

Review of maternal death in a tertiary care centre western India: a 5 year study

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ABSTRACT

Objectives: To study epidemiological aspects of maternal mortality in our centre. To study causes of maternal death and its impact on health care sector. To calculate the maternal mortality rate in our set up and its comparison with national data. To study measures to reduce maternal mortality. **Methodology:** A retrospective study of all maternal deaths according to definition of maternal mortality between 1st January 2015 to 31st December 2020. **Result:** Indirect obstetrics causes related to maternal deaths includes anemia 40% (28/70), hypertension 37.14% (26/70), hepatitis 17.14% (12/70) and cardio-respiratory disease 12.85% (9/70). Direct causes of maternal deaths include haemorrhage 27.14% (19/70), septicemia 22.85% (16/70), DIC 21.42% (15/70), eclampsia 20% (14/70), cardio-respiratory failure 10% (7/70), hepatic encephalopathy 8.57% (6/70) pulmonary embolism 4.28% (3/70) and other causes like intraventricular failure, brain infarct, raised intracranial tension 4.28% (3/70). Sepsis includes post abortal sepsis, surgical wound sepsis, puerperal sepsis and causes of haemorrhage was APH, PPH and ruptured uterus. **Conclusion:** A number of social and economic factors affect maternal mortality. Proper antenatal care received during antenatal period, early hospitalization during labour and early referral to tertiary care hospitals, availability to blood products and multispecialty facilities are necessary to reduce maternal deaths. The poor illiterate unbooked women from rural areas and late referral to tertiary care centers are more vulnerable to maternal morbidity and mortality.

Keywords: Maternal mortality and morbidity, anemia, septicemia, hemorrhage, hypertension.

Maternal mortality is defined as “the death of a 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.”¹ Averting maternal deaths remains a challenge to healthcare system in India. As per the latest report of national sample registration system (SRS) MMR of India for 2016-2018 is 113/1,00,000 live births.² According to sustainable development goals (SDG), the global target is to reduce MMR to <70/1,00,000 live births by 2030 and to provide universal access to reproductive healthcare.² India contributes 1/5 of global burden of absolute maternal

deaths.³ Maternal mortality in resource poor nations has been attributed to the “3 delays”- delay in deciding to seek care, delay in reaching care in time and delay in receiving adequate treatment. The leading causes of maternal mortality are: anaemia, hypertensive disorders, haemorrhage, unsafe abortion, sepsis and obstructed labour. Appropriate pre-pregnancy counselling, early booking and timely referral for specialist multidisciplinary antenatal care are all vital to make impact on maternal mortality. Appropriate postnatal care in the first few hours and days following childbirth prevents the great majority of maternal morbidity and mortality.

The key requirement to decrease maternal death is to

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understand the causes of deaths for effective policy and healthcare Programs. The quality of healthcare delivery system of a country is reflected by its MMR (maternal mortality rate). This study reviews the obstetric standards of practice in our institute. Various programmes that are followed to improve maternal and neonatal health are as follows -

- JSY (Janani Suraksha Yojana) is a demand promotion and conditional cash transfer scheme was launched in April 2005 with the objective of reducing maternal and infant mortality. It promotes institutional delivery among poor pregnant women.⁴
- JSSK (Janani Shishu Suraksha Karyakram): Government of India has launched JSSK programme on 1st June 2011 which entitles all pregnant women delivering in public health institutions to absolutely free and no expense delivery including caesarean section.
- PMSMA (Pradhan Mantri Surakshit Matritva Abhiyan) was launched in 2016 to ensure quality antenatal care and high-risk pregnancy detection in pregnant women on 9th of every month.⁵
- LaQshya: MoFHW has recently 'LaQshya' labour room quality improvement initiative for focused and targeted approach to strengthen processes related to the labour rooms and maternity operation theatre.
- MoFHW government of India launched a new initiative SUMAIV- "Surakshit matritva aashwasan" expected outcome of this new initiative is zero preventable maternal and newborn deaths and high quality of maternity care delivered with dignity and respect.

The lifetime risk of maternal death in developed countries is 1 in 5400 compared to 1 in 54 in developing countries.⁶ The global lifetime risk of maternal death nearly halved between 2000 and 2017 from 1 in 100 to 1 in 190.⁶

Aims and objectives –

- 1) To study epidemiological aspects of maternal mortality in our Centre.
- 2) To study causes of maternal death and its impact on health care sector.
- 3) To calculate the maternal mortality rate in our set up and its comparison with national data.
- 4) To study measures to reduce maternal mortality.

Materials and methods

Study design: Retrospective study of all maternal deaths according to definition of maternal mortality studied at our tertiary care Centre.

Study period: 1st January 2015 to 31st December 2020.

Data collection: All data were collected from maternal death register and analysis was done regarding maternal age, gestational age, parity, antenatal care, mode of delivery and, medical and obstetric management, predisposing factors and cause of death.

Results

During the study period of 1st January 2015 to 31st December 2020, there were a total 26,460 live births and 70 maternal deaths. Maximum number of maternal deaths were reported in the age group 21-30 years 72.85% (51 cases), because maximum number of pregnant patients belongs to this age group. Death among teenage pregnancies (<20 years) and in between 31-40 years of age group were 11.42% (8 cases) and 15.71% (11cases) respectively. Regarding parity majority of deaths were seen in multiparous women 64.28% (45 cases) compared to nulliparous (primigravidae) women 35.71% (25 cases). During this study unregistered cases were 54.28% (38/70), registered cases with more than 3 visits were 17.14% (12/70) and with < 3 visits were 28.57% (20/70). In our study 74.28% (52 cases) maternal deaths were seen in lower socioeconomic group people. Maternal mortality among middle and higher socioeconomic class were 22.85% (16 cases) and 2.85% (2 cases) respectively. Rate of maternal mortality among uneducated mothers were 17.14% (12/70). Maternal mortality among women with primary and secondary or higher education were 45.71% (32/70) and 37.14% (26/70) respectively. More

Table 1: Maternal mortality in relation to age, parity, registration, socioeconomic and educational status, place of residence

Age in years N (%)	<20 Years	8(11.42%)
	21-30 Years	51(72.85%)
	31-40 Years	11(15.71%)
Parity N (%)	Nulliparous	25(35.71%)
	Second	18(25.17%)
	Third	17(24.28%)
	Fourth or more	10(14.28%)
Unregistered N (%)	No previous ANC visit	38(54.28%)
Registered N (%)	<3 Visits	20(28.57%)
	>3 Visits	12(17.14%)
Socioeconomic Status N (%)	Lower	52(74.28%)
	Middle	16(22.85%)
	Upper	2(2.85%)
Education status N (%)	Uneducated	12(17.14%)
	Primary	32(45.71%)
	Secondary or more	26(37.14%)
Place of residence N (%)	Rural	28(40%)
	Semiurban	24(34.28%)
	Urban	18(25.71%)

maternal deaths were reported in women from rural areas (40%), majority of them were referred to our institute from periphery. Maternal death rate among women who lived in

semiurban and urban areas were 34.28% and 25.71 % respectively (table 1).

Table 2: Status of mother at the time of death and outcome of pregnancy

Status of mother at time of death	Antepartum	14(20%)
	Intrapartum	
	Postpartum	56(80%)
Outcome of pregnancy	Normal vaginal delivery	28 (40%)
	Emergency LSCS	25(35.71%)
	Elective LSCS	2(2.85%)
	Abortion	1(1.42%)

In our study antenatal death rate was 20% (14/70) and post-natal death rate was 80% (56/70). Among post-natal 40% (28/70) were delivered by normal vaginal delivery, 35.71% (25/70) were delivered by emergency caesarean section, 2.85% (2/70) women died after elective caesarean section. And one case of maternal mortality following D & E for missed abortion (table 2).

Table 3: Admission to death interval

Time duration	N (%)
<12 Hours	21(30%)
12-24 Hours	18(25.71%)
24-48 Hours	11(15.71%)
3-7 Days	9(12.85%)
8-14 Days	8(11.42%)
15-21 Days	2(2.85%)
21-42 Days	1(1.42%)

Maximum mortality 30% (21/70) were noted within first 12 hours of admission. 55.71% (39/70) of women died within 24 hours of admission to hospital. 15.71% (11/70) patients were died during 24-48 hours of admission to hospital. Between 8-14 days maternal deaths were 11.42% (8/70), and between 15-21 days maternal deaths were 2.85% (2/70). In our study only 1.42% (1/70) maternal death were noted between 21-42 days (table 3).

Table 4: Indirect causes of maternal mortality

Comorbidities	N (%)
Anaemia	28 (40%)
Hypertension	26 (37.14%)
Hepatitis	12 (17.14%)
Cardio-respiratory arrest	9 (12.85%)

Indirect obstetrics causes related to maternal deaths includes anaemia 40% (28/70), hypertension 37.14% (26/70), hepatitis 17.14% (12/70) and cardio-respiratory disease 12.85% (9/70) (table 4).

Direct causes of maternal deaths include haemorrhage 27.14% (19/70), septicaemia 22.85% (16/70), DIC 21.42% (15/70), eclampsia 20% (14/70), cardio-respiratory failure

Table 5: Direct causes of maternal mortality

Causes of maternal mortality	N (%)
Haemorrhage	19(27.14%)
Septicaemia	16(22.85%)
DIC + MODS	15(21.42%)
Eclampsia	14(20%)
Cardio-respiratory failure	7(10%)
Hepatic encephalopathy	6(8.57%)
Pulmonary embolism	3(4.28%)
Other causes (raised ICT +IVH +Brain Infarct)	3(4.28%)

10% (7/70), hepatic encephalopathy 8.57% (6/70) pulmonary embolism 4.28% (3/70) and other causes like intraventricular failure, brain infarct, raised intracranial tension 4.28% (3/70). Sepsis includes post abortal sepsis, surgical wound sepsis, puerperal sepsis and causes of haemorrhage was APH, PPH and ruptured uterus (table 5).

Discussion

Maternal mortality is a global health problem and maternal mortality is an index of reproductive health of society. High incidence of maternal deaths reflects poor quality of health services, late referral and low socio-economic status of the community. UNICEF has estimated that approximately 80% of maternal death could be averted if women had access to essential maternity and basic health care services.^{7,8}

The maternal mortality ratio (MMR) in our study is 264 per 1,00,000 live births. Which is higher than national standard MMR in India that is 167 per 1,00,000 live birth as larger number of cases came to our hospital were referral from primary health centres.⁸ Study done by Tayade et al reported MMR of 242 at Wadgwa Maharashtra and Shivkumar et al reported MMR of 974 at VIMS Bellary, Karnataka.⁹

Majority of the maternal mortality in our study was seen in the age group of 21-30 years (72.85%), similar to the study done by Dinesh Pathak (65.48%)¹⁰ as majority of the women conceived in this age group. Maternal mortality of 54.28% was seen in the unbooked cases in our study. This was seen due to the lack of proper antenatal care. Also, these cases presented to our institute with an already compromised maternal and fetal conditions leading to more incidence of prolonged labor and emergency Caesarean sections. This similar observation was also seen in the study of Doddamani et al (60%).¹¹

Mortality rate in our study (64.28%) as well as in study of Garg et al (71%) shows an inclination towards multiparous women compared to primiparous due to more incidence of co-morbidities related to higher age and more chances of atonicity of uterus, placental abnormalities due to previously scarred uterus.¹²

In our study which was carried out in a tertiary care-based hospital 55.71% women died within 24 hours of hospital admission, a majority of these included women who were referred from primary and secondary health care facilities and many of them did not have stabilized vital parameters at the time of arrival to the hospital. The study of PS Jani et al showed 46.3% women died within 24 hours to

hospital admission.¹³

Anaemia (40%) was major contributory factor to maternal mortality which deteriorates the compensatory mechanism at the time of severe haemorrhage and contributes to shock and multi organ damage. In the study done by PS Jani et al anaemia was found in 29.26% cases of maternal mortality. High incidence of anaemia is due to lack of routine antenatal care, health education and use of haematinics.¹³

In developing countries large number of maternal deaths were due to classic triad of haemorrhage (27.14%), sepsis (22.85%), and hypertensive disorder (20%). Study done by Soni M et al shows direct causes of maternal mortality were haemorrhage (29.5%) sepsis (18%), and hypertensive disorders (12.9%). Majority of these patients were referred cases without asepsis and antibiotic coverage and late referral leads to poor outcome of patients¹³ while in developed countries cardiovascular conditions ranked first (15.5%) followed by other medical conditions often reflecting pre-existing illnesses (14.5%), infection (12.7%), haemorrhage (11.4%), and cardiomyopathy (11.0%).⁷ Causes of maternal mortality following abortion and D & E are unsafe abortion, sepsis, haemorrhage.

Maternal death review has been initiated by government of India in 2010 to improve obstetrics care and reduce maternal mortality and morbidity.¹⁴ Facility based maternal deaths reviews will be taken up for all government teaching hospitals, referral hospitals and other hospitals where more than 500 deliveries are conducted in a year. Community based MDR using verbal autopsy format is a method of finding out the maternal causes of death and ascertaining the personal, family or community.

Conclusion

A number of social and economic factors affect maternal mortality. Proper antenatal care received during antenatal period, early hospitalization during labour and early referral to tertiary care hospitals, availability to blood products and multispecialty facilities are necessary to reduce maternal deaths. The poor illiterate unbooked women from rural areas and late referral to tertiary care centers are more vulnerable to maternal morbidity and mortality. Anaemia is major contributory factor to maternal morbidity and mortality in India. Sepsis, DIC, haemorrhage and hypertensive disorders remain common cause of mortality. Maternal deaths can be reduced by improvement in health system and proper implementation of NRHM programmes.

Conflict of interest: None. **Disclaimer:** Nil.

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