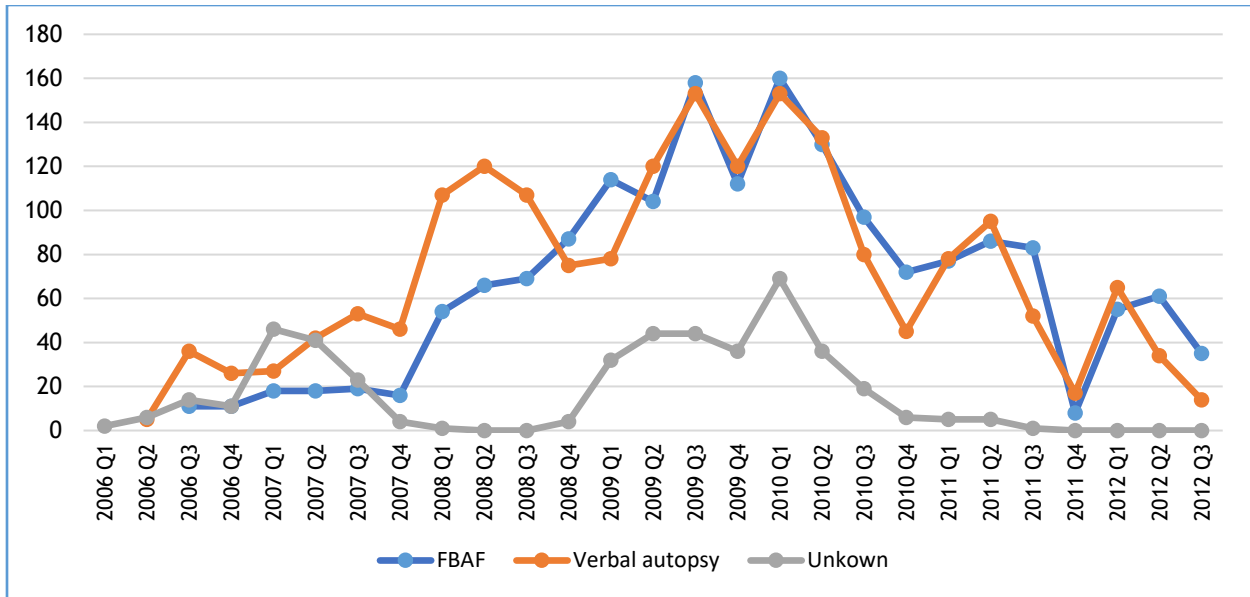


Figure 7: Quarterly Maternal death reporting trend by source of abstraction (VA and FBAF),

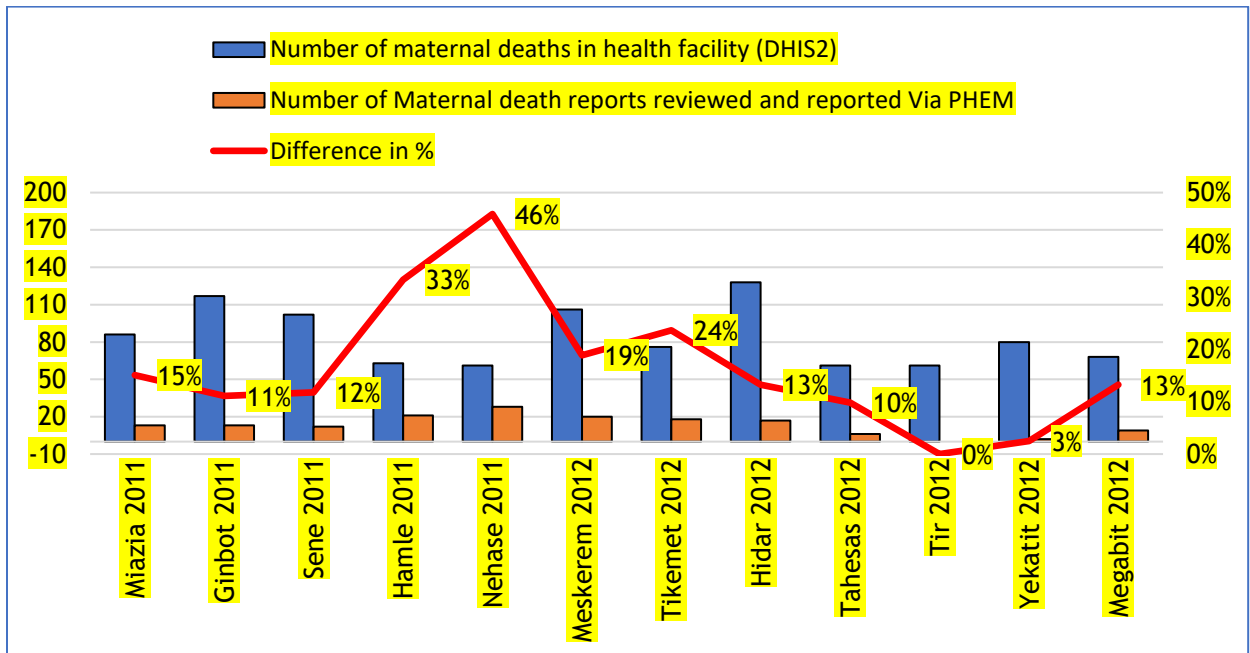


Figure 8: Triangulating maternal deaths (institutional maternal deaths) with maternal death reviewed and reported from Health facilities via PHEM system, Miazia -2011 - Megabit- 2012

1.1.4. National MPDSR Surveillance data quality

Surveillance data quality measures are directly related to the system's capability to receive real-time data with acceptable quality for decision making to improve the health status of the community.

As Per the National MPDSR technical guideline, maternal & Perinatal death review summary (Case-based reporting) should reach national levels (EPHI) within a month after the reported date of notification. During the 2012 EFY reporting period, the mean number of days for maternal death case-based report to reach to National levels was 41 days (Figure 9). This varies across regions, from 0 (Somali) to 78 (Tigray) days. There is further variation by a source of data, with an average of 32 days for MDRFs based on facility-based abstractions to be received and 51 days for MDRFs based on verbal autopsies (Table 3).

Table 3: - Reporting regions meantime of reporting for maternal death case-based reporting, by data sources 2012 EFY

Region	Mean number of days		
	FBAF	VA	Both sources
Tigray	67	81	78
Benishangul Gumuz	4	98	35
Oromiya	38	27	35
Hareri	32	-	32
Amhara	34	27	30
Addis Ababa	28	-	28
Gambella	4	0	3
Somali	0	-	0
National average	32	51	41

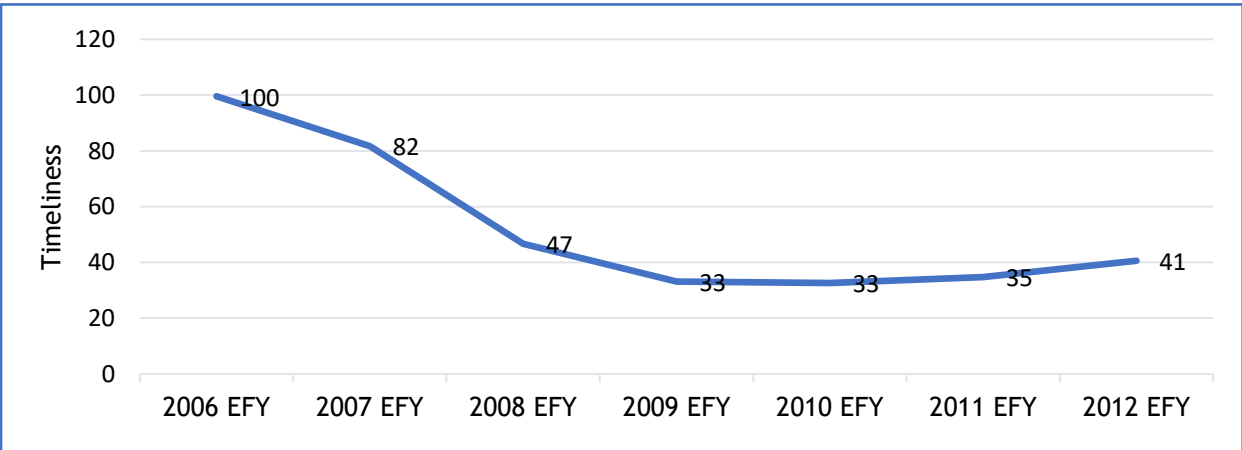


Figure 9: - Timeliness of case-based reporting - Mean number of days elapsed to receive the case-based report (maternal) to the National level.

Though timeliness of case-based reporting (mean number of days' case-based reporting from the date of notification) has shown a declining trend compared to initial years of implementation, the 2012 EFY performance is lower than the last three years' average.

Content completeness of Maternal death case-based reports received at the national level as calculated as a percentage of filled data elements in the reporting form, during the 2012 EFY was 71%. There are also regional discrepancies in completeness ranging from the lowest 59% for the Oromia region and the highest for Amhara (82%). Gambella, Oromia & Harari performed below the national average with respect to content completeness which is 71% (Table 4).

Table 4: - Completeness of Maternal case-based reporting (Content completeness) by region and national, 2012 EFY

Region	Reports by FBAF	Reports by Verbal Autopsy	Total Reports
Amhara	81%	83%	82%
Addis Ababa	77%	-	77%
Somali	75%	-	75%
Benishangul Gumuz	75%	69%	73%
Tigray	71%	71%	71%
Hareri	63%	-	63%
Gambella	62%	67%	64%
Oromiya	59%	59%	59%
National	69%	73%	71%

1.2. Perinatal death surveillance and response system performance

According to 2016 EDHS, perinatal mortality rate is 33/1000 pregnancies which are estimated to be 87,000 neonatal deaths & 97,000 stillbirths per year. The unavailability of perinatal mortality indicators in the national health information system was the major challenge to monitor the program and performance of the regions at national level. To track the perinatal mortality and generate information for action, perinatal death surveillance and response was introduced integrated with PHEM system in 2009 EFY as a national program.

Since the time of implementation, only three regions namely Oromia, Amhara and Addis Ababa city administration started to report perinatal deaths through Public Health Emergency Management System. Later on, Benshangul Gumuz and Dire Dawa started reporting through case-based formats in 2012 EFY.

During the three consecutive implementation years between 2010 EFY to 2012 EFY, a total of 1,373 perinatal deaths were reviewed and reported to national PHEM database. From the reported perinatal deaths, about 96% of deaths were reported during 2011 EFY and 2012 EFY. Out of the total reported deaths, 659 which is 0.4% of the expected perinatal death in the nation were reported in 2012 EFY.

Moreover, the geographic coverage of perinatal death reporting is lower as compared to the expected reporting level. Only 22% of the zones/town admins/sub-cities reported perinatal death during the current 2012 EFY. Zonal structures under six regions namely Afar, Benishangul Gumuz, Gambela, Tigray, SNNP, and Harari are found to be silent zones for PDSR during 2012 EFY (Figure.10).

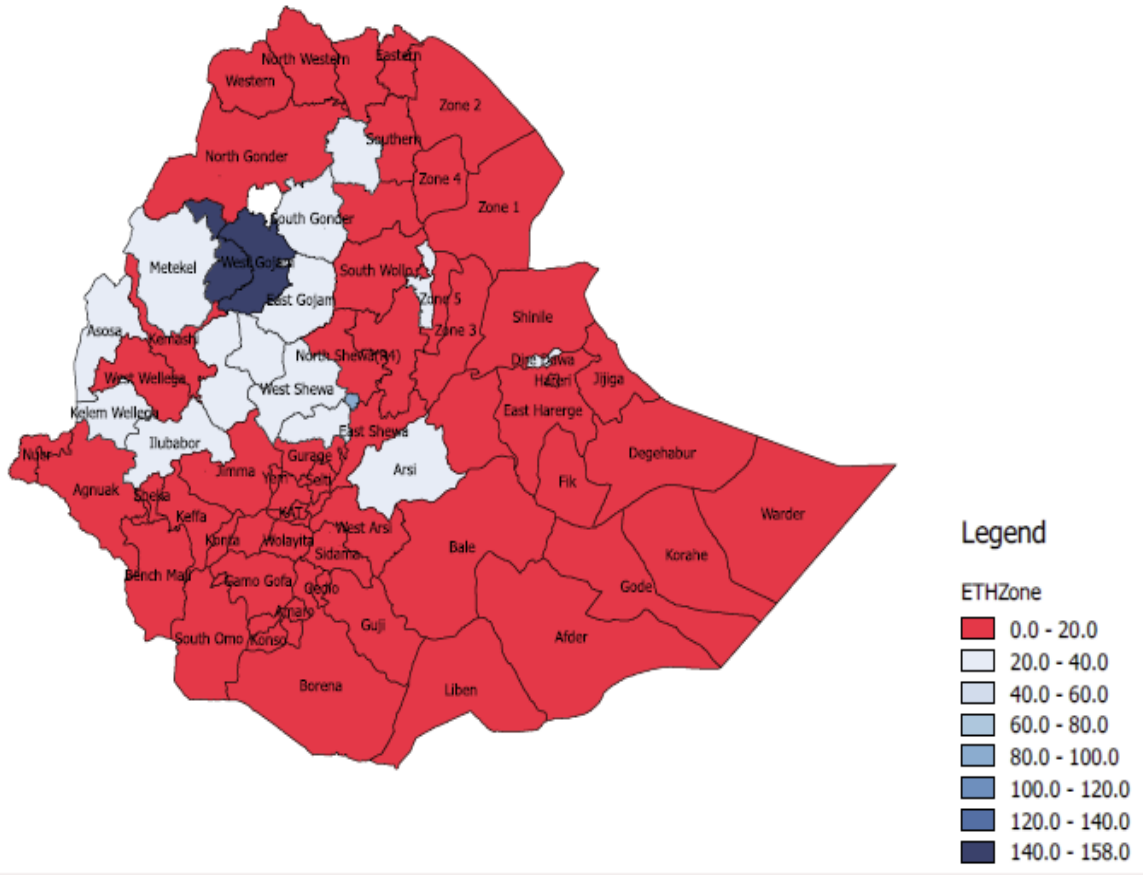


Figure 10: - Coverage of Perinatal death reporting, Case-based reporting by Zones/sub cities,2012 EFY, Ethiopia

Part II: -Characteristics of reported Maternal Deaths

This chapter mainly focuses on characteristics of deceased mothers reported through Maternal death case-based report in 2012 EFY. This includes, socio demographic characteristic of deceased women's, Cause of Maternal death and contributing Factors of Maternal Deaths.

Summary of Findings

- The mean age of the deceased women is 28.5 year
- Of 289 reported maternal deaths, 67 % died in health facilities, 11.4 % died on transit and 20.4 % at home
- About 73.7% of deceased women died during the postpartum period, 14.2% during delivery and 12.1% before delivery
- Direct causes contribute for 75.7% of deceased mothers while indirect cause of death accounted for 24.3% maternal deaths
- Obstetric hemorrhage was the leading cause of maternal deaths accounting for 47% followed by anemia 16%, Hypertensive Disorder of Pregnancy (HDP) 11%, and sepsis 6%
- Of contributing factors, delay one contributes for 44%, delay two for 32% and delay three for 35%.
- From delay one, lack of decision to go to facility accounts for 28%, from delay two delayed arrival to next facility to referred facility accounts for 26% and from delay three delayed arrival from another facility counts 21%

2.1. Socio-Demographic Characteristics of reported Maternal deaths

A total of 4,051 maternal deaths were reported from 2006 EFY to 2012 EFY through case-based report. Among these, 289 (7.1%) maternal deaths were reported in 2012 EFY. The analysis result showed that most deceased women were illiterate, married, age between 20-34 and rural resident which accounts for 92.5%,80.6%,70% and 67.9% respectively.

The finding of 2012 EFY is consistent with the total aggregated result, in that the mean age of women who died from pregnancy-related causes was 28.5 years. Of all reported deaths, 82.4%, 91.7% and 51.9% of them were illiterate, married and resided in rural areas. As it is showed in below figure 11, the majority of women who died were in the 20-34-year age group (67.8% of 290 total reported maternal deaths).

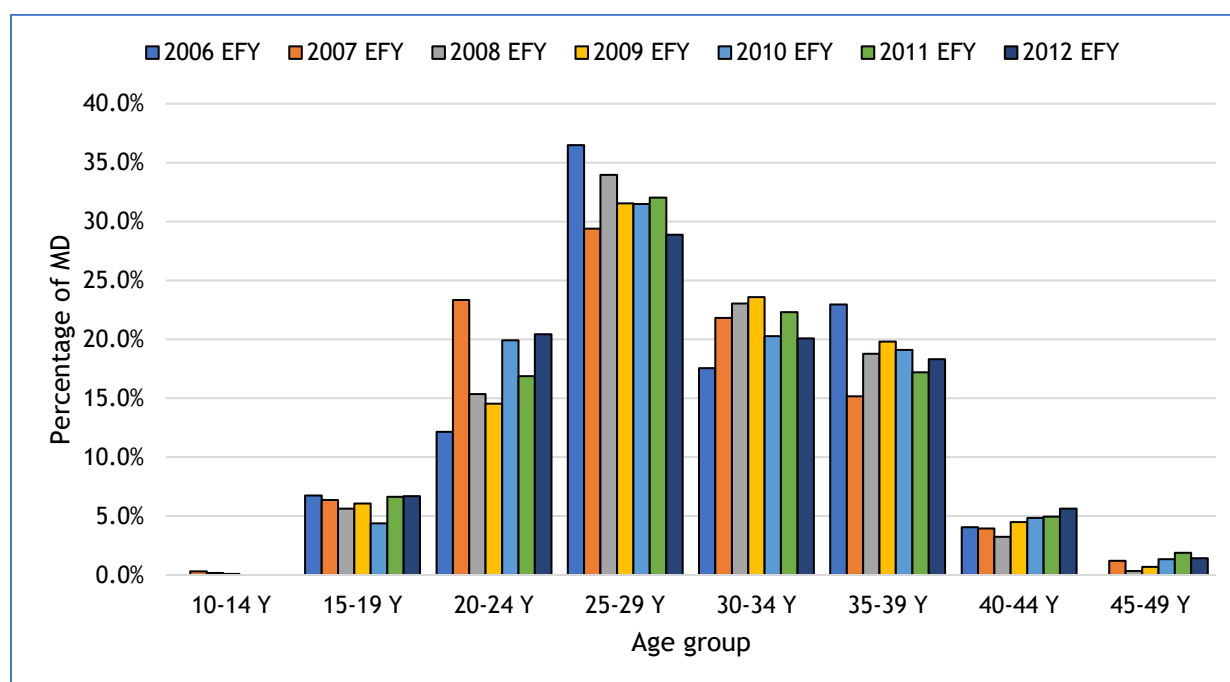


Figure 11: Age groups for all reported maternal death from 2006EFY to 2012EFY, Ethiopia

2.2. Place of death

The total aggregated data analysis result from 2006EFY-2012EFY revealed that, 69.2% of Maternal deaths occurred in health facility followed by home (17.1%) and on transit (both on from home to health facility and from facility to facility) (13.5%). Similarly, the 2012 EFY death review finding from the reported 289 maternal deaths shows, majority (67 %) died in health facilities, about 57.8% died at the hospital and 6.6% in health centers. While about 11.4 % died on the way to on transit and 20.4 % at home.

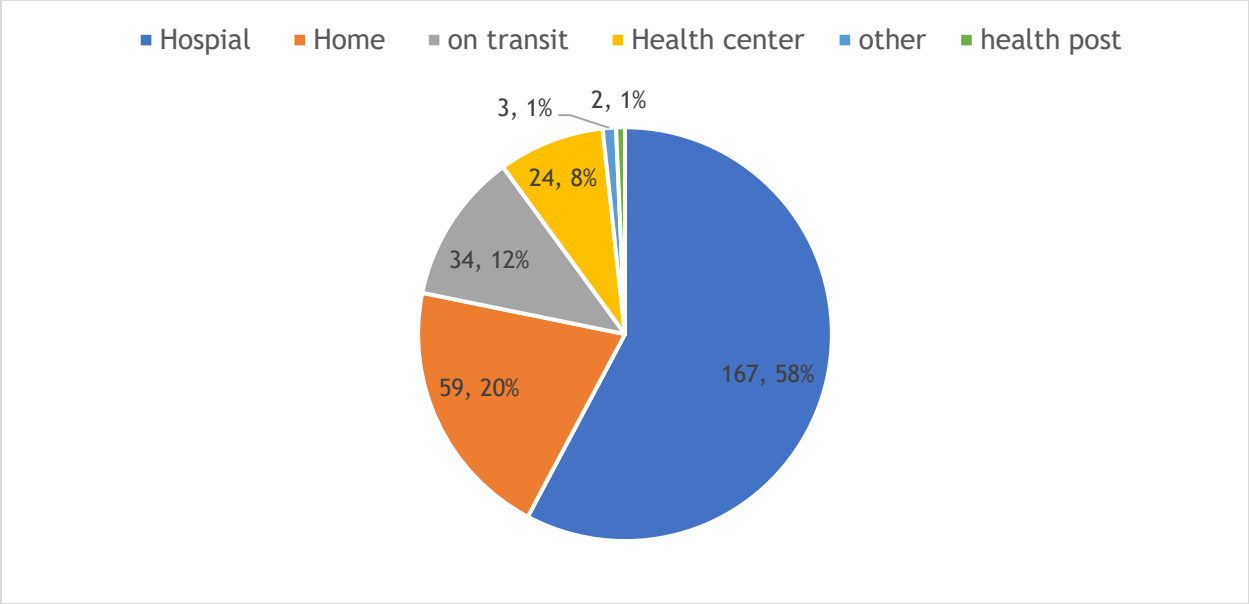


Figure 12:- Places of death of reported maternal deaths in 2012 EFY, Ethiopia N=289

2.3. Obstetric history of the deceased mothers

Analysis of the total reported maternal deaths since implementation of the system shows, 36.7% were multiparous and 26.5% grand multipara (Delivered five and above). The 2012 EFY result is also consistent with the aggregated result, in which 39.4 % were multiparous and 23.2% grand multigravida.

Table 5: - Distribution of obstetrics of history in decreased women from 2006-2012EFY, Ethiopia

Obstetrics Characteristics	2006 EFY(N=74) (%)	2007 EFY (335) (%)	2008 EFY (590) (%)	2009 EFY(N=1013) (%)	2010 EFY(N=1145) (%)	2011(N=60) EFY (%)	2012 EFY(N=289) (%)	Total (N=4051) (%)
Parity								
0-1	32.4	38.8	37.8	34.0	35.7	42.0	37.4	36.8
2-4	28.4	34.6	36.1	36.9	37.5	36.0	39.4	36.7
5&+	39.2	26.6	26.1	29.1	26.	22.0	23.2	26.5
Gravidity								
0-1	24.3	28.1	35.1	26.2	27.2	36.5	28.7	29.1
2-4	28.4	38.5	36.3	39.0	38.2	35.5	40.5	37.7
5&+	47.3	33.4	32.2	34.8	34.6	27.9	39.4	33.2
History of ANC follow up								
Yes	45.0	64.9	66.3	70.5	77.0	75.2	70.3	72.7
No	55.0	35.1	33.7	29.5	23.0	24.8	29.7	27.3

2.4. Time of death

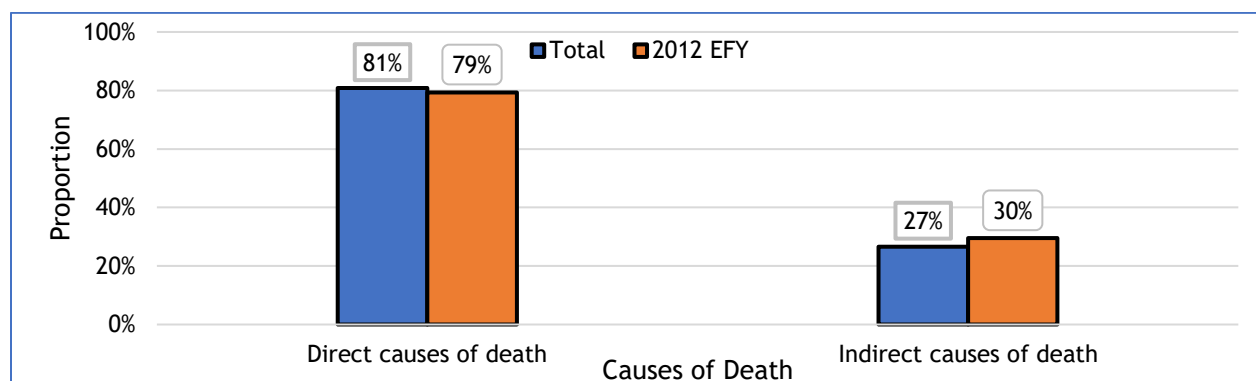
Total aggregated maternal death report analysis shows that, Majority of deaths happened during post-partum period (69.5 %) followed by intrapartum (15.8 %) and antepartum (14.8%). During 2012 EFY, about 35(12.1%) died before delivery, 41(14.2%) during delivery, and 213(73.7%) during the postpartum period (Table 6).

Table 6:- Distribution time of death for deceased women by reporting during the year of 2006-2012 EFY, Ethiopia

Time of death	2006 EFY(N=74) (%)	2007 EFY(335) (%)	2008 EFY(590) (%)	2009 EFY(N=1013) (%)	2010 EFY(N=1145) (%)	2011(N=605) EFY(%)	2012 EFY(N=289) (%)	Total(N=4051) (%)
Antepartum	25.7	20.7	14.2	15.0	15.0	10.9	12.1	14.8
Intrapartum	9.5	14.3	20.5	15.9	15.8	13.2	14.2	15.8
Post-partum	64.9	64.8	65.3	69.1	69.2	75.9	73.7	69.5

2.5. Causes and trends of Maternal Deaths

Of the 289 maternal deaths in the 2012 EFY, 96% had a cause of death assigned, while the remaining 4% coded as no cause of death assigned as other direct or indirect causes. Based on the aggregated maternal deaths analysis for deaths reported between 2006 EFY and 2012 EFY, 81% of deaths were due to direct obstetric causes whereas deaths due to indirect causes accounted for 27% of all deaths (Figure 13). Of the 289 reported maternal deaths during 2012 EFY, the causes of death for 219 (79.0%) were due to direct causes, while the indirect cause of death accounted for 80 (21.0%) maternal deaths (Figure13).



Note: - More than causes of death may be assigned for a deceased mother. Which makes the total proportion of causes of deaths (direct and indirect) greater than 100%.

Figure 13: - Proportion of Direct & Indirect causes of deaths in 2012 and total for the 2006 - 2012 EFY, Ethiopia

In 2012 EFY, Obstetric hemorrhage was the leading cause of maternal deaths, accounting for 47% of the total maternal deaths followed by anemia (20%), HDP (Preeclampsia and Eclampsia) (14%), and sepsis (8%).

The trend of causes of maternal death over the last 7 fiscal years shows that Obstetric hemorrhage, anemia, HDP, and sepsis have persisted as the major causes (Figure 15). Abortion contributed to only 1% of maternal deaths in 2012 EFY.

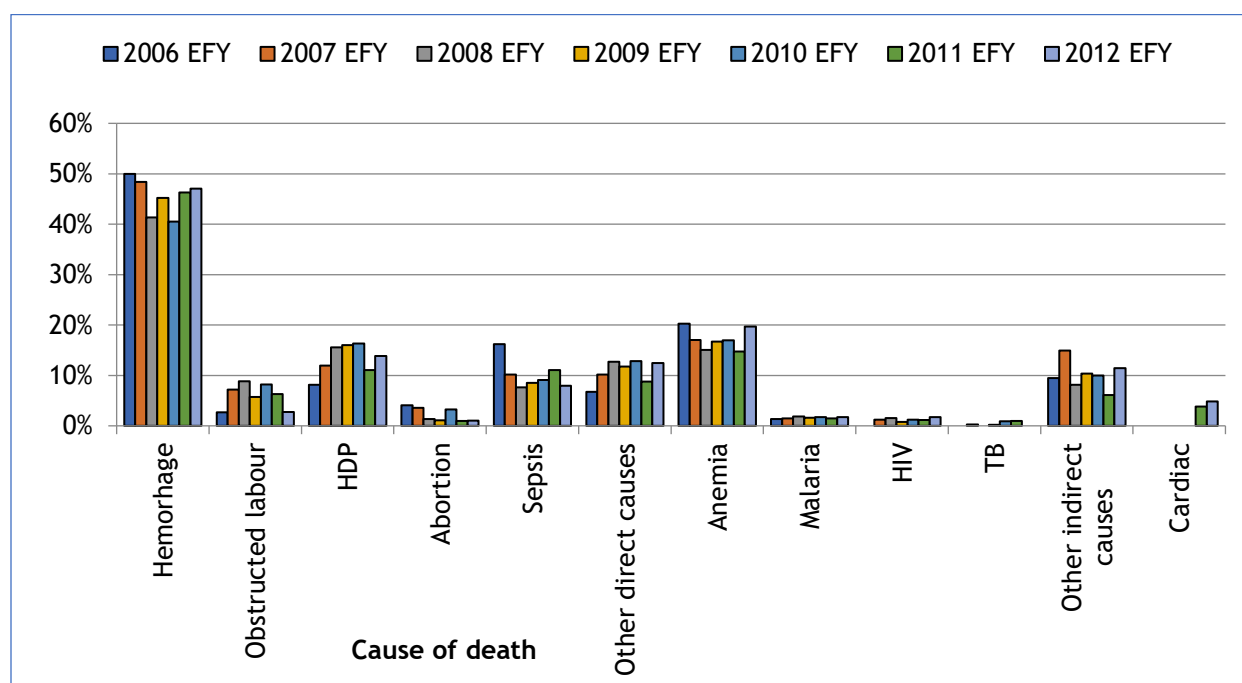


Figure 14: - Trends of causes of maternal deaths (all causes) in Ethiopia from 2006-2012 EFY, Ethiopia

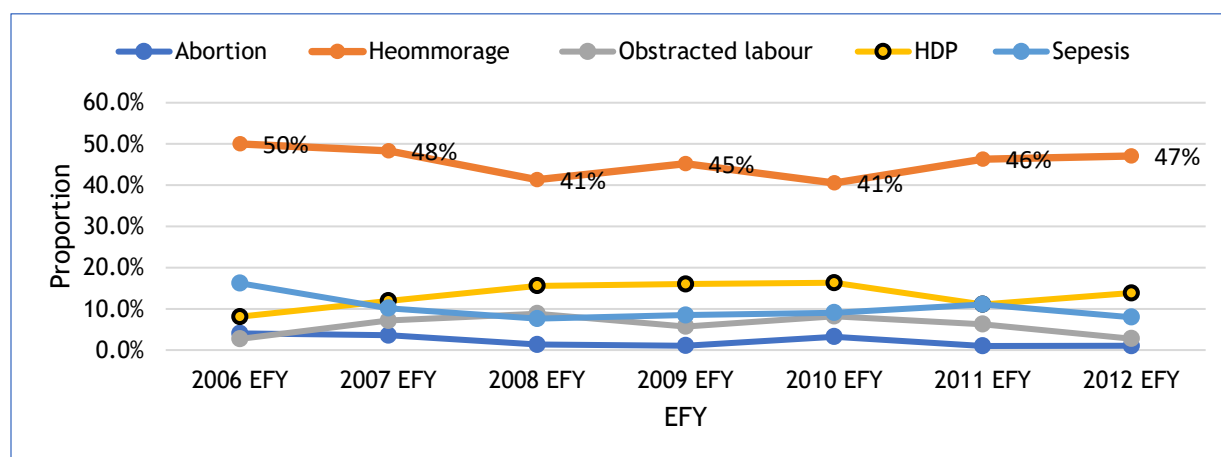


Figure 15: - Trend of causes of maternal death (direct causes), 2006-2012 EFY, Ethiopia

Direct Causes of Death

Among the 219 direct causes of death in 2012 EFY, obstetric Haemorrhage accounted for 62% deaths followed by HDP & sepsis each accounting for 18% and 11% of the deaths respectively. Similarly, the trend of causes of maternal death over the last 7 fiscal years shows that Obstetric haemorrhage, HDP and sepsis have persisted as the major causes (Figure 16).

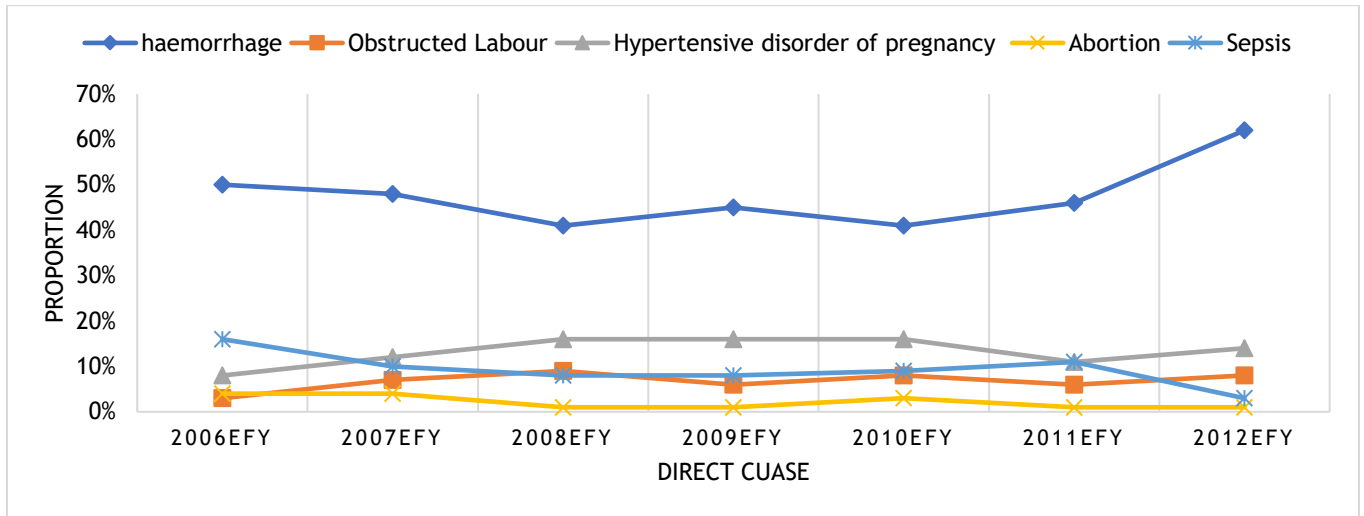


Figure 16: - Trends of direct maternal causes of death from 2006-2012 EFY Indirect Causes of Maternal Death

Among the 80 maternal deaths due to indirect causes reported during 2012 EFY, anemia accounted for 71% followed by other indirect causes of death (41%), and Malaria and TB accounts for 6%.

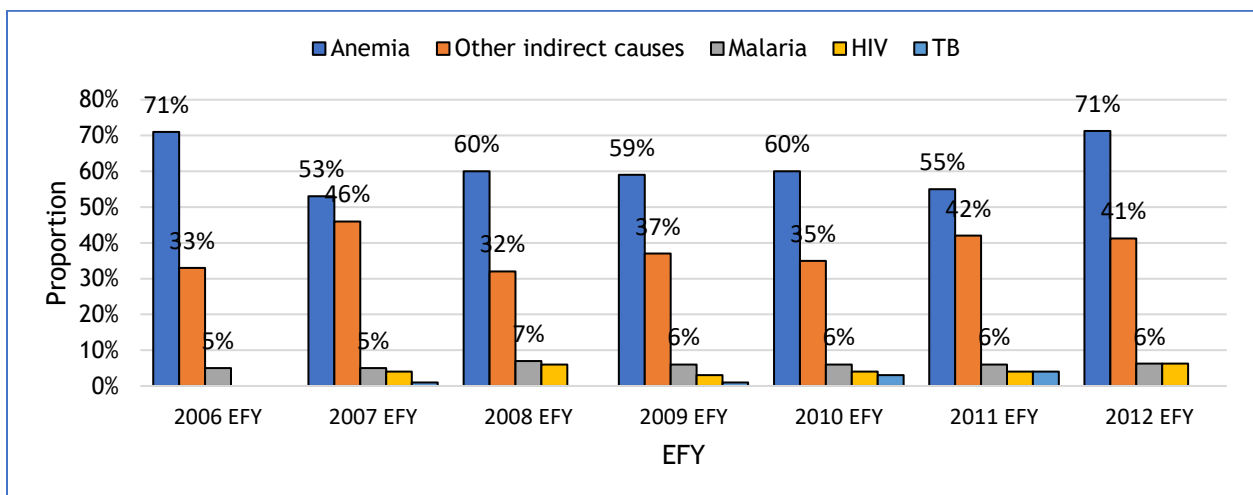


Figure 17: - Trend of indirect cause of maternal death from 2012 EFY, Ethiopia

2.6. Specific Causes of Maternal Deaths

Obstetric Hemorrhage:

Of the 136 obstetric hemorrhage related deaths included in the final database, 54% of identified by FBAF and 46% by verbal autopsy (VA). Considering the regional distribution of hemorrhage deaths, more than 70% of hemorrhage related deaths occurred in three regions; 35% in Amahara, 23% in Oromia and 15% in Tigray.

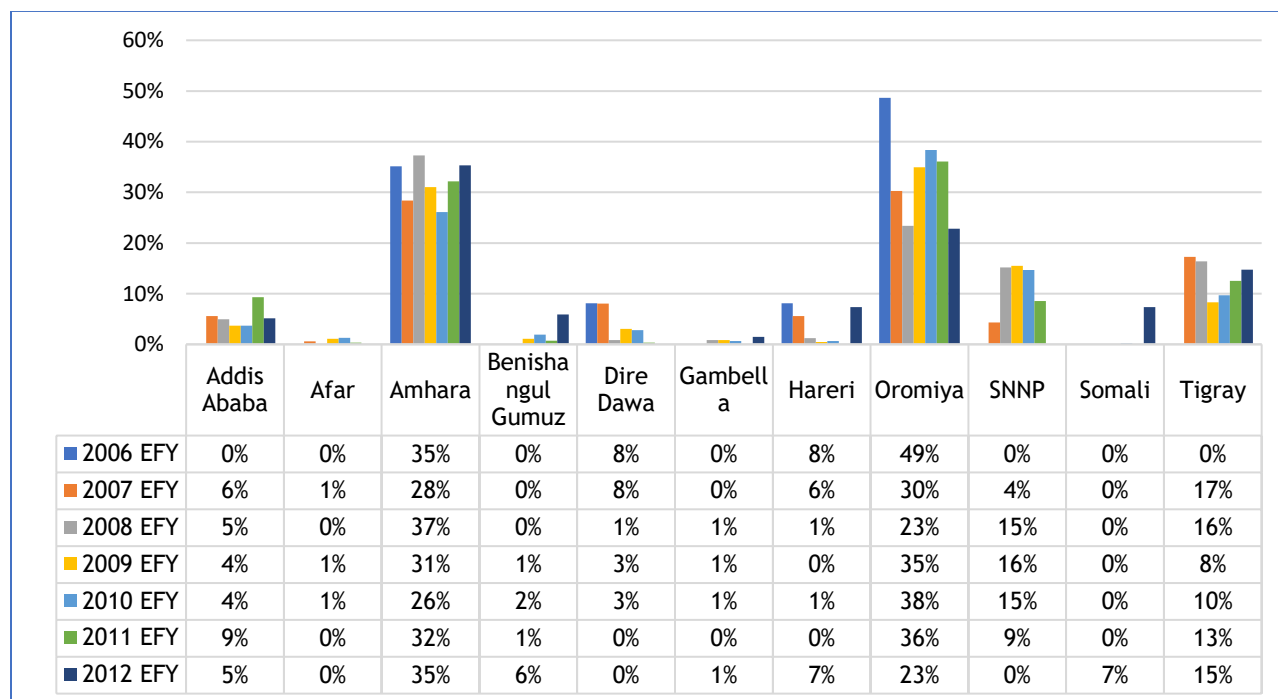


Figure 18: - Distribution of Obstetric Haemorrhage deaths by Region and Year (2006-2012 EFY), Ethiopia

In the 2012 EFY, more than half (54%) of obstetric hemorrhage deaths occurred in hospitals, 8 % in health centers and 26% occurred at home. The remaining twelve percent (12%) of all obstetric hemorrhage deaths occurred while women were on-transit from home to health facility and from health facility to health facility (Figure 19). This clearly shows that, delay 3 contribute more to maternal mortality than do delays 1 and 2 as 62% of deaths were institutional (hospitals & health centers). Late diagnoses, lack of drugs and supplies, inadequate care or severe mismanagement and/or limited blood supply for transfusion were among the contributing factors indicated in delay three. The distribution of place of death among obstetric hemorrhage deaths over the last seven years (2006-2012 EFY) showed a similar trend except death occurring on transit declining since 2006(Figure 19).

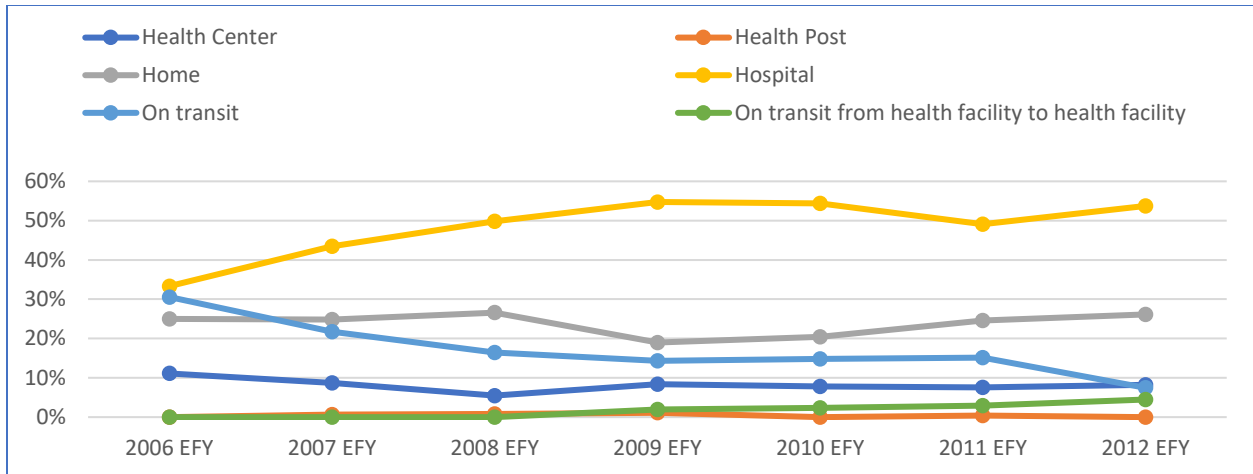


Figure 19- Trends of Obstetric Hemorrhage deaths by place of death and Year (2006-2012 EFY), Ethiopia

Nearly 69 % of all haemorrhage deaths occurred during postpartum period and the remainder 26% and 5% in the intrapartum and pregnancy (antepartum) respectively and this has been a similar trend in the past seven years (2006-2012 EFY) (Figure 20).

The women’s characteristics reports of the obstetric haemorrhage deaths showed that 9% of them had at least one antenatal care visit (ANC) during pregnancy, 32% had two ANC visits, 21% had three ANC visits and the remaining 38% had four or more visits. Obstetric haemorrhage related deaths varied by age at death. The proportion of obstetric haemorrhage deaths among women ages 25-29 years was high (27%) followed by women ages 35-39 years (22%). This highlights the burden in this age group and potential opportunity for prevention.

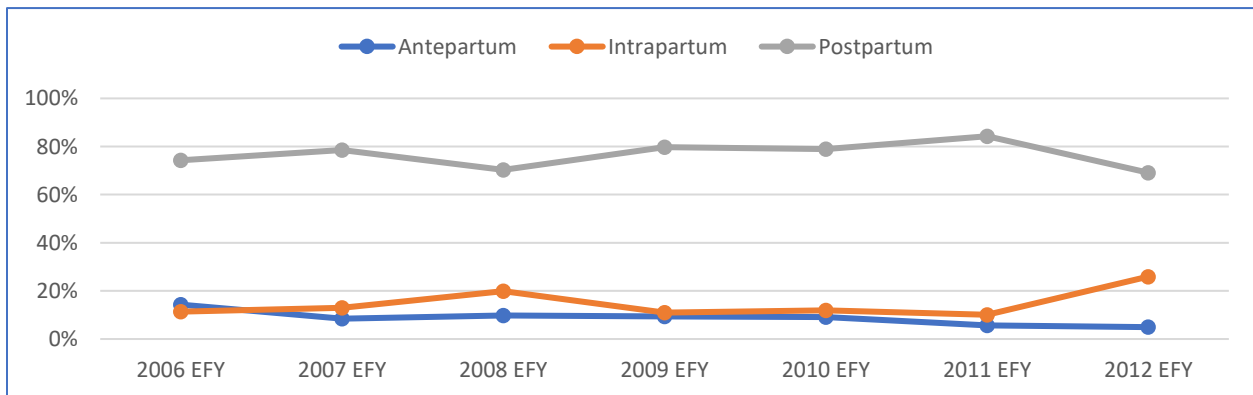


Figure 20: - Trends of Obstetric Haemorrhage deaths by timing of death and Year (2006-2012 EFY), Ethiopia

Almost 39% of the reported obstetric hemorrhage deaths were Para II to IV. Para I and grand multi-parity were observed in 29% and 32% of the obstetric hemorrhage deaths in 2012 EFY. There is a declining trend of grand multi-parity among these deaths over the past six years (2006-2012 EFY).

Delay-one factor (delay to seek care) contributed to 45% of the obstetric hemorrhage deaths, while delay-two and delay-three factors contributed for 35% and 33% of these deaths respectively in the 2012 EFY (Figure 21). Delay-one factor persisted as the major contributing for obstetric hemorrhage deaths over the last seven years as it was a factor for more than 50% obstetric hemorrhage deaths, but it declined to less than 50% in 2012. This indicates there is still problem in seeking care and might have decreased the chances of survival.

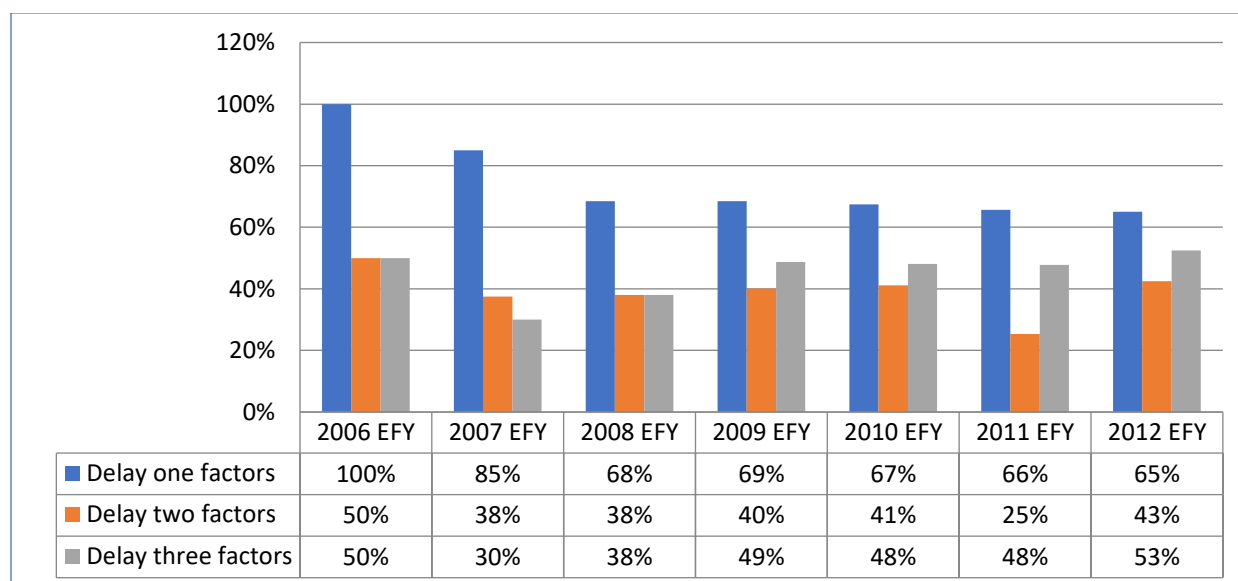


Figure 21: - Distribution of Obstetric Hemorrhage deaths by delay model and Year (2006-2012 EFY), Ethiopia

Lack of decision to go to health facility, delayed referral from home, delayed arrival to next health facility from another facility on referral, and failure of recognition of the problem were the major delay factors for deaths due to obstetric haemorrhage in 2012 EFY. (Annexed 1)

Anemia:

Of the 57 Anemia related maternal deaths included in the final database, 62% of identified by FBAF and 38% by verbal autopsy (VA). More than 85% deaths due to anemia occurred in three regions; 40% in Oromia, 25% in Tigray, and 20% in Amhara region.

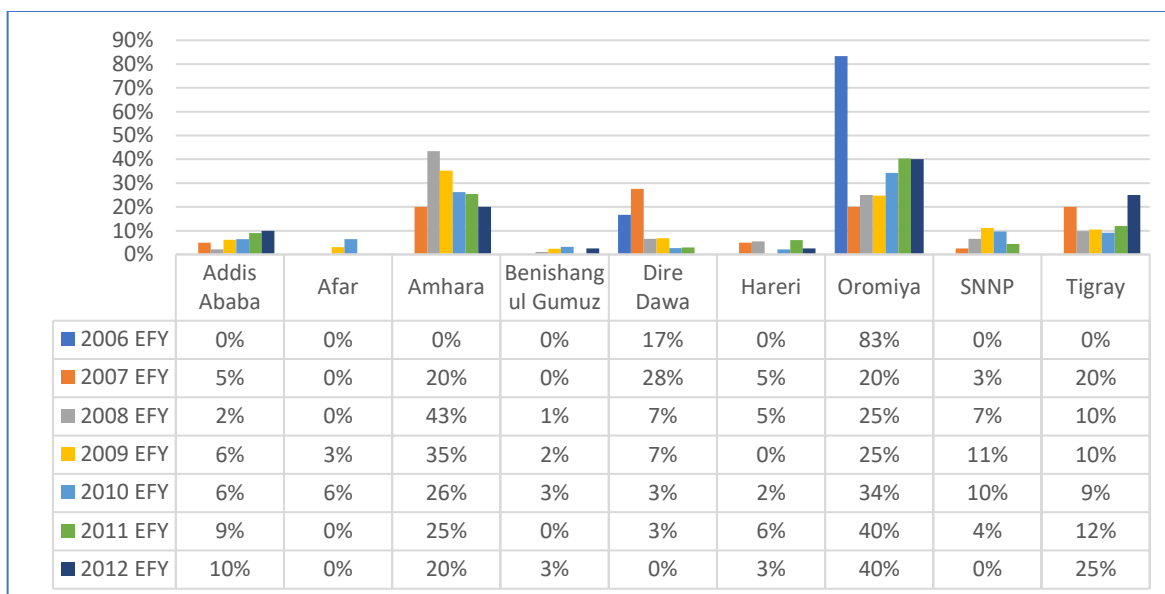


Figure 22: - Distribution of Anemia deaths by region and year (2006-2012 EFY), Ethiopia

In 2012 EFY, 73% of anaemia deaths occurred in hospitals, and 18% occurred at home, the remaining ten percent (10%) occurred while women were on-transit from home to health facility and from health facility to health facility. This can significantly indicate the missed opportunity to diagnose and treat anemia before delivery during ANC. In addition, the inter-health facility transfer of women should be improved to address the delay to reach health facility from health facility. The distribution of place of death among anaemia related deaths over the last seven years (2006-2012 EFY) showed a similar trend since 2006(Figure 23).

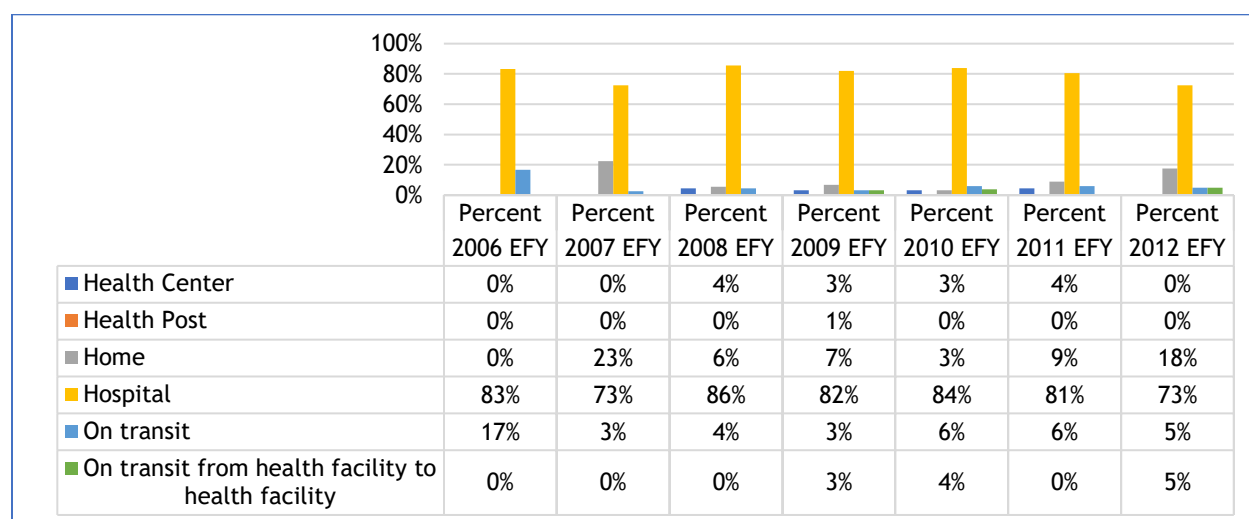


Figure 23: - Trends of Anemia related deaths by place of death and Year (2006-2012 EFY), Ethiopia

Nearly 74 % of all anaemia related deaths occurred during postpartum period and the rest 3% and 23% in the intrapartum and pregnancy (antepartum) respectively. This has been a similar trend in the past seven years (2006-2012 EFY) except deaths during intrapartum declined in 2012 (Figure 24).

The deceased women due to obstetric anaemia showed that 17% had at least one antenatal care visit (ANC), 25% had two ANC visits, 25% had three ANC visits and the remaining 33% had four or more visits.

The proportion of anaemia deaths among women ages 20-24 years and 25-29 years was 31% for both, and followed by women ages 30-34 years (18%). This highlights the burden of anemia related deaths in the younger age group and potential opportunity for prevention. Almost half (49%) of women died due to anaemia were Para I and 41 % were Para II-IV. Grand multi-parity was observed in only 10 % of anaemia deaths in 2012 EFY (See the table Annex 1).

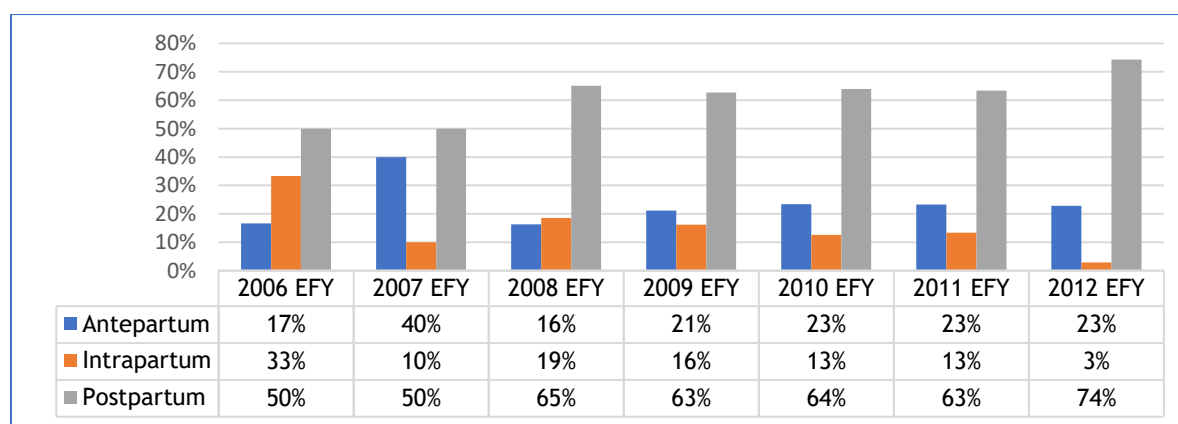


Figure 24: - Trends of anemia deaths by timing of death and Year (2006-2012 EFY), Ethiopia

Delay-one factor (delay to seek care) contributed to 65% of the anaemia related deaths, while delay-two and delay-three factors contributed for 43% and 53% of these deaths respectively in the 2012 EFY (Figure 25). Delay-one factor persisted as the major contributing for obstetric anaemia related deaths over the last seven years.

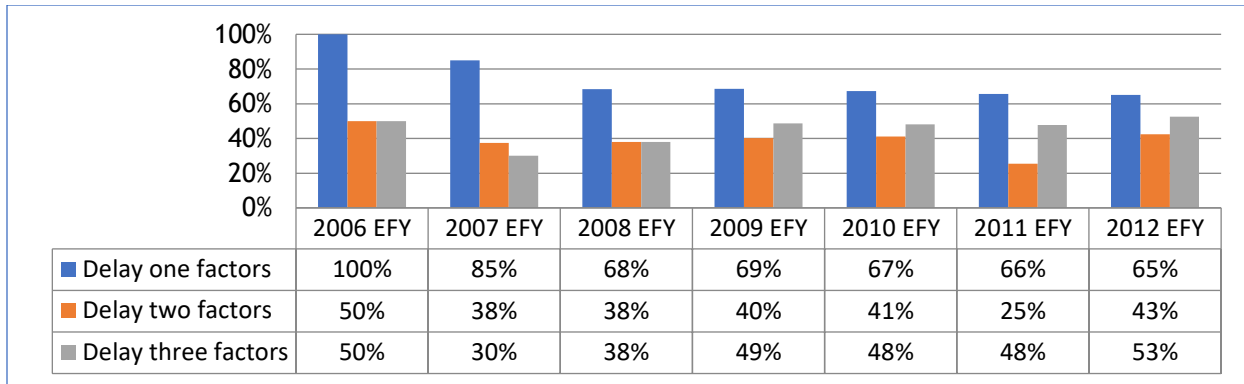


Figure 25: - Distribution of anemia related deaths by delay's and Year (2006 - 2012 EFY), Ethiopia

Hypertensive disorder of pregnancy (HDP): Preeclampsia and Eclampsia

Of the 40 HDP related maternal deaths, 62% of identified by FBAF and 38% by verbal autopsy (VA). More than 90% death due to HDP occurred in four regions; 40% in Oromia, 25% in Tigray, 20% in Amhara and 10% in Addis Ababa.

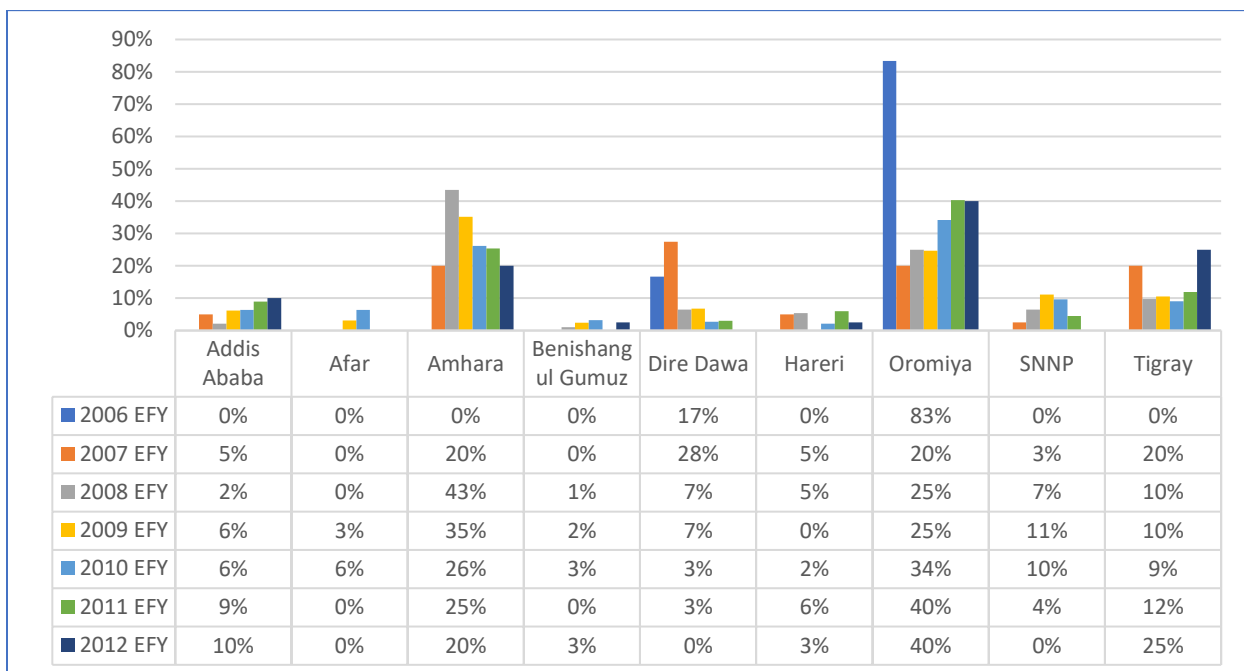


Figure 26: - Distribution of HDP deaths by region and year (2006-2012 EFY), Ethiopia

In 2012 EFY, 73% of HDP deaths occurred in hospitals, and 18% occurred at home, the remaining ten percent (10%) occurred while women were on-transit from home to health facility and from health facility to health facility (Figure 27). And inter-health facility transfer of women should be improved with early identification and administration of pre-referral lifesaving medications. The distribution of place of death among HDP related deaths over the last seven years (2006-2012 EFY) showed a similar trend since 2006(Figure 27).

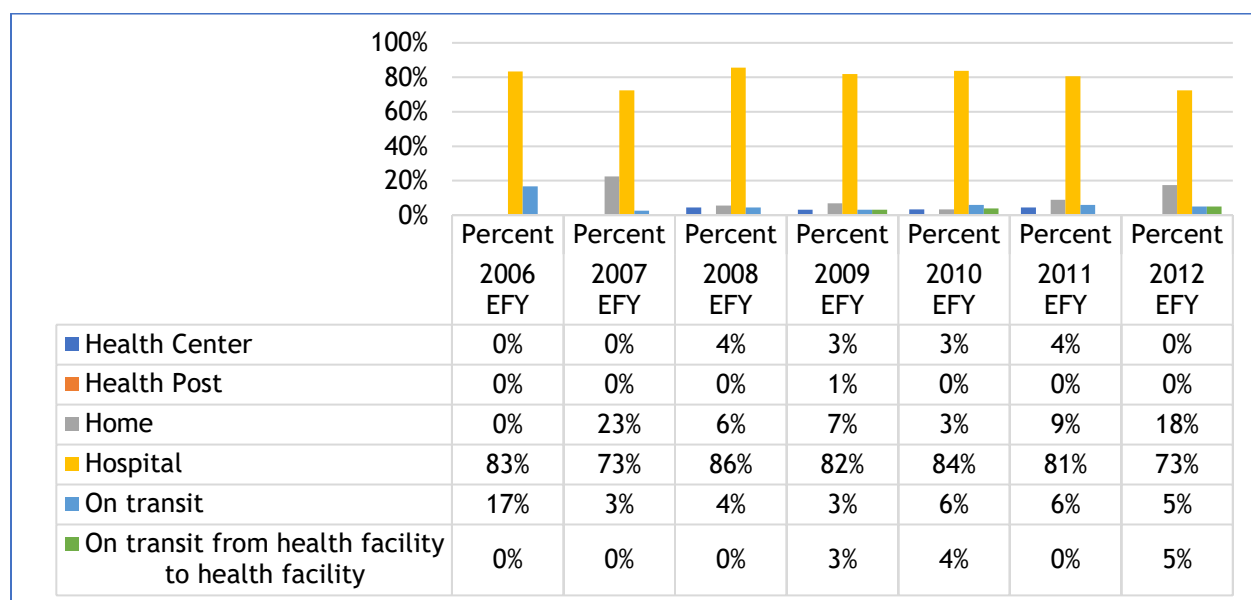


Figure 27: - Trends of HDP related deaths by place of death and Year (2006-2012 EFY), Ethiopia. Nearly 74 % of all HDP related deaths occurred during postpartum period and the remainder 3% and 23% in the intrapartum and pregnancy (ante-partum) respectively and this has been a similar trend in the past seven years (2006-2012 EFY) except deaths during intrapartum appears declining since 2009 (Figure 28).

The women’s characteristics reports of the HDP deaths showed that 17% of them had at least one antenatal care visit (ANC) during pregnancy, 25% had two ANC visits, 25% had three ANC visits and the remaining 33% had four or more visits. HDP related deaths varied by age at death. The proportion of HDP deaths among women ages 20-24 years and 25-29 years was high and similar (31%) followed by women ages 30-34 years (18%). This highlights the burden in this age group and potential opportunity for prevention. Almost half (50%) of women died due to HDP were Para I and 41 % were Para II-IV. Grand multi-parity was observed in only 9 % of HDP deaths in 2012 EFY.

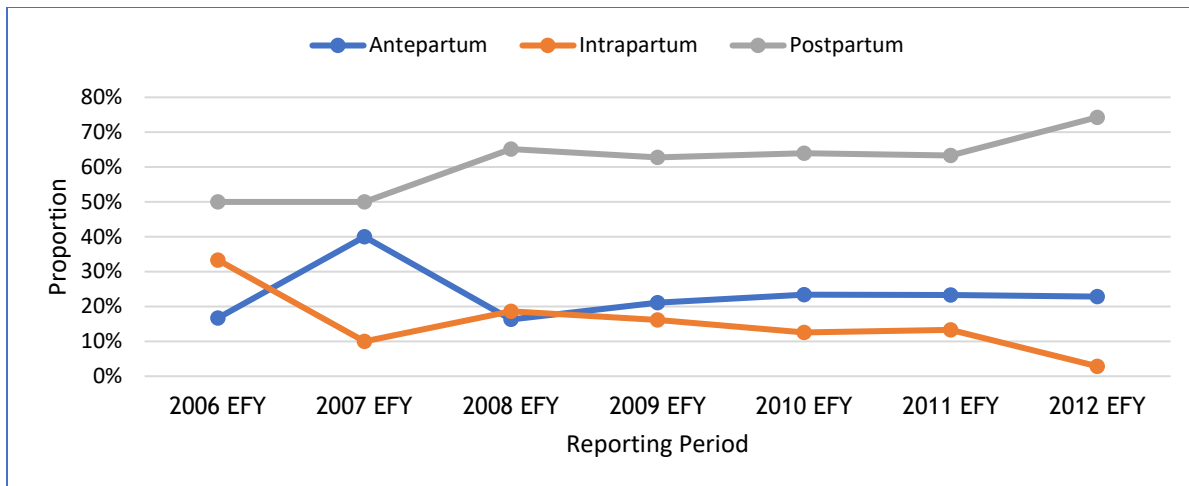


Figure 28: - Trends of HDP deaths by timing of death and Year (2006-2012 EFY), Ethiopia
 Delay-one factor (delay to seek care) contributed to 65% of the obstetric HDP related deaths, while delay-two and delay-three factors contributed for 43% and 53% of these deaths respectively in the 2012 EFY (Figure 29). Delay-one factor persisted as the major contributing for HDP related deaths over the last seven years as it was a factor for more than HDP related deaths. This indicates there is still problem in seeking care and might have decreased the chances of survival.

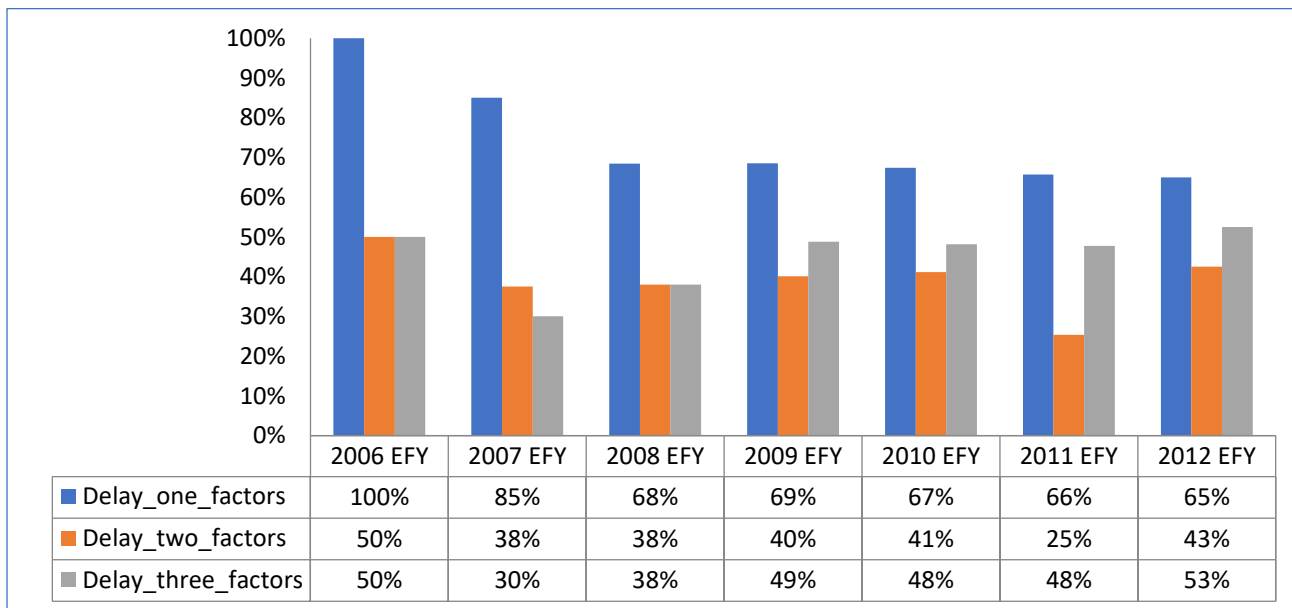
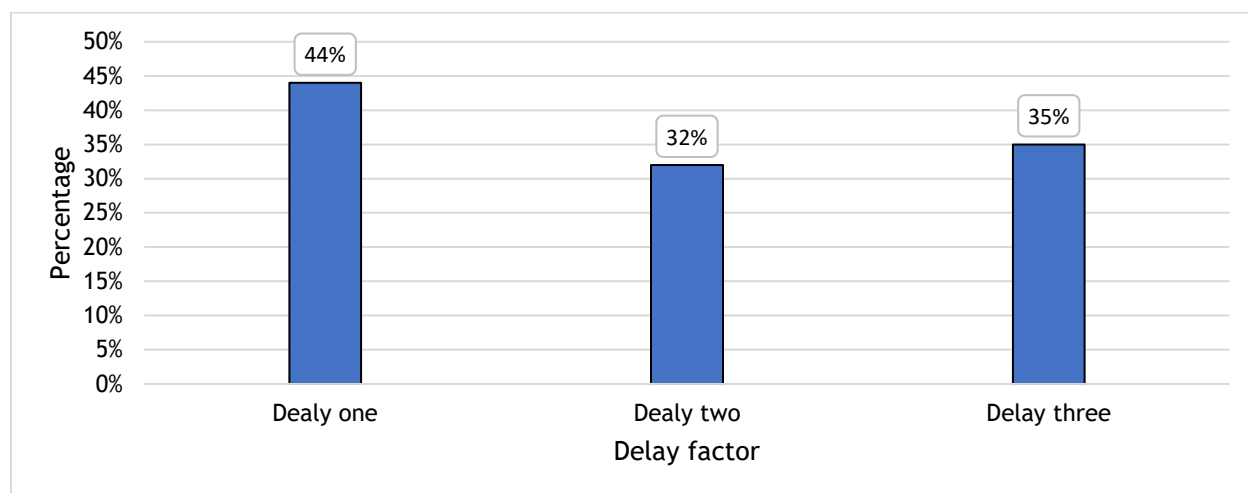


Figure 29: - Distribution of HDP related deaths by delay model and Year (2006-2012 EFY), Ethiopia

2.7. Contributing factors for maternal deaths in Ethiopia

Findings from 289 maternal death review report showed that, delay one was responsible for 102 (44%), delay two for 83 (32%), and delay three for 96 (35%) maternal deaths. From delay one, lack of decision to go to a health facility is the most contributing factor. Whereas delayed arrival to the next facility from referring health facility is the leading contributing factor from delay three factors. (Figure 30)



Note: - Since the proportion of each of the delay factors was computed out of the total contributing factors, the proportions of each delay factors may add up more than 100%

Figure 30: - Proportion of contributing factor of maternal death in 2012 EFY, Ethiopia

Based on findings from the total maternal death review from 2006 to 2012 EFY, the major reasons for **delay one** contributing to maternal deaths were lack of decision to go to health facility (35%), failure to recognize the problem (27%), delayed referral from home to a health facility 29%, and traditional practices 16%. Similarly, the major reasons for **delay two** were delayed arrival to referred facility (24%), lack of transportation (13%), and lack of road (8%). Additionally, the predominantly reported factors among **delay three** were delayed arrival to the next facility from referring facility during referral (22%), delayed management after admission (12%), lack of supplies and equipment (11%) and Human error or mismanagement (6%). (Figure 31)

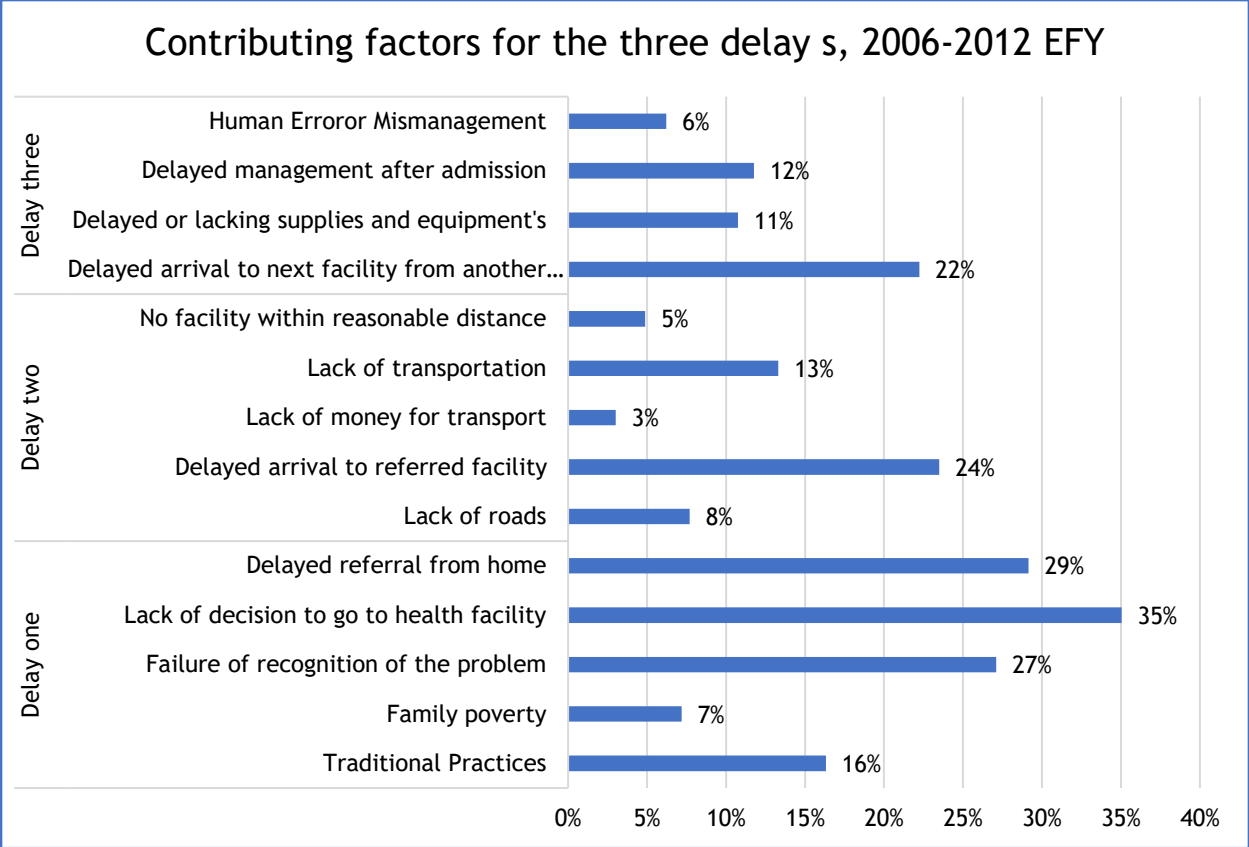


Figure 31: - Distribution of individual contributing factor per delays for maternal death from 2006 - 2012 EFY, Ethiopia

The 2012 EFY maternal death review findings is consistent with the previous findings regarding the contributing factors for maternal deaths in the nation. The main reasons among delay one contributing factors to maternal death were lack of decision to go to health facility (28%), failure to recognize the problem (20%), delayed referral from home to a health facility (19%), and traditional practices (14%). Similarly, the main reasons for delay two were delayed arrival to referred facility (26%), lack of transportation (13%), and lack of road (7%).

Additionally, the predominantly reported specific delay three factors were delayed arrival to the next facility from another facility during referral (21%), delayed management after admission (11%), lack of supplies and equipment (11%) and Human error or mismanagement (7%). (Figure 32)

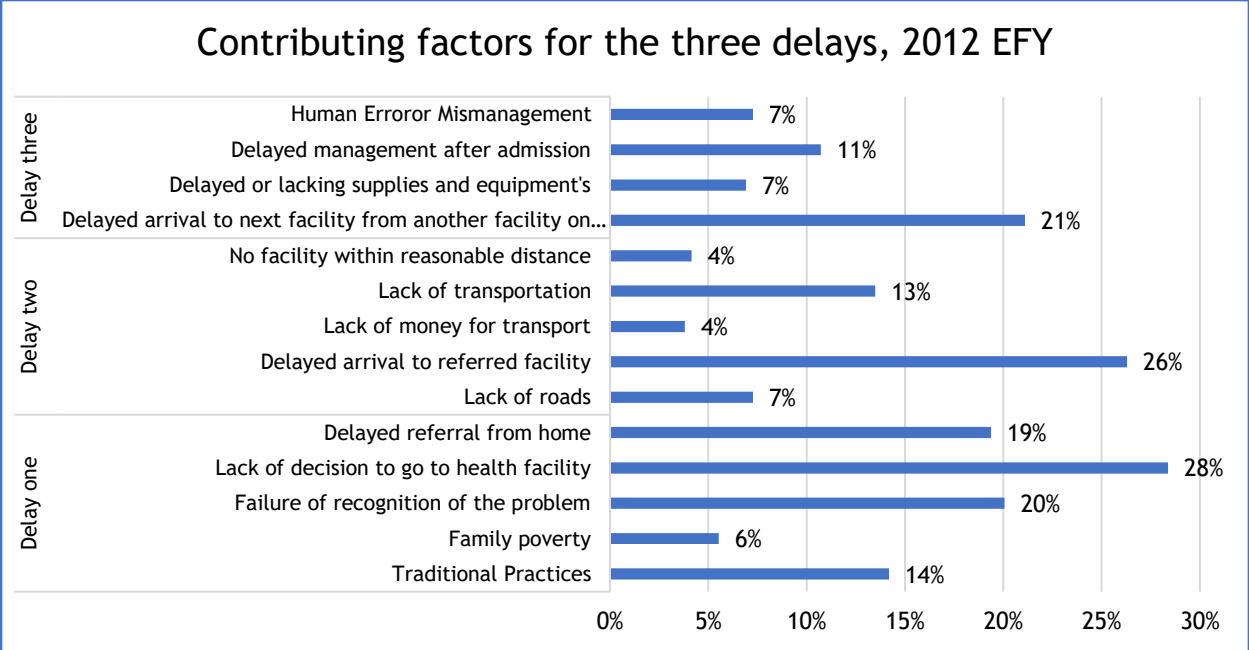


Figure 32: - Distribution of individual contributing factor per delay factors for maternal death, 2012 EFY, Ethiopia

Regarding the trend in contributing factors for maternal deaths in Ethiopia over the last seven years, delay one has been the top contributing factor and shows significant decline from 74% to 44%. Since 2008, delay three is the second leading contributing factor to maternal death and decline from 49% to 32%. Significant change is not seen in the trend of delay three during the last 7 implementation years (Figure 33).

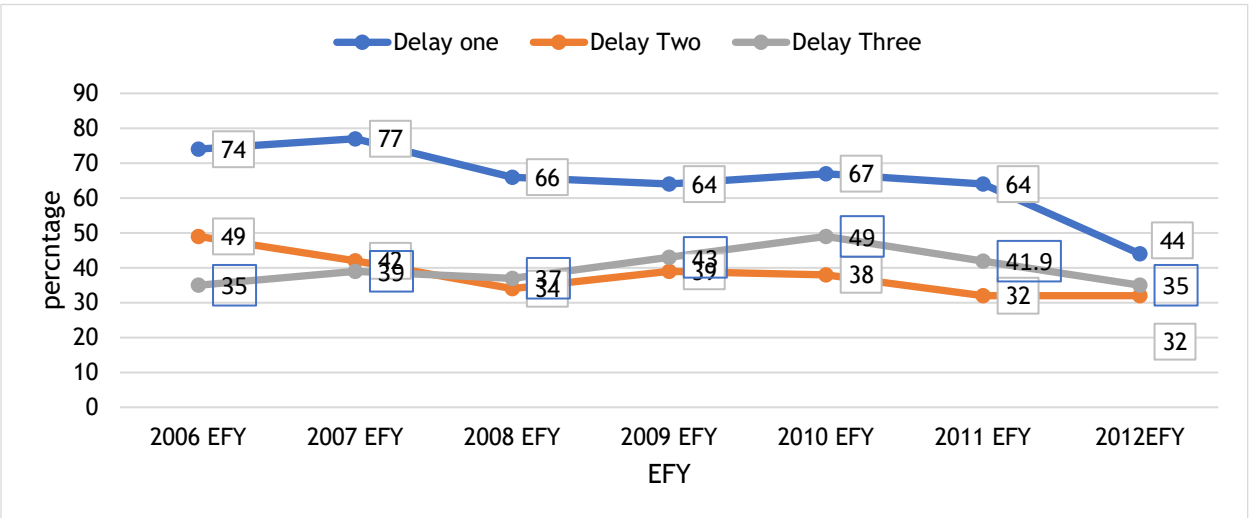


Figure 33: -Trend of delay factors to maternal death from 2006-2012EFY, Ethiopia

Part III: - Perinatal Death

3.1 Socio-demographic characteristics

Summary of Findings

- *Out of the total perinatal death reports received at national level, more than half (52%) were from Amhara region followed by Addis Ababa (27%) and Oromia (20%).*
- *From 2012 EFY perinatal deaths, majority 398 (60.7%) of the deceased perinates families were living in rural area.*
- *The last three years reported perinatal deaths review shows that, about 45% of deceased perinates were preterm births (28 to 38 GA).*
- *About 475 (72.5%) of mothers of deceased perinate was alive when they deliver their baby*
- *Regarding age of deceased perinate mother, 32.3% of mothers were in the age between 25 and 29 years*
- *Regarding place of death, about 3/4th (493) of perinatal death was happened at hospitals*

Background Information of deceased perinate

Out of the total perinatal death reports received at national level, more than half (52%) were from Amhara region followed by Addis Ababa (27%) and Oromia (20%). From the total three years perinatal death reports, half 717 (52%) of the deceased perinate mother resided in rural area and 767 (55.9%) of the deceased perinates were males. The last three years reported perinatal deaths review shows that, about 45% of perinates were preterm births (28 to 38 GA). Based on 2012 EFY report, about 398 (60%) of the deceased perinate parents resided in rural area and 354 (53.9%) of the deceased perinates were males (Table 7).

Table 7: -Socio-demographic and obstetric characteristics of deceased perinate reporting from 2010 - 2012 EFY, Ethiopia

Variables	2010 EFY		2011 EFY		2012 EFY		Total		
	#	%	#	%	#	%	#	%	
Region	Addis A	58	96.70%	207	31.50%	99	15.10%	364	26.50%
	Amhara	1	1.70%	284	43.20%	423	64.50%	708	51.60%
	Beni-Gumuz	0	0.00%	0	0.00%	22	3.40%	22	1.60%
	Dire D	0	0.00%	0	0.00%	5	0.80%	5	0.40%
	Oromia	1	1.70%	166	25.30%	107	16.30%	274	20.00%
Estimated GA Cat	>=43	0	0.00%	7	1.10%	8	1.20%	15	1.10%
	28- 35	36	60.00%	176	26.80%	115	17.50%	327	23.80%
	35- 38	2	3.30%	166	25.30%	117	17.80%	285	20.80%
	38- 43	16	26.70%	183	27.90%	154	23.50%	353	25.70%
	Missing	6	10.00%	125	19.00%	262	39.90%	393	28.60%
Sex of the deceased	Female	36	60.00%	285	43.40%	252	38.40%	573	41.70%
	Male	22	36.70%	354	53.90%	391	59.60%	767	55.90%
	Missing	2	3.30%	18	2.70%	13	2.00%	33	2.40%

During 2012 EFY, 656 (47.8% out of the total reported cases starting from the beginning) perinatal deaths were reported from five reporting regions. The last three years' perinatal death case-based report shows that 1011 (73.6%) of perinatal death happened at the hospital. (See annex tables 2).

General Information of deceased perinate mother

From the total deceased perinate mothers reported between 2010 EFY and 2012 EFY, 1031 (75.1%) were alive when they deliver their baby and 411 (29.9%) of deceased perinate mothers were in the age between 25 and 29 years. Out of total perinatal deaths, 67 (4.9%) of them were from adolescent mother aged from 15 to 19 years (Figure 34) (See annex tables 2).

During 2012 EFY, 475 (72.5%) of the deceased perinate mothers were alive when they deliver their baby and 204 (32.3%) of deceased perinate mothers were in the age between 25 and 29 years old. From the total perinatal deaths, 21 (4.4%) of them were from adolescent mother aged from 15 to 19 years (Figure 34).

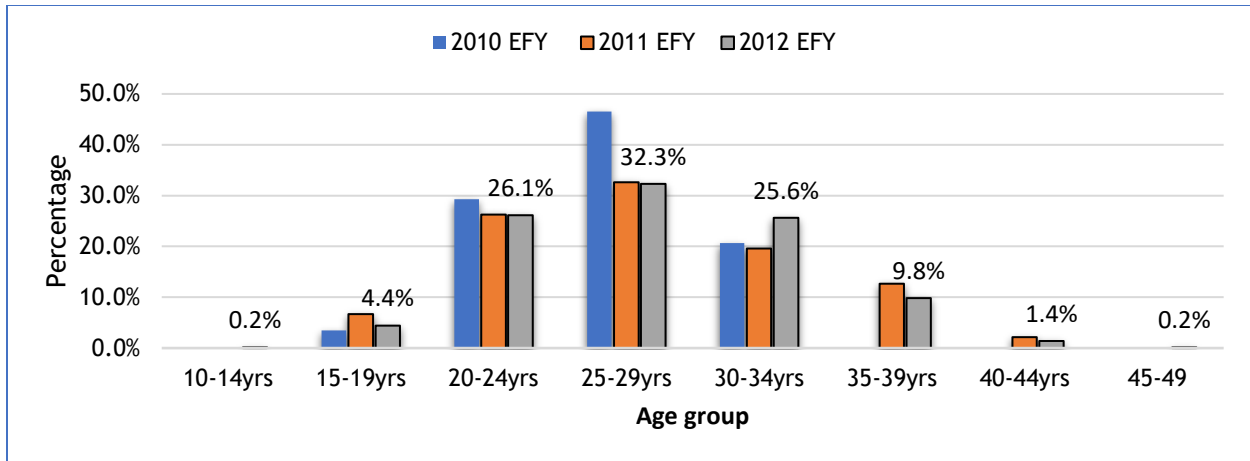


Figure 33: - Age of deceased perinate mother in Ethiopia from 2010 to 2012 EFY

Out of total deceased perinate mothers reported from 2010 EFY to 2011 EFY, 412 (44.3%) attended Antenatal care services. The 2012 EFY report shows that, 146 (35.4%) of deceased perinate mothers attended Antenatal care. From total reported deceased perinates more than half 746 (58.1%) were delivered alive

3.2. Causes of Perinatal Death

Summary of Findings

- Major causes of perinatal deaths reported from 2010 EFY to 2012 EFY were Prematurity 459 (30.1%), Asphyxia 449 (29.5%) and Sepsis and Pneumonia & Meningitis 317 (20.8%) respectively
- Causes of perinatal deaths from reporting regions had showed similar trend in the last three years
 - Prematurity, asphyxia and sepsis, pneumonia & meningitis were the leading causes for perinatal deaths and had similar trend across all implementation years
 - Neonatal tetanus related perinatal deaths during the last implementation years contributed to only 0.1% of total reported perinatal deaths reported throughout the years
- Major causes of Maternal deaths of deceased perinates were Obstructed labour, HDP and Ante Partum Hemorrhage (APH) accounting 27.1%, 26.3% and 20.3% respectively

A total of 1373 perinatal deaths were reported to the national Maternal and Perinatal Death surveillance and Response system. Out of total reported perinatal death (From 2010 EFY to 2012 EFY), the leading cause of perinatal deaths were Prematurity 459 (30.1%), Asphyxia 449 (29.5%), Sepsis, Pneumonia and meningitis 317 (20.8%) (Figure 35).

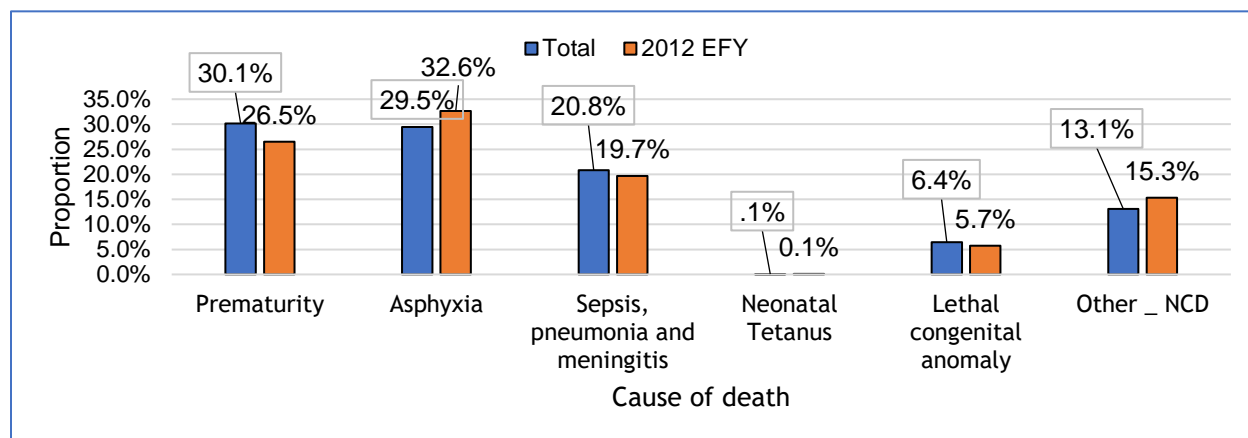


Figure 34: - Proportion of cause of Perinatal death aggregate year vs 2012 EFY, Ethiopia

The causes of perinatal deaths at national level had shown a similar trend during the last three implementation years. Prematurity, asphyxia, and sepsis, pneumonia and meningitis were the leading causes of perinatal deaths. Neonatal tetanus related perinatal deaths during the last implementation years contributed to only 0.1% of total reported deaths. (Figure 36)

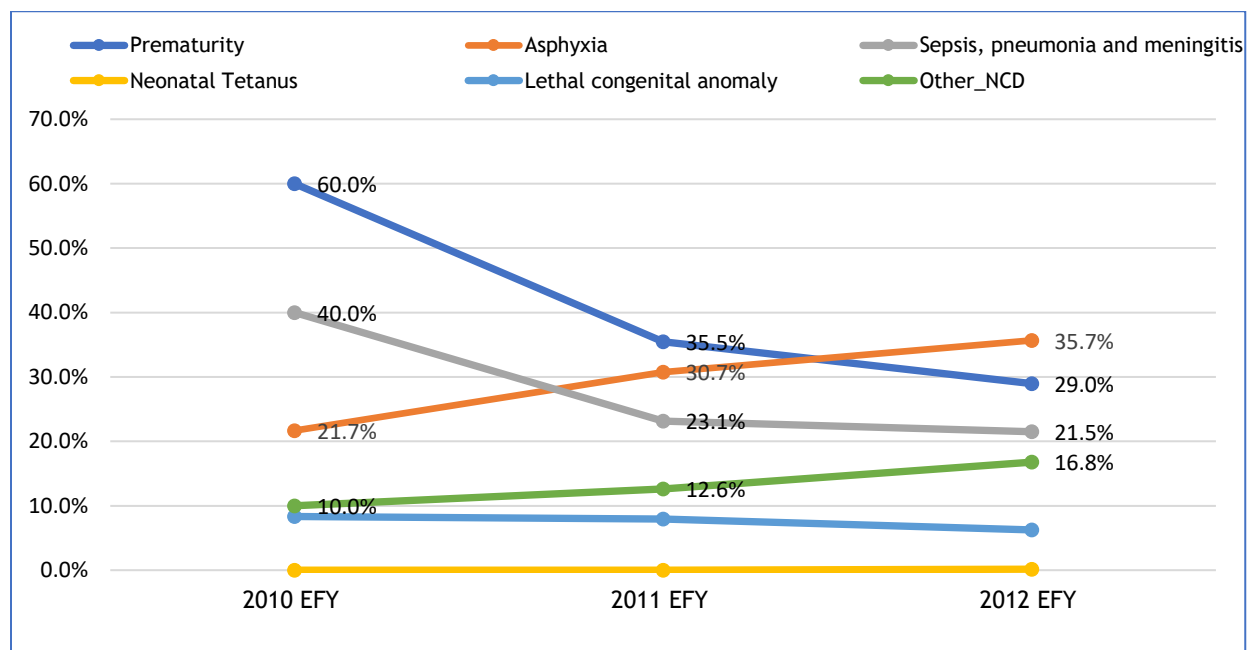


Figure 35: - The trend of causes of perinatal death from 2010-2012EFY in Ethiopia

3.2.1 Mothers status of the deceased perinate

Causes of maternal death of the deceased Perinate

During 2012 EFY, the causes of maternal death of the deceased perinate analysis showed that obstructed labour, pre-eclampsia and eclampsia, and Ante Partum Hemorrhage (APH) were responsible for the deaths of 27.1%, 26.3%, and 20.3% mothers respectively. This shows that, there is a good opportunity to prevent the double loss of lives (perinatal and maternal loss) through improving quality of care during prereferral and intrapartum for expectant mothers and perinate. About 18.2% of maternal deaths of the deceased perinate was unknown (Figure 37).

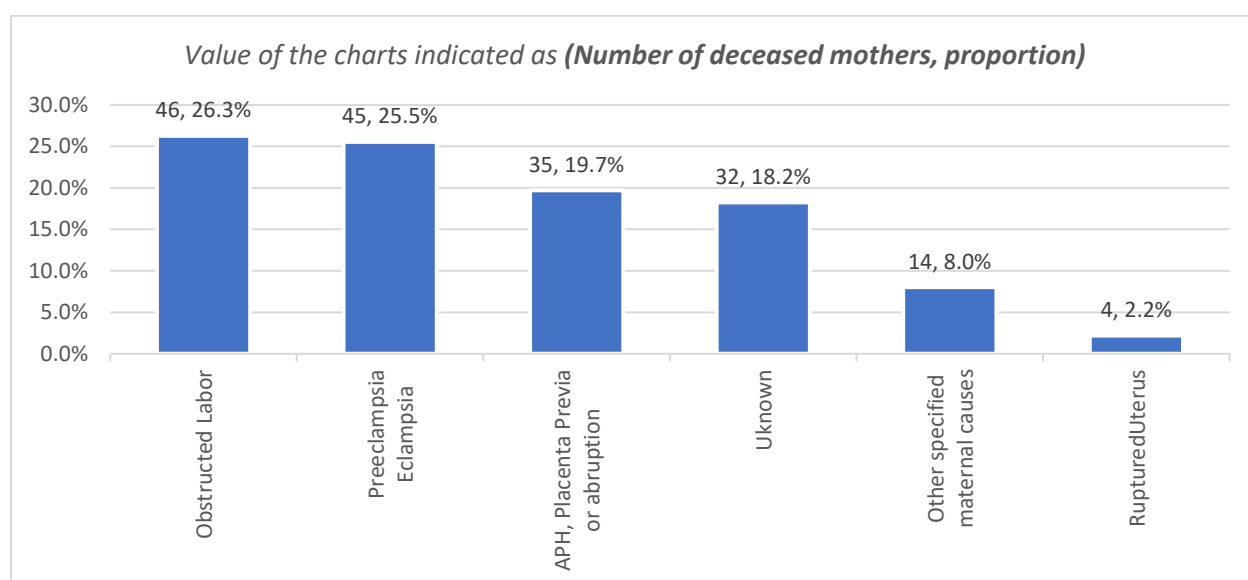


Figure 36: -Maternal cause of death for the deceased Perinate in 2012EFY, Ethiopia

3.3. Contributing factors for perinatal deaths

Delays in seeking, accessing, and receiving care during obstetric emergencies are usually classified into three categories respectively. In 2012 EFY, out of 656 perinatal deaths review, delay one accounted for 327 (50.3%) of perinatal deaths followed by delay three 190 (29.2%) and delay two 132 (20.3%) (Figure - 38).

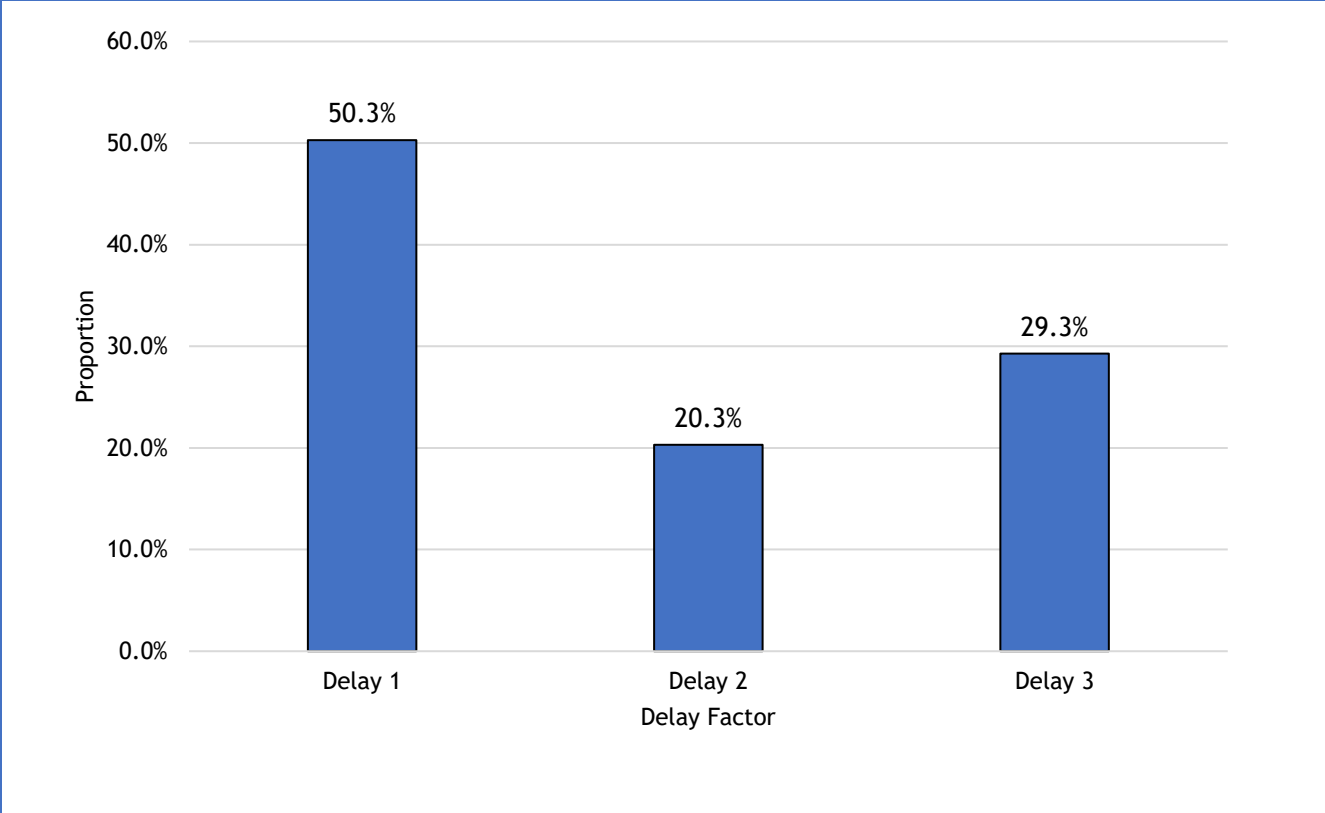


Figure 37: -Proportion of contributing factor for perinatal deaths in 2012, Ethiopia

The main reasons for delay one contributing factors for perinatal deaths were being unaware of the warning signs of problems during pregnancy 113 (17.4%) followed by failure to recognize the danger signs in new born infants 87 (13.4%). Similarly, the main reasons for delay two were unavailability of transportation 45 (6.9%). In addition, the predominantly reported specific delay three factors were delayed arrival to next facility from referring health facility during referral 83 (12.7%). (Figure 39)

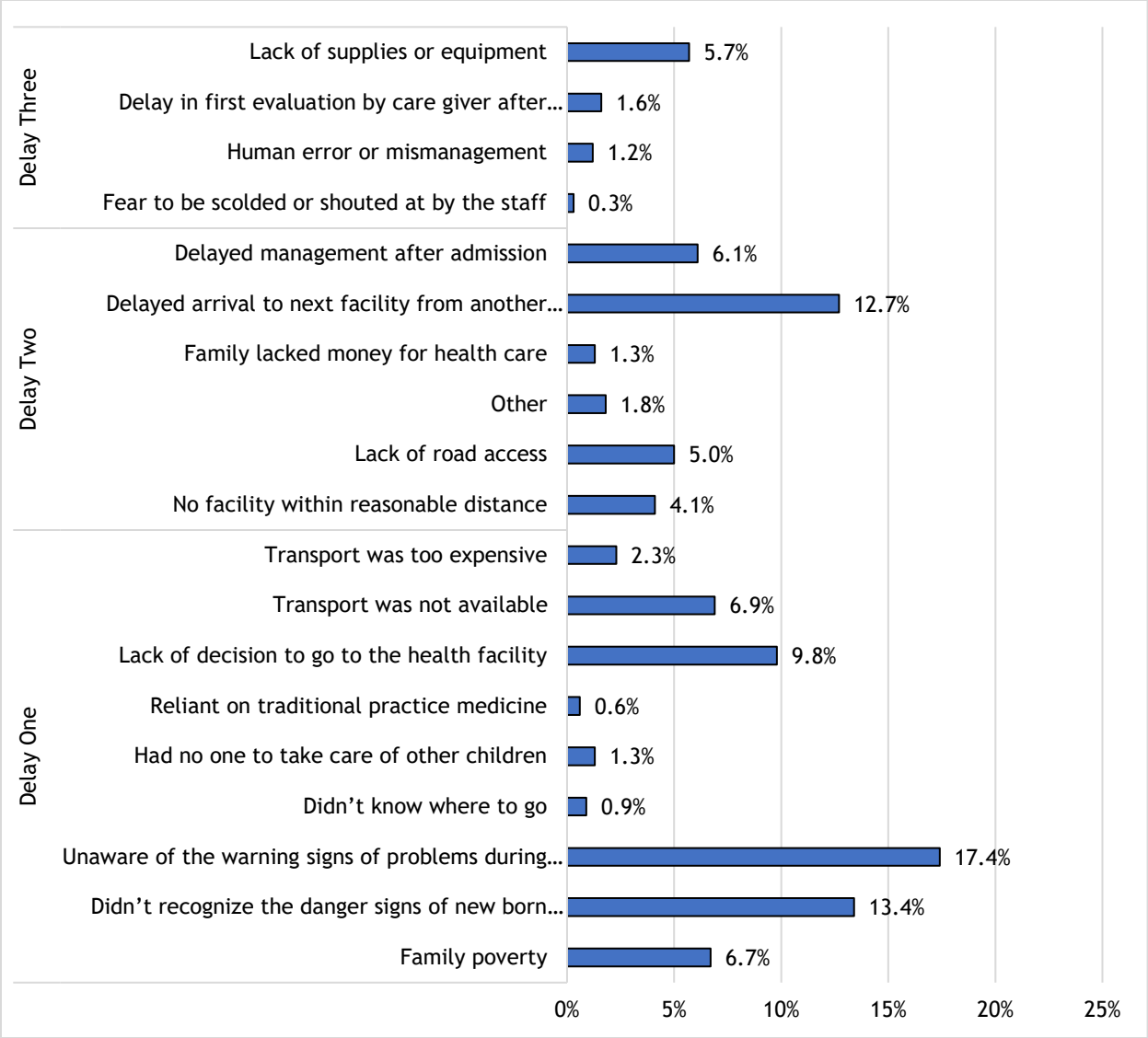


Figure 38 - Distribution of individual contributing factor per delays for maternal death for 2012 EFY, Ethiopia

The three-year contributing factors for perinatal death trend show that, delay one shows increasing trend from 30.7% to 50.3%. Delay two shows decrement from 23 %to 20.3 and delay three increase from 46.2% to 29.2% (Figure 39).

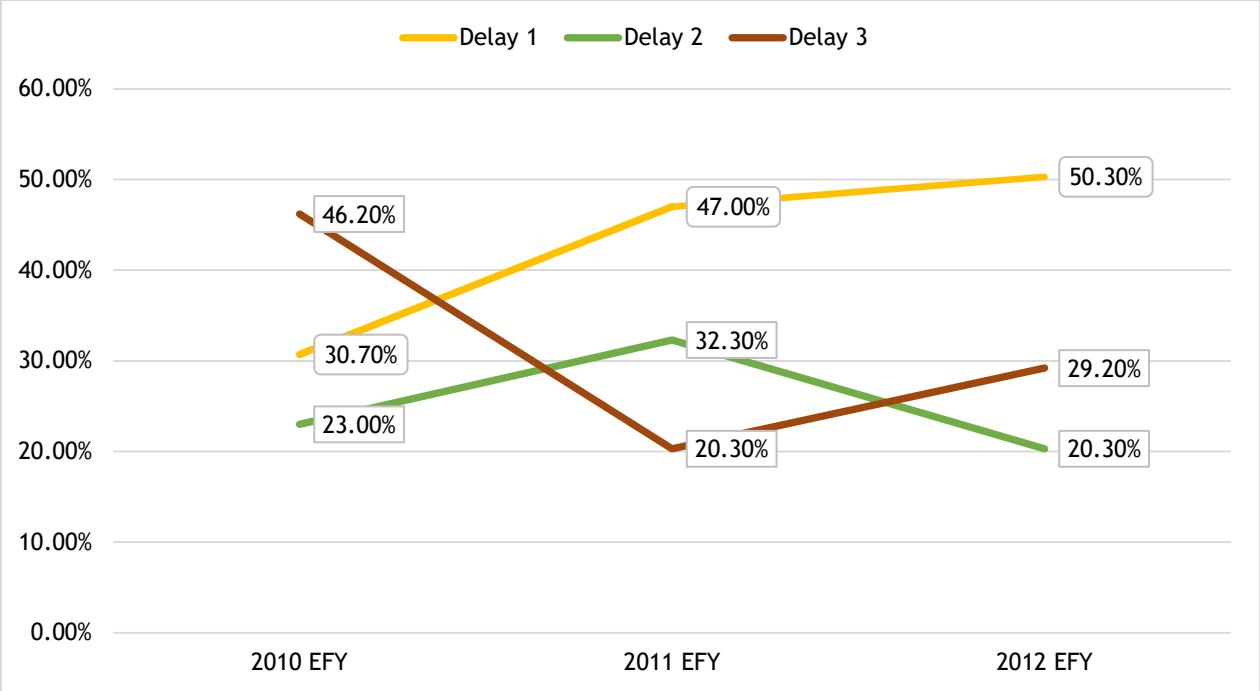


Figure 39: -Trends of delays in perinatal death from 2010-2012 EFY, Ethiopia

PART IV: - Response

Response to maternal deaths

Findings from the review of maternal deaths with detailed analysis of the surveillance findings on the underlying and contributory causes of death, framed the formulation of focused and strategic prioritized recommendations for action which can be translated into response to prevent future deaths through addressing modifiable factors and improve quality of care at facility.

Under the guidance of the MOH MNCH directorate, the responses to areas of deficiencies identified have been proposed and implemented at national, region, district and facility level during the last two years. Summarized in this document included, implemented at national, region, district and facility level during the last two years, and includes strengthening supply of essential equipment & obstetric drugs, improving transport system to improve referral links between facilities, ensure availability of blood for transfusion and building healthcare providers capacity and job aids to improve capacity to care for women during pregnancy and childbirth and adhere to guidelines and protocols.

Moreover, efforts also made to address community factors related to knowledge and care seeking behaviors of pregnant women.

Response to improve Community & Patient / Family knowledge and care seeking behavior

- Improving maternal health services by empowering the community on danger signs of pregnancy and care seeking through IEC/BCC
 - Organizing pregnant women conferences at community level
 - Intensified regularly assignment of Midwives from the health centers to their respective catchment health post (community) and provide maternal and newborn health related education
 - Produce mass media campaigns for TV, radio and print media spots on HDP & consumption of iron rich foods during pregnancy to prevent anemia and disseminated to increase community and healthcare providers awareness, practice and care-seeking behaviors across different settings
 - Organize community dialogue and HDA leaders to address cultural and community barriers for care seeking

- Intensified early identification & linkage of pregnant women from community (health post) to catchment health center by health extension workers
- Communities and health facility representatives worked in partnership to establish maternity home with active involvement (in-kind & financial) of communities

Capacity building for Health Workers

- Training provided for health care workers from selected health facilities and district and region from all regions. The participants trained on safe emergency obstetrics care, MPDSR, training on 1st & 2nd trimester abortion and basics of quality improvement to improve quality of care (QoC) that women.
- Health care providers also trained on how to use and implement new technologies including uterine balloon tamponade, tranexamic acid & NASG to improve management of postpartum hemorrhage.
- Catchment-based mentorship program is implemented in selected health facilities in regions from 2011EFY & 2012 EFY to build capacity of health care providers to improve MNCH quality of care & obstetric emergency care.
- MPDSR guidelines, a tool which includes the notification & reporting formats & register) and protocols printed, distributed and made available in facilities as job aids.
- Share information about lessons learned across the system, MOH produced best practices video for MDSR implementing health facilities depicting successful responses taken following maternal death reviews and projects linked to Quality improvement (QI) practice and distributed to facilities
- Moreover, Guideline and protocols on management of selected obstetric cases for hospitals is revised and will be revised shortly health center management of selected obstetric cases

Ensuring availability of essential obstetric drugs, supplies and equipment

- lifesaving commodities such as Oxytocin, MagSO₄, Ergometrine, Ca Gluconate, Iron float supplement, Anti helminthic drug supplementation, and medication for abortion are included in the Integrated Pharmaceuticals Logistics System (IPLS) procured & distributed to all regions. Besides, Tranexamic acid is included in the essential drug list.

- Manual vacuum aspiration set procured & distributed
 - Over 1486 NASG distributed for health facilities in 155 woredas of all regions
 - Around 5648 NASG is already procured and will be distributed after orientation

Strengthening referral system

- About 1857 Ambulances were distributed to woredas in all regions for facilitating the referral system at district level. Besides, MOH is also mobilizing resource to procure more ambulance
- Decisions were made at all level for allocation of resources for fuel, maintenance (fuel, ambulances & maintenance) and promote appropriate prioritization

Response to ensure availability of essential surgery and safe blood

- The process is underway to establish mini blood bank in 77 hospitals from six regions (Amhara, Oromia, Tigray, SNNP, Harari & Dire Dawa) mainly for primary hospitals. Among 10 components of items in package of mini blood bank, only one item (platelet agitator) is secured while the other 9 are under purchasing process to all regions of 77 hospitals.
- Safe motherhood promotional campaign cared out at all regions to create awareness blood donation, early ANC initiation, institutional delivery

Strengthening health facility capacity

- CEmNOC facility expansion were carried in all regions at several settings
- Experience sharing were made on model maternity waiting homes by all regions to initiate & strengthen maternity homes

Crosscutting issues

- Interregional forum between Addis Ababa City Administration (All hospitals) and Oromiya regional health bureau and between Oromia and SNNP regional health bureau is established to strengthen referral and coordination

Response to Perinatal death

The findings from the perinatal death reviews show that there need to be a prompt response to the identified causes and contributing factors. Apart from the need to improve quality of obstetric practices, demand creation to improve coverage of early initiation of ANC, skill birth attendance, prevention of neonatal infections, preterm deliveries and early identification of neonatal danger signs and referral are critical.

Moreover, improving availability of life-saving essential newborn medicines and strengthening the supply chain system need to be stressed. Other contributing factors for delays like improving the knowledge and care seeking for neonatal care of communities is also of critical importance.

Improving Community care seeking for newborn health:

- Health extension workers have been capacitated to sensitize the WDA and other existing platforms on community mobilization and improve their interpersonal communication,
- HEWs, after receiving integrated refreshment training (IRT) on RMNCAH module, are providing simplified orientation to WDAs in their kebeles on how to communicate key newborn health promotion and disease prevention message with their catchment households;
- Health post open house community dialogues were conducted to avoid closure of HPs
- Various quality assurance approaches and tools have been used to reinforce the skills of WDAs on their undertakings like the family health guide and speaking books to disseminate newborn health related messages and improve demand for newborn health services;
- To improve service uptake by the community, newborn care services including drugs at HPs are made to be fee exempted and has been communicated to all regions.

Improve capacity of health extension workers & quality of services at HPs

- Basic and regular refresher trainings provided to HEWs on community based newborn care (CBNC) case management
- Basic trainings for Health Workers from Health Centers on CBNC case management and supportive supervision skills was provided; this helps HEWs on early identification of newborn danger signs and early referral to HCs.

- Initial follow-up provided (Post training follow-up) to health posts within 4-6 weeks after initial CBNC trainings
- Regular supportive supervision provided to health posts by health center staff
- Broadcasting of mass media messages via TV, radio and print media spots on preventable causes of neonatal deaths like infections & prematurity (on World Prematurity Day).
- Conducting community conversations to address cultural and community barriers for newborn care seeking
- Strengthening early postnatal care services by health extension workers to early identify & treat sick newborns.
- Strengthening early & timely referral linkage of sick neonates from health post to catchment health center

Capacity building for Health Workers

- Training provided for health care workers from selected health facilities, woreda and region from all regions. The participants were trained on IMNCI, essential newborn care (ENC), and neonatal intensive care unit services (NICU). These training packages include knowledge and skill-based courses on Neonatal resuscitation, kangaroo-mother like care and sepsis management in newborns.
- Neonatal content is integrated into the implemented catchment-based mentorship program in all regions of selected health facilities in 2011EFY & 2012 EFY to build capacity of health care providers to improve quality of essential newborn care& build skill of health works on neonatal resuscitation.
- Moreover, NICU management protocol and advanced NICU management protocol (for high level neonatal ICUs) that focus on management of selected neonatal clinical cases for hospitals with different levels of NICUs are under revision & development respectively and will be finalized in 2013 EFY.

Ensure availability essential newborn drugs, supplies and equipment

- Annual newborn health commodity quantifications, procurement and IPLS based drug distribution to all regions are ongoing to avail life-saving essential commodities free of charge at HPs & health centers. These include essential new born life-saving

commodities such as Amoxicillin DT, Gentamycin, Tetracycline ophthalmic ointment, Vitamin K and Chlorhexidine Gel for umbilical cord care.

- Equipping of 79 hospitals with NICU equipment such as Bilirubin meter, Oxygen concentrator, Pulse oximeter, portable, Glucometer, Mobile Digital X-ray, Light, examination, mobile, Color Doppler Ultrasound, new born Ventilator, Photometer, HemoCue Glucose, Patient Monitor, ECG recorder, Neonate Encephalogram, suction Pump, blood bank Refrigerator, Blood Gas analyzer, Infusion pump, Photo therapy unit/access, Phototherapy irradiance meter, Radiant Warmer, Baby CPAP, and Neonatal Room Thermometer was conducted. This is expected to improve the quality of service and neonatal outcomes at the NICUs.
- Capacity building in the form of ToT was provided to health care providers including clinicians, NICU nurses, and biomedical engineers (MEs). The scope of the capacity building included introduction on main parts of the equipment, operating the device, ensuring full safety of the device, conducting basic maintenance and trouble shooting. This training was intended for the NICU equipment which was distributed and installed in the recipient hospitals to be ready to use and be functional. Cascading (on site) trainings have also been conducted at respective hospitals.
- Gap filling training on NICU was also provided to NICU nurses from all regions.

Strengthening health facility capacity

- Selection and capacity building of staff of 14 hospitals as learning centers for advanced neonatal ICU care is ongoing. Once finalized these hospitals are expected to provide mentorship and improving referral networking activities for catchment hospitals. As a start-up, training on CPAP machine was provided to HCWs from the 14 tertiary level hospitals.

Challenges

- Strengthening the “P” in Maternal and Perinatal Death Surveillance and Response is remaining a challenge
- Limited coordination & partnership among all relevant stake holders
- Integration of EPHI with quality and MCH directorate found to be poor
- Limitation of database in capturing quality data and geographical completeness for Perinatal death reports at national and regional level

- Infrastructure and logistic challenges like space, clean toilets, pipe water, soap or hand rub, and overhead radiant heaters were not available sufficiently in some health facilities
 - Some health facilities could not use radiant warmer due to absence of Electric power
- Lack of accountability mechanism and limited Human Resource assigned at public health emergency management system at all levels
 - Staff Turnover and Knowledge gap at each level due to attrition of trained staffs
- Very weak and/or absence of strong performance monitoring, data management and feedback mechanism of in MPDSR
- Weak performance in some regional structures (Dire-dawa, Afar, SNNPR, Gambella and Somali); this may be related to the commitment level of focal points assigned in the regions
- Poor in data quality, routine Monitoring & Evaluation activities and provision of feedback on case-based reporting to the lower-level health system structures
- Weak collaboration and engagement of stakeholders working in maternal and perinatal health area
 - Limited technical and financial support to strengthen MPDSR system from partners
- Absence of system for monitoring individual and programmatic response at all levels
- Shortage of budget for availing lifesaving maternal health commodities & delay in establishment of mini blood bank in six regions of 77 hospitals.

Perinatal death

- Limited effort on partner mapping and engagement
- Surveillance data quality problems due to different factors including absence of operational definition for cause and delay factors and absence of customized ICD-10 protocol
- Lack of consistency in reporting / notification of perinatal deaths through PHEM system and challenges in national perinatal death surveillance database
- Limited M&E, regular feedback by identifying death reporting and silent zonal structures
- Limited functionality of sub national level health system & lack of equity in quality health services to reduce perinatal death

Part V: - Recommendation

Maternal Deaths

- Strengthening implementation and integration of MPDSR and PHEM structures at all levels starting from RHBs by providing training for untrained PHEM focal points
- Strengthening ownership of regional and woreda health offices PHEM unit by including MPDSR in the performance indicators of the unit
- Identification, follow up and continuous feedback for silent zones, woreda structures and health facilities for MPDSR by regional health bureau and national PHEM
- Providing orientation for community leaders, one- to-five networks, HDA, HEWs, Political leaders, health professionals working in different departments of the health institution about when and how to notify maternal death
- MPDSR finding guided response should be given to the top three causes of maternal deaths (hemorrhage, Anemia, and hypertensive disease of pregnancy) and leading causes of perinatal death (Prematurity, asphyxia, sepsis, pneumonia and meningitis)
 - strengthening the capacity of care providers and institutions in terms of essential medical equipment and drug supplies and more importantly expansion of mini-blood bank service and availability of blood.
- Improve the reporting rate of maternal death through engagement of higher leadership
- The “R” part of MPDSR report with best practice should be documented and reviewed at each level
- Strengthen the engagement of all relevant stakeholders for response including Partner mapping and resource mobilization
- Revitalizing the national and regional MPDSR TWG
- Contextualized programmatic level responses should be given in all regional structures for major driving factors for maternal in the nation.
 - Designing and launching mass media campaigns that reach a large community to raise awareness along with strengthening routine health

education session competing with actors such as danger signs and benefits of early care-seeking.

- Improving the referral system and increase more ambulance transportation

Perinatal Death

- Improve the reporting rate of perinatal death through engagement of higher leadership.
- Making neonatal mortality a national health priority and develop a neonatal health driven national newborn and child survival strategy for 2020/21-2025.
- Closely monitor neonatal mortality indicators and share the findings of the quarter MPDSR & DHIS-2 data review to the national and regional leadership. This is expected to improve the very low reporting rate of perinatal deaths & commitment toward the MPDSR system which need engagement of the higher-level leadership.
- Integrate perinatal death notification into the national MPDSR data base
- Expansion of community based newborn care (CBNC) to selected woredas of Afar, Somali & Gambella regions to improve access to newborn health services.
- Technical support to roll out neonatal content of the IRT for HEWs.
- Strengthening the “P” in Maternal and Perinatal Death Surveillance and Response through program reviews, joint supportive supervisions and capacity building.
- Increase the number of health centers with newborn care corners (NBC) via improving access to radiant warmers at labor & delivery (L&D) units.
- Capacity building trainings to staff at NICUs to improve appropriate clinical application and use of newly installed advanced NICU equipment.
- Improving the quality of care at NICUs, strengthening & expansion of the catchment based clinical mentorship program to new health facilities.
- Rolling out the saving-little lives (SLL) program targeting 298 hospitals in five regions (Amhara, Oromia, Sidama, SNNP and Tigray). This mentorship focused initiative through the L&D, NICU, KMC and quality improvement (QI) packages aims to improve the quality of service and increase neonatal survival both at L & D and NICU service delivery units
- Work on Partner mapping, Data quality, operationalizing delay factors and preparing customized ICD-10 protocol for causes of maternal and perinatal death

Annexes

Annexes 1

Hemorrhage caused deaths by General characteristics		Ethiopian Fiscal Year															
		2006 EFY		2007 EFY		2008 EFY		2009 EFY		2010 EFY		2011 EFY		2012 EFY		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Region	Addis Ababa	0	0%	9	6%	12	5%	17	4%	17	4%	26	9%	7	5%	88	5%
	Afar	0	0%	1	1%	0	0%	5	1%	6	1%	1	0%	0	0%	13	1%
	Amhara	13	35%	46	28%	91	37%	142	31%	121	26%	90	32%	48	35%	551	31%
	Benishangul-Gumuz	0	0%	0	0%	0	0%	5	1%	9	2%	2	1%	8	6%	24	1%
	Dire Dawa	3	8%	13	8%	2	1%	14	3%	13	3%	1	0%	0	0%	46	3%
	Gambella	0	0%	0	0%	2	1%	4	1%	3	1%	0	0%	2	1%	11	1%
	Hareri	3	8%	9	6%	3	1%	2	0%	3	1%	0	0%	10	7%	30	2%
	Oromiya	18	49%	49	30%	57	23%	160	35%	178	38%	101	36%	31	23%	594	33%
	SNNP	0	0%	7	4%	37	15%	71	16%	68	15%	24	9%	0	0%	207	12%
	Somali	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	10	7%	11	1%
Tigray	0	0%	28	17%	40	16%	38	8%	45	10%	35	13%	20	15%	206	12%	
Age cat	10-14	0	0%	1	1%	1	0%	1	0%	0	0%	0	0%	0	0%	3	0%
	15-19	3	8%	9	6%	9	4%	25	6%	10	2%	19	7%	8	6%	83	5%
	20-24	4	11%	27	17%	27	12%	56	13%	77	17%	31	11%	21	16%	243	14%
	25-29	12	33%	38	24%	66	28%	115	26%	133	29%	90	33%	36	27%	490	28%
	30-34	7	19%	44	28%	64	28%	131	29%	99	22%	64	23%	25	19%	434	25%
	35-39	7	19%	27	17%	57	25%	90	20%	97	21%	53	19%	29	22%	360	21%
	40-44	3	8%	7	4%	7	3%	24	5%	29	6%	12	4%	10	8%	92	5%
45-49	0	0%	3	2%	1	0%	4	1%	9	2%	5	2%	3	2%	25	1%	
Marital Status	Married	35	95%	151	93%	225	92%	427	93%	446	96%	263	94%	119	88%	1666	94%
	Not Married	2	5%	11	7%	19	8%	31	7%	18	4%	17	6%	17	13%	115	6%
	0-1	6	17%	46	29%	60	26%	105	24%	113	25%	86	32%	34	29%	450	26%

Parity group	2-4	11	31%	53	34%	86	37%	172	39%	175	39%	108	40%	45	39%	650	38%
	5 & above	19	53%	57	37%	87	37%	166	37%	160	36%	74	28%	37	32%	600	35%
Gravidity	0-1	5	14%	34	22%	46	20%	71	16%	71	16%	53	22%	24	21%	304	18%
	2-4	12	33%	55	35%	79	34%	167	38%	174	39%	109	44%	39	34%	635	38%
	5 & above	19	53%	67	43%	107	46%	201	46%	200	45%	84	34%	52	45%	730	44%
MDRF extracted from	FBAF	4	17%	31	30%	60	25%	169	44%	171	44%	135	49%	73	54%	643	41%
	Verbal autopsy	19	83%	71	70%	182	75%	218	56%	219	56%	140	51%	63	46%	912	59%
Place of death	Health Center	4	11%	14	9%	13	5%	38	8%	36	8%	21	8%	11	8%	137	8%
	Health Post	0	0%	1	1%	2	1%	5	1%	0	0%	1	0%	0	0%	9	1%
	Home	9	25%	40	25%	63	27%	86	19%	94	20%	68	25%	35	26%	395	22%
	Hospital	12	33%	70	43%	118	50%	248	55%	250	54%	136	49%	72	54%	906	52%
	On transit	11	31%	35	22%	39	16%	65	14%	68	15%	42	15%	10	7%	270	15%
	On transit from health facility to health facility	0	0%	0	0%	0	0%	9	2%	11	2%	8	3%	6	4%	34	2%
	other	0	0%	1	1%	2	1%	2	0%	1	0%	1	0%	0	0%	7	0%
Timing in relation to the pregnancy	Antepartum	5	14%	13	8%	23	10%	42	9%	41	9%	14	6%	4	5%	142	9%
	Intrapartum	4	11%	20	13%	47	20%	49	11%	54	12%	25	10%	21	26%	220	13%
	Postpartum	26	74%	121	79%	166	70%	357	80%	357	79%	209	84%	56	69%	1292	78%
Is the Death Preventable	preventable	31	91%	136	90%	198	89%	373	88%	402	92%	222	93%	81	84%	1443	90%
	Unpreventable	3	9%	6	4%	15	7%	28	7%	26	6%	14	6%	10	10%	102	6%
	Unknown preventability	0	0%	9	6%	9	4%	22	5%	10	2%	2	1%	5	5%	57	4%
ANC _ Visit	One Visit	0	0%	2	13%	0	0%	7	12%	16	16%	11	14%	3	9%	39	13%
	2 Visit	0	0%	5	31%	2	18%	10	17%	12	12%	21	27%	11	32%	61	20%
	3 Visit	0	0%	7	44%	2	18%	18	31%	33	33%	17	22%	7	21%	84	28%
	4 & above	1	100%	2	13%	7	64%	24	41%	40	40%	29	37%	13	38%	116	39%

Maternal death Characteristics and Anemia		Ethiopian Fiscal Year															
		2006 EFY		2007 EFY		2008 EFY		2009 EFY		2010 EFY		2011 EFY		2012 EFY		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age cat	10-14	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	15-19	1	17%	7	18%	5	6%	8	5%	12	6%	5	8%	4	10%	42	7%
	20-24	1	17%	11	29%	22	24%	30	19%	53	29%	17	27%	12	31%	146	25%
	25-29	1	17%	7	18%	37	41%	55	35%	47	25%	14	22%	12	31%	173	30%
	30-34	0	0%	6	16%	17	19%	24	15%	35	19%	17	27%	7	18%	106	18%
	35-39	3	50%	4	11%	6	7%	32	20%	31	17%	7	11%	3	8%	86	15%
	40-44	0	0%	2	5%	3	3%	7	4%	6	3%	1	2%	1	3%	20	3%
	45-49	0	0%	1	3%	0	0%	3	2%	1	1%	3	5%	0	0%	8	1%
Parity group	0-1	3	50%	19	50%	36	43%	64	42%	89	50%	32	50%	18	49%	261	47%
	2-4	1	17%	13	34%	33	39%	44	29%	53	30%	15	23%	15	41%	174	31%
	5 & above	2	33%	6	16%	15	18%	46	30%	36	20%	17	27%	4	11%	126	22%
Gravidity	0-1	2	33%	12	32%	36	41%	49	32%	72	42%	20	35%	14	39%	205	38%
	2-4	1	17%	18	47%	35	40%	54	36%	51	30%	16	28%	17	47%	192	35%
	5 & above	3	50%	8	21%	16	18%	48	32%	48	28%	21	37%	5	14%	149	27%
ANC Visit	One Visit	0	0%	0	0%	1	8%	3	9%	9	20%	2	13%	2	17%	17	13%
	2 Visit	0	0%	2	25%	3	23%	12	34%	10	22%	3	20%	3	25%	33	26%
	3 Visit	0	0%	6	75%	3	23%	7	20%	9	20%	1	7%	3	25%	29	23%
	4 & above	0	0%	0	0%	6	46%	13	37%	17	38%	9	60%	4	33%	49	38%
Marital Status	Married	6	100%	35	88%	89	97%	149	92%	174	93%	61	91%	37	93%	551	93%
	Not Married	0	0%	5	13%	3	3%	13	8%	13	7%	6	9%	3	8%	43	7%
EDUC	No Education	4	80%	22	73%	56	75%	90	72%	102	73%	33	77%	18	78%	325	74%
	Elementary	1	20%	4	13%	8	11%	19	15%	21	15%	5	12%	2	9%	60	14%
	High school	0	0%	3	10%	8	11%	8	6%	11	8%	5	12%	1	4%	36	8%

	College and above	0	0%	1	3%	3	4%	8	6%	6	4%	0	0%	2	9%	20	5%
ANC_ attendance	attended ANC	0	0%	10	67%	18	62%	58	75%	72	75%	17	50%	21	75%	196	70%
	No ANC attendance	1	100%	5	33%	11	38%	19	25%	24	25%	17	50%	7	25%	84	30%
Delivery Outcome	Live birth	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	still birth	1	100%	8	100%	28	100%	60	100%	69	100%	22	100%	18	100%	206	100%
Region	Addis Ababa	0	0%	2	5%	2	2%	10	6%	12	6%	6	9%	4	10%	36	6%
	Afar	0	0%	0	0%	0	0%	5	3%	12	6%	0	0%	0	0%	17	3%
	Amhara	0	0%	8	20%	40	43%	57	35%	49	26%	17	25%	8	20%	179	30%
	Benishangul Gumuz	0	0%	0	0%	1	1%	4	2%	6	3%	0	0%	1	3%	12	2%
	Dire Dawa	1	17%	11	28%	6	7%	11	7%	5	3%	2	3%	0	0%	36	6%
	Hareri	0	0%	2	5%	5	5%	0	0%	4	2%	4	6%	1	3%	16	3%
	Oromiya	5	83%	8	20%	23	25%	40	25%	64	34%	27	40%	16	40%	183	31%
	SNNP	0	0%	1	3%	6	7%	18	11%	18	10%	3	4%	0	0%	46	8%
Tigray	0	0%	8	20%	9	10%	17	10%	17	9%	8	12%	10	25%	69	12%	
MDRF extracted from	FBAF	1	17%	11	41%	52	57%	102	68%	121	72%	44	68%	25	63%	356	65%
	Verbal autopsy	5	83%	16	59%	39	43%	47	32%	46	28%	21	32%	15	38%	189	35%
Timing relation to the pregnancy	Antepartum	1	17%	16	40%	14	16%	34	21%	41	23%	14	23%	8	23%	128	23%
	Intrapartum	2	33%	4	10%	16	19%	26	16%	22	13%	8	13%	1	3%	79	14%
	Postpartum	3	50%	20	50%	56	65%	101	63%	112	64%	38	63%	26	74%	356	63%
Place of death	Health Center	0	0%	0	0%	4	4%	5	3%	6	3%	3	4%	0	0%	18	3%
	Health Post	0	0%	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	1	0%
	Home	0	0%	9	23%	5	6%	11	7%	6	3%	6	9%	7	18%	44	7%
	Hospital	5	83%	29	73%	77	86%	132	82%	155	84%	54	81%	29	73%	481	82%
	On transit	1	17%	1	3%	4	4%	5	3%	11	6%	4	6%	2	5%	28	5%
	On transit from health facility to health facility	0	0%	0	0%	0	0%	5	3%	7	4%	0	0%	2	5%	14	2%
other	0	0%	1	3%	0	0%	2	1%	0	0%	0	0%	0	0%	3	1%	

Maternal death Characteristics and HDP		Ethiopian Fiscal Year															
		2006 EFY		2007 EFY		2008 EFY		2009 EFY		2010 EFY		2011 EFY		2012 EFY		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age cat	10-14	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	15-19	1	17%	7	18%	5	6%	8	5%	12	6%	5	8%	4	10%	42	7%
	20-24	1	17%	11	29%	22	24%	30	19%	53	29%	17	27%	12	31%	146	25%
	25-29	1	17%	7	18%	37	41%	55	35%	47	25%	14	22%	12	31%	173	30%
	30-34	0	0%	6	16%	17	19%	24	15%	35	19%	17	27%	7	18%	106	18%
	35-39	3	50%	4	11%	6	7%	32	20%	31	17%	7	11%	3	8%	86	15%
	40-44	0	0%	2	5%	3	3%	7	4%	6	3%	1	2%	1	3%	20	3%
	45-49	0	0%	1	3%	0	0%	3	2%	1	1%	3	5%	0	0%	8	1%
Parity	0-1	3	50%	19	50%	36	43%	64	42%	89	50%	32	50%	18	49%	261	47%
	2-4	1	17%	13	34%	33	39%	44	29%	53	30%	15	23%	15	41%	174	31%
	5 & above	2	33%	6	16%	15	18%	46	30%	36	20%	17	27%	4	11%	126	22%
Gravidity_	0-1	2	33%	12	32%	36	41%	49	32%	72	42%	20	35%	14	39%	205	38%
	2-4	1	17%	18	47%	35	40%	54	36%	51	30%	16	28%	17	47%	192	35%
	5 & above	3	50%	8	21%	16	18%	48	32%	48	28%	21	37%	5	14%	149	27%
ANC Visit	One Visit	0	0%	0	0%	1	8%	3	9%	9	20%	2	13%	2	17%	17	13%
	2 Visit	0	0%	2	25%	3	23%	12	34%	10	22%	3	20%	3	25%	33	26%
	3 Visit	0	0%	6	75%	3	23%	7	20%	9	20%	1	7%	3	25%	29	23%
	4 & above	0	0%	0	0%	6	46%	13	37%	17	38%	9	60%	4	33%	49	38%
Marital Status	Married	6	100%	35	88%	89	97%	149	92%	174	93%	61	91%	37	93%	551	93%
	Not Married	0	0%	5	13%	3	3%	13	8%	13	7%	6	9%	3	8%	43	7%
EDUC	No Education	4	80%	22	73%	56	75%	90	72%	102	73%	33	77%	18	78%	325	74%
	Elementary	1	20%	4	13%	8	11%	19	15%	21	15%	5	12%	2	9%	60	14%
	High school	0	0%	3	10%	8	11%	8	6%	11	8%	5	12%	1	4%	36	8%

	College and above	0	0%	1	3%	3	4%	8	6%	6	4%	0	0%	2	9%	20	5%
ANC attendance	attended ANC	0	0%	10	67%	18	62%	58	75%	72	75%	17	50%	21	75%	196	70%
	No ANC attendance	1	100%	5	33%	11	38%	19	25%	24	25%	17	50%	7	25%	84	30%
Delivery Outcome	Live birth	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	still birth	1	100%	8	100%	28	100%	60	100%	69	100%	22	100%	18	100%	206	100%
Region	Addis Ababa	0	0%	2	5%	2	2%	10	6%	12	6%	6	9%	4	10%	36	6%
	Afar	0	0%	0	0%	0	0%	5	3%	12	6%	0	0%	0	0%	17	3%
	Amhara	0	0%	8	20%	40	43%	57	35%	49	26%	17	25%	8	20%	179	30%
	Benishangul Gumuz	0	0%	0	0%	1	1%	4	2%	6	3%	0	0%	1	3%	12	2%
	Dire Dawa	1	17%	11	28%	6	7%	11	7%	5	3%	2	3%	0	0%	36	6%
	Hareri	0	0%	2	5%	5	5%	0	0%	4	2%	4	6%	1	3%	16	3%
	Oromiya	5	83%	8	20%	23	25%	40	25%	64	34%	27	40%	16	40%	183	31%
	SNNP	0	0%	1	3%	6	7%	18	11%	18	10%	3	4%	0	0%	46	8%
Tigray	0	0%	8	20%	9	10%	17	10%	17	9%	8	12%	10	25%	69	12%	
MDRF extracted from	FBAF	1	17%	11	41%	52	57%	102	68%	121	72%	44	68%	25	63%	356	65%
	Verbal autopsy	5	83%	16	59%	39	43%	47	32%	46	28%	21	32%	15	38%	189	35%
Timing relation to the pregnancy	Antepartum	1	17%	16	40%	14	16%	34	21%	41	23%	14	23%	8	23%	128	23%
	Intrapartum	2	33%	4	10%	16	19%	26	16%	22	13%	8	13%	1	3%	79	14%
	Postpartum	3	50%	20	50%	56	65%	101	63%	112	64%	38	63%	26	74%	356	63%
Place of death	Health Center	0	0%	0	0%	4	4%	5	3%	6	3%	3	4%	0	0%	18	3%
	Health Post	0	0%	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	1	0%
	Home	0	0%	9	23%	5	6%	11	7%	6	3%	6	9%	7	18%	44	7%
	Hospital	5	83%	29	73%	77	86%	132	82%	155	84%	54	81%	29	73%	481	82%
	On transit	1	17%	1	3%	4	4%	5	3%	11	6%	4	6%	2	5%	28	5%
	On transit from health facility to health facility	0	0%	0	0%	0	0%	5	3%	7	4%	0	0%	2	5%	14	2%
other	0	0%	1	3%	0	0%	2	1%	0	0%	0	0%	0	0%	3	1%	

Annex 2

		Year EFY							
		2010 EFY		2012 EFY		2011 EFY		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Region	Addis Ababa	58	96.7%	99	15.1%	207	31.5%	364	26.5%
	Amhara	1	1.7%	423	64.5%	284	43.2%	708	51.6%
	Benishangul-Gumuz	0	0.0%	22	3.4%	0	0.0%	22	1.6%
	Dire Dawa	0	0.0%	5	.8%	0	0.0%	5	.4%
	Oromia	1	1.7%	107	16.3%	166	25.3%	274	20.0%
Residence of deceased parents		1	1.7%	7	1.1%	38	5.8%	46	3.4%
	Rural	3	5.0%	398	60.7%	316	48.1%	717	52.2%
	Urban	56	93.3%	251	38.3%	303	46.1%	610	44.4%
Estimated GA Cat	>=43	0	0.0%	8	1.2%	7	1.1%	15	1.1%
	28- 35	36	60.0%	115	17.5%	176	26.8%	327	23.8%
	35- 38	2	3.3%	117	17.8%	166	25.3%	285	20.8%

	38- 43	16	26.7%	154	23.5%	183	27.9%	353	25.7%
	Missing	6	10.0%	262	39.9%	125	19.0%	393	28.6%
Sex of the deceased	Female	36	60.0%	252	38.4%	285	43.4%	573	41.7%
	Male	22	36.7%	391	59.6%	354	53.9%	767	55.9%
	Missing	2	3.3%	13	2.0%	18	2.7%	33	2.4%
Place of death	During referral (from facility to facility)	0	0.0%	0	0.0%	12	1.8%	12	.9%
	Health Centre	2	3.3%	67	10.2%	49	7.5%	118	8.6%
	Health Post	0	0.0%	4	.6%	3	.5%	7	.5%
	Home/ Relatives' Home	2	3.3%	53	8.1%	90	13.7%	145	10.6%
	Hospital	56	93.3%	493	75.2%	462	70.3%	1011	73.6%
	Missing	0	0.0%	12	1.8%	32	4.9%	44	3.2%
	On Transit	0	0.0%	27	4.1%	9	1.4%	36	2.6%
Is the mother of the deceased perinate alive	Missing	8	13.3%	41	6.3%	122	18.6%	171	12.5%
	No	3	5.0%	140	21.3%	28	4.3%	171	12.5%
	Yes	49	81.7%	475	72.4%	507	77.2%	1031	75.1%
Age Cat	10-14yrs	0	0.0%	1	.2%	0	0.0%	1	.1%
	15-19yrs	2	3.3%	28	4.3%	37	5.6%	67	4.9%
	20-24yrs	17	28.3%	165	25.2%	145	22.1%	327	23.8%
	25-29yrs	27	45.0%	204	31.1%	180	27.4%	411	29.9%
	30-34yrs	12	20.0%	162	24.7%	108	16.4%	282	20.5%
	35-39yrs	0	0.0%	62	9.5%	70	10.7%	132	9.6%
	40-44yrs	0	0.0%	9	1.4%	12	1.8%	21	1.5%
	45-49	0	0.0%	1	.2%	0	0.0%	1	.1%
	Missing	2	3.3%	24	3.7%	105	16.0%	131	9.5%
Parity Cat	>= 5	2	3.3%	59	9.0%	58	8.8%	119	8.7%
	0 - 1	29	48.3%	251	38.3%	223	33.9%	503	36.6%
	2 - 4	21	35.0%	317	48.3%	214	32.6%	552	40.2%
	Missing	8	13.3%	29	4.4%	162	24.7%	199	14.5%
Number of Child Cat	>=5	0	0.0%	31	4.7%	42	6.4%	73	5.3%
	0 - 1	24	40.0%	405	61.7%	259	39.4%	688	50.1%
	2 - 4	6	10.0%	165	25.2%	158	24.0%	329	24.0%
	Missing	30	50.0%	55	8.4%	198	30.1%	283	20.6%
	Missing	14	23.3%	65	9.9%	181	27.5%	260	18.9%

Religion of the mother	Muslim	9	15.0%	70	10.7%	142	21.6%	221	16.1%
	Orthodox	29	48.3%	488	74.4%	308	46.9%	825	60.1%
	Other	0	0.0%	0	0.0%	5	.8%	5	.4%
	Protestant	8	13.3%	33	5.0%	21	3.2%	62	4.5%
Educational status of the mother	College and above	5	8.3%	53	8.1%	33	5.0%	91	6.6%
	Elementary school	7	11.7%	61	9.3%	57	8.7%	125	9.1%
	High school	6	10.0%	62	9.5%	68	10.4%	136	9.9%
	Missing	42	70.0%	184	28.0%	333	50.7%	559	40.7%
	No formal Education	0	0.0%	266	40.5%	151	23.0%	417	30.4%
	No formal education, but can read and write	0	0.0%	30	4.6%	15	2.3%	45	3.3%
Occupation of the mother	Agriculture	2	3.3%	241	36.7%	165	25.1%	408	29.7%
	Clerical	0	0.0%	1	.2%	2	.3%	3	.2%
	House wife	1	1.7%	16	2.4%	32	4.9%	49	3.6%
	Manual Skilled	0	0.0%	14	2.1%	13	2.0%	27	2.0%
	Manual Unskilled	1	1.7%	2	.3%	1	.2%	4	.3%
	Missing	40	66.7%	112	17.1%	218	33.2%	370	26.9%
	Other	2	3.3%	47	7.2%	47	7.2%	96	7.0%
	Pofessional	5	8.3%	30	4.6%	19	2.9%	54	3.9%
	Sales and Services	0	0.0%	76	11.6%	25	3.8%	101	7.4%
	Student	0	0.0%	12	1.8%	0	0.0%	12	.9%
	Unemployed	9	15.0%	105	16.0%	135	20.5%	249	18.1%
ANC follow up status of the mother	4 and above	29	48.3%	146	22.3%	237	36.1%	412	30.0%
	Missing	18	30.0%	230	35.1%	194	29.5%	442	32.2%
	No ANC	2	3.3%	75	11.4%	43	6.5%	120	8.7%
	One ANC	1	1.7%	36	5.5%	23	3.5%	60	4.4%
	Three ANC	2	3.3%	99	15.1%	96	14.6%	197	14.3%
	Two ANC	8	13.3%	70	10.7%	64	9.7%	142	10.3%
Number of TT vaccine during the pregnancy of the deceased case	Missing	28	46.7%	87	13.3%	137	20.9%	252	18.4%
	No TT	7	11.7%	44	6.7%	53	8.1%	104	7.6%
	One TT	13	21.7%	60	9.1%	108	16.4%	181	13.2%
	Two and above TT	12	20.0%	465	70.9%	359	54.6%	836	60.9%
	C/S	27	45.0%	69	10.5%	93	14.2%	189	13.8%

Mode of delivery of the deceased baby	Forceps	0	0.0%	12	1.8%	11	1.7%	23	1.7%
	Missing	8	13.3%	20	3.0%	24	3.7%	52	3.8%
	Operative vaginal delivery	3	5.0%	7	1.1%	17	2.6%	27	2.0%
	SVD	22	36.7%	539	82.2%	498	75.8%	1059	77.1%
	Vacuum	0	0.0%	9	1.4%	14	2.1%	23	1.7%
Status of the baby at birth		9	15.0%	22	3.4%	59	9.0%	90	6.6%
	Alive/live born	51	85.0%	342	52.1%	353	53.7%	746	54.3%
	Dead/Still birth	0	0.0%	292	44.5%	245	37.3%	537	39.1%
Place of delivery of deceased baby	Clinic	0	0.0%	0	0.0%	3	.5%	3	.2%
	Health Center	2	3.3%	117	17.8%	87	13.2%	206	15.0%
	Health Post	6	10.0%	5	.8%	4	.6%	15	1.1%
	Home	1	1.7%	21	3.2%	24	3.7%	46	3.4%
	Hospital	43	71.7%	426	64.9%	457	69.6%	926	67.4%
	Missing	8	13.3%	79	12.0%	73	11.1%	160	11.7%
	On transit	0	0.0%	8	1.2%	9	1.4%	17	1.2%