



## Maternal Near-Miss Analysis at Tertiary Level Hospital: An Effective Indicator for Maternal Health Care

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### Abstract

Complications that arise during pregnancy and childbirth continue to be one of the primary causes of sickness and mortality among women in India who are of reproductive age. The World Health Organization's (WHO) maternal near miss (MNM) concept has gained popularity among academic medical centres in recent years. This is because it provides a large sample size on which to test new interventions and evaluate the efficacy of existing standards of care for pregnant women. The World Health Organization's (WHO) maternal near miss (MNM) concept has also been embraced by tertiary institutions because of its potential to prevent maternal deaths. Although research on this subject is growing, relatively few studies have focused on MNMs in eastern India, and no studies have been conducted to date in Odisha to investigate various delays contributing to MNMs. To supplement other methods of evaluating the calibre of maternal healthcare provided in the institution, prospective obstetric patients' near-miss rates and types were studied. This prospective observational research includes all the patients with severe maternal morbidity from May 2020 to September 2021 admitted in the Department of Obstetrics & Gynaecology, SCB Medical College, Cuttack, Odisha, India. During this period the total number of live birth recorded was 11,677 .Rate of maternal death per 1,000 live births was 16.1; the rate of maternal near-miss was 47.1; the ratio of maternal near-miss and maternal mortality was 2.9:1. The most frequent reason for close calls was reported to be hemorrhagic disorders. Among all the complications leading to haemorrhage, ectopic pregnancy contributed to 141 cases (45.6% of all haemorrhages) followed by postpartum haemorrhage (18.12%). Eclampsia was found to be the most common cause among all cases of hypertension. Therefore, it is recommended that the main level of

treatment, as well as other levels of care, focus on avoiding or ameliorating maternal- near-miss events (such as haemorrhage, hypertensive disorders, and sepsis). The establishment of tertiary care in each area and enhancement of the peripheral health care system are important.

**Keywords:** *Maternal near miss, maternal outcomes, Ratio of maternal near miss, maternal mortality, tertiary level hospital*

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## Introduction

In countries like India and those Throughout sub-Saharan Africa, maternal mortality is a serious problem (MMR). There were an estimated 211 maternal fatalities for every 100,000 live births in the world in 2017. That's the equivalent of more than 810 women dying every day from complications during delivery anywhere in the globe. The rate of maternal mortality in India is roughly 97 per 100,000 live births in 2018–2020. States with poor maternal health outcomes include Assam, Rajasthan, Uttar Pradesh, Odisha, Madhya Pradesh, and Chhattisgarh, which account for a disproportionately high number of maternal deaths. When compared to other African nations like Gabon and Djibouti, the MMR in a state like Assam is 215 per cent. States like Kerala, Tamil Nadu, Maharashtra, Telangana and Andhra Pradesh, which have death rates under 70 per 100,000 people, are among the best achievers. When it comes to the southern states, Karnataka has a low MMR of 92 per 100,000 people (UNICEF, 2021).

The wide gap between the world richest and poorest is reflected in the high prevalence of maternal mortality in certain regions. The majority of these maternal deaths take place in low-income nations, where the MMR as of 2017 was roughly 462 per 100,000 live births as opposed to 11 per 100,000 live births in high-income countries. Low- and lower-middle-income nations account for 94% of all maternal deaths (Rafiq et al., 2019). The quality of maternal health and healthcare has been evaluated using maternal mortality as an indicator, and it also serves as a gauge for the advancement of society and the human race. Increased MMR is linked to additional issues, such as a greater rate of neonatal and infant morbidity and mortality, and many severe morbidity instances, including severe and long-lasting consequences, are associated with each maternal death (*Maternal Mortality Rate (MMR)*, n.d.).

A woman who narrowly avoided death but pulled through during pregnancy, childbirth, or within 42 days of ending her pregnancy is said to have experienced a maternal near-miss. It has been demonstrated that using data from **Software Assurance Maturity Model**. (SAMM) can help reveal health system flaws or maternal health care needs more quickly than maternal deaths. Maternal mortality has decreased to single digits in many affluent nations, however near miss instances are more prevalent and are therefore helpful in assessing the current system. They also benefit from not being as uncommon as maternal deaths in terms of giving appropriate information, while yet being uncommon enough to avoid overtaxing the facility's clinicians and data-gathering staff (Verma et al., 2020). Although research on this subject is growing, relatively few studies have focused on MNMs in eastern India, and no studies have been conducted to date in Odisha to investigate various delays contributing to MNMs. To supplement other methods of evaluating the calibre of maternal healthcare provided in institutions, a prospective purpose of this research was to identify the prevalence and characteristics of near-miss occurrences in pregnant women.

## Objectives

- Maternal near-miss instances and maternal fatalities will be estimated, and the MNMR, SMOR, MNMMR and mortality index (MI) will be calculated.

- The goals of this study are: To predict the frequency with which MNMs occur and To identify the factors that contribute to MNMs.

## **Materials and Methods**

All women who have obstetric problems or risk factors admitted to the hospital are included in the study. The referral requirements were seldom consistently followed, though many patients gave birth in the hospital despite having no serious difficulties. Cuttack, which is 3,932 square kilometres in size, has a population of 2,618,708, is in eastern Odisha. The department of Obstetrics & Gynecology, SCB Medical College which has 318 beds, offers tertiary treatment to patients from Odisha, nearby states like Chhattisgarh and West Bengal as well as women who have received antenatal care and have been referred by other clinics and hospitals. This prospective observation research included all severe maternal morbidity patients admitted to the Obstetrics and Gynecology Department of SCB Medical College, Cuttack from May 2020 to September 2021.

Daily visits to the emergency room, intensive care unit, and obstetric wards were used to carry out the prospective monitoring. A thorough interview with MNM mothers was conducted according to the study's protocol two days following their admission to ensure survival. The participants were monitored until their release. The collected information was placed into a Microsoft Excel spreadsheet and shown in tables and charts. Statistics were used to compare the results to the control group. As a risk assessment tool with a 95% confidence interval, the relative risk was estimated. The chi-square test and the T-test were used to determine the P value for age and gestational age, respectively.

## **Results and Discussion**

Cases of maternal near-miss and maternal fatalities, as well as their corresponding incidence ratios, mortality indices, and ratios of severe maternal outcomes and near-misses, were calculated.

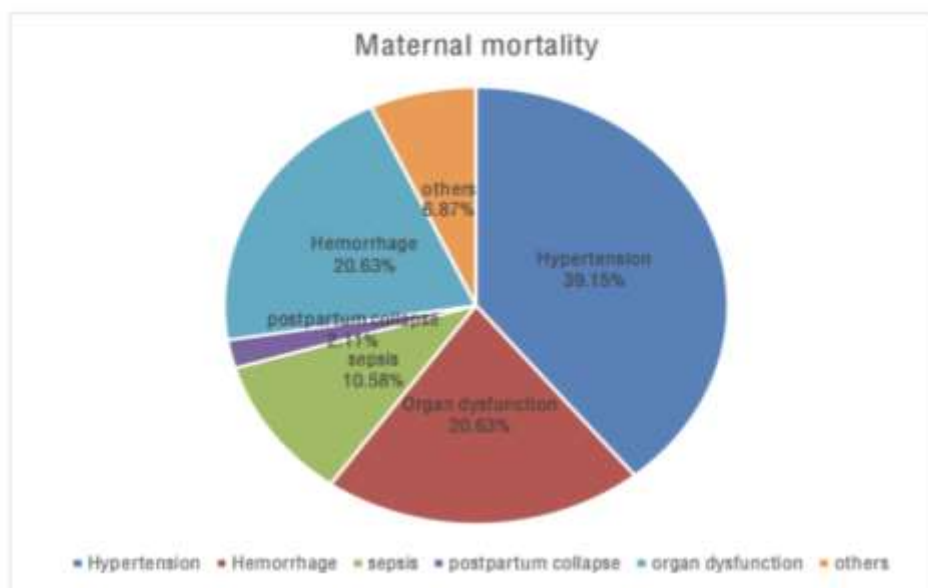
Around 11,677 live births were recorded between May 2020 and September 2021 during the study period. Cases of severe maternal outcomes (SMO) was calculated to be 739. Total number of maternal deaths was 189 (25.57%) and total number of maternal close instances was 550 (74.42%). Severe maternal outcomes (SMOR) per 1,000 live births was 63.28 and maternal near-miss rate (MNMR) was 47.1 per 1,000 live births, The maternal mortality rate was 16.1 per 1,000 live births. The mortality index (MI) was 25.57%, with a 2.9:1 maternal near-miss mortality ratio(MNMMR). To determine the relative risk and to evaluate various sociodemographic and clinical features between WOAMOs and MNM patients, the same 550 Normal Controls and those admitted within 24 hours of a near-miss case, including Women without adverse maternal outcome (WOAMOs), were also analyzed.

## **The pattern of MNM occurrence and the causes of MNM**

Table 1 presents the various complications leading to a near miss. The most common cause of near-miss cases was reported to be hemorrhagic disorders. Among all the complications leading to haemorrhage, ectopic pregnancy contributed to 141 cases (45.6% of all haemorrhages) followed by postpartum haemorrhage with 18.12%. Eclampsia was found to be the most common cause among all the cases of hypertension i.e., 91 cases (87.5% of all HTN cases). Out of 74 cases of sepsis, 59 patients (79.7% of all sepsis cases) had puerperal sepsis followed by septic abortion with 13.5% (Fig 1).

**Table 1- Type of complications in patients**

Diagnosis						
Hemorrhage		309				
1.Ectopic			141		45.6	
2. Abortion			21		6.8	
3.APH						
a.placenta previa			24		7.76	
b.abruptio			13		4.2	
4. placenta increta		15			4.85	
5.PPH		56			18.12	
6.ruptured uterus			26		8.4	
7.others		23			7.44	
Hypertension						
1.Eclampsia			104		87.5	
2.Severe pre-eclampsia		13			12.5	
sepsis						
1.Puerperal sepsis			74			
2.septic abortion			59		79.7	
3.post-surgical procedure		8			13.5	
		7			11.8	

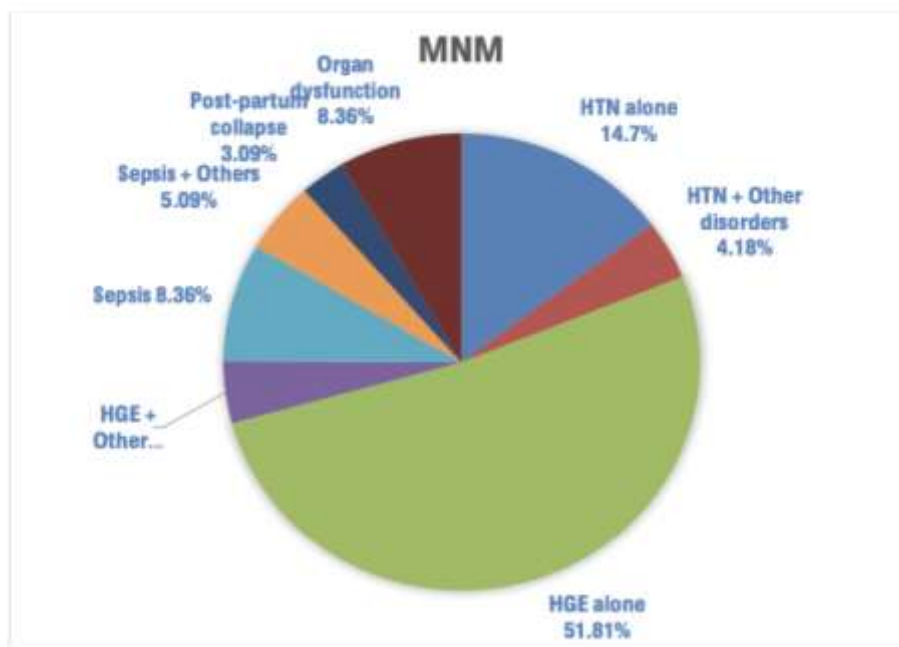


**Fig 1: Percentage of maternal mortality**

The various causes of near misses were studied and tabulated in Table 2; Fig 2. As it is evident haemorrhage was the most common cause of (51.81%) near misses. whereas the most common cause of maternal mortality was hypertension i.e., 39.15% of all maternal death during this period followed by haemorrhage. All the deaths related to different organ dysfunction were responsible for 20.63% of cases.

**Table 2: Various causes of maternal near miss**

Causes	MNM		Maternal mortality	
	Frequency	Percent	frequency	Percentage
<b>HTN alone</b>	81	14.7	74	39.15%
<b>HTN + Other disorders</b>	23	4.18		
<b>HGE alone</b>	285	51.81	39	20.63%
<b>HGE + Other disorders</b>	24	4.36		
<b>Sepsis</b>	46	8.36	20	10.58%
<b>Sepsis + Others</b>	28	5.09		
<b>Post-partum collapse</b>	17	3.09	4	2.11%
<b>Organ dysfunction</b>	46	8.36	39	20.63%
<b>others</b>			13	6.87%



**Fig 2: Percentage of various causes for MNM**

Maternal morbidity and death are still issues in underdeveloped nations despite advancements in obstetric treatment over the past few decades. Maternal morbidity, which makes up a sizable portion of the iceberg's base and is mostly unstudied, is "Just the top of the iceberg" in terms of maternal mortality. Near-miss situations are a more reliable indicator of health infrastructure because they typically happen more frequently than maternal deaths. A more thorough picture of the health system's performance is provided by the quantitative study of near-miss incidents.

In the present study, haemorrhage had the major contribution i.e., 309 cases (56.18%) either alone or in combination with other complications followed by Hypertension in 104 patients (18.09%), and next comes sepsis in 13.45%. Similar results are found in the study by Gurung et al (2015) and Say et al.(2016). The results of the current research conflict with those of other studies like as Oliveira-Neto et al.(2019), which showed that hypertensive disorders (72.7%) and haemorrhage (20.8%) are the causes of MNM. Drechsel and colleagues 2022 reported in their study that the Ruptured ectopic pregnancy as a single entity contributes significantly to Maternal Near misses (45.6%) followed by postpartum haemorrhage (18.12%). Eclampsia and puerperal sepsis are the commonest among hypertension and sepsis cases respectively. Lo et al.( 2013) study that eclampsia and postpartum haemorrhage are the most frequent cause of hypertension and haemorrhage respectively leading to maternal near misses.

In comparison to MNM, the most frequent cause of mortality is hypertension, which was responsible for 39.15 % of maternal death whereas haemorrhage was responsible for 20.63%, which was almost half of the deaths due to hypertension. Reportedly, problems that may be mitigated with simple intrapartum emergency treatment, such as significant bleeding, ruptured ectopic, and uterine rupture, are less difficult to less than those that need more widespread use of better prenatal care. Therefore, saving lives requires prompt action. Major advancements in prenatal blood pressure monitoring were thwarted by insufficient health worker presence, inconsistent antenatal attendance, and broken blood pressure equipment, leading to delays in diagnosis at the proper time.

This study is a step towards reaching the millennium development goal (MDG) 5 which involves maternal health. The key to improvisation starts with understanding the women susceptible to near-miss events. A maternal near-miss event has been described as a case where the women during pregnancy or childbirth somehow manage to survive even though they undergo extreme life-threatening complications during pregnancy and almost faced death (Habte & Wondimu, 2021). However, the WHO technical definition also adds the clause of 42 days within the termination of pregnancy (Kuklina and Goodman, 2018).

## **Conclusion**

Finding the frequency of near-miss incidents and understanding the elements that contribute to them were the primary goals of our research. By giving these people more of our focus, we may assist lower their risk of experiencing a near-miss situation. Therefore, at all levels of treatment, including the primary level, maternal health policy has to focus on avoiding and/or ameliorating maternal- near-miss events (haemorrhage, hypertensive disorders, sepsis). A tertiary care centre should be established in each district, and the health care system should be bolstered on the periphery. Empowering women and educating the public about health may do a lot toward raising standards in obstetric care, as can a heightened focus on one's health. The government should aggressively distribute as much of its resources as possible to low-

income citizens. Referral hospitals should maintain oversight of continuing medical education and give feedback to practitioners at district hospitals.

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