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Original Research Article

## Maternal mortality assessment in a tertiary care hospital in Uttar Pradesh, India

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### ABSTRACT

**Background:** Objective of this study was to calculate the maternal mortality rate in our hospital and to assess the epidemiological aspects and causes of maternal mortality to further analyse ways to reduce the maternal mortality rate (MMR).

**Methods:** This was a retrospective analytical study done in the department of obstetrics and gynecology, MLN Medical College and District Women Hospital, Prayagraj over a time period of 10 years i.e., October 2009 to October 2019. Retrospective analysis and evaluation of the medical records and statistics was done to find out and collect specific causes of maternal deaths in the give time period.

**Results:** There were 357 maternal deaths from October 2009 to October 2019. Maternal mortality rate in the study was calculated to be 498.42 per 1 lakh live births. Maximum deaths were in 21-30 years age group with multipara, unbooked and illiterate cases. Majority of the deaths reported were from direct causes of maternal mortality i.e., hemorrhage, hypertensive disorders and sepsis.

**Conclusions:** In the selected hospitals, the mean maternal mortality rate in the study period was 498.42/100000 births. 71.4% had direct cause and 21.56% had indirect cause of maternal mortality several factors like regular antenatal visits, early identification of high-risk cases, timely referral, institutional deliveries, adequate post-partum care and follow-up can contribute to decrease the maternal mortality rate effectively.

**Keywords:** Causes of maternal mortality, Epidemiology, Maternal mortality rate

### INTRODUCTION

Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to pregnancy and not from accidental causes.<sup>1</sup> There is reduction in maternal mortality globally. One-fifth of the global burden of absolute maternal deaths is in India.<sup>2</sup> There is 44% fall of world's MMR in 25 years. 216 maternal deaths per lakh live birth in 2015 from 385 in 1990 showed 2.3% fall annually.<sup>3</sup> Extensive efforts to reduce maternal mortality are made in India, however, the progress is uneven. High rate of maternal mortality is still

in Uttar Pradesh and Rajasthan compared to Kerala and Tamil Nadu.

The three delays: delay in seeking care, delay in reaching care and delay in receiving adequate and appropriate care inhibit women from receiving appropriate maternal health care.

Delays in seeking care comprise of the decisions made by the pregnant women or other decision-making individuals. Decision-making individuals can include the woman's spouse and family members.<sup>4</sup> It is due to lack of knowledge about when to seek care, inability to afford

health care, and women needing permission from family members.

Delays in reaching care are due to limitations in transportation to a medical facility, lack of adequate medical facilities in the area.

Delays in receiving adequate and appropriate care may be because of number of trained providers and lack of appropriate supplies.<sup>3,4</sup>

Considering the lack of studies analysing the number and cause of maternal mortality especially in Uttar Pradesh, this study was done in an attempt to mainly chalk out the trend and causes of MMR in selected hospitals with tertiary care settings with the following objectives.

#### **Aims and objectives**

1. To calculate the maternal mortality rate in our hospital.
2. To describe the epidemiological aspects and causes of maternal mortality.

#### **METHODS**

This was a retrospective analytical study conducted at department of obstetrics and gynecology, MLN Medical College and District Women Hospital, Prayagraj, Uttar Pradesh, India from October 2009 to October 2019.

#### **Inclusion criteria**

All maternal deaths occurring in the hospital during the period from October 2009 to October 2019 in the department of obstetrics and gynecology MLN Medical College and District Women Hospital, Prayagraj were included in the study.

#### **Exclusion criteria**

Women that died due to life threatening conditions unrelated to pregnancy i.e., not during pregnancy or 42 days after termination of pregnancy were excluded.

Maternal mortality rate for the study period was calculated by using the formula;

$$\text{MMR} = \frac{\text{Total number of maternal death}}{\text{Total number of live births}} \times 100000$$

Sample collection was done from medical records. This was a retrospective analysis of data, from October 2009 to October 2019 in department of obstetrics and gynecology, MLN Medical College and District Women Hospital, Prayagraj, Uttar Pradesh, India. Data regarding maternal mortality was collected from maternal mortality Register and medical records were reviewed, their socio-

demographic features, mode of delivery, diagnosis on admission, surgical intervention, ICU admission, cause of death and time of death were collected.

#### **Statistical analysis**

The collected data was entered in MS Excel and descriptive analysis was performed. The data was compiled and presented in the form of tables. The results (sociodemographic features, mode of delivery and cause of death) have been expressed as percentages. The year-wise trend of maternal mortality in the selected hospitals has been depicted in a line diagram.

#### **RESULTS**

During the study period, October 2009 to October 2019, out of the total 72,819 deliveries conducted, there were a total of 71,627 live births and 357 maternal deaths that were recorded (Table 1).

**Table 1: Variables depicting the maternal outcomes of the cases investigated.**

Total number of deliveries	Total number of live births	Total number of maternal deaths
72,819	71, 627	357

The epidemiological characteristics of maternal deaths are shown in Table 2. Maximum maternal deaths, i.e., 189 (52.94%) were reported in the age group of 20 to 30 years. More deaths were reported in multiparous women 211 (59.10%) as compared to 146 (40.90%) in Primiparas, more maternal deaths were reported in women from rural areas 233 (65.27%) as compared to women from urban areas 85 (34.73%). Maximum maternal deaths were reported in unbooked patients, 287 (80.39%) as compared to booked patients 70 (19.60%). More than sixty percent (61.34%) of maternal deaths were reported in illiterate women.

According to the data collected, it was observed in this study that, 280 (71.47%) had direct cause of maternal mortality, resulting directly as a complication of pregnancy, including hemorrhage, eclampsia and pre-eclampsia, unsafe abortions and infections. 77 (21.56%) women died due to indirect causes, that is death due to a pre-existing cause not related to pregnancy like anemia, liver, cardiac and respiratory dysfunction (Table 3).

On analysis of the data recorded, as depicted in Table 4, it was observed that out of 357 maternal mortalities, there were 113 (31.65%) cases of hemorrhage, 96 (26.89%) eclampsia and pre-eclampsia and 44 (12.32%) infections, whereas 77 (21.56%) women died due to indirect causes like anemia, liver, cardiac and respiratory dysfunction. It was seen that 15 (4.20%) and 12 (3.36%) mortalities resulted from rupture uterus and ruptured ectopic pregnancy respectively.

**Table 2: Distribution based on demographic variables.**

Characteristics		Number of cases (n=357)	Percentage
Age (years)	<30	189	52.94
	>30	168	47.06
Literacy	Illiterate	219	61.34
	literate	138	38.66
Residential area	Rural	233	65.27
	Urban	85	34.73
Booked/unbooked	Booked	70	19.60
	Unbooked	287	80.39
Gravidity	Primi	146	40.90
	Multi	211	59.10

**Table 3: Distribution of patient according to the cause of death.**

Cause of maternal death	Number of patients (n=357)	Percentage
Direct causes	280	78.43
Indirect causes	77	21.56

**Table 4: Distribution of patients based on cause specific complications.**

Cause of maternal death	Number of patients (n=357)	Percentage
APH and PPH	113	31.65
Hypertensive disorder	96	26.89
Anemia	47	13.16
Infections	44	12.32
Rupture uterus	15	4.20
Rupture ectopic pregnancy	12	3.36
Liver dysfunction	12	3.36
Cardiac dysfunction	10	2.80
Respiratory dysfunction	8	2.24

**Table 5: Time interval between admission and death.**

Time between admission and death	Number of patients (n=357)	Percentage
<24 hours	247	68.27
>24 hours	110	31.73

It was observed that among 357 maternal deaths recorded, 247 (68.27%) patients expired within 24 hours of admission and 99 (31.73%) deaths were reported in anytime period after 24 hours (Table 5).

## DISCUSSION

Maternal mortality is an indicator of reproductive health of the society. High incidence of maternal deaths reflects

poor quality of maternal services, late referral and low socioeconomic status of the community. The mean Maternal mortality rate in the study period was 498.42/100000 births. The current maternal mortality ratio (MMR) in India is 122/100,000 live births.<sup>4</sup> This study has comparatively high MMR, which could be due to the fact, that our hospital is a tertiary care hospital and receives a lot of complicated referrals from rural areas of Prayagraj at a very late stage.

In this study, 52% of maternal deaths were in the age group of 20 to 29 years, as highest numbers of births are reported in this age group. Similarly, 56.66% of maternal deaths were reported in multiparous patients. More maternal deaths were reported in women from rural areas (69.16%), unbooked patients (83.33%), illiterate women (65%), and women belonging to low socioeconomic status. (83.33%) All this study findings in the study were similar to studies by Jain et al, Jadhav et al, Pal et al, and Onakewhor et al.<sup>5-8</sup>

It was observed that 71.47% of maternal deaths were due to direct causes. Hemorrhage (31.41%), eclampsia (27.56%), and sepsis (12.55%) were the major direct causes of maternal deaths. This finding was consistent with studies by Jain et al, Jadhav et al, Pal et al, Onakewhor et al, and Shah et al.<sup>5-9</sup>

Even today large number of maternal deaths is due to the classical triad of hemorrhage, sepsis, and eclampsia.<sup>10</sup> All these are preventable causes of maternal mortality provided the treatment is instituted in time. Unfortunately, in many cases, patients were referred very late, in critical condition, unaccompanied by health care worker. Most of these deaths are preventable if patients are given proper treatment at periphery and timely referred to higher centers. Training of health workers and staff nurses working in rural areas and skilled attendant at birth training gives path of hope for reducing maternal mortality.

Indirect causes accounted for 28.52% of maternal deaths in this study. Jaundice, heart disease and respiratory diseases were responsible for 2.88%, 2.56%, and 1.25%

of maternal deaths, respectively. These findings were consistent with studies by Jain et al, Jadhav et al, Pal et al and Onakewhor et al.<sup>5-8</sup>

Maternal deaths can be prevented by improving the health care facilities in rural areas by ensuring round the clock availability of facility for primary management. Most importantly, early detection of high-risk pregnancies and referring them to a tertiary center at the earliest can reduce the complications of high-risk pregnancies. National Rural Health Mission (NRHM) can also play an integral role in reducing maternal mortality by advocating and implementing institutional deliveries and timely referral of high-risk cases.

## CONCLUSION

In the selected hospitals, the mean maternal mortality rate in the study period was 498.42/100000 births. 71.4% had direct cause and 21.56% had indirect cause of maternal mortality. 68.27% of maternal mortalities occurred within 24 hours and 31.73% after 24 hours. As women have gained access to family planning and skilled birth attendance with backup emergency obstetric care, the global maternal mortality ratio has reduced significantly. Although attempts have been made in improving the status of maternal care, there is much room for improvement, particularly in under developed regions. Instituting integrated maternal health services with emphasis on primary health care and emergency obstetric care can achieve remarkable improvement in maternal and perinatal outcome.

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