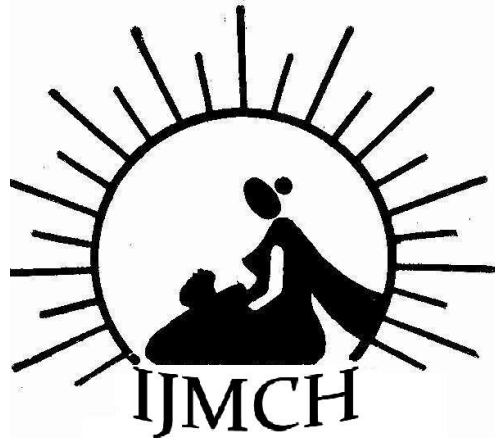


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– The Lessons Learnt

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Trends of Maternal Mortality in a Secondary Care Centre – The Lessons

Learnt

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ABSTRACT

Objectives: To find out the trends in MMR and differences of the factors influencing maternal mortality, for planning strategies to reduce maternal mortality in a rural community based secondary care centre in WB.

Methods: A retrospective analysis of all maternal deaths was carried out from hospital records over a period of two years in 1993-1994 and another two years in 2008-2009. Data was analyzed separately with respect to maternal factors, socio-demographic factors and causes of death.

Results: MMR in 1993-94 was 1090/100000 LB and 2008-09 was 508/100000 LB. Direct obstetric deaths comprised about 80% of all deaths similar in both the study periods. Maternal deaths due to higher age groups of ≥ 26 years, high parity of ≥ 4 & unbooked cases were comparatively more frequent with statistical significance in earlier study period. The prime killer in earlier period was eclampsia and the latter period was haemorrhage (51.98% vs. 21.05% and 15.89% vs. 40% in the two study periods respectively), a statistically significant finding.

Conclusion: Though there has been 50% reduction in MMR it is still high. Improvement of socio-demographic factors, better communication and transport system, prevention early detection and prompt management of complications with necessary improvements in infrastructure are needed.

KEY WORDS: *Maternal mortality, Maternal mortality ratio (MMR)*

INTRODUCTION

Maternal mortality is an index of effectiveness of obstetric services prevailing in any country. Prevention of maternal deaths is one of our foremost goals to provide safety to motherhood, to avoid loss to the family, society and the nation. It was estimated that about 1, 00,000 mothers die every year in India making up 20% of all maternal deaths in the world.⁽¹⁾

In order to reduce maternal mortality and to implement safe motherhood programme, the first task is to identify the causes which are multiple and interrelated. The aims and objective of the present study was

- i. To find out the trends in MMR and differences of the factors influencing maternal mortality,
- ii. For planning strategies to reduce maternal mortality in a rural community based secondary care centre in WB.

MATERIALS AND METHODS

Matri Sadan Berhampore District Hospital, a 170 bedded maternity unit catering to both urban and wide rural belts of the district of Murshidabad and adjoining areas of surrounding districts, is a secondary care referral hospital with annual deliveries ranging from 18000-20000 and abortion ranging from 2000-4000 annually. A retrospective observational study of all maternal deaths was carried out from hospital records over a period of two years from 1st January 1993 to 31st December 1994 and another period of two years from 1st January 2008 to 31st December 2009. All the deaths were analyzed with regards to age, parity, socio-economic status, antenatal care, hospital stay and obstetric factors of deaths. All the data were compiled and analyzed. Statistical tests were done with Epi info version 3.2 software. The other National and Global reports were reviewed and strategies and measures suggested.

RESULTS

During the study period of 1993-1994 there were 27710 live births with 302 maternal deaths compared to the study period of 2008-2009 where the figures were 37400 live births with 190 maternal deaths, the MMR being 1090 and 508 per 1,00,000 thousand live births respectively.

As shown in Table I, in the 1993-1994 period 80% of maternal deaths were in women \leq 25 years and 30% in $>$ 25 years compared to 91% and 9% of 2008-2009 period respectively. In the earlier study period 84% of deaths were in parity \leq 3 and 16% in parity $>$ 3 compared to 93% and 7% in 2008-2009 period respectively. Of the total number of deaths 85% of 1993-94 period and 68% of 2008-09 period were un booked. Of the total deaths pregnancy of less than 12 weeks were found in 8.27% of deaths in 1993 -1994 and 19.46% of deaths in 2008-09 study periods. Home delivery related maternal deaths were found in 40% v/s 14.73% of total deaths in the two study periods respectively.

Table I: Distribution of cases of maternal deaths in relation to maternal factors

Maternal Factors	1993-1994 (n = 302)		2008-2009 (n = 190)	
	No	%	No	%
• Age in years				
≤ 20	114	37.7%	88	46.3%
21-25	128	42.38%	84	44.2%
26-30	45	14.90%	16	8.42%
31-35	12	3.97%	2	1.05%
≥36	3	0.99%	0	0
• Parity				
1	142	47.0%	98	51.57%
2	80	26.5%	50	26.3%
3	34	11.25%	28	14.73%
4	26	8.6%	8	4.21%
≥5	22	7.28%	6	3.15%
• Residence				
Rural	254	84.10%	152	80%
Urban slum	36	11.92%	30	15.78%
Urban	12	4%	8	4.27%
• Religion				
Hindu	54	18%	45	23.68%
Muslim	236	78%	137	72.10%
Christian	12	3.97%	8	4.21%
• SE status				
Low	242	80.13%	140	73.68%
Middle	54	17.88%	40	21.05%
High	6	1.98%	10	5.26%
• Antenatal care				
Booked	45	14.90%	61	32.10%
Unbooked	257	85.10%	129	67.89%
• Education				
Illiterate	145	48.01%	73	38.42%
Primary	81	26.82%	31	16.31%
Secondary	67	22.18%	68	35.78%
> XII	9	2.98%	18	9.47%

Major causes of death were hemorrhage, eclampsia, and sepsis, obstructed labor - rupture uterus and anemia, Severe pre-eclampsia and eclampsia was the commonest cause of death (51.98% of all maternal deaths) in the earlier study period whilst hemorrhage was the commonest cause (40%) in the latter period

Table II: Distribution of cases of maternal deaths according to causes

Causes	1993-1994 (n = 302)		2008-2009 (n = 190)	
	No	%	No	%
• Direct	249	82.45	154	81.05
Hemorrhage	48	15.89	76	40
Severe pre-eclampsia-eclampsia	157	51.98	40	21.05
Sepsis	24	7.95	24	12.63
Obstructed labour- rupture uterus	3			
	17	6.62	14	7.36
• Indirect	44	14.56	28	14.73
Severe anemia	25	8.27	10	5.26
Infective hepatitis	5	1.65	4	2.10
Heart disease	5	1.65	2	1.05
Thromboembolism	6	1.98	0	0
Pulmonary TB	3	0.99	6	3.15
Malaria	-	-	2	1.05
Epilepsy	-	-	2	1.05
Acute gastroenteritis	-	-	2	1.05
• Anesthetic deaths	9	2.98	8	4.20

Table III: Obstetric Outcome and Maternal mortality

Causes	1993-1994 (n = 302)		2008-2009 (n = 190)	
	No	%	No	%
• Undelivered	21	6.95	11	5.78
• Spontaneous vaginal delivery	188	62.25	83	43.68
• Forceps	18	5.96	15	7.89
• Destructive operation	10	3.31	7	3.68
• Cesarean section	25	8.27	26	13.68
• Laparotomy (rupture uterus)	15	4.96	11	5.78
• Ectopic	2	0.66	3	1.57
• Abortion	23	7.61	34	17.89

In both the study periods PPH was the commonest cause of hemorrhagic death (9.27% and 18.9% of total maternal deaths in the two study periods respectively) whilst ante partum eclampsia accounted for the majority of eclampsia deaths (84% and 82% of all eclampsia deaths respectively).

Table III shows the obstetric outcome and maternal mortality. Table IV shows the time of death. Deaths during puerperium including postoperative puerperal deaths were commoner than ante partum and intra partum deaths. Table V shows the time interval between admission and death. Death occurred within 24 hours in 65.23% and 75.78% in the two study periods respectively. The remaining deaths occurred mostly between 1 to 7 days.

Table IV: Time of maternal death

Time	1993-1994 (n = 302)		2008-2009 (n = 190)	
	No	%	No	%
• Antenatal	11	3.64	5	2.63
• Intranatal	10	3.31	6	3.15
• Puerperal	216	71.52	105	55.26
• Postoperative	42	13.90	40	21.05
• Postabortal	23	7.61	34	17.89

Table V: Time Interval between admission and death

Time	1993-1994 (n = 302)		2008-2009 (n = 190)	
	No	%	No	%
• < 24 hours	197	65.23	144	75.78
• 1-7 days	93	30.79	46	24.21
• 8-30 days	6	1.98	0	0

DISCUSSION

Maternal mortality varies from region to region, country to country, even province to province. MMR in India is still quite high compared to developed countries.⁽¹⁾ Hemorrhage, Pre-eclampsia- Eclampsia, Sepsis, Obstructed labor - Rupture uterus are the important killers while anaemia and infective hepatitis are important indirect causes of maternal death.⁽²⁾ This is also the observation in the present study. Severe Pre-eclampsia and Eclampsia accounted for 51.98% of all maternal deaths in 1993-94 study period, higher than 19.7% to 32.0% observed in some Indian studies.^(3,4,5) This is due to low socio-economic status, improper antenatal care, lack of awareness, rudimentary transport services and delayed treatment in severe complications. The 2008-2009 study period has shown Eclamptic deaths comprising 21.05% of maternal deaths – the reasons of lowered incidence compared to the earlier period being improvement in all the responsible factors along with use of Magnesium sulphate in all the eclampsia cases compared to Chlorpromazine & Promethazine used in the earlier period.

Death due to hemorrhage is a leading cause of maternal mortality. The incidence of hemorrhagic death of 15.89% and 40.0% in the study periods of 1993-1994 and 2008-09

respectively is similar to a few Indian studies^(3,6) (of 24.6% to 31.9%). The higher incidence of hemorrhage being the cause of maternal deaths reflects the dismal picture of anemia, malnutrition, poor transport, delayed decision making and overall lack of availability of blood and inadequate blood bank facilities in the rural set up. Hemorrhagic death comprised 48 out of total 302 deaths in 1993-94 period and 76 out of 190 deaths in 2008-09 period. Lower figure in 1993-94 period is due to the fact that some cases had both eclampsia and haemorrhage contributing to death but eclampsia was the predominant factor and thus not included in the hemorrhagic group. Increase in the incidence of hemorrhagic death in the 2008-09 period is also due to actual reduction in the incidence of eclamptic deaths associated with persistence of factors responsible for hemorrhagic deaths. PPH was the major killer in the hemorrhagic death group, being 9.27% and 18.9% of all maternal deaths in the two study periods respectively.

Sepsis was responsible for 7.95% and 12.63% of all maternal deaths in the two study periods, similar to 12.9% to 20.9% of some studies^(3, 4, 6, 7.). Illegal abortion, improper asepsis, poor sense of hygiene, malnutrition and home delivery with puerperal sepsis are the responsible factors.

Severe anemia is responsible for 8.27% of maternal deaths of 1993-94 period and 5.26% of 2008-09 period, similar to the study of Majhi *et al.*⁽²⁾ This incidence is actually the 'tip of the iceberg' about anemia because anemia is an underlying or aggravating factor for death due to many other causes like hemorrhage, sepsis, pre-eclampsia, eclampsia. The contribution of anemia is found to be high in some of the reported series⁽⁸⁾ (28.87% reported by Spare and Johnson 1999).

The contribution of infective hepatitis to maternal death is low in this series (1.65% and 2.10% in the two study periods) similar to that of Patil *et al.*⁽⁶⁾ but is as high as 22% in some of the reported series of India.⁽⁹⁾

The trend of maternal mortality between the study periods showed statistically significant reduction in the incidence of death in > 25 years [$p = 0.027$], in high parity of ≥ 4 [$p = 0.46$] and unbooked cases [$p = 0.0045$] significant reduction of eclampsia and increased incidence of haemorrhage as the cause of maternal death [$p = 0.00$].

Maternal mortality has diminished significantly from 1090 per 1, 00,000 live births of 1993-94 period to 508/1, 00,000 live births of 2008-09. Lower parity, wider community participation, increased awareness, wider access to health care facilities with Emergency Obstetric Care (EOC) facility, universal use of Magnesium Sulphate in Eclampsia and better transport system played a great role in lowering MMR. Inadequate blood bank facilities and non availability of blood in dire emergencies and risky anesthesia in terminally ill pregnant mothers contributed to still noteworthy mortality due to hemorrhage and anesthesia related deaths in the two study periods.

CONCLUSIONS

1. The present study shows more than 50% reduction in MMR during an interval of 15 years.

Direct obstetric deaths still account for more than 80% of maternal mortality in the rural population based secondary care centre with hemorrhage, pre-eclampsia – eclampsia, sepsis, obstructed labor – rupture uterus being the major killers. Maternal deaths due to higher age group of > 25 years, high parity of > 3 and un booked cases

was frequent with statistical significance in the earlier study periods. The prime killer was eclampsia in earlier period (51.98% vs. 21.05%) but hemorrhage was the commonest cause in the latter period (15.89% vs. 40% of all maternal deaths respectively).

Better outcome in eclampsia was due to universal use of Magnesium sulphate, increased awareness as well as comparatively wider community participation & gradually improving transport & EOC facilities.

Inadequate blood bank facilities and non availability of blood in dire emergencies as well as anesthetic hazards in moribund cases are hindering further reduction of maternal deaths. Transport facilities, EOC facilities and community awareness are still inadequate influencing prevailing scenario of maternal deaths.

2. Further reduction of MMR should be targeted by adopting the following measures –
 - i) Raising community awareness and education particularly education of women and their empowerment
 - ii) Improving access to quality health care including adolescent health care through ICDS, antenatal care, family welfare and contraceptive services and wider availability of emergency obstetric care (EOC) by establishing a network of first referral units (FRUs) with adequate blood transfusion, anesthesia and operative service facilities
 - iii) component separation and their used in appropriate cases instead of whole blood transfusion to manage the crisis of scarcity of blood to some extent, at the same time providing necessary facilities to all blood banks in this direction
 - iv) Liberal distribution of Iron, Folic acid, ensuring proper coverage with Tetanus Toxoid and emphasizing on the use of Magnesium sulphate to severe PIH and eclampsia cases even at health centre level;
 - v) Emphasizing on Institutional delivery by skilled birth attendants, maintenance of strict asepsis in all obstetric interventions and prompt referral of high risk cases to appropriate care centre.
 - vi) Better road condition and round the clock transport facility
 - vii) political will and increasing fund allocation in health budget. Proper implementation of the measures need combined commitment and coordinated efforts of the community, health professionals and political system.

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