



MATERNAL MORTALITY AT TERTIARY CARE CENTRE

Obstetrics & Gynaecology

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ABSTRACT

Maternal deaths in the majority of developing nations are merely the tip of the iceberg, exposing the true socioeconomic status of all women and the feminization of global poverty. Maharashtra has Maternal Mortality Ratio of 33/100000 live births. (2018-2020). Given that the majority of MMR causes are avoidable and treatable, it is possible to reduce its prevalence. **Aim:** Keeping this scenario in mind, we aimed to study maternal mortality at tertiary care centre of government of Maharashtra, with following objectives: To study various causes of maternal mortality at tertiary care centre, to assess the percentage and various causes of maternal mortality, to study socioeconomic demographic factors affecting maternal mortality and to assess preventive factors for maternal mortality in a tertiary health care centre. **Method:** We conducted a 22-month prospective observational study in a Maharashtra government tertiary care center from November 2022 to August 2024. **Results:** My research covered 17 maternal deaths. Most of these deaths occurred between 20 and 24 years old and were among illiterate, low-income rural residents. Unbooked cases had greater deaths. Second gravida mortality was slightly greater than primi or higher gravida scores. Delays in obtaining care or referral from peripheral centers caused 5 (29.41%) deaths within 6 hours. Two (11.76%) deaths occurred during ANC in our study, whereas the rest were PNC. Most patients were referred from peripheral centers: 10 (58.8%) from government and 3 (17.64%) from private. We found that pregnancy can cause pulmonary edema, the leading cause of death worsened by pre-existing preeclampsia/ eclampsia. **Conclusion:** Addressing root causes and improving health care services can minimize maternal mortality. 100% ANC care, 100% skilled assistance for every delivery, timely transport facilities, well-equipped secondary or tertiary care centers to manage complicated cases, access to essential obstetric care for complicated cases, and blood bank backup are essential to improving maternal health.

KEYWORDS

maternal mortality, maternal deaths, preeclampsia, eclampsia, hemorrhage, pulmonary edema, embolism, direct cause, indirect cause.

INTRODUCTION

Parturition is an inherent process that can become life-threatening for any patient. It is sometimes remarked that the term "normal delivery" is used in hindsight. Delivery is a transformative experience for all mothers.

Pregnancy and delivery are generally revered occasions. However, for numerous women, it is a personal torment that could potentially result in their demise. The demise of a woman due to complications during childbirth or pregnancy-related incidents is an extremely distressing ordeal.

Maternal mortality in developing countries serve as a visible indicator of the overall socioeconomic situation of women in our society.

While pregnancy is considered a natural biological state, it can cause serious maternal disease and death. This is due to physiological changes and potential issues throughout pregnancy, labor, and postpartum.

Maternal death, as defined by the International Classification of Disease (ICD-10), refers to the death of a woman during pregnancy or within 42 days after the termination of pregnancy. This definition includes deaths caused by or made worse by pregnancy or its management but excludes deaths caused by accidental or incidental factors.¹ The Maternal Mortality Ratio (MMR) is a highly responsive indicator that indicates the level of quality in the reproductive healthcare given to pregnant women.² The maternal mortality ratio refers to the number of deaths of mothers during a specific period, per 100,000 live births that occur during the same period.

The maternal mortality ratio was 2000 per 100,000 live births in 1938, 1000 in 1959, 560 in 1990, 540 in 1999, 370 in 2000, 254 in 2004-2006, 212 in 2007-2009, 190 in 2013, 130 in 2014-2016, 122 in 2015-2017, 113 in 2016-2017, 103 in 2017-2018, and 97 in 2018-2020.

Maternal mortality ratio (MMR) is the number of childbirth-related deaths per 100,000 live births. The UN's 2030 Sustainable Development Goals (SDG) put maternal mortality at 70. The Ministry of Health and Family Welfare tracks maternal mortality and stillbirth. According to the data from the Sample Registration System (SRS) published by the Registrar General of India (RGI), indicate a

consistent decrease in the Maternal Mortality Ratio (MMR) from 130 to 97 per 100,000 live births. Assam performs the most poorly among all states with 195 mortalities, while Kerala performs the most excellently with only 19 mortalities.³

India has constantly improved its performance in decreasing maternal mortality by successfully attaining its national goal of reducing the Maternal Mortality Ratio (MMR) to below 100. However, it is still falling short of the United Nations-mandated Sustainable Development Goals target, which aims for a Maternal Mortality Rate (MMR) of 70 deaths per 100,000 live births. India has a deadline of 2030 to achieve this aim, which gives them a time frame of eight years. The Registrar General of India provides a definition for the lifetime risk of maternal mortality as the likelihood that at least one woman between the ages of 15 and 49 will die as a result of childbirth or the postpartum period, assuming that the probability of death is evenly distributed throughout the entire reproductive age range. The national lifetime risk of maternal death is 0.21 percent. Madhya Pradesh has the highest lifetime risk estimate at 0.53 percent, followed by Uttar Pradesh at 0.50 percent, Assam at 0.42 percent, Bihar at 0.39 percent, and Chhattisgarh at 0.35 percent. lowest in Kerala 0.03%, followed by Maharashtra 0.06%

India has a maternal mortality rate of six, but Madhya Pradesh, Uttar Pradesh, Assam, Bihar, and Chhattisgarh had 15.3, 14.3, 12.1, 11, and 9.9, respectively. The only state with a maternal mortality rate below one is Kerala (0.9). Top-tier states Maharashtra, Telangana, Andhra Pradesh, and Tamil Nadu have risk levels of 1.8, 2.3, 2.4, and 2.7.

Poor planning of antenatal care (ANC), uncontrolled fertility, lack of access to or insufficient use of healthcare facilities, inadequate referral services, low education, poverty, ignorance, and gender discrimination resulting in the inferior social standing of women are the primary factors contributing to maternal death in India. PPH is the primary cause of maternal mortality in India, however, there is a gradual shift towards problems related to preeclampsia and eclampsia.^{6,7}

The prevalence of anemia among women aged 19 to 49 has risen from 53.1% in 2015-2016 to 57% in 2019-2021. Just 58.1% of women received a minimum of four prenatal care check-ups, and only 26% of moms ingested iron folic acid for 180 days or more during pregnancy. The percentage of births occurring in institutions nationwide has risen

from 78.9% in the period of 2014-2016 to 88.6% in the period of 2019-2021.

There is little maternal mortality research at Indian tertiary care hospitals. Reducing maternal mortality at a tertiary care institution can benefit the country's future and the MMR. This study examined the tertiary care facility maternal mortality ratio, impact of sociodemographic factors on maternal death, identify reasons and find preventative measures to minimize mother mortality.

In the future, tertiary care maternal mortality research can be supported by references and proof. Knowing tertiary hospital maternal mortality statistics is always beneficial.

MATERIALAND METHOD

Type: Prospective Study

Duration: 22 months, November 2022 to August 2024

Place: The Government Hospital of Tertiary Care Centre was chosen as it is the most visited and very well-known for teaching institute especially for high quality, most advanced surgical treatments and for convenience.

Inclusion criteria: All Maternal deaths of patients who have died due to direct or indirect obstetric causes but less than one year after termination of pregnancy in this study period and at this study setting of tertiary care center of the government of Maharashtra are included.

Also, only deaths from the study setting are considered while studying maternal mortality at the tertiary care centre.

Exclusion criteria: All Maternal deaths that do not fulfill the inclusion criteria along with obstetric deaths are excluded.

RESULTS

Age Wise (Years)	Maternal Deaths	Percentage (%)
<20	2	11.76%
20-24	8	47.05%
25-29	3	17.65%
>30	4	23.53%
Total	17	100

Table 1: Age-Wise Distribution Of Maternal Deaths With Percentage.

Literacy Status	Maternal Deaths	Percentage (%)
Illiterate	12	70.58%
Literate	5	29.41%
Total	17	100

Table 2: Distribution Of Maternal Deaths According To Their Literacy Status.

Socioeconomic Status	Maternal Deaths	Percentage (%)
Upper	0	0%
Upper Middle	1	5.88%
Lower Middle	1	5.88%
Upper Lower	4	23.52%
Lower	11	64.7%
Total	17	100

Table 3: Distribution Of Maternal Deaths According To Their Socioeconomic Status.

Residential Status	Maternal Deaths	Percentage (%)
Urban	3	17.64%
Rural	14	82.35%
Total	17	100

Table 4: Distribution Of Maternal Deaths According To Their Place Of Residence.

ANC Registration	Maternal Deaths	Percentage (%)
BOOKED	6	35.29%
UNBOOKED	11	64.70%
Total	17	100

Table 5: Distribution Of Maternal Deaths According To Their Antenatal Supervision.

Gravida Status	No. Of Cases	Percentage (%)
Total	17	100

Table 6: Distribution Of Maternal Deaths According To Their Gravida Status

Admission-Death Interval	No. Of Cases	Percentage (%)
<6 HOURS	5	29.41%
7-24 HOURS	2	11.76%

25-48HOURS	4	23.52%
>49HOURS	6	35.29%
Total	17	100

Table 7: Distribution Of Maternal Deaths According To Interval Between Admission And Death Of Patient

Mode Of Delivery	No. Of Cases	Percentage (%)
UNDELIVERED	2	11.76%
POST VAGINAL DELIVERY	4	23.52%
POST LSCS	11	64.70%
Total	17	100

Table 8: Distribution Of Maternal Deaths According To Mode Of Delivering Baby.

Status Of Patient	No. Of Cases	Percentage (%)
ANTEPARTUM	2	11.76%
INTRAPARTUM	0	0%
POSTPARTUM	15	88.23%
Total	17	100

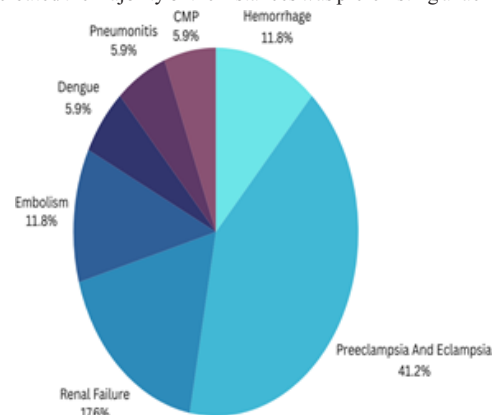
Table 9: Distribution Of Maternal Deaths According To Status At The Time Of Death.

Place Of Delivery/Referral	No. Of Cases	Percentage (%)
TERTIARY CARE CENTER	4	23.52%
DH/RH/PHC/SDH	10	58.8%
PRIVATE HOSPITAL	3	17.64%
Total	17	100

Table 10: Distribution Of Maternal Deaths According To Their Place Of Delivering Baby Or Referrals.

During my research, I have examined a total of 17 instances of maternal mortality. It is noteworthy to highlight that the majority of these deaths transpired between the reproductive age window of 20-24 years.^{10,11} Furthermore, a major portion of these fatalities were observed among individuals who lacked literacy skills and hailed from low-income households residing in rural regions.¹⁴ Deaths occurred more in unbooked cases than in booked cases. Mortality was slightly higher in second gravida than primi or higher gravida scores. Death that occurred within 6 hours amounted to 5(29.41%) which was due to delay in seeking care or delay in referral from peripheral centers.¹² Deaths after 24hrs were around 10 (58.82%) in number and the rest 2 (11.76%) occurred between 7 to 24 hrs. In our study, 2 (11.76%) deaths took place during ANC whereas the rest were PNC deaths out of which 9 (52.94%) were post-LSCS and 6 (35.29%) were post-vaginal delivery.^{13,15,16} Most of the patients were referred from peripheral centers 10 (58.8%) from government setups and 3(17.64%) from private hospitals.

Among all the deaths, there were 14 instances (82.3%) caused directly by conditions such as postpartum hemorrhage (PPH), pulmonary embolism (PE), eclampsia, and antepartum hemorrhage (APH) leading to acute kidney injury (AKI). The primary cause of mortality is Preeclampsia and its associated complications, accounting for 41.17% of cases. Among these, 3 deaths were attributed to pulmonary edema, 2 to cerebral hemorrhage, and 2 to multiorgan failure syndrome. The second most prevalent issue was acute renal damage and failure, which is a significant complication of abruptio placentae, accounting for 17.6% of cases. Following that, postpartum hemorrhage accounted for 11.76% of cases. The prevalence of indirect causes, such as infection, CNS and heart illness, was 17.6%. The underlying factor that exacerbated the majority of the instances was pre-existing anaemia.^{5,17}



Our analysis revealed that pregnancy can result in the occurrence of pulmonary oedema, which is the most commonly reported primary cause of death. This syndrome is occasionally exacerbated by Preeclampsia/ eclampsia. "Therefore, after each occurrence of pregnancy, a woman undergoes a process of rebirth." During pregnancy, the female body experiences various physiological changes. Consequently, this results in many intricacies.

DISCUSSION:

A Maternal Mortality Ratio (MMR) of 63.04 was obtained from 17 maternal deaths and 26,966 live births during the study. This MMR is below national average.

An analysis was conducted on 17 cases of maternal deaths, focussing on factors such as age, literacy status, place of residence, the socioeconomic-demographic profile of the patient, antenatal care, parity, time interval from admission to death, cause of death, mode of delivery, status of patient at the time of death, and communication facility. The analysis also considered any delays in reaching the tertiary care centre from the primary care centre.

The overwhelming majority of maternal deaths (99%) take place in underdeveloped nations. In comparison, developed countries have a maternal mortality ratio of approximately 20 per 100,000 live births.⁴ Maternal mortality is a major global public health issue, especially in developing nations like India. Causes of maternal mortality are beyond medical care. Various factors associated with maternal mortality include socioeconomic factors, the health care system, cultural factors, disease burden, and their interactions. A vast majority of maternal deaths suggest that much can be done to improve maternal survival.

In our study, maximum maternal deaths were attributed to pre-eclampsia and eclampsia-related complications in contradictory to the nationwide commonest cause which is obstetric hemorrhage.

Maternal deaths due to postpartum hemorrhage are usually due to delayed and substandard care in the diagnosis and management of blood loss. These reasons were vigilantly tackled in our institute by early detection of postpartum hemorrhage and timely decision-making for transfusion and interventions.⁸ Two deaths due to PPH were due to the delayed referral from the peripheral health care centers.

Though preeclampsia is mostly not preventable, complications due to preeclampsia and eclampsia are preventable, which can be achieved by increasing awareness and education regarding hypertension in pregnancy and its complications, increasing ANC care and follow-up at all healthcare facilities, raising awareness of healthcare workers at peripheral centers regarding the severity of mild preeclampsia as even mild preeclampsia can abruptly convert into severe form of preeclampsia, counseling regarding proper nutrition and antioxidant supplements and starting low dose aspirin in high-risk groups and liberal use of magnesium sulfate in pre-eclampsia cases.

The root causes of maternal death were poverty, lower education, lower socioeconomic status, various cultural beliefs and practices that greatly influence women's decision to seek health care facilities for delivery, early marriage, lack of physical activity, and a hectic and stressful lifestyle.

Preventive measures that can be taken to reduce maternal mortality are to solve the root causes and strengthen all health care services. Eradication of root causes by avoiding gender bias, promoting female education, marrying at the proper age, and proper pregnancy planning with proper ANC, intranatal, and PNC care.

Interdependent elements of any strategy to improve maternal health are 100% ANC care, provisions of 100% skilled assistance for every delivery, timely availability of transport facilities, well-equipped secondary or tertiary care centers to manage complicated cases, access to essential obstetric care for complicated cases and abundance of blood bank backup as a backbone.

CONCLUSIONS

Failure to adhere to preventive measures during ANC visits can heighten the likelihood of complications during pregnancy and childbirth. These preventive measures include vaccinations, supplements (such as iron and folic acid), and screenings. Inadequate regular follow-ups can result in delayed interventions, which in turn

can postpone necessary treatments and escalate the risk of adverse outcomes for both the mother and the baby.

Ensuring adequate birth preparedness during antenatal care (ANC) visits is essential for effectively planning a safe delivery. This includes making informed decisions about healthcare facilities and arranging transportation. Failure to adequately prepare can result in delays in accessing care during emergencies. Enhancing access to and utilization of ANC services is vital for reducing maternal mortality rates and promoting better health outcomes for both mothers and their infants.

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