

Research Article

Maternal Mortality at a Teaching Hospital of Rural India: A Retrospective Study

Ratan Das*, Soumya Biswas and Amitava Mukherjee

Department of Obstetrics and Gynaecology, Malda Medical College and Hospital, Malda, West Bengal, India

***Correspondence Info:**

Dr. Ratan Das,
RMO cum clinical tutor,
Department of Obstetrics and Gynaecology,
Malda Medical College and Hospital, Malda, West Bengal, India.
E-mail: ranta1982@gmail.com

Abstract

Introduction: Pregnancy, although being considered a physiological state, carries risk of serious maternal morbidity and at times death. This is due to various complications that may occur during pregnancy, labour or thereafter. Maternal death has serious implications on the family, the society and the nation. Maternal Mortality Ratio (MMR) is a very sensitive index that reflects the quality of health care provided by the country to the women population.

Objectives: To assess the maternal mortality ratio and the causes of maternal death over a period of five years at a tertiary care teaching hospital of rural India.

Methods: A retrospective hospital based study of 256 maternal deaths over a period of 5 years from January 2008 to December 2012. The information regarding demographic profile and reproductive parameters were collected and results were analyzed by using percentage and proportion.

Results: Over the study period, there were 52413 deliveries, giving a MMR of 518.48 per 1,00,000 live births. The leading direct cause (81.64%) was Eclampsia (43.75%), while indirect (18.35%) leading cause was heart disease (6.64%). Most of the women (60.92%) died within 12 hours of admission suggesting majority patients reach the tertiary care hospital quite late. The age group of below 25 years (67.17%), primigravida (63.28%) and unbooked cases (89.84%) were mainly affected.

Conclusions: Most maternal deaths are preventable by optimum antenatal, intranatal and postnatal care. Early referral, quick and well equipped transport facilities and promotion of overall safe motherhood is essential to reduce maternal deaths.

Keywords: Maternal mortality, eclampsia, post partum hemorrhage, heart disease, rural India

1. Introduction

Maternal mortality is defined as the death of any woman while being pregnant or within 42 completed days of termination of pregnancy, irrespective of the duration or site of pregnancy, from any cause related to or aggravated by pregnancy, but not from accidental or incidental causes^{1,2}. Maternal mortality is a ratio, and it is expressed internationally as maternal death rate per 1,00,000 live births. Maternal mortality is an index to judge the health care provided by a country to the women population. It also reflects the educational and socio-economic state of a country as well as public health consciousness. Between 1990 and 2010, maternal mortality worldwide dropped by almost 50% but still it is unacceptably high. Almost all maternal deaths (99%) occur in developing countries^{1,2}. India is among those countries, which has a very high maternal mortality ratio. Currently, it is estimated to be 212 per 1,00,000 live births, which is far above the desired goal of 100 per 1,00,000 live births as per the objectives of Millennium Development Goals (MDG)^{1,2}. The high number of maternal deaths in some areas reflects inequities in access to health services, and highlights the gap between rich and poor. Pregnancy, although being considered a normal physiological state, carries serious risk of morbidity and at times death. Maternal death has serious implications to the family, the society and the nation. It deprives the surviving infant of mother's care. One of the most important goals of the MDGs is to reduce the maternal mortality. The Government of India is committed to tackling the appalling health statistics of the rural poor, and of the scheduled caste and tribal peoples, which significantly contribute to the global mortality rates of mothers and children under the age of 5 years³. Hence, this present study was conducted to review the existing maternal mortality ratio and the causes of maternal death at a tertiary care teaching hospital of rural India. So that, corrective steps can be taken to reach the goal within the stipulated time frame as most of the deaths are preventable.

2. Materials and Methods

This retrospective hospital based study was carried out in the Obstetrics and Gynaecology Department of Malda Medical College and Hospital, a rural tertiary level health care referral centre in West Bengal, India over a period of 5 years from January 2008 to December 2012. A total 256 maternal deaths were analysed with the special emphasis on socio-demographic profile of the patient, prenatal care, parity and cause of death. We also analysed the time interval from admission to death, trimester of pregnancy at the time of death, communication facility and delay if any in reaching the tertiary care centre from primary care centre. The ethical committee of the institute had approved the study. Results were analysed by using percentage and proportion.

3. Results

Table 1 shows year wise MMR from 2008 to 2012. It is observed from table 2 that out of total 256 deaths, 93 (36.32%) were in the age group of 19-24 years followed by 79 (30.85%) deaths in <19 years. Majority of maternal deaths (77.51%) belonged to lower class, followed by (15.50%) from the upper lower class. All the mothers who died were from rural areas. Majority (74.80%) of them were illiterate and only 15.50% had studied up to primary level.

Table 1: Year wise Maternal Mortality Rate

Year	Total Deliveries	Live Birth	Maternal Deaths	MMR/100000
2008	8614	8002	40	499
2009	9077	8536	40	468
2010	10454	9885	62	627
2011	12256	11625	54	464
2012	12012	11327	60	529

Table 2: Distribution of maternal deaths according to socio demographic characteristics (n=256)

Socio-demographic characteristics	No. of maternal deaths	Percentage
Age		
< 19	79	30.85
19-24	93	36.32
25-29	54	21.09
30-34	15	05.85
>35	15	05.85
Socio-economic status		
Upper	00	00
Upper middle	00	00
Lower middle	18	6.90
Upper lower	40	15.50
Lower	200	77.51
Education		
Illiterate	193	74.80
Primary education	40	15.50
Secondary education	25	9.68
Higher secondary education	00	00
Area of residence		
Urban	00	00
Rural	256	100

As seen from table 3, out of total 256 deaths, 162 (63.28%) were primigravidas, 85 (33.20%) were multigravidas, and 9 (3.51%) were grand multipara. Maximum deaths (89.84%) have occurred who were unbooked cases. Majority (48.82%) deaths occurred in post-partum period; followed by (30.46%) in the 3rd trimester and (11.71%) in the 2nd trimester. As observed from table 3, out of 256 deaths, 79 (30.85%) women died within 6 hour of admission and 77 (30.07%) died between 7-12 hours of admission. It is also seen from table 3 that, 62 (24.21%) women died between 13-24 hours of admission and 38 (14.84%) after 24 hours of admission.

Table 3: Distribution of maternal deaths by delivery related characteristics.

Variables	No. of maternal deaths	Percentage
Parity		
Primigravidas	162	63.28
Multigravidas (2-4)	85	33.20
Grand multi (>5)	09	3.51
Antenatal registration		
Booked	26	10.15
Unbooked	230	89.84
Stage of pregnancy at time of death		
1 st trimester	23	8.98
2 nd trimester	30	11.71
3 rd trimester	78	30.46
Post- partum	125	48.82
Abortion	15	5.85
Time interval from admission to death		
0-6 hrs	79	30.85
7-12 hrs	77	30.07
13-24 hrs	62	24.21
>24 hrs	38	14.84

As evident from Table 4, direct cause contributed to 81.64% of maternal deaths and indirect cause contributed to 18.35%. Amongst the direct causes, 43.75% were due to eclampsia. Haemorrhage and sepsis were responsible for 21.87% and 13.28% of deaths. Embolism accounted for 2.73% of the maternal deaths. Amongst the indirect causes, heart disease accounted for 6.64% of deaths and Cerebro vascular accident was responsible for 5.85% of maternal deaths. Other indirect causes were renal failure (3.12%) and anemia (2.74%).

Table 4: Causes of maternal deaths

Cause of death	No. of maternal death	Percentage
Direct cause	209	81.64
Eclampsia	112	43.75
Haemorrhage	56	21.87
Sepsis	34	13.28
Pulmonary embolism	7	2.73
Indirect cause	47	18.35
Heart disease	17	6.64
Cerebro vascular accident	15	5.85
Renal failure	8	3.12
Anaemia	7	2.74

4. Discussion

Maternal mortality is unacceptably high in developing countries including India. Death of mother is a tragic event. In practical life, it has a severe impact on the family, community and eventually, the nation. The young surviving children left motherless, are unable to cope with daily living and are at an increased risk of death. Reduction of maternal mortality is the objective of MDGs, especially in low income countries, where one in 16 women die of pregnancy related complications⁴.

Recent assessment of global statistics suggests that despite major gains, among the 75 so-called Countdown countries that have 98% of all maternal deaths and deaths among children younger than 5 years of age, only 17 are on track to reach the MDG 4 target for child mortality and only 9 are on track to reach the MDG 5 target for maternal mortality. However, estimates from the Institute for Health Metrics and Evaluation suggest that 31 countries will achieve MDG 4, 13 countries will achieve MDG 5, and only 9 countries will achieve both targets⁵.

In the present study, there were 256 maternal deaths amongst 52413 deliveries, giving a MMR of 518.48 per 1,00,000 live births, which is higher than the national averages. Malda medical college and hospital being a teaching institution and a tertiary care centre, get complicated cases from rural areas. Admissions of moribund cases referred from peripheral hospital have inflated this mortality ratio, like other teaching institutions of India. Like our study, other similar studies from tertiary care institution reported MMR ranged between 213 to 879 per 1,00,000 live births^{6,7,8}.

No discussion of global maternal, newborn, and child health is complete without addressing basic issues of social determinants⁹. Marmot notes that, according to the World Health Organization, "Social determinants of health are the conditions in which people are born, grow, live, work, and age; these circumstances are shaped by the distribution of money, power and resources at global, national, and local levels"¹⁰. In the present study, Maximum deaths (67.17%) were in the age group of below 25 years. Maternal deaths in age <19 years is 30.85% & over the age of 30 years is 11.70%. A study done by Dogra also showed similar age distribution like our study¹¹. With the prevailing custom of early marriage in rural area, majority of the women present with their pregnancy in the early age group. In the present study, out of 256 deaths, 162 (63.28%) were primigravidas and 85 (33.20%) were multigravidas. In our study 9 (3.51%) women were grand multipara. Dogra and Purandare also published similar report in their studies^{11,12}. In the current study, maximum maternal deaths occurred in primigravidas. This is because most of the eclamptic patients were primigravida and eclampsia took the highest toll of maternal deaths. Too many and too close pregnancies also adversely affect the mother's health. The incidence of unbooked cases was 89.84%. In our study, majority of maternal deaths seen in unbooked cases. High incidence of deaths among the unbooked cases has also been observed in study done by Roy *et al*¹³.

Much of the burden of maternal and child mortality and ill health is concentrated among the poorest populations in countries of sub-Saharan Africa and South Asia. In many of these countries, the highest mortality is observed among the marginalized and poor, who frequently reside in remote and rural areas with limited access to health care services⁹. A delay in accessing care can occur at three time points. This has been described as the three-delay model: the first delay refers to a woman or her family delaying the decision to seek care; the second is the delay in reaching that care; and the third is the delay in receiving care once a healthcare provider is reached¹⁴.

In the present study, 30.85% women died within 6 hours of admission and 30.07% died between 6-12 hours of admission. In our study 24.21% women died between 13-24 hours of admission and 14.84% women died after 24 hours of admission. Similar reports have also been published by Purandare in their study¹². About 60.92% deaths occurred within 12 hours of admission suggesting majority patients reach the tertiary care hospital quite late. Strengthening of both basic and comprehensive emergency obstetrics care at primary health centre level and first referral unit could possibly save many mothers lives.

In the present study, maximum deaths (48.82%) occurred in the post-partum period, followed by (30.46%) in the 3rd trimester. Similar results have also been reported by other studies^{11,12}. High numbers of deaths in post-partum period indicate the need for continuous vigilance in post-partum period and prompt action in case of problems. Intranatal care by skilled attendant, timely management and replacement of lost blood volume can reduce deaths in post-partum period. It is clear that interventions that have a relatively narrow delivery channel and separate management, such as immunizations, do achieve high coverage, whereas those that require functional health systems and facilities, such as skilled birth attendance and postnatal care, reach barely half the population in need⁹. Despite wide recognition of evidence-based interventions and the availability of information and guidelines, major gaps remain in implementation

In the present study, direct causes contributed to 81.64% of maternal deaths, of which eclampsia (43.75%) is the most Common cause. Other direct causes were haemorrhage (21.87%), sepsis (13.28%) and pulmonary embolism (2.74%). Indirect causes contributed to 18.35% maternal deaths, of which heart disease (6.64%), cerebro vascular accident (5.85%), renal failure (3.12%), and anaemia (2.74%) were the most common causes. Though eclampsia is preventable in almost all cases by good obstetrics care, it was found to be the leading cause of deaths (43.75%) in our institution. It is mainly due to high incidence of eclampsia in this area and delayed referral mostly after 12 hours of the incidence. Eclampsia, as seen in our study was found to be the leading cause of death in study done by Roy¹³.

Despite the availability of magnesium sulphate for the prophylaxis and treatment of eclamptic seizures, the rates of eclampsia and maternal complications remain very high. This is because magnesium sulphate will only prevent eclamptic seizures in women who are hospitalized with severe preeclampsia during labour and immediately postpartum. The high maternal mortality reported from the developing countries was noted primarily among patients who had multiple seizures outside the hospital and those without prenatal care^{15,16,17}. In addition, this high mortality rate could be attributed to the lack of resources and intensive care facilities needed to manage maternal complications from eclampsia. In the developing countries, most women will not be identified early, as most cases of eclampsia develop at home and/or during transport. Not surprisingly, the rate of preeclampsia and eclampsia is higher in the developing countries because of absent prenatal care and lack of access to proper hospital care.

The socioeconomic status, level of education, the quality of patients' nutrition and antenatal care of the patients in our study were very low. Lack of and/or poor prenatal care, delay in early diagnosis, progression to severe disease, delay in treatment, lack of access to hospital care, lack of access to transportation to clinic, lack of transport from clinic to hospital, lack of transport from hospital to tertiary facility, lack of well-trained staff and personal, lack of proper resources and, Intensive care unit were responsible for high maternal mortality in our study. These results are comparable with the study done by Bangal¹⁸.

Although the focus during the past decade has been on the saving of lives, it is also important to look beyond survival to issues of reducing morbidity and disability and improving long-term outcomes of relevance to human development. The close links among poverty, inequity, under nutrition, and human deprivation are well known, and all these factors have been shown to reduce the potential for human development considerably⁹. There are promising interventions that can benefit survival as well as human development¹⁹ and there is a huge public health need to integrate the two issues. Linking the agenda for maternal and child health and nutrition with the emerging issues of long-term development, human capital, and economic growth may well be the most appropriate strategy to ensure that we stay the course in solving one of the most important moral dilemmas of our times. Although the MDG target dates are in 2015, the need to keep a sustained focus on maternal and child health should remain.

5. Conclusion

The MMR in our study is higher than the national averages. Most deaths could have been avoided with the help of good antenatal, intranatal and postnatal care, early referral, quick, efficient and well equipped transport facilities, availability of adequate blood and blood components, and by promoting overall safe motherhood. To reduce the maternal mortality and morbidity the main thrust should be on implementing basic and comprehensive emergency obstetrics care. Analysis of every maternal death through maternal death audit, either at community level (verbal autopsy) or at the institutional level should be carried out. It will help in identifying the actual cause of maternal deaths and deficiencies in health care delivery system that might contribute in formulating preventive measures to reduce pregnancy related deaths.

References

1. Countdown to 2015 for maternal, newborn and child survival: accountability for maternal, newborn and child survival. Geneva: Who Health Organisation, 2013 (http://www.countdown2015mnch.org/documents/2013Report/Countdown_2013-Updates_noprofiles.pdf).
2. Trends in maternal mortality: 1990-2010— estimates developed by WHO, UNICEF, UNFPA and the World Bank. 2012. (<http://www.unfpa.org/public/home/publications/pid/10728>).
3. World Health Organization & Unicef. Countdown to 2015 Decade Report (2000–2010): Taking Stock of Maternal, Newborn and Child Survival. Geneva: WHO and UNICEF, 2010 [http://www.childinfo.org/files/countdownReport_2000-2010.pdf] Accessed 17 August 2011.
4. Gurina NA, Vangen S, Forsen L, Sundby J. Maternal mortality in St. Petersburg, Russian Federation. *Bull World Health Organization*. 2006; 84: 283-9.
5. Lozano R, Wang H, Foreman KJ *et al*. Progress towards Millennium Development goals 4 and 5 on maternal and child mortality: an updated systematic analysis. *Lancet*. 2011; 378:1139-1165.
6. Pal A, Rai P, Hazara S, Mondal T K. Review of changing trends in Maternal Mortality in rural medical College in West Bengal. *J. Obstet Gynaecol India*. 2005; 55: 521-525.
7. Purandare N, Singh A, Upadhya S, *et al*. Maternal mortality at a referral centre: a five year study. *J obstet Gynaecol India*. 2007; 57(3):248-50.
8. Verma A, Minhas S, Sood A. A study of Maternal Mortality. *J. Obstet Gynaecol India*. 2008; 58: 226-229.
9. Bhutta Z A, Black R E. Global Maternal, Newborn, and Child Health—So Near and Yet So Far. *N Engl J Med*. 2013; 369:2226-2235.
10. Marmot M. Closing the health gap in a generation: the work of the Commission on Social Determinants of Health and its recommendations. *Glob Health Promot*. 2009; 16(Suppl 1):23-27.
11. Dogra P, Gupta K B. A study of maternal mortality at a tertiary institute. *Obs. and Gynae. Today*. 2009; 115: 58-60.
12. Purandare N, Singh A, Upadhyae S, Saraogi R M. Maternal Mortality at a referral centre: a five year study. *J. Obstet Gynaecol India*. 2007; 57: 248-250
13. Roy S, Singh A, Pandey A, Roy H, Roy S, Roy S. Maternal Mortality in Apex Hospital of Bihar. *J. Obstet Gynecol Ind*. 2002; 52: 100-104.
14. Mullick SS, Serle E. Achieving millennium development goals 4 and 5: a snapshot of life in rural India BJOG 211; 118 (Suppl. 2):104-107.
15. Goldenberg RL, McClure EM, MacGuire ER, *et al*. Lessons for low-income regions following the reduction in hypertension-related maternal mortality in high-income countries. *Int J Gynecol Obstet*. 2011; 113:91- 95.
16. Danso KA, Opare-Addo HS. Challenges associated with hypertensive disease during pregnancy in low-income countries. *Int J Gynecol Obstet*. 2010; 110:78-81.
17. Dasari P, Habeebullah S. Maternal mortality due to hypertensive disorders of pregnancy in a tertiary care center in Southern India. *Int J Gynaecol Obstet*. 2010; 110:271-273.
18. Bangal VB, Giri PA, Garg R. Maternal Mortality at a Tertiary Care Teaching Hospital of Rural India: A Retrospective Study. *Int J Biol Med Res*. 2011; 2(4): 1043 – 1046.
19. Engle PL, Fernald LC, Alderman H, *et al*. Strategies for reducing inequalities and improving developmental outcomes for young children in low-income and middle-income countries. *Lancet* 2011; 378:1339-1353.