

## Original Research Article

# An analysis of trends in maternal mortality at a tertiary care teaching hospital of Western Rajasthan, India: a four year retrospective study

Neha Agrawal\*, Sandeep Kumar Uppadhaya, Afzal Hakim, Manish Mittal

Department of Community Medicine, Dr. S. N. Medical College, Jodhpur, Rajasthan, India

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### \*Correspondence:

Dr. Neha Agrawal,

E-mail: [nehaagrawal.live@gmail.com](mailto:nehaagrawal.live@gmail.com)

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## ABSTRACT

**Background:** Maternal mortality reflects not only the adequacy of health care services of any country or state but also the standard of living and socio-economic status of the community. India is among those countries, which has a very high maternal mortality ratio; the state of Rajasthan having the third highest maternal mortality in the country. This study was done to assess the maternal mortality in a tertiary hospital situated in Jodhpur, a city in Western Rajasthan where large numbers of patients are referred from rural parts in and around the city.

**Methods:** This study was done to assess the trends in maternal mortality at a tertiary medical college hospital situated in Western Rajasthan. A retrospective hospital based study was carried out in the Obstetrics and Gynaecology Department of Ummaid hospital, Dr S. N. Medical College situated in Jodhpur, Rajasthan, India over a period of 4 years from July 2010 to June 2014.

**Results:** During the study period spanning 4 years, there were in total 84,746 live births with 195 maternal deaths. The mean maternal mortality ratio for the four year period was found to be 230.1 per lakh live births.

**Conclusions:** The maternal mortality was quite high than the national average.

**Keywords:** Antenatal care, Direct & indirect cause, Hospital stay, MMR

## 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.<sup>1</sup> Maternal mortality reflects not only the adequacy of health care services of any country or state but also the standard of living and socio-economic status of the community. Among the Indian states, Rajasthan has one of the highest Maternal Mortality Ratio after Assam & Uttar Pradesh with a MMR of 244 per lakh live births (SRS 2011-13).<sup>2</sup> Although Rajasthan has been able to bring down the maternal deaths in the recent years but

still it falls far behind the national average of 167 per lakh live births<sup>2</sup> and has a lot of ground to cover to achieve the national socio-demographic goal of 100 per lakh live birth.<sup>1</sup>

Jodhpur, the second largest city of Rajasthan, has one of the highest maternal mortality in the state (222 per lakh live birth, according to AHS 2012-13), where 11.4% females get married before the legal age of 18 and 73.2% females in the age group 18-59 years are anaemic.<sup>3</sup>

This study was done to assess the maternal mortality in a tertiary medical college hospital situated in western Rajasthan where large numbers of patients are referred

from rural parts in and around Jodhpur. Aims and objectives of the present study were:

- To calculate the maternal mortality ratio in our hospital
- To assess the causes of maternal mortality

## METHODS

### *Study design and area*

The hospital based retrospective study was carried out in Ummiad Maternal & Child Hospital; a Tertiary Government Hospital affiliated to Dr. S.N. Medical College, Jodhpur.

### *Sampling*

Case records of all 195 maternal deaths occurring in the Ummiad Maternal & Child Hospital, Jodhpur between July 2010 and June 2014 were studied in detail.

### *Study tool and technique*

Prior to the study permission was taken from the Principal and the Superintendent of the Ummiad Hospital, Jodhpur. A pre-designed and modified proforma was the major tool of the study to assess the maternal deaths. This proforma included information regarding age, residence, parity, antenatal booking, timing of death, duration of hospital stay and cause of death. IPD Case records of all maternal deaths were taken from Medical Record department of the hospital and various variables were studied. MMR was calculated as the number of deaths occurring during pregnancy or 6 weeks thereafter, of any cause related to or aggravated by pregnancy, but excluding any coincidental causes, per one lakh live births in the same year.<sup>1</sup>

$$\text{MMR} = \frac{\text{Total no of maternal deaths} \times 100000}{\text{Total no of live births}}$$

Mean maternal mortality ratio for the study period was calculated by calculating the mean of yearly MMR of the entire study period.

### *Analysis of data*

Data thus collected was entered and analysed using Microsoft Excel Sheet Version 2010.

## RESULTS

During the 4 year study period spanning from July 2010 to June 2014 there were in total 84,746 live births with 195 maternal deaths. The mean maternal mortality ratio for the four year period was found to be 230.1 per lakh live birth. The maternal mortality was found to have declined from the year 2010 (373.37/lakh) to the year

2014 (227.11/lakh); with variations in the between years. Year wise distribution of maternal deaths has been shown in Table 1.

**Table 1: Year wise distribution of the maternal deaths.**

Year	No of live births	No. of maternal deaths	MMR
July'10-Dec'10	11249	42	373.37
2011	16164	35	216.53
2012	22424	38	169.46
2013	23461	54	230.17
Upto June'14	11448	26	227.11
Total MMR	84746	195	230.1

Mortality was found to be higher in young mothers (20-25 years) with 47.18% maternal deaths in this age group followed by 21.54% deaths in 25-35 year olds. Majority (89.23%) of the deaths were in mothers belonging to rural areas and were unbooked pregnancies (86.15%). Mortality was higher in mothers pregnant with their second or third child (35.9%) followed by primigravidas (33.85%). Only 14.87% mothers stayed alive for more than 48 hours. 3.08% of the maternal deaths occurred within an hour of hospital admission, 22.05% within 1-6 hours, 20% within 6-12 hours, 17.95% within 12-24 hours and 22.05% within 24-48 hours.

Only 12.82% of the mothers condition was normal on admission, while in majority of the mothers their condition was poor (30.77%) to very poor (37.95%). Majority (77.95%) of the maternal deaths occurred postnatally followed by 14.87% maternal deaths in the third trimester of their pregnancy. Maternal deaths during the first and second trimester accounted for only 3.08% and 4.10% of the maternal deaths. Majority (52.82%) of the maternal deaths were referred patients while the rest (47.18%) had directly come to this tertiary centre.

Only 40.51% of the mothers delivered a live child before their untimely demise, of the rest 34.36% were IUD's, 3.08% were still births and the remaining either did not deliver (17.95%) or were cases of complicated abortion (3.59%).

The epidemiological characteristic of the study group mothers and their hospital stay duration is represented in Table 2 and 3.

Obstetrical or direct causes were the major (74.36%) culprit behind these deaths as depicted in Table 4. Haemorrhage (both ante & postpartum), PIH and sepsis were the major direct causes responsible for the maternal deaths, accounting for 62.56% of the deaths.

Indirect causes were responsible for 25.64% of the deaths. Anaemia was the main (40%) indirect cause behind the maternal deaths followed by embolism (28%;

pulmonary and amniotic fluid embolism both). Heart diseases were responsible for 10% of the deaths due to indirect causes while 22% deaths were due to causes such as Fulminant malaria, Tubercular meningitis, Swine flu, HIV and Blood transfusion reaction.

**Table 2: Distribution of maternal deaths according to their socio-demographical and obstetrical characteristics.**

Patient characteristics	Classification	No of cases	Percentage
Age	15-20	24	12.31
	20-25	92	47.18
	25-30	42	21.54
	30-35	25	12.82
	>35	12	6.15
Parity	Primi	66	33.85
	G2-G3	70	35.9
	>3	59	30.25
Residence	Urban	21	10.77
	Rural	174	89.23
Antenatal status	Booked	27	13.85
	Un-booked	168	86.15
Stage of pregnancy	1 <sup>st</sup> trimester	6	3.08
	2 <sup>nd</sup> trimester	8	4.10
	3 <sup>rd</sup> trimester	29	14.87
	Postpartum/postnatal	152	77.95
Referral status	Referred	103	52.82
	Not Referred	92	47.18
Condition At admission	Normal	25	12.82
	Average	36	18.46
	Poor	60	30.77
	Very Poor	74	37.95
Pregnancy outcome	Live Birth	79	40.51
	Still Birth	6	3.08
	IUD	67	34.36
	Abortion	7	3.59
	Undelivered	35	17.95
Timing of death of delivered patients	<24 hours	100	51.28
	Less than a week	47	24.10
	More than a week	5	2.56

**Table 3: Distribution of maternal deaths according to their duration of hospital stay.**

Duration of hospital stay	No of maternal deaths	Percentage
<1hour	6	3.08
1-6hour	43	22.05
6-12 hour	39	20
12-24hour	35	17.95
24-48hours	43	22.05
>48hours	29	14.87
Total	195	100

**Table 4: Distribution of maternal deaths according to their cause.**

Cause of maternal death	No of maternal deaths	Percentage
<b>Direct cause</b>	<b>145</b>	<b>74.36</b>
Haemorrhage (APH, PPH)	65	44.83
PIH	43	29.66
Obstructed Labour, Rupture Uterus	11	7.59
Abortion complications	5	3.45
Sepsis	14	9.66
Others	7	4.83
<b>Indirect cause</b>	<b>50</b>	<b>25.64</b>
Embolism	14	28
S. Anemia	20	40
Heart disease	5	10
Others	11	22

## DISCUSSION

Maternal death has serious implications not only on the family, but on the society and nation too. A high incidence of maternal deaths reflects poor quality of maternal services, late referral and low socioeconomic status of the community. The mean mortality ratio in the present study was 230.1 per lakh live birth. This ratio though higher than the current national MMR of 167/100000 live birth<sup>2</sup>, is comparable to the MMR of Rajasthan state reported to be 244/ lakh live births by SRS 2011-13 and also to that of Jodhpur city itself reported as 222/lakh live births according to AHS 2012-13.<sup>2,3</sup>

Various studies in India, done in tertiary care hospitals too have reported a very high Maternal Mortality ratio.<sup>4-8</sup> The reason for such high MMR could be that a tertiary care hospital receives a lot of complicated referrals from rural areas and that too at a very late stage. This is reflected in the current study too, as it was seen that 52.82% of maternal deaths were referred cases and most of their condition was poor (30.77%) to very poor on admission (37.95%).

In our study most of the maternal deaths were seen in the age group of 20-25 years (47.18%), multigravidas (66.15%) and mothers belonging to rural areas (89.23%) with un-booked status (86.15%). These findings are comparable to studies carried out by Bangal et al and Mootha et al which too have reported a similar outcome. Although Haralkar et al, Bardale et al and Zaman et al reported a higher maternal mortality in primiparous mothers.<sup>4-8</sup>

In the present study it was observed that about three-fourth (77.95%) of the maternal deaths occurred in the postnatal period and least (3.08%) during the first trimester. This finding is mirrored by studies of Haralkar

et al (57.87%) and Zaman et al (46.58%), although the proportion is not as high as our study.<sup>6,8</sup> Majority (65.79%) of the postnatal deaths occurred within 24 hours of delivery, 30.92% of mothers died within a week into their puerperium and the rest (3.29%) survived for more than a week. This finding suggests that close monitoring is required during the puerperium period especially during the first 24-48 hours and mothers should be explained the importance of hospital stay during this period so that they can be closely monitored. Stress should also be laid on requisite number of postnatal visits, so that in case of any complication prompt intervention can be initiated.

In the current study about two-thirds (63.08%) of the maternal deaths occurred within 24 hours of hospital admission. Similarly, Zaman et al too reported a high proportion (67.1%) of maternal deaths within 24 hours of hospital admission.<sup>8</sup> Haralkar et al reported a fifty: fifty ratio while in studies by Bardale et al (44.44%) and Bangal et al (39.47%) this proportion was on the lower side.<sup>4,6,7</sup>

In the present study direct obstetrical causes were the major (74.36%) culprit behind the maternal deaths. Haemorrhage (44.83%), PIH (29.66%) and sepsis (9.66%) were the main direct causes responsible for the maternal deaths. Studies by Mootha et al (62.60%) and Haralkar et al (72.68%) too reported that majority of the maternal deaths were due to direct obstetrical causes.<sup>5,6</sup> In these studies too, the triad of eclampsia, haemorrhage and sepsis were the major direct causes behind the maternal deaths. In the present study Anaemia (40%) was the most important indirect cause of maternal deaths, a finding mirrored by studies of Zaman et al (23.28%) and Haralkar et al (51.92%).<sup>6,8</sup> Bangal et al reported that direct and indirect causes had an equal contribution (50% each).<sup>4</sup>

## CONCLUSION

The maternal mortality ratio in the current study though higher than the national average, was found to be lower than the state average. Majority of maternal deaths were due to causes which can be easily prevented by providing appropriate antenatal coverage, educating mothers regarding high risk signs and timely referral to tertiary health care centres. There is also a need for strengthening the peripheral centres and educating the community regarding safe motherhood.

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## REFERENCES

1. Park K. Preventive medicine in obstetric, Paediatrics and geriatrics: Park's Text Book of Preventive and Social Medicine. 22th edition. p. 557; 493.
2. Sample Registration System. Maternal Mortality Ratio Bulletin 2011-13. Available at [http://www.censusindia.gov.in/2011-common/Sample\\_Registration\\_System.html](http://www.censusindia.gov.in/2011-common/Sample_Registration_System.html). Accessed 28 August 2016.
3. Annual Health Survey. 2011-12 Fact Sheet Rajasthan. Available at [http://www.censusindia.gov.in/vital\\_statistics/AHSBulletin/AHS\\_Factsheets\\_2011\\_12.html](http://www.censusindia.gov.in/vital_statistics/AHSBulletin/AHS_Factsheets_2011_12.html). Accessed 28 August 2016.
4. 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):1043-6.
5. Mootha S, Bathula U. Evaluation of Maternal Mortality Rate (MMR) at a High Volume Tertiary Referral Centre: What are we Missing? A Study Spanning 85,404 Live Births Over 9 Years. *IJSR*. 2013;4(1):302-4.
6. Haralkar SJ, Pore PD, Khandekar SV, Haralkar AS, Tapare. Study of Maternal Mortality At Tertiary Govt. Hospital In Solapur, Western Maharashtra. *IJMCH*. 2012;14(2):1-8.
7. Bardale RV, Dixit PG. Pregnancy-related deaths: A Three-year retrospective study. *J Indian Acad Forensic Med*. 2010;32(1):15-8.
8. Zaman S, Beguma AA. Maternal mortality at a rural medical college of Assam: a retrospective study. *J Obstet Gynaecol Barpeta*. 2014;1(1):46-51.

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