

# Facility Based Maternal Death Review at Tertiary Care Hospital: A Small Effort to Explore Hidden Facts

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## ABSTRACT

**Aim:** Maternal mortality is one of the most important indicators of quality of health care. One of the United Nations' Millennium Development Goals is to reduce the maternal mortality rate to 75% by 2015 and India is lagging behind in achieving the goal. The current study is designed to evaluate various aspect of maternal death at tertiary care centre. **Methods:** Facility based maternal death review conducted at tertiary referral centre with around 6500 deliveries a year. Observational cross sectional study was carried out from January 2010 to September 2014. A pre-structured coded Performa provided by National Rural Health Mission was used for present study. **Results:** The mean maternal mortality ratio in the study period was 203.42/100000 births. 21(35%) patients did not attended any health facilities during ante natal period. Forty six(60%) deaths occurred in the age group of 20-29 years. Out of 60 maternal deaths, 18 (30%) were primigravida and 42(70%) were multiparous. Thirty nine (65%) mothers died of direct causes in which the most common was haemorrhage in i.e. 21 (35%) Twenty one (35%) mothers died of indirect causes in which 7(11.66%) mothers died because of anaemia. **Conclusion:** Maternal deaths were higher in reproductive age group i.e. between 20-29 yrs and more in multiparous as compared to primigravida. Among the direct causes haemorrhage and among the indirect causes anaemia was the most common cause contributing to maternal deaths.

**KEY WORDS:** Maternal Mortality Ratio, Facility Based Maternal Death Review, Haemorrhage, Anaemia.

## INTRODUCTION

Maternal mortality is a direct indicator of the quality of health care services provided in community. It has large variations among different countries, different region and even in different institutes which are reflecting the type of maternal care provided and health status of the community.

Yet for all this public health and medical advances, according to the most recent (2013) census 2,89,000 women still die each year because of consequences of pregnancy and childbirth[1]. An estimated more than 10 million women suffer serious maternal morbidities, including debilitating and socially devastating conditions such as uterine prolapse and obstetric fistulae [1]. It is a major developmental concern because maternal morbidity and mortality occurs in their most productive years (age-group of 15-45). Majority of maternal deaths occur in the developing world among the poorest and most disadvantaged women [2]. Haemorrhage, hypertension, sepsis, unsafe abortion and obstructed labour are estimated to cause 80% of the world's maternal deaths [3]. The two targets for assessing progress in improving maternal health (MDG 5) are reducing the maternal mortality ratio (MMR) by three quarters between 1990 and 2015, and achieving universal access to reproductive health by 2015[4]. The WHO states, at the country level, the two countries that accounted for one third of all global maternal deaths are India at 17% (50 000) and Nigeria at 14% (40 000)

[5]. India's projected goal is to reduce the maternal mortality ratio from 437 per 100,000 live births to 109[6]. The WHO reports that India's maternal mortality ratio for 2008 is at 230, while making progress the country is not on track to meet its goal in 2015[5]. In 1998, the main causes of maternal death in rural India were anaemia, bleeding in pregnancy and puerperium, abortion, eclampsia and toxemia, puerperal sepsis, obstructed labour[7]. Maternal mortality has either direct or indirect causes. Deaths due to direct causes are still the leading cause of maternal mortality resulting in 82.09% of total deaths [8]. Hypertensive disorders, haemorrhage, and sepsis are the top three direct causes of maternal mortality [8]. Anaemia is the leading indirect cause for maternal deaths in India [9].

There was no hospital based study available in the recent years in our territory so the current study was designated to evaluate various aspects of maternal death at tertiary care centre – Surat Municipal Institute of Medical Education and Research (SMIMER), Surat.

## MATERIALS AND METHODS

The observational cross sectional study was conducted from January 2010 to September 2014 with an average of 6500 deliveries per year. SMIMER is the tertiary care centre and referral unit. It gets referrals from rural areas, community health centres, primary health centres,

corporation maternity hospital, private nursing homes and a large number of patients come from urban slums. All the registered, emergency and unregistered pregnant women who admitted into the hospital and died were included in the study. No autopsy was performed because of various social problems and due to refusal from the patient's relatives. A pre-structured coded Performa provided by National Rural Health Mission was used for present study [10]. Death which occurred in the department and those patients who were transferred to other departments and died there due to some pregnancy related or aggravated conditions were included in this study. It should be once again stressed that as the causes of maternal deaths vary from place to place so this study may not give accurate information pertaining to the state of affairs.

In this study, we have followed the definition of maternal mortality as has been suggested by the international federation of Obstetrics and Gynaecology (FIGO, 1976) which states that "The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes."

Facility-based maternal death review [11] is defined as in-depth investigation of the causes and associated factors in maternal deaths that occur in health facilities. It entails interviews of health personnel who attended to the deceased. It can also be extended to interviews of family members who accompanied the deceased. The review is nonjudgmental to encourage the cooperation of the health workers involved. It provides information for improving obstetric care.

### The causes of maternal death are divided into

1. Direct obstetrics cause is defined as maternal deaths resulting from obstetric complications of the pregnant state (pregnancy, labour, and the puerperium), from interventions, omissions or incorrect treatment, or from a chain of events resulting from any of the above [12].

2. Indirect obstetrics cause is defined as maternal deaths resulting from previous existing disease or disease that developed during pregnancy and that was not due to direct obstetric causes but was aggravated by the physiological effects of pregnancy [13].

The maternal mortality ratio is expressed as a number of maternal deaths per 100,000 live births [12]. Strict confidentiality of the data is maintained. Ethical Approval was taken from the Institutional Ethics Sub-Committee of Surat Municipal Institute of Medical Education and Research.

## RESULTS

The mean maternal mortality ratio in the study period was 203.42/100000 births. Among the total number patients

who were expired in this hospital during the study period, 49 were unregistered whereas 11 were registered in the antenatal clinic in SMIMER. 30 (50%) patient came first time in SMIMER in emergency, 19 (31.7%) patients were referred from other health facilities where as (11) 18.3% patients were registered in SMIMER. 21 (35%) patients did not attend any health facilities during ante natal period. 26 (43.33%) patients attended less than 3 ante natal visits where as 13 (21.67%) attended > 3 ante natal visits. 46 (60%) deaths occurred in the age group of 20-29. There were 10 deaths after 30 years of age and 4 patients were below 20 years of age.

Among the patients of who expired, only 18 patients were primiparous while 42 i.e. 70% were multigravida. A patient in the study was 7th gravida with HB- 4 gm %. She died immediately post partum due to cardiac failure. Another was 6th gravida, she also died because of severe anaemia. 3rd patient was 5th gravida, she was delivered at home and came to hospital in moribund condition due to Post Partum Haemorrhage. Among 3 cases of ruptured uterus two were grand multiparous.

As shown in Table 1, In this study also out of 10 patients of Post Partum Haemorrhage, 4 patients had no risk factors. Of all 8 cases of eclampsia, 6 died of acute pulmonary oedema and cardio respiratory arrest, 1 patient died of intracranial haemorrhage and one patient had HELLP syndrome.

**Table 1.** Causes of maternal death

CAUSE	PATIENTS (n=60)	PERCENTAGE
[A] DIRECT CAUSES	39	65 %
1. HAEMORRHAGE	21	35 %
- POSTPARTUM HAEMORRHAGE	10	16.66 %
- ANTEPARTUM HAEMORRHAGE	5	8.33 %
- RUPTURED UTERUS	3	5 %
- INVERSION UTERUS	1	1.66 %
- RETAINED PLACENTA	1	1.66 %
- POST ABORTAL BLEEDING	1	1.66 %
2. ECLAMPSIA	8	13.33 %
3. SEPTICEMIA	6	10 %
4. AMNIOTIC FLUID EMBOLISM	1	1.66 %
5. DIC	3	5 %
[B] INDIRECT CAUSES	21	35 %
1. SEVERE ANAEMIA	7	11.16 %
2. JAUNDICE	6	10 %
3. MALARIA	2	3.33 %
4. MEDICAL CONDITION	4	6.66 %
- EISSENMENGER'S SYNDROME	1	1.66 %
- MITRAL STENOSIS	1	1.66 %
- TB MENINGITIS	1	1.66 %
- PULMONARY KOCH'S	1	1.66 %
5. DENGUE HAEMORRHAGIC FEVER	2	3.33 %

In this study 6 patients died due to septicaemia. Out of which 4 were emergency patients. All these 4 patients were from lower socio economic class with poor antenatal care, were manipulated by untrained dais, existence of risk factors like anaemia and unaware of importance of hygiene during pregnancy. 5th patient was known case of sickle cell disease with severe pregnancy induced hypertension. The patients with sickle cell disease are already immune-compromised. In spite of giving higher antibiotics and all aseptic precautions, she developed septicaemia. 6th patient had undergone obstetrics hysterectomy because of placenta accereta. Post operatively she was put onto ventilator support. After few days of ventilator support, she developed ventilator associated pneumonia and ultimately died due to septicaemia. There is significantly less number of patients who are died of sepsis because of standard aseptic precautions, use of higher antibiotics and availability of good infrastructure facilities.

In the study 3 out of 7 anaemic patients were died shortly after delivery. This is because just after delivery due to cardiac load is suddenly increase as the blood in the uterine circulation is squeezed in the general circulation immediately after delivery which puts undue strain on the weak heart already compromised by hypoxia. One patient was expired due to lack of blood. Another one patient died in labour before delivery while other patient with severe anaemia delivered at home and come to the hospital in moribund condition. One patient died after 3 days of delivery due to sudden breathlessness and pulmonary edema. This patient had an associated severe pre eclampsia. (Table 1)

## DISCUSSION

Maternal mortality is an index of reproductive health of the society. High incidence of maternal deaths reflects poor quality of maternal services, late referral, low socioeconomic status of the community and preference for non-institutional delivery. The mean Maternal mortality ratio in the study period was 203.42/100000 births. The current maternal mortality ratio (MMR) in India is 178/100,000 live births [14]. Various studies done in India in the last 15 years have shown wide variation in MMR ranging from 47/100000 to 625/100000 births [15-19]. The comparatively high MMR in this study could be due to the fact, that SMIMER hospital is a tertiary care hospital and receives a lot of complicated referrals from rural areas of southern Gujarat and Maharashtra at a very late stage. Among these referral patients most are cured but the patients reached in moribund condition or in the state of irreversible shock could not be survived.

Maternal mortality ratio(MMR) was 178 according to Sample Registration System (2010-2012)[14] and MMR was 212 according to Sample Registration System (2007-2009) [20]. Similar study was done at Manipal university, Karnataka during year 2005-2010 and MMR was 335[21]. Another

study done at Rewa, Madhya Pradesh found average MMR during study period was 555[9]. MMR of above all studies are comparable except arpita et al because that study was carried out in S.S Medical College, Rewa, Madhya Pradesh. This hospital is solace for majority of poor rural women. Women of rural areas lack awareness about antenatal care. Although blood transfusion facility exists, may not rise to occasion due to unwillingness to donate blood. Too many, too frequent, too early child bearing and too late referral were the major contributory factors [9].

Low death rate in registered patients highlights the importance of antenatal care in reducing maternal mortality. Maternal death was less in patients who took regular Ante Natal Care which can provide chance to catch disease like anaemia, early detection of severe pregnancy induced hypertension. Causes like post partum haemorrhage, amniotic fluid embolism and other indirect causes like malaria and jaundice could not be prevented although we can identify high risk factors and thus reduces the risks. Pregnant women with proper antenatal care were aware of the benefits of Tetanus Toxoid immunization, proper dietary intake, Iron Folic Acid tablets consumption and danger signs of pregnancy [22]. Awareness among pregnant women helps for a better prognostic outcome of childbirth. Patients not taking ANC visits are usually not aware of danger signs for which they need urgent medical help. Even they are not counselled to deliver the baby at a health institution or by a Skilled Birth Attendant. Women who are told about danger signs during pregnancy and early signs of impending labour are better prepared both psychologically and financially during delivery.

Maximum number of deaths occurred in the age group of 20-29 because most of the patients in our setup conceive during 20-30 years of age [23]. Prevalence of severe anaemia, PPH, placenta previa and ruptured uterus are more common in grand multiparous, whereas eclampsia and toxemia of the pregnancy were common among the primiparous patients. In the present study the numbers of deaths between multiparous patients were more than in primiparous which is comparable to the studies of the other researchers [9, 21, 24]. Parity has been analysed, it has a great influence on maternal death. Due to desire for male child creates the problems of increasing parity. Repeated pregnancies at small intervals lead to ill health of the mother as she has no time to regain her pre-pregnancy health and becomes anaemic and unfit for the next pregnancy.

Direct causes like haemorrhage, eclampsia, sepsis are major events that leads to maternal death. Other studies supports the finding that maximum number of deaths are due to haemorrhage[9,24,25] except the study done in Karnataka[21] in which maximum deaths occurred due to sepsis because at the time of their study H1N1 infection was prevalent in that area. H1N1 infection symptoms are subtle to start with, but they progress rapidly to acute respiratory

distress syndrome (ARDS). Studies have shown that most of women who die of post partum haemorrhage (PPH) do not have risk factors, hence all women should be considered at risk for PPH[26]. Deaths from the eclampsia are comparable with other studies[9,24,25].

Among the indirect causes anaemia remains the main culprit. This finding is also supported by other studies done at Rewa[9] and Maharashtra[24]. Indirect causes like jaundice, malaria and dengue haemorrhagic fever affected less number of patient but they are also avoidable. These indirect factors were also seen in study done in Karnataka [21]. Though the patients were less in number who died because of indirect causes but findings were consistent over the large geographic area.

## CONCLUSION

Maternal deaths were higher in reproductive age group i.e. between 20-29 yrs and more in multiparous as compared to primigravida. Among the direct causes haemorrhage and eclampsia and among the indirect causes anaemia was the most common cause contributing to maternal deaths.

## REFERENCES

1. Maternal death due to pregnancy and related complication: recent estimates. Available at: <http://www.who.int/features/qa/12/en/>. [Access date: 12.07.2015].
2. Maternal mortality. World Health Organization. Available at: <http://www.who.int/mediacentre/factsheets/fs348/en/>. [Access date: 12.07.2015].
3. Maternal Deaths Worldwide Drop By Third. Available at: [http://www.who.int/mediacentre/news/releases/2010/maternal\\_mortality\\_20100915/en/index.htm](http://www.who.int/mediacentre/news/releases/2010/maternal_mortality_20100915/en/index.htm). Accessed on July 21st 2015.
4. The Millennium Development Goals Report 2009. Available at: [http://www.un.org/millenniumgoals/pdf/MDG\\_Report\\_2009\\_ENG.pdf](http://www.un.org/millenniumgoals/pdf/MDG_Report_2009_ENG.pdf). [Access date: 12.07.2015].
5. Progress towards Millennium Development Goals 4 and 5. Available at: [http://www.who.int/pmnch/topics/part\\_publications/progress\\_towards\\_mdg.pdf](http://www.who.int/pmnch/topics/part_publications/progress_towards_mdg.pdf). [Access date: 12.07.2015].
6. Government of India (GOI). National health profile of India 2010. New Delhi, 2010.
7. George A. Persistence of High Maternal Mortality in Koppal District, Karnataka, India: Observed Service Delivery Constraints. *Reproductive Health Matters*. 2007;15(30):91-102.
8. Bhattacharyya SK, Majhi AK, Seal SL, et al. Maternal mortality in India: A 20-year study from a large referral medical college hospital, West Bengal. *J Obstet Gynaecol Res*. 2008 Aug;34(4):499-503. doi: 10.1111/j.1447-0756.2008.00721.x
9. Arpita N et al: A retrospective and prospective study of maternal mortality in a rural tertiary care hospital of central india. *Indian J Community Health* 2013;25(1):16-21.
10. Facility Based Maternal Death Review Form. [http://www.pbnrh.org/docs/Annexures\\_pdf\\_mtr/Annexure-1.pdf](http://www.pbnrh.org/docs/Annexures_pdf_mtr/Annexure-1.pdf). [Access date: 12.07.2015].
11. Maternal Death Review Guidelines. Available at: <http://www.pbnrh.org/docs/mdr.pdf>. [Access date: 12.07.2015].
12. Maternal Death Review Guidebook. National Rural Health Mission. p-80.
13. Maternal Death Review Guidebook. National Rural Health Mission. p-81.
14. Special Bulletin on Maternal Mortality in India 2010-12. Sample Registration System Office of Registrar General, India. Available at: [http://www.censusindia.gov.in/vital\\_statistics/SRS\\_Bulletins/MMR\\_Bulletin-2010-12.pdf](http://www.censusindia.gov.in/vital_statistics/SRS_Bulletins/MMR_Bulletin-2010-12.pdf). [Access date: 12.07.2015].
15. International Classification of Diseases (ICD). Tenth Revision. Geneva: World Health Organization. Available at: <http://www.who.int/classifications/icd/en/>. [Access date: 21.07.2015].
16. Beyond the numbers: Reviewing maternal deaths and complications to make pregnancy safer. Geneva: World Health Organization; 2004. Available at: [http://www.who.int/maternal\\_child\\_adolescent/documents/9241591838/en/](http://www.who.int/maternal_child_adolescent/documents/9241591838/en/). [Access date: 12.07.2015].
17. Omran AR, Standley CC, Azar JE, et al. Family formation pattern and health, An international collaborative study in India, Iran, Lebanon, and Philippines and Turkey. Geneva: WHO. 1976; p561.
18. Maternal Mortality Update 2002: A Focus on Emergency Obstetric Care. United Nations Population Fund (UNFPA). Available at: [http://www.unfpa.org/sites/default/files/pub-pdf/mmupdate-2002\\_eng.pdf](http://www.unfpa.org/sites/default/files/pub-pdf/mmupdate-2002_eng.pdf) [Access date: 21.07.2015].
19. New Delhi: Government Press; 1994. National child survival and safe motherhood programme, MCH Division, Department of Family Welfare, Ministry of Health and Family Welfare, Government of India.
20. Special Bulletin on Maternal Mortality In India 2007-09. Sample Registration System Office of Registrar General, India. Available at: [http://censusindia.gov.in/Vital\\_Statistics/SRS\\_Bulletins/Final-MMR%20Bulletin-2007-09\\_070711.pdf](http://censusindia.gov.in/Vital_Statistics/SRS_Bulletins/Final-MMR%20Bulletin-2007-09_070711.pdf) [Access date: 12.07.2015].
21. Mundkur A, Rai L. Prepare and prevent rather than repair and repent: Study of maternal mortality in tertiary care hospital. *Int J Med Public Health* 2013;3:163-7.
22. Bavarva N, Patel PB, Bansal RK. Utilization of Maternal Care Services in Urban area: Still an Issue of Modern World. *Ntl J of Community Med* 2015; 6(2):125-129.
23. Patel P, Bavarva N, Patel M. Sociodemographic and obstetrical factors associated with low birth weight: Community based retrospective study in an urban slum of Western India. *Appl Med Res*. 2015; 1(3): 94-98.
24. Murthy BK, Murthy MB, Prabhu PM. Maternal Mortality in a Tertiary Care Hospital: A 10-year Review. *International Journal of Preventive Medicine*. 2013;4(1):105-109.
25. Paul B, Mohapatra B, Kar K. Maternal Deaths in a Tertiary Health Care Centre of Odisha: An In-depth Study Supplemented by Verbal Autopsy. *Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine*. 2011;36(3):213-216. doi:10.4103/0970-0218.86523.
26. Kumar S. Reducing maternal mortality in India: Policy, equity, and quality issues. *Indian J Public Health*. 2010;54(2):57-64.

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