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ORIGINAL ARTICLE

UNDERREPORTING OF IN-HOSPITAL MATERNAL DEATHS IN THREE HOSPITALS, ADDIS ABABA, ETHIOPIA

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ABSTRACT

Introduction*: Ethiopia as one of the signatories the Sustainable Development Goal three to reduce preventable maternal deaths and launched a maternal death surveillance and response system making maternal deaths a reportable event by the health care system since 2013 in addition to the existing health management information system. With increasing institutional birth, more maternal deaths are being reported from facilities, mainly hospitals. But the mechanism of reporting using the health management information system and maternal and perinatal death surveillance and response system are challenged with hospital maternal deaths as tracking the deaths that occur in units other than the maternity units will have causes indirectly related to the birth process.*

Objective*: This study aimed to assess the reporting of in-hospital maternal deaths in three hospitals of Addis Ababa, Ethiopia.*

Methods*: We extracted data from death certificates and medical records of all females aged 15-49 years who died between January 2015 and December 2017 using practical data capturing tool developed by the Initiative for maternal mortality program assessment called; rapid ascertainment process of institutional death. We also assessed the result with the maternal deaths reported through the health management information system and the maternal and perinatal death surveillance and response system. Results was analyzed using SPSS version 20 and descriptive statistics is presented.*

Result: *During the study period there were 1210 women deaths in the age group of 15-49 years with 1137 well documented death certificates. We reviewed medical charts of 876 (77.04 %) female deaths and found 84 (9.58%) maternal deaths using the Initiative for maternal mortality program assessment rapid ascertainment process of institutional death tool. Using health management information system and /or maternal death surveillance and response systems 47 (56%) of the maternal deaths were reported by the studied hospitals resulting in underreporting of 37 (44%) of female deaths. Most deaths (28.6%) occurred in the adult emergency department and (27.4%) in the intensive care units of the hospitals. Direct maternal deaths contributed to two-third of the deaths and preeclampsia/eclampsia was the leading direct maternal cause contributing to (21.4%) of the deaths while cardiac disease is the leading cause to (15.5%) the indirect causes of maternal deaths.*

Conclusion*: There is a significant gap in reporting maternal deaths using both health management information system and maternal death surveillance and response system when women died on non-maternity wards such as emergency and intensive care units. This study suggested that, the use of Initiative for maternal mortality program assessment, rapid ascertainment process of institutional death tool is a feasible strategic option to identify maternal deaths by assessing all female deaths aged 15-49 occurring in service units other than labor and delivery.*

Keywords*: underreporting, maternal death. rapid ascertainment process of institutional death, Ethiopia.*

INTRODUCTION

Skilled birth is a key intervention to decrease all avoidable maternal deaths and is increasing in Ethiopia.(1). The national estimates indicated that only 48% of pregnant women deliver at health facilities while this is high in urban areas especially at the capital Addis Ababa where 94.8% of all deliveries occur at health facilities (1).With the aim of rectifying problems related preventable maternal deaths, the Ethiopian Government had launched the maternal and perinatal death surveillance and response system (MPDSR) in addition to the existing health management information system (HMIS) since 2013 and has made maternal death as one of reportable events by the health care system (2). Since then, almost all maternal deaths are reported from health facilities especially hospitals. However, despite the efforts made by the health system in capturing material deaths using both the standard health services reporting system HMIS and MDSR, up to 40% of maternal deaths fail to be reported (3).

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Hospital studies have shown that routine methods of identifying maternal deaths underestimate the number by one-half to two-thirds (3-5). The main problem being the misclassification of indirect maternal deaths as non-maternal. In addition, assessment of the cause of in-hospital deaths is generally based on the clinician's diagnosis of the disease(s) that led to the fatal outcome. However, short of autopsy, such estimations entail frequent misclassification errors. Indeed, when clinical diagnoses have been contrasted with post-mortem findings, rates of major clinical—pathological discrepancies have ranged from 10% to above 30%, especially in the diagnosis of infectious diseases (6).

The underreporting of maternal deaths in hospital settings has also been highlighted by findings from Initiative for maternal mortality program assessment-Rapid ascertainment process for institutional deaths (IMMPACT-RAPID) which shows that many additional maternal deaths could be identified from case-note reviews (7).

Failure to differentiate between direct and indirect causes of maternal mortality may lead to unrealistic plans and outcomes and inappropriate use of resources. consequently, to the misallocation of resources. Indirect maternal deaths were particularly likely to be missed because they often occurred in wards other than the maternity wards and were frequently reported as non-maternal deaths (8,9).

This study aims to estimate in-hospital maternal deaths using the IMMPACT RAPID as compared with two systems currently functioning in reporting of maternal deaths; the HMIS and maternal and perinatal death surveillance and response (MPDSR) in Ethiopia. The IMMPACT-RAPID is a practical data capturing tool which is a plausible alternative to the existing systems in picking all maternal deaths irrespective of the place of death within the health facility. RAPID involves a review of institutional records for all deaths of women aged 15–49 years to identify all pregnancy-related deaths, including those that may have been missed from routine reports. RAPID tool is found to provide an estimate of the numbers of pregnancy-related deaths omitted from routine reports and analysis of case in a similar setting (7).

PATIENTS AND METHODS

A retrospective descriptive study involving two regional hospitals Gandhi Memorial Hospital GMH), and Zewditu Memorial Hospital (ZMH) and one tertiary hospital, Tikur Anbessa Specialized Hospital (TASH), in Addis Ababa Ethiopia.

The three hospitals in addition to maternal health services offer multidisciplinary medical care. The hospitals report vital events using both HMIS and MPDSR systems to the relevant institutions. All reproductive aged women deaths occurred between January 2015-December 2017 among women of reproductive age (15-49 years) in every department including the emergency department and intensive care units, whose death certificates were accessed.

Data of all female deaths in the reproductive age with wards where the death happened were collected using the RAPID assessment tool format I (annexed) prepared by IMMPACT by trained medical interns from the log books of the hospitals' morgues. Following this, copies of the death certificate were retrieved from the wards. Medical charts for the well documented medical certificates were retrieved from the respective hospitals archive. The female deaths are classified as maternal, non- maternal or unclassified by Obstetricians and Gynecologists using Format II (Annexed). The maternal deaths were further studied and classify as direct, indirect or unclassified. Deaths reported through the HMIS and MPDSR system was also collected from the HMIS Offices of the respective hospitals.

Data were stored and analyzed using SPSS version 20 statistical software. The findings of the study were presented using descriptive tables and graphs. Ethical clearance was obtained from the institutional review board of the Collage of Health Sciences, Addis Ababa University and the Addis Ababa Regional Health Bureau.

RESULTS

In the study period, there were 1210 female deaths in the reproductive age in the three hospitals of which death certificates were found for 1137 (94%). From those we were identified by the death certificate, only 876 (77.0%) of the medical records were reviewed, mainly due to loss of charts (178) and 83 had incomplete /absent data in the medical charts.. From the 876 charts reviewed from January 2015-December 2017, 84 maternal deaths were identified. During the same time period, there were 53,681 deliveries resulting in 53,744 births, of which 53,351 were livebirths. The youngest mother was 15 years and the oldest was 47 years old with a median age of 27. The mean (SD) parity was 2.2 (±1.4). The mean (SD) time to present to the hospital was 3.9 (±3.1) days with the longest time to seek care being 18 days. Adolescents constituted 13% of maternal deaths and most (67.9%) maternal deaths were from among mothers in the age group 20-35 years.

The nulli and primiparas constituted about one third of the maternal deaths, while the multiparas accounted for 57.1%. A majority (66.9%) of the deaths are from Addis Ababa. Most 69/84 (81.1%) of the mothers died in the postpartum period and 10/84 (11.9%) died from complications of abortion.

The mean time (SD) to admission was 2.07 (±3.7) days for direct causes, while it was 4.1 (±4.02) days for indirect causes ($p < .001$). Mothers stayed for a mean (SD) duration of 4 days (±3.2) before death.

Table 1: Characteristics of women who died in the three hospitals between January 2015-2017, in the three hospitals (GMH, ZMH and TASH) Addis Ababa, Ethiopia

		Reported no			Yes		
		Count	Row Total N %	Table N %	Count	Row Total N %	Table N %
Hospital	GMH	7	38.9%	8.3%	11	61.1%	13.1%
	TASH	25	48.1%	29.8%	27	51.9%	32.1%
	ZMH	5	35.7%	6.0%	9	64.3%	10.7%
Age(yrs)	<20	5	45.5%	6.0%	6	54.5%	7.1%
	20 -24	6	50.0%	7.1%	6	50.0%	7.1%
	25 -29	13	40.6%	15.5%	19	59.4%	22.6%
	30 - 34	8	61.5%	9.5%	5	38.5%	6.0%
	35-39	4	33.3%	4.8%	8	66.7%	9.5%
	> 40	1	25.0%	1.2%	3	75.0%	3.6%
Parity	0	6	85.7%	7.1%	1	14.3%	1.2%
	1	7	29.2%	8.3%	17	70.8%	20.2%
	2	24	50.0%	28.6%	24	50.0%	28.6%
	3	0	0.0%	0.0%	5	100.0%	6.0%
Address	Addis Ababa	27	48.2%	32.1%	29	51.8%	34.5%
	Outside Addis Ababa	9	36.0%	10.7%	16	64.0%	19.0%
	unknown	1	33.3%	1.2%	2	66.7%	2.4%
Pregnancy status	antepartum	0	0.0%	0.0%	3	100.0%	3.6%
	intrapartal	0	0.0%	0.0%	1	100.0%	1.2%
	postabortion	5	71.4%	6.0%	2	28.6%	2.4%
	postlapratomy	1	100.0%	1.2%	0	0.0%	0.0%
	postpartum	29	42.0%	34.5%	40	58.0%	47.6%
	Preevacuation	2	66.7%	2.4%	1	33.3%	1.2%
class	direct	13	22.4%	15.5%	45	77.6%	53.6%
	indirect	14	87.5%	16.7%	2	12.5%	2.4%
	unclassified	10	100.0%	11.9%	0	0.0%	0.0%

During the study period, only 47 were maternal deaths reported. The HMIS (8/84) and MDSR (15/84) separately. Both systems identified 24 of the 84 deaths resulting in reporting of only 56% of in-hospital maternal deaths.

The institutional maternal death reporting rate differs from 66.7% (12/18) at Ghandi Memorial to 40.4% (21/52) at Tikur Anbessa Specialized Hospital. Indirect and unclassified maternal deaths tend to be misreported than direct causes. In addition, none of the indirect maternal deaths were reported as maternal deaths from TASH. (Fig 1). All maternal deaths reported were from Labor and delivery unit, maternity wards and operating room.

Majority of maternal deaths from the Intensive Care Unit (ICU) 15/23 (65.2%) were also reported while only (2/24) 8.3% from the Adult Emergency Department. None of the deaths from Gyn ward, Medical, surgical wards were notified as maternal deaths by the respective hospitals.

Unlike the expectation that most maternal deaths occur in labor and maternity wards, in this study most maternal deaths were from the Adult Emergency Department (28.6%) and intensive care unit (27.4%) which are an entry to the management of most critical patients. The women dedicated wards (labor, maternity and gyn) contributed to 28.6% of the deaths during the study period. (Table 2).

Figure 1: Place of maternal deaths in hospitals at Addis Ababa, Jan 2015-Dec. 2017

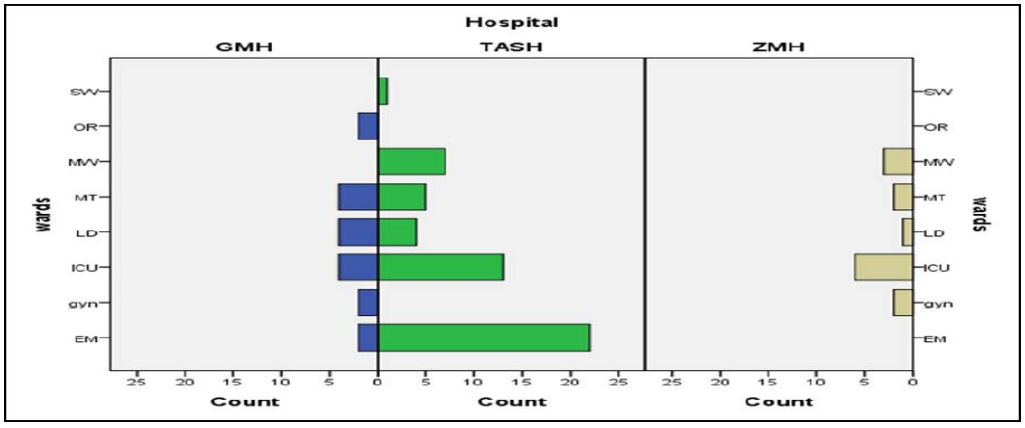

Table 2: Place of death in three hospitals in Addis Ababa, Jan 2015- Dec. 2017, Ethiopia

	No.	Percent
Emergency Department	24	28.6
Gyn wards	4	4.8
Intensive Care Unit	23	27.4
Labor and Delivery	9	10.7
Maternity ward	11	13.1
Medical Ward	10	11.9
Operating Room	2	2.4
Surgical ward	1	1.2
Total	84	100.0

Most Deaths in Tikur Anbessa Specialized Hospital happened at the Adult Emergency Department followed by Intensive care unit and medical wards while in Ghandi Memorial equal proportion of mothers died in the labor ward, maternity and ICU. Most Deaths at Zewditu Memorial took place in ICU followed by medical and maternity wards. Major proportion 58/84 (69%) of the maternal deaths were from direct causes while almost one in five deaths (19%) 16/84were from indirect causes. Maternal deaths couldn't be classified in 11.9% (10/84) of the deaths due to poor documentation. Of the direct causes of maternal death, the top five causes are Preeclampsia/ Eclampsia (21.4%), Postpartum Hemorrhage (15.5%), Puerperal sepsis (13.1%), abortion (11.9%) and Pulmonary Embolism (6% of maternal deaths). The indirect causes were from cardiac disease (15.5%) and HIV (4.8%). (Fig 2).

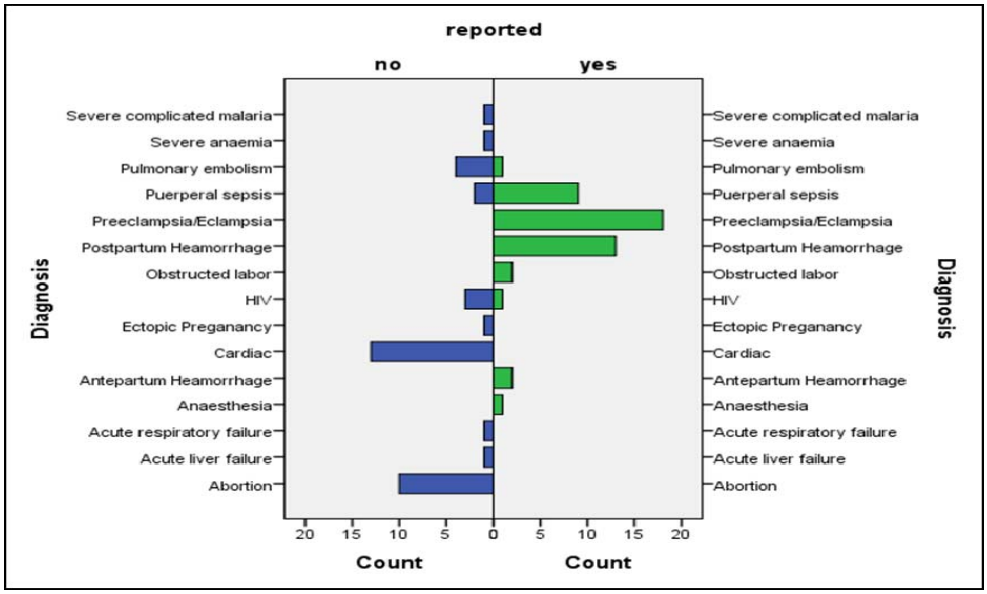

Figure 2: Reported causes of maternal deaths - Jan 2015-Dec. 2017.

A large proportion (52.4%) of the mothers had one or more form of procedure done. Cesarean section, hysterectomy and cesarean hysterectomy was done for 43.2%, 22.7% and 2.4% respectively.

DISCUSSION

In this retrospective descriptive study, we found 84 maternal deaths out of 53,351 live births giving a maternal mortality ratio of 156/100000. Of these, only 9 deaths occurred in the labor ward, 4 in the gyn ward and 11 in maternity wards while the rest occurred in medical, surgical, intensive care and emergency units. The HIMS , MPDSR and RAPID captured 33/84 (39%), 40/84 (47.6%) and 84/84/100%/ of the maternal deaths respectively. Considering that the already existing system has weakness in identifying in-hospital maternal deaths leading to misreporting of maternal death as seen in a study from the Netherlands.(10) . Its clears as a sensitive global and country level indicator, such reporting will give false reassurance at the policy level with distorted allocation of resources for reducing preventable maternal deaths..

Counting maternal deaths, reviewing and taking lessons from the audit process has been one of the recommended methods to reduce maternal mortality at both institutional and community level.(11) In this study, both the HMIS and MDSR system identified a little more than half of the maternal deaths. This is also found in studies done in Morocco, Taiwan and but the rate is quite high compared to these studies (12,13). This might be due to documentation on death certificate that focus more on the clinical diagnosis which lacks definitive diagnosis so as to identify maternal deaths.

Most death certificates documented a malfunction of the organs system as final cause of death which is the usual fatal route all deaths happen at last. The fact that almost a quarter of the female deaths in reproductive age identified in this study couldn't be classified mainly because of poor documentation is concerning as deaths from hemorrhagic shock and acute pulmonary events leave little time for referral and intervention.

The maternal mortality ratio found in this study is lower than what is documented in Ethiopian demographic and health survey (EDHS) 2016(14) but much higher that what we are expected to achieve in sustainable development goal (SDG)-3. This might be because most of the deaths came quite late which might show the time taken to develop the severest form of the disease process and its complication that culminate their life.

In this study, we found a contribution of maternal deaths from indirect causes as witnessed in many studies (15) but much higher that what is reported in The Ethiopian EMONC final report (16). This might be due to the fact that the hospitals in this study are university or university affiliate hospitals with multidisciplinary team resulting in reception of the most critical and complicated cases. Women from non-maternity wards died of indirect causes mostly related to cardiac, pulmonary related causes and HIV. This is alarming in light of the increasing number of deliveries at institutions and the growing burden of chronic non communicable and communicable diseases necessitating focus on the management of these cases as those of direct causes. Interventions that increase detection of underlying diseases and integrating multidisciplinary care will be worth considering if the SGD 3 is to be achieve through reduction of maternal deaths from all causes.

One of the contributing factors for misreporting found in this study is the fact that majority of the maternal deaths happened outside the labor and delivery area. This shows the hospitals with multidisciplinary services will have maternal deaths mostly from indirect causes which is an important shift from the usual expectation. The fact that patients stayed reasonably long from admission to the hospital to death shows the loose linkage among respective departments including the ICU might be due resources limitation like ICU beds; especially from adult emergency.

In this study, most direct causes are due to preeclampsia/Eclampsia rather than postpartum hemorrhage. this might be due to the fact that most cases might have severe hemorrhage where by the chances of women reaching the health facilities alive is less. These deaths are mostly reported as " death on arrival" with poor documentation without mentioning the cause of death.

In this study, most mothers had surgical interventions to deliver or terminate pregnancy and this might imply the gap in hospital care which has failed to identity those cases in a timely fashion for a timely intervention to avoid death. Though the study has a good power as a result of the large sample size, but suffers from the retrospective nature of the study which limits identification of the causes of death. The fact that maternal deaths are classified based on the clinical diagnosis rather that autopsy and our inability to classify about 23% of the female deaths is the main limitation of the study.

Conclusion

The IMMPACT RAPID Tool used in this study, identifies all female deaths in the studied health facilities. Maternal death reporting is underestimated as indirect maternal deaths were not captured either in the HMIS or in the MPDSR at Hospitals in Addis Ababa. In addition, maternal deaths outside the labor and delivery units were misreported. Preeclampsia/ Eclampsia, postpartum hemorrhage, puerperal sepsis and abortions contribute significantly to direct maternal deaths while cardiac diseases and HIV were the commonest causes for indirect causes. The postpartum period still remains the most critical time for both direct and indirect causes of maternal deaths. The findings from this study suggested that identifying all female deaths in reproductive age is a plausible strategy to reduce the significant misreporting of maternal deaths from hospitals. Attention and action to develop strategy for reducing Preventable causes of maternal deaths from cardiac disease and pulmonary embolism is needed.

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Competing Interest

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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