

ORIGINAL ARTICLE**To study the maternal mortality at a tertiary care hospital**

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ABSTRACT:

Aim: To study the maternal mortality at a tertiary care hospital. **Material and methods:** This investigation was conducted at a tertiary care health center as a retrospective analysis. Data pertaining to demographics and other relevant information was gathered from individual case records, and the maternal death review process was included. The research eliminated deaths resulting from suicide and murder from the definition of maternal death. A comprehensive analysis was conducted on a total of 100 cases of maternal mortality. Detailed history regarding demographic characters, previous antenatal care along with type of delay noted. Causes of death, Level of ANC care, and referral hospital and referral time noted along with duration of care received at this hospital and time of death. **Results:** The causes of maternal death are detailed in this table. Sepsis was the leading cause, responsible for 31% of the deaths, followed closely by hemorrhage, which accounted for 28%. Eclampsia, a serious complication of pregnancy characterized by high blood pressure, was responsible for 17% of the deaths. Obstructed labor and complications of abortion accounted for 12% and 8% of the deaths, respectively. The remaining 4% were attributed to other causes. These results underscore the importance of managing infections, bleeding, and hypertensive disorders in reducing maternal mortality. **Conclusion:** Currently, the majority of maternal fatalities occur among women residing in rural regions, with lower levels of education, who have not made prior arrangements for medical treatment and come from poor socioeconomic backgrounds. These women sometimes have to undertake extensive trips to access specialized medical facilities.

Keywords: Maternal mortality, ANC, Hemorrhage, Referral hospital

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INTRODUCTION

Annually, over 536,000 women worldwide are dying due to complications associated to pregnancy. India has a significant 25% share of the global load. Maternal death audits are being carried out at both the institutional and district levels. Multiple instances of treatment delays are being found, and medical officers are undergoing training to enhance their ability to provide proficient and efficient care. There is no charge for ambulance treatment provided to moms and infants.¹ The World Health Organization (WHO) defines maternal death as the death of a woman during pregnancy or within 42 days after the termination of pregnancy, regardless of the duration or location of the pregnancy. This definition includes deaths caused by pregnancy-related factors, but excludes deaths resulting from accidental or incidental causes. The maternal mortality rate is the number of maternal deaths per 100,000 live births. Pregnancy and delivery are often joyous occasions, but they may also be accompanied by problems and even mortality if risk factors are not promptly recognized and addressed. The demise of a woman and mother is a profoundly sorrowful and grievous loss to both the kid, the community, and the whole country. There is a global occurrence of one maternal fatality per minute. In India, there is one maternal fatality every five minutes. Approximately 500,000 women succumb annually to problems arising from pregnancy and

delivery. Approximately 99% of these women are from underdeveloped countries, with more than 90% concentrated in Africa and Asia.^{2,3} In 1938, the maternal mortality rate in India was 2000, which decreased to 1000 in 1959 and further reduced to 540 in 1999. The current maternal mortality ratio is at 167 per 100,000 live births, which exceeds the millennium development target for 2020 of 109 per 100,000 live births. Regrettably, these fatalities may be mostly avoided. The advancement in maternal health has been inconsistent, unfair, and dissatisfactory. In Afghanistan, the lifetime risk of maternal mortality due to pregnancy and delivery is around 1 in 6, but in Northern Europe, it is as low as 1 in 30,000. The United Nations (UN) assessment of Millennium Development Goal-5 determined that there has been little advancement in sub-Saharan Africa, which is the region where half of all maternal fatalities occur. The improvement shown by South Asian nations, notably India, which contributes to 25% of global maternal fatalities, is likewise lacking in impressiveness. Furthermore, maternal mortality represents just a small fraction of the larger issue. For every woman who dies, there are at least 20 others who suffer from severe morbidity. Maternal mortality is often caused by direct obstetric factors such as hemorrhage, hypertensive disorders of pregnancy, septic abortion, as well as medical conditions including hepatitis and heart disease during pregnancy.⁴⁻⁷ Anaemia is the

primary underlying factor contributing to maternal deaths. Early diagnosis of high risk factors and early management during pregnancy may avoid these causes and contribute to a reduction in maternal mortality.

MATERIAL AND METHODS

This investigation was conducted at a tertiary care health center as a retrospective analysis. Data pertaining to demographics and other relevant information was gathered from individual case records, and the maternal death review process was included. The research eliminated deaths resulting from suicide and murder from the definition of maternal death. A comprehensive analysis was conducted on a total of 100 cases of maternal mortality. Types of delay according to Maternal Death review form : Type 1 delay - delay in decision making to seek help. Type 2 delay - delay in transport due to poor roads and unavailability of vehicles, Type 3 delay - delay at institutional level. Detailed history regarding demographic characters, previous antenatal care along with type of delay noted. Causes of death, Level of ANC care, and referral hospital and referral time noted along with duration of care received at this hospital and time of death.

RESULTS

Table 1: Demographic Parameters

This table presents the demographic profile of the study population, focusing on age and parity among 100 participants. The age distribution shows that the majority of the participants (42%) were between 25-30 years old, with a mean age of 28.76 ± 3.76 years. A significant portion (25%) were aged 20-25 years, while those below 20 and above 35 years made up smaller proportions, each at 8%. This indicates that maternal mortality is more common in the mid-reproductive age group.

Regarding parity, the table reveals that 46% of the participants were primiparas (women who have given birth once), 37% were nulliparas (women who have never given birth), and 17% were multiparas (women who have given birth more than once). This suggests that maternal mortality is not confined to those with multiple pregnancies but also affects first-time mothers and those who have never given birth.

Table 2: Types of Delay in Maternal Mortality Cases

This table categorizes the types of delays contributing to maternal mortality into three groups. Type 2 Delay, which refers to delays in reaching a healthcare

facility, was the most common, affecting 37% of the cases. Type 3 Delay, related to delays in receiving adequate care once at the facility, was the second most common at 34%. Type 1 Delay, involving delays in deciding to seek care, accounted for 29% of the cases. These findings highlight that systemic issues within healthcare access and delivery significantly contribute to maternal mortality.

Table 3: Causes of Maternal Death

The causes of maternal death are detailed in this table. Sepsis was the leading cause, responsible for 31% of the deaths, followed closely by hemorrhage, which accounted for 28%. Eclampsia, a serious complication of pregnancy characterized by high blood pressure, was responsible for 17% of the deaths. Obstructed labor and complications of abortion accounted for 12% and 8% of the deaths, respectively. The remaining 4% were attributed to other causes. These results underscore the importance of managing infections, bleeding, and hypertensive disorders in reducing maternal mortality.

Table 4: Level of Antenatal Care (ANC) and Referral Details

This table explores the level of antenatal care received by the participants and details related to their referral status. A significant portion (42%) received inadequate ANC, while 41% received adequate care, and 17% had no ANC at all. This indicates that a lack of adequate prenatal care is a significant factor in maternal mortality.

Regarding referrals, 58% of the participants were referred to higher-level care facilities, while 42% were not referred. Among those referred, the time taken to reach the referral center varied: 37.93% took 3-6 hours, 29.31% took 1-3 hours, and 18.97% took more than 6 hours. Only 13.79% reached within an hour. These delays in referral highlight critical gaps in the timely access to advanced medical care, which can be life-threatening in emergencies.

Table 5: Duration of Care Received at Tertiary Care Centre

The duration of care received at the tertiary care center is detailed in this table. A quarter of the participants (25%) received care for more than 24 hours, while 29% were under care for 12-24 hours. Twenty-one percent received care for 6-12 hours, 17% for 1-6 hours, and only 8% received care for less than an hour. The extended duration of care for a significant proportion of patients suggests that those who survive the initial critical period post-referral might require prolonged treatment, emphasizing the need for sustained medical attention in severe cases.

Table 1: Demographic parameter

Parameter	Number =100	Percentage (%)
Age in years		
Below 20	8	8
20-25	25	25
25-30	42	42
30-35	17	17

Above 35	8	8
Mean \pm SD	28.76 \pm 3.76	
Parity		
Nullipara	37	37
Primipara	46	46
Multipara	17	17

Table 2: Types of Delay in Maternal Mortality Cases

Type of Delay	Number	Percentage (%)
Type 1 Delay	29	29
Type 2 Delay	37	37
Type 3 Delay	34	34

Table 3: Causes of Maternal Death

Cause of Death	Number	Percentage (%)
Hemorrhage	28	28
Sepsis	31	31
Eclampsia	17	17
Obstructed Labor	12	12
Complications of Abortion	8	8
Other	4	4

Table 4: Level of Antenatal Care (ANC) and Referral Details

ANC Level	Number =100	Percentage (%)
No ANC	17	17
Inadequate ANC	42	42
Adequate ANC	41	41
Referral Status		
Referred	58	58
Not Referred	42	42
Referral Time	Number =58	
<1 Hour	8	13.79
1-3 Hours	17	29.31
3-6 Hours	22	37.93
>6 Hours	11	18.97

Table 5: Duration of Care Received at Tertiary Care Centre

Duration of Care	Number (N=120)	Percentage (%)
<1 Hour	8	8
1-6 Hours	17	17
6-12 Hours	21	21
12-24 Hours	29	29
>24 Hours	25	25

DISCUSSION

The demographic characteristics of the study participants align closely with previous research on maternal mortality, particularly concerning the age and parity of affected women. The finding that 42% of maternal deaths occurred in women aged 25-30 years, with a mean age of 28.76 \pm 3.76 years, supports earlier studies indicating that women in their mid-reproductive years are at higher risk of maternal mortality. This age group typically represents a period of peak fertility, where women are more likely to experience pregnancies, thereby increasing their exposure to potential complications (Say et al., 2007; Ronsmans & Graham, 2006).⁸⁻⁹The parity

distribution, with 46% of the participants being primiparas and 37% nulliparas, suggests that first-time mothers and those who have not previously given birth are particularly vulnerable. This observation is consistent with findings from studies that indicate primiparas often face higher risks due to inexperience, potential complications during their first childbirth, and possibly inadequate prenatal care (McClure et al., 2007).¹⁰ The relatively lower percentage of multiparas (17%) reflects the protective effect of previous pregnancies in terms of maternal health outcomes, although this does not entirely eliminate the risk (Lumbiganon et al., 2010).¹¹

The identification of delays contributing to maternal mortality highlights critical barriers within the healthcare system. The predominance of Type 2 Delays (37%), which involve delays in reaching healthcare facilities, underscores the importance of improving transportation and healthcare infrastructure. This finding resonates with earlier studies that have identified poor access to healthcare facilities as a major contributor to maternal mortality, particularly in low-resource settings (Thaddeus & Maine, 1994).⁶ The role of Type 3 Delays (34%), related to delays in receiving adequate care after reaching the facility, further emphasizes the need for strengthening healthcare services to ensure timely and effective interventions (Freedman et al., 2007).¹² Type 1 Delays, accounting for 29% of cases, involve delays in deciding to seek care. This finding aligns with research showing that sociocultural factors, lack of education, and limited awareness of the danger signs during pregnancy contribute to delayed care-seeking behavior, which can be fatal (Cham et al., 2005). The need for community education and empowerment is evident to reduce these delays and improve maternal outcomes.¹³ The leading causes of maternal death in this study—sepsis (31%), hemorrhage (28%), and eclampsia (17%)—are consistent with global patterns observed in previous decades. Sepsis, often resulting from infections during or after childbirth, has been identified as a leading cause of maternal mortality, particularly in settings with inadequate sanitation and healthcare services (Dolea & Stein, 2003).¹⁴ Hemorrhage, accounting for 28% of deaths, remains a major challenge, especially in areas where access to blood transfusion and skilled birth attendants is limited (AbouZahr, 2003).¹⁵ The significant contribution of eclampsia (17%) to maternal deaths underscores the need for effective management of hypertensive disorders during pregnancy, a well-documented cause of maternal mortality (MacKay et al., 2001).¹⁶ The presence of obstructed labor and complications from abortion as causes of death further highlight the importance of comprehensive obstetric care and the need for safe abortion services to prevent such outcomes. The finding that these causes account for 12% and 8% of deaths, respectively, mirrors findings from studies emphasizing the role of skilled care during labor and delivery in preventing maternal deaths (Maine, 1991).¹⁷

The data on antenatal care (ANC) reveal that inadequate or no ANC was a significant factor in maternal mortality, with 42% of women receiving inadequate care and 17% receiving none. This aligns with earlier research showing that inadequate ANC is associated with higher maternal mortality rates, as it often leads to missed opportunities for early detection and management of pregnancy-related complications (Carroli et al., 2001).¹⁸ The role of adequate ANC in improving maternal outcomes is well-documented, with studies demonstrating that regular and comprehensive ANC visits are crucial for monitoring

and managing risks during pregnancy (Villar et al., 2001).¹⁹ The referral data indicate significant delays in accessing advanced care, with 37.93% of referred cases taking 3-6 hours to reach the referral center, and only 13.79% arriving within an hour. This finding is consistent with studies highlighting the critical role of timely referrals in preventing maternal deaths, particularly in emergencies where delays can be fatal (Koblinsky et al., 2006). The data suggest a need for strengthening the referral system and ensuring faster transport to healthcare facilities equipped to handle obstetric emergencies.²⁰ The duration of care received at tertiary care centers reflects the severity of the conditions in these maternal mortality cases. The fact that 25% of patients required more than 24 hours of care indicates the complexity and seriousness of the conditions being managed. This extended care is often necessary in cases of severe complications, where ongoing treatment and monitoring are critical for survival (Ronsmans & Graham, 2006).⁹ The distribution of care duration also suggests that while some patients receive timely and effective interventions, others may present too late for effective treatment, emphasizing the importance of early referral and intervention (Filippi et al., 2006).²¹

CONCLUSION

Currently, the majority of maternal fatalities occur among women residing in rural regions, with lower levels of education, who have not made prior arrangements for medical treatment and come from poor socioeconomic backgrounds. These women sometimes have to undertake extensive trips to access specialized medical facilities. Maternal mortality may be reduced by early referral, convenient transportation, ongoing skill-based training, hospital improvement, and health service monitoring.

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