

Maternal Mortality Rate and its causes– Changing trends in Kolkata, India

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ABSTRACT

Background: Maternal mortality is a reflection of the healthcare provided to a woman by its society. It is tragic that deaths occur during the natural process of child birth which is mostly preventable.

Aim: To analyze the trends of maternal mortality rate (MMR) and its causes in a tertiary care hospital in Kolkata, India.

Methods: Study design: Retrospective study. Data source: Records of maternal deaths from 1989-1991; and from 2006-2008. Maternal mortality rates and causes of death were analyzed and compared.

Results: The MMR rate came down from 1051 to 494.33 (change of 47%) over a span of seventeen years, while the causative factors did not change their rank orders.

Conclusion: Credit for declining trend of MMR may be attributed to improving skills of health workers, adopting improved standards for the management of pregnancy and childbirth at different levels of health care system.

Key words: maternal mortality, Millennium Development Goal, ICD-10

INTRODUCTION

World Health Organization (WHO)'s 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) defines maternal mortality as "the death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes".¹ Every year, approximately 358,000 women die from complications of pregnancy and childbirth worldwide. Sub-Saharan Africa and South Asia accounted for 87% of global maternal deaths.²

India is one of the countries with a high maternal mortality ratio (MMR) and the highest (136,000) estimated number of maternal deaths.³ The main causes of maternal mortality in India are hemorrhage, sepsis, abortion, hypertensive disorders, and obstructed labor.⁴ MMR for India was 407 by Sample registration system (SRS) 1997 estimate and came down to 301 per 100,000 live births by SRS 2003 estimate. Going by this pace we would achieve the MMR of 195 by the year 2012 and of 160 by 2015, far from the NRHM goal of 100 per 100,000 live births by 2012 or Millennium Development Goal of 109 per 100,000 live births by 2015.⁴

Maternal mortality is ascribed usually to complications that generally occur during or around labor and cannot be accurately predicted. The major causes of maternal mortality are mostly preventable through regular ante natal check up, proper diagnosis, and management of labor complications.⁵

This study is an attempt to collect the distribution and magnitude of the burden of MMR in our population; and to identify the etiological factors. This research will also add to the existing data that are essential to the planning, implementation and evaluation of services for the prevention, control and treatment of the disease burden amongst the mothers.

MATERIAL AND METHODS

Study population and design: The present study was conducted in the department of obstetrics, Medical College Kolkata. Hospital records of all the maternal deaths from 1989-1991; and from 2006-2008 were collected. The total numbers of live births during the corresponding period were also collected. The causes of death ascribed for the maternal deaths were recorded from the copies of the cause of death certificate attached, and were confirmed through cross checking the details recorded in the case files. We then analyzed the data to look for the trends of MMR between the two periods, and observed the possible variations in the pattern of modalities.

To analyze the causes of maternal deaths, WHO criteria were followed for the purpose of this study. Accordingly, causes were classified as direct (hemorrhage, preeclampsia/ eclampsia, sepsis, unsafe abortion and obstructed labor) and indirect (anemia, jaundice, heart disease, pulmonary embolism, other medical causes, and HIV/AIDS).

RESULTS

The total number of maternal deaths in the year 2006, 2007 and 2008 were 62, 59 and 45, corresponding to the total number of live births of 9898, 11705 and 12735 respectively (Table 1). The calculated MMR for the above period was 626, 504 and 353 with mean being 494.33. During the year 1989 to 1991 the total number of maternal deaths was 76, 92 and 86 respectively with the corresponding number of live births of 7538, 7529 and 7681. Hence the MMR during this period was 915, 1089, 1041; with a mean of 1051. Therefore, the observed decline in the MMR over a span of seventeen years was from 1051 to 494.33 (47%).

Table 1: Maternal mortality rate

YEAR	NO. OF DEATH	NO. OF LIVE BIRTH	MMR	YEAR	NO. OF DEATH	NO. OF LIVE BIRTH	MMR
1989	76	7538	915	2006	62	9878	626
1990	92	7529	1089	2007	59	11705	504
1991	86	7681	1041	2008	45	12735	353

Table 2: Causes of maternal mortality

CAUSES	1989		1990		1991		2006		2007		2008			
	No	%	No	%	No	%	No	%	No	%	No	%		
DIRECT														
Hemorrhage	25	32.89	21	22.82	15	17.44	61	19	30.64	16	27.11	13	28.88	48
Preeclampsia/Eclampsia	15	19.73	33	35.86	30	34.88	78	12	19.35	16	27.11	13	28.88	41
Sepsis	05	6.58	07	7.61	02	2.32	14	03	4.83	02	3.38	02	4.44	8
Unsafe abortion	04	5.26	02	2.17	05	5.81	11	09	14.51	04	6.77	02	4.44	15
Obstructed labor	0	0	03	3.26	0	0	3	0	0	01	1.69	0	0	1
INDIRECT														
Anemia	04	5.26	03	3.26	09	10.46	16	05	8.06	03	5.08	03	6.66	11
Jaundice	14	18.42	15	16.34	18	20.93	47	11	17.74	06	10.16	05	11.10	22
Heart disease	02	2.63	02	2.17	03	3.48	7	02	3.22	07	11.86	05	11.10	14
Other medical causes	03	3.97	03	3.26	02	2.32	8	0	0	02	3.38	0	0	2
HIV/AIDS	0	0	0	0	0	0	0	0	0	01	1.69	0	0	1
Pulmonary embolism	04	5.26	03	3.26	02	2.32	9	01	1.61	01	1.69	01	2.22	3

Analysis of the causes of maternal death (Table-2) showed that during 2006-2008, the direct causes accounted for 66-69% of the maternal deaths while the indirect causes shared a percentage of 30-33.

Retrospectively, analysis of the data during 1989, 1990, and 1991 reflected that the contribution of direct causes ranged from 60-71%, and indirect causes ranged from 28-39.5%. Amongst the individual causes of maternal deaths, hemorrhage and eclampsia took the major share throughout the entire study period with a mean being 26.6% for hemorrhage and 27.63% for preeclampsia/eclampsia. The next important cause was jaundice for which the mean figure was 15.78%. Unsafe abortion contributed to 6.49% and anemia accounted for 6.46% of maternal deaths. Pulmonary embolism has remained almost constant at 2.72% while one death has been reported due to AIDS in 2007.

DISCUSSION

The revised Millennium Development Goal framework agreed by the United Nation General Assembly has set a target for maternal health under section 5A as 'reduction of the MMR by three quarters between 1990 and 2015'.⁶ The recommended indicators to reflect this improvement are MMR and the proportion of births attended by skilled health personnel. Meeting Millennium Development Goal- 5 has become a challenging task worldwide.

Our results showed a 47% decline in MMR over last 17 years. The results are more or less comparable to rates from tertiary care hospitals in

South Asian countries or developed countries.⁶ However, Berg *et al.*, in the United States reported the MMR as low as 10.3 in 1991 and 12.9 in 1997 per 100,000 live births; whereas, in similar studies

conducted in Ethiopia and Pakistan, MMR was reported as high as 9.6 to 12.7/1000 live births.^{5,6,7}

Many possible factors either alone or in combination may be the stakeholders for such a variation. The tertiary care hospitals, regrettably, receives usually complicated and referred cases, sometimes, the patients are admitted only during the terminal stages of their illness. This may be the reason for such a high reporting of MMR in our setup. However, the overall decline of MMR over the observed period may be attributed to various factors like substantial investment in midwifery training by the central as well as the state government, free case supportive health and family planning services like free sterilization camp, judicious utilization of Family Planning methods, Manual Vacuum Aspiration training for safe abortion, and Janani Surakshya Yojna, etc.

In our study, two third of maternal deaths were attributed to direct causes. Hemorrhage and preeclampsia/eclampsia were responsible for 50% of total deaths. Although the absolute number has come down over a period of 17 years, the percentage of share of causative factors remained unchanged. These findings are more or less consistent with the causes of maternal deaths observed in different Indian studies.^{8,9,10}

Anemia and jaundice took the major share among the indirect causes of death. Anemia which is very much prevalent in our country is responsible for

indirect as well as the direct causes of deaths from cardiac failure, hemorrhage, infections and preeclampsia. This alone accounts for almost 40-60% of maternal deaths in non-industrialized countries.¹¹

Amongst the indirect causes of death, a new addition has come up in 2007 i.e. death of a mother with terminal AIDS. As the prevalence is going up, we can expect increase number of such deaths in coming years.

CONCLUSION

The hospital-based maternal mortality figures do not reflect the true picture in the community. But it provides a more thorough assessment of the underlying cause of death and contributing factors that are useful in planning various strategies or interventions at various levels. It is concluded that majority of the maternal deaths can be averted by proper and timely intervention of 3E's i.e., emergency obstetric care, early risk screening and efficient obstetric services.

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REFERENCES

1. World Health Organization. International Statistical Classification of Diseases and Related Health Problems. Tenth Revision, Vol. 1: Tabular list, Vol. 2: Instruction manual. Geneva; 1992.
2. World Health Organization. Trends in Maternal Mortality: 1990 to 2008 Estimates developed by WHO, UNICEF, UNFPA and The World Bank. Geneva; 2010.
3. Maternal Mortality in 2000, Estimates developed by WHO. Geneva: UNICEF and UNFPA; 2004. World Health Organization.
4. Govt. of India (Sample Registration System), Maternal Mortality in India: 1997.2003, Trends, Causes and Risk Factors, Registrar General, India, New Delhi in collaboration with Centre for Global Health Research, Toronto.
5. Begum S, Aziz-un-Nisa, Begum I. Analysis of maternal mortality in a tertiary care hospital to determine causes and preventable factors. *J Ayub Med Coll Abbottabad*. 2003;15(2):49-52.
6. Maternal and Newborn Health where we stand, Edited by Patricia Moccia, The state of the World's Children 2009, New York, UNICEF, December 2008:1-24.
7. Berg CJ, Chang J, Callaghan WM, Whitehead SJ. Pregnancy related mortality in the United States, 1991-1997. *Obstet Gynecol*. 2003;101(2):289-96.
8. Jadav AJ, Rote PG. Maternal mortality- changing trends. *J Obstet Gynecol India*. 2007;57(5):398-400.
9. Verma A, Minhas S, Sood A. A study on maternal mortality. *J Obstet Gynecol India*. 2008;58(3):226-229.
10. Pal A, Ray P, Hazra S, Mondal TK. Review of changing trends in maternal mortality in a rural medical college in West Bengal, *J Obstet Gynecol India*. 2005;55(6): 521-524.
11. Sharma JB. Nutritional anemia during pregnancy in nonindustrialised countries. Edited by John Studd; Progress in Obstetrics & Gynecology, London, Elsevier, 2008; Vol 15:103-122.