

Review of Maternal Mortality at A Tertiary Care Hospital

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Abstract

Introduction: Child birth is an important milestone in any women's life. Illness or death during or after childbirth has impacts not only on the mother and her family but has serious consequences on the nation's sociodemographic goals. Safe motherhood is considered a human rights issue. Maternal death is thus, a reflection of social disadvantage and not merely a health disadvantage.

Methods: A retrospective study was done from August 2018 to September 2019 in Pannadhyay Rajkiya Mahila Chikitsalaya Udaipur. Medical records of all maternal deaths over the chosen period were analyzed.

Result: The MMR in this study period was around 451.46/100,000 live births. Unbooked cases accounted for majority of the deaths. Most cases were referred to our tertiary care hospital. Maximum deaths occurred between 21 & 30 years of age. Anemia was widely prevalent. Most deaths were due to indirect causes, most common being sepsis which was closely followed by hypertension and haemorrhage.

Conclusion: Strengthening of peripheral centres, hiring competent staff and adequate blood bank facilities together with reference linkages must be done. Auditing the causes for maternal mortality is extremely helpful to identify preventable causes and delay.

Keywords: Maternal Mortality; Hypertension; Haemorrhage; MMR.

Introduction

Maternal death is defined as 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 neither from accidental nor incidental causes. Maternal death is expressed as maternal mortality ratio (MMR) which indicates the quality of healthcare in a country.

India once had one of the highest MMRs in the world – in 1990, it was 437 per 100,000 live births.¹ MMR is not only an indicator of maternal and infant health, but also an insight into a particular country's socioeconomic state and health system.² In 2005, the government launched the National Rural Health Mission "to provide accessible, affordable and quality health care to rural sections, especially the vulnerable populations. It did so by promoting institutional delivery and breastfeeding and providing postnatal care by integrating various conditional cash transfer schemes for pregnant and lactating women. JSY (Janani Suraksha Yojana) program was launched in the year 2005 aiming at a 100% institutional delivery rate, especially in the vulnerable sections of society. The success of the JSY scheme established building blocks for the JSSK (Janani Shishu Suraksha Karyakaram) scheme

which was launched in 2011 with free entitlements to the pregnant women, sick newborns and infants for free delivery including cesarean section and treatment in public health institution along with free transport.³

In 2015-2017, maternal deaths reduced to 122 per one lakh live births; highest being in Assam (229) and lowest in Kerala.⁴² The decline in MMR was much faster in India (4.5%) as compared to global rate (2.6%).⁴ However, India missed the millennium development goal target of 109 per 1,00,000 live births.¹ India's commitment to reduce its MMR is reflected in the National Health Policy 2017 which envisages reducing MMR to 100 by 2020.⁵ Now the Government of India is striving towards bringing down the MMR to <70/100,000 live births by 2030 as per the sustainable development goals (SDGs).

With a land area approximating 10% of India, Rajasthan is the largest state in the country. It is also the seventh most populous state of India with a total population of 68 million (Census 2011), three quarters of which live in rural areas, are illiterate and engaged in agriculture. Rajasthan, according to the latest SRS data from 2015-2017 has an MMR of 186, much above that of India as a country.¹¹

A robust Maternal Death Surveillance and Response (MDSR) is expected to be important to eliminate preventable maternal mortality and reduce the MMR. MDSR is a form of continuous surveillance that links the health information system and quality improvement processes from local to national levels. It includes routine identification, notification, quantification, and determination of causes to avoid all maternal deaths, as well as the use of this information to respond with actions that will prevent future deaths.⁶ Three approaches can be used-

- Confidential enquiry into maternal deaths (CEMD)
- Facility based death reviews
- Community based death reviews (also called verbal autopsy).⁷⁻¹⁰

In a state like Rajasthan, having a high MMR, MDSR process would reveal gaps such as lack of availability of emergency obstetrics care in facilities and gaps in timely referral.

Keeping all this in view, this study was done to analyse the MMR of our Tertiary Care Center, understand its epidemiological aspects and suggest corrective measures to reduce maternal mortality.

Aims and Objectives

1. To determine the Maternal Mortality Ratio in our tertiary care hospital for a period of one year.
2. To identify causes and related conditions leading to maternal mortality.
3. To analyse types of delay contributing to maternal death.
4. To suggest measure which can be taken up to strengthen the existing health infrastructure and protocols to reduce maternal mortality.

Materials and Methods

This is a retrospective study carried out in the department of obstetrics and Gynecology at RNT Medical College and Pannadhay Rajkiya Mahila Chikitsalaya Udaipur which is a tertiary care centre in north western India. It has an annual delivery rate of 18,000-20,000 and gets a large number of referrals from PHCs, CHCs, maternity homes as well as from hospitals and medical colleges from in and around Udaipur. The hospital runs on one ICU, one blood bank and a single emergency operation theatre round the clock to provide emergency obstetric services and critical care to their patients.

The details of all maternal deaths from August 2018 to August 2019 were collected from individual files and maternal death review forms. These forms were filled by the treating doctor and reviewed by supervising faculty. This data was analyzed with respect to the following parameters: age, parity, socioeconomic status, residence, booking status, condition on admission, prevalence of anemia, admission death interval, cause of death and type of delays were identified. Total maternal deaths were carefully studied and analyzed. Maternal mortality ratio for the study period was calculated using the formula:(Table 2-7)

All maternal deaths occurring within a reference period (usually 1 year) x 100,000

Total number of live births occurring within the reference period

Types of delay according to Maternal Death Review form is summarized as follows:

Type I delay- delay in decision to seek help

Type II delay- delay in transport due to unavailability of vehicles and delay in referral

Type III delay- delay in treatment at the institutional level

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean \pm SD and median. The data was entered in MS Excel spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

Table 1: Age Distribution.

Age Distribution	Frequency	Percentage
1) <=20	12	14.12%
2) 21-30	57	67.06%
3) 31-40	15	17.65%
4) >40	1	1.18%

Table 2: Residence.

Residence	Frequency	Percentage
Outside Udaipur	55	64.71%
Udaipur	30	35.29%

Table 3: Parity.

Parity	Frequency	Percentage
Grand Multipara	8	9.41%
Multipara	37	43.53%
Primi	40	47.06%

Table 4: Socio-economic Status.

Se Status	Frequency	Percentage
Lower	59	69.41%
Middle	26	30.59%
Upper	0	0.00%

Table 5: Booking.

Booking	Frequency	Percentage
Booked	20	23.53%
Registered	11	12.94%
Unbooked	54	63.53%

Table 6: Status on Admission.

Status on Admission	Frequency	Percentage
Good	8	9.41%
Fair	8	9.41%
Critical	38	44.71%

Table 7: Prevalence of Anemia.

Prevalence of Anemia	Frequency	Percentage
No/Mild	35	41.18%
Moderate	16	18.82%
Severe	34	40.00%

Table 8: Referral.

Referral	Frequency	Percentage
No Referral	25	29.41%
Referred	60	70.59%

Table 9: Duration of Hospital Stay.

Duration of Hospital Stay	Frequency	Percentage
< 24 Hours	50	58.82%
24-48 Hours	11	12.94%
> 48 Hours	24	28.24%

Table 10: Associated Condition.

Associated Condition	Frequency	Percentage
PIH	22	25.88%
Jaundice	13	15.29%
PPH	18	21.18%
DIC	5	5.88%
APH	6	7.06%
Creval Cancer	2	2.35%
Obesity	1	1.18%
Pulmonary Edema	4	4.71%
AKI	12	14.12%
Ectopic Preg	1	1.18%
Heart Disease	9	10.59%
IUD	7	8.24%
Septic Abortion	1	1.18%
ARDS	6	7.06%
SEPSIS	24	28.24%
Aspiration	1	1.18%
Diabetes	1	1.18%
Abortion	1	1.18%
Ruptured Ectopic	2	2.35%
Ruptured Uterus	3	3.53%
Fever	2	2.35%
Embolism	3	3.53%
ICH	1	1.18%

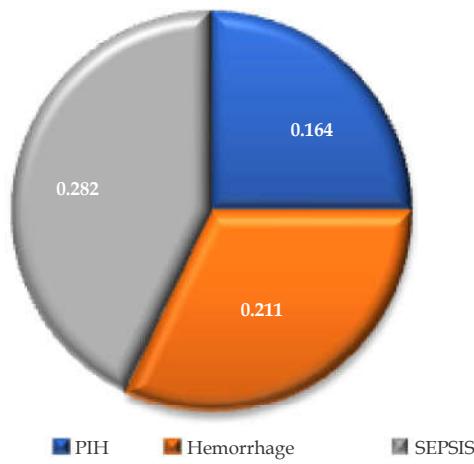


Fig. 1: Associated Condition.

Table 11: Type of Delay.

Type of Delay	Frequency	Percentage
Delay I	47	58.02%
Delay II	20	24.69%
Delay III	14	17.28%

Table 12: Delivery.

Delivery	Frequency	Percentage
FTND	43	55.13%
LSCS	25	32.05%
Undelivered	10	12.82%

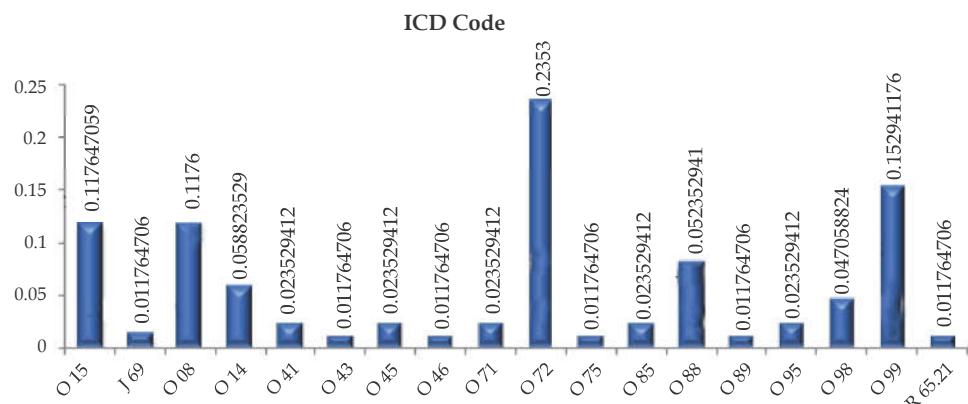
Table 13: Stage of Labor when Death Occurred

Stage of Labor when Death Occured	Frequency	Percentage
ANC	11	14.10%
PNC	67	85.90%

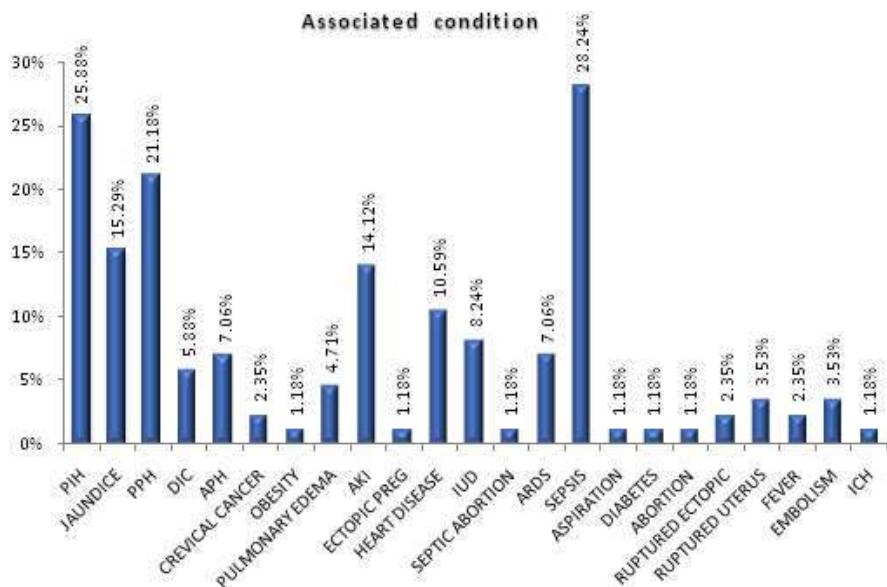
Results

In the present study there are 85 maternal deaths among 19,049 deliveries giving a maternal mortality ratio of 451.46 per 1,00,000 live births which is not just higher than the maternal mortality rate in Rajasthan state of 186 per 1,00,000 live births but also above the national average of 122.⁵

Before the introduction of JSY scheme in 2006 at this institute, the MMR reported was 488.84 and 564.50 in the year 2004 and 2005 while more than a decade later, it has been 309.51 and 328.34 in the year 2017 and 2018 respectively.(Chart 1 & 2)



Causes and maternal deaths according to WHO ICD 10 coding are shown in bar chart-1.



Frequency of associated is depicted in bar chart-2.

Discussion

India has a maternal mortality ratio of 122 per 1,00,000 live births which is considerably higher than the objective of 100 per 1,00,000 live births as per fifth millennium development goals (MDG-5)^{4,5}. Preventing maternal deaths and reducing maternal morbidity has become the maternal health priority in the developing world as most of them are preventable and can be reduced simply with skilled care by health professionals. The loss of a mother shatters a family and threatens the well being of surviving children. Evidence shows that infants whose mother dies during childbirth are more likely to die before their second birthday than infants whose mother survives.

The health care facility under study is a tertiary care referral centre and pregnant women with severe morbidly and pre existing complications are referred here for management, which explains the higher MMR in the health care unit thus creating a Hawthorn bias. Majority of the patients who presented for the first time had no antenatal care (54, 63.53%) and most of them referred (70.9%) from other public/private facilities across the state or neighbouring states (especially Madhya Pradesh having MMR of 188). Banswara (157 kms from Udaipur) closely followed by Dungarpur referred the maximum patients to our facility; most moribund referrals were found to be from Neemach, Madhya Pradesh (128 Kms from Udaipur). Most of these women presented to the

institute in a serious (36.47%) or critical condition (44.71%) often with multiple complications and died within 24 hours of admission to the hospital (58.82%). Similar results of death within 24 hours were shown in studies by Mittal et al. (45.05%) and Jadhav et al. (46.83%).^{12,13} The most common identified delay was of type I (58.02%) contributing to a higher mortality. Besides poor resources of health facilities in rural areas, women may lack awareness regarding the seriousness of issues. Women hence, must be given knowledge of risk factors pertaining to pregnancy status.

In the present study, 67.06% of the deaths were between the age group of 21-30 years. This is comparable to the findings of other researchers. The Indian tradition of early marriage and early pregnancy may be responsible for this distribution. 35.4% of women aged -24 years are married before 18 years and 6.3% of women aged 15-19 years were already mothers or pregnant at the time of NFHS-4 survey in Rajasthan.¹⁴ According to the same survey, 63% women in Rajasthan had antenatal check up in their first trimester but only 9.7% women received full ANC care.¹⁴ To give maximum benefits to pregnant women, care must be provided at the doorsteps of the community. We should always remember the importance of PNC care (85.9%) women in our study died in the PNC period) and make sure all post partum women are reviewed by a doctor, nurse or midwife within 48 hours of birth. This number is currently a mere 63.7% in our state.¹⁴

ICD Code	Title
O 15	Eclampsia
J 69	Pneumonitis due to inhalation of food and vomit
O 08	Complications following abortion and ectopic and molar pregnancy
O 14	Pregnancy induced hypertension
O 41	Disorders of amniotic fluid including chorioamnionitis
O 43	Placental disorders
O 45	Abruptio placenta
O 46	Antepartum haemorrhage not elsewhere classified
O 71	Other obstetric trauma
O 72	Postpartum hemorrhage
O 75	Other complications of Labor not elsewhere classified
O 85	Puerperal sepsis
O 88	Other puerperal infections
O 89	Complications of anesthesia
O 95	Obstetric death of unspecified cause
O 98	Maternal infectious and parasitic diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium
O 99	Other maternal diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium
R 65	Systemic inflammatory response syndrome (SIRS)

Majority of maternal deaths occurred in lower socioeconomic status (69.41%). Poverty and illiteracy are the major determinants of poor health seeking behaviour and are major serious risk factors for maternal mortality. Delayed referral, poor transport facilities, underutilized health facilities and poor socioeconomic status are responsible for the high MMR.

In our study 47.06% women were primigravidae closely followed by 43% women being multigravidae. However, most of the similar conducted researchers have found higher mortality among multigravida women. According to the maternal depletion hypothesis, a close succession of pregnancies and periods of lactation worsens the mother's nutritional status because there is not adequate time for the mother to recover from the physiological stresses of the preceding pregnancy before she becomes subject to the stresses of her next pregnancy.

In Rajasthan, close to half of the women (46.6%) suffer from anemia during pregnancy.¹⁴ 1 in 5 maternal deaths is attributed to anemia and in our study, 40% women presented with severe anemia (Hb <7) on admission.

In our study, more than half of the maternal deaths were due to direct obstetric causes: hypertensive disorders (25.88%), pregnancy related sepsis (30.59%), hemorrhage (28.24%) and abortion (1.18%). A study done by Mittal et al. reported

28.02% women dying of eclampsia and pre eclampsia however, their loss due to hemorrhage and sepsis was much lower (12.36% and 20.87%).

In this study, the most common cause of death was sepsis closely followed by hemorrhage. As per WHO nearly 75% of all maternal deaths are due to severe bleeding usually after childbirth, infections, high blood pressure during pregnancy, complications from delivery and unsafe abortions.¹⁵

In our study, 44.71% maternal deaths were attributed to medical conditions. Heart disease, kidney disease, ARDS, neoplasm attributed to 10.59%, 14.12%, 12.95% and 2.35% respectively. These rates are much higher compared to those of other studies by Mittal et al. (25.5%) and khandale et al. (20.6%).^{12,13}(Graph 10)

Conclusion

Most of the maternal deaths in the present study were observed in women from rural areas who were less educated with no antenatal coverage and belonged to lower socioeconomic status.

Maternal death is an avoidable tragedy and most of the causative factors can be prevented to a larger extent, only if antenatal women seek and receive good antenatal care, are sensitised about family planning, identify complications early and are timely referred to an appropriate facility.

From this study, we conclude that the following measures may help reduce the national MMR to achieve the desired MMR of <70 by 2030.

1. Ensuring 100% antenatal coverage.
2. Dietary supplementation, oral iron supplementation for correction of anemia. Injectable iron is now also available.
3. Early identification and management of pre eclampsia.
4. Promoting institutional deliveries.
5. Provision of safe abortion services.
6. Continuous vigilance in postpartum period and prompt action in case of problems.
7. Promotion of family planning services and spacing of births.
8. Treatment of medical conditions, e.g., hypertension, diabetes, cancer, jaundice.
9. Strengthening existing Emergency Obstetric Care (EmOC) facilitates by training and up graduation of medical and paramedical staff and improving infrastructure facilities including blood storage facility.
10. Maternal death surveillance and audit.
11. Appropriate referral linkages with stress on early referral, easy transport and with adequate life support measures.
12. Direct interaction between bereaved relatives with the district administration in the presence of healthcare providers. This mechanism provides an accountability which will prevent maternal deaths from the delays identified.

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