Section: Obstetrics and Gynecology

Original Research Article

A FIVE YEAR REVIEW OF MATERNAL MORTALITY IN TERITARY CARE CENTRE - MEASURES TO BE TAKEN FOR SAFE MOTHERHOOD

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Received *: 05/04/2025*
Received in revised form *: 19/05/2025*
Accepted *: 10/06/2025*

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DOI: 10.70034/ijmedph.2025.2.430

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 2382-2385

ABSTRACT

Background: Maternal mortality is a universal public challenge and its reduction has long been a priority in international health efforts. **Objectives:** This study was conducted to analyze maternal mortality and recommend measures to promote safe motherhood.
Materials and Methods: A retrospective study was done from January 2019 to December 2023 at a tertiary care centre in Andhra pradesh. The medical records of all maternal deaths occurred during this five-year period were reviewed and analyzed.
Results: The maternal mortality ratio (MMR) during the study period was 631.6 per 100,000 live births. Unbooked cases accounted for the majority of maternal deaths, with 269 cases (95.72%), while booked cases accounted for only 12 (4.27%). Most maternal deaths were due to direct causes, including hypertensive disorders (63 cases, 22.4%) and obstetric hemorrhage (48 cases, 17%). Among indirect causes, viral pneumonia was predominant with 34 cases (12.09%), especially during the COVID-19 pandemic, followed by anemia (26 cases, 9.2%), heart disease (10 cases, 3.5%), and liver disease (9 cases, 3.2%).
Conclusion: Analyzing the causes of maternal mortality is essential for identifying preventable factors and addressing delays in care.
Keywords: Maternal mortality, direct causes, indirect causes, tertiary care centre.

INTRODUCTION

Maternal mortality is a key indicator for assessing the quality of healthcare services. According to the World Health Organization (WHO), "Maternal death is defined as 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 or aggravated by the pregnancy or its management, but not from accidental or incidental causes".[1]
The Sustainable Development Goals (SDGs) aim to reduce the global maternal mortality ratio (MMR) to less than 70 per 100,000 live births by 2030, with no country having an MMR more than twice the global average.[2] In India, the MMR has shown a consistent decline, reaching 99 per 100,000 live births in 2020—representing a 70% reduction from 1997–1998.[3] Most maternal deaths are preventable through early identification of risk factors and timely intervention. Analyzing these deaths is crucial to identifying gaps in the system and taking appropriate measures for ensuring safe motherhood.

Aims & Objectives

1) To determine maternal mortality ratio at tertiary care center over five-year period.
2) To analyze epidemiological factors and causes of maternal mortality.
3) To suggest measures for reducing maternal mortality.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Obstetrics and Gynecology at GGH Guntur, a tertiary care center in Andhra Pradesh, with an annual delivery rate of approximately 8,000 to 10,000. Data on all maternal deaths from January

2019 to December 2023 were obtained from the maternal death register and facility-based maternal death review forms. The data were analyzed with respect to age, parity, socioeconomic status, booking status, admission-to-death interval, causes of death, and types of delay identified. A total of 281 maternal deaths were thoroughly reviewed and analyzed.

RESULTS

During the study period (January 2019 to December 2023), there were 44,489 live births and 281 maternal deaths. The maternal mortality ratio was 631.6 per 100,000 live births (Table 1).

Table 1: Year wise MMR

Year	Total live births	Maternal deaths	MMR
2019	9766	48	491.5
2020	9575	89	929.5
2021	9116	75	822.7
2022	8797	38	431.96
2023	7235	31	428.47
Total	44489	281	631.6

It was observed that the majority of maternal deaths—261 cases (92.8%)—occurred during the prime reproductive years (18–35 years). Approximately two-thirds (57%) of the women were multiparous. A significant proportion, 185 women (65.8%), belonged to the lower socioeconomic class. In terms of education, 102 women (36.29%) were uneducated, while 80 (28.46%) had only completed primary schooling.

Alarmingly, 269 cases (95.72%) were unbooked. Most of the cases—182 women (64.7%)—were referred from other healthcare centers, with many arriving in serious (50.8%) or critical (24.1%) condition at the time of admission to our facility. Among these, 25 women (8.8%) were brought in dead, and 108 (38.4%) died within 24 hours of admission.

Table 2: Sociodemographic characteristics of maternal death

S no	Sociodemographic character		Number	Percentage
1	Age	<18	2	0.7
		18-35	261	92.8
		>35	18	6.4
2	Parity	Primi	121	43.06
		Multipara	97	34.51
		Grand multipara	63	22.41
3	Socioeconomic status	Lower	185	65.8
		Middle	81	28.8
		Upper	15	5.3
4	Education	Uneducated	102	36.29
		Primary school	80	28.46
		Secondary school	74	26.33
		Graduate	25	8.89
5	Registration status	Unbooked	269	95.72
		Booked	12	4.27
6	Referral status	Referral	182	64.7
		No referral	99	35.2
7	General condition on admission	Good	28	9.9
		Fair	42	14.9
		Serious	143	50.8
		Critical	68	24.1
8	Admission to death interval	Brought dead	25	8.8
		< 24hrs	108	38.4
		24 hrs to 1wk	117	41.6
		> 1 wk	31	11.03

Direct causes of maternal death were observed in 180(64.05%) cases and indirect causes were noted in 101(35.9%) cases. Among the direct causes, hypertensive disorders were identified in 63 cases (22.4%), obstetric hemorrhage in 48 cases (17%), and pregnancy-related infections in 17 cases (6.04The major indirect causes included viral pneumonia in 34 cases (12.09%), anemia in 26 cases (9.2%), heart diseases in 10 cases (3.5%), and liver disorders in 9 cases (3.2%).

Table 3: Causes of maternal death according to WHO ICD-10

	ICD group	Number	Percentage
1	D - Pregnancies with abortive outcome	5	1.7
2	D - Hypertensive disorders	63	22.4

3	D - Obstetric hemorrhage (APH-13, PPH-35)		48	17
4	D - Pregnancy related infection		17	6.04
5	D - Other obstetric complications Thromboembolism(13), Amniotic fluid embolism(6), PPCM(22)		41	14.5
6	D - Unanticipated complications of management. TRALI(2), Meningitis(2), Neurogenic shock(1), Aspiration pneumonia(1).		6	2.1
			180	64.05
7	Indirect	Viral pneumonia	34	12.09
		anemia	26	9.2
		Heart disease	10	3.5
		Liver disease	9	3.2
		ARDS(6), GB syndrome(3), viral hemorrhagic fever(4), renal disease(5), HIV with TB(2), Autoimmune disorder(2).	22	7.8
			101	35.9
8	unspecified		0	
9	coincidental		0	

Type-I delay noted in 168(59.7%) and type-II delay in 110(39.1%) constituting the major categories of delay.

Table 4: Type of delays identified

	Number	Percentage
Type-I	168	59.7
Type-II	110	39.1
Type-III	3	1.06

DISCUSSION

The Maternal Mortality Ratio (MMR) in our study was 631.6 per 100,000 live births, with annual figures of 491.5 (2019), 929.5 (2020), 822.7 (2021), 431.96 (2022), and 428.47 (2023). The significantly higher MMR during 2020 and 2021 was primarily due to the COVID-19 pandemic, which limited healthcare access, thereby increasing both obstetric and non-obstetric maternal deaths. COVID-19 pneumonia also contributed notably to the rise in non-obstetric deaths.[4]

The MMR in our study was considerably higher than the national average. A probable reason could be the heavy burden of referral cases received at our center. A majority of the women (95.72%) were unbooked, consistent with the 83.7% reported in a study by Jain D. Maheshwari et al,[5] This high percentage highlights the critical need for adequate antenatal care.

In our study, 64.7% of cases were referred from other centers. Of these, 50.8% were in serious condition, and 24.1% were in critical condition at the time of admission. Twenty-five women (8.8%) were brought dead, and 108 women (38.4%) died within 24 hours of admission, likely due to late referrals. A study by Mitra S. et al. reported similar findings, with 64.5% of patients in critical condition at admission, and 60% dying within 24 hours, aligning with our observations.[6]

In our study, 65.8% of women belonged to lower socioeconomic status, 36.29% were uneducated, and 28.46% had only primary education. These findings align with a study by Mallik N. Sarkar et al., where 81% belonged to the lower socioeconomic class, and 58% were uneducated.[7] These results emphasize the importance of education and economic empowerment in improving maternal health outcomes and ensuring better utilization of healthcare services.

Regarding the causes of maternal death, 64.05% were due to direct obstetric causes, with hypertensive disorders (22.4%), obstetric hemorrhage (17%), and pregnancy-related infections (6.04%) being the most common. A study by Pratima et al. also found similar results, with 69.8% of maternal deaths due to direct obstetric causes, and hypertensive disorders accounting for 28.02%.[8] According to the WHO, hemorrhage remains a leading global cause of maternal death. However, in our center, a well-equipped blood bank significantly reduced deaths from hemorrhage.

Among indirect causes, viral pneumonia (12.09%) and anemia (9.2%) were predominant. The COVID-19 pandemic during 2020 and 2021 led to a sharp rise in viral pneumonia-related maternal deaths. The pandemic had a substantial global impact on maternal health,[9]

In our study, Type I delay was observed in 59.7% of cases, which is comparable to the findings of Pratima Mittal et al., where 64.28% of cases experienced Type I delay.[10] This delay plays a significant role in maternal mortality in developing countries like India. Key contributing factors include rural residence, poverty, illiteracy, and lack of awareness of warning signs.[11]

To reduce maternal mortality, mass awareness campaigns, educating antenatal women about the importance of regular check-ups and danger signs, strengthening first referral units, and ensuring round-the-clock transportation are essential. Additionally, direct admission of high-risk pregnancies to tertiary care centers, along with effective management of

postpartum hemorrhage and infection control practices, can significantly lower maternal deaths.

CONCLUSION

A thorough re-evaluation of the causes and contributing factors of maternal mortality can provide new insights into its prevention and lead to improved maternal outcomes. Preconception counseling, health education, accessible healthcare facilities, and the provision of high-quality care during childbirth have a protective impact on maternal health.[12]

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