

## ORIGINAL ARTICLE

## MATERNAL MORTALITY: A 5-YEAR ANALYSIS AT A DISTRICT HEADQUARTER HOSPITAL IN PAKISTAN

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**Background:** Maternal mortality ratio is an important figure reflecting the strength of a healthcare system. Traditionally the causes of maternal death are described by the three-delay model. This study was conducted to evaluate the causes and determinants of maternal mortality at a secondary level hospital in a rural area of northern Pakistan over a period of 5 years (2013-17). **Methods:** This cross-sectional study was conducted in 2018 on hospital data for the previous 5 years (2013-17) regarding mortality in the Gynaecology department of District Headquarter hospital, Timergara. Cases of maternal death were identified and secondary data was retrieved from the hospital records and patient case sheets. **Results:** Forty-seven cases of maternal death were identified over a period of 5 years and the average maternal mortality ratio calculated to be 110/100,000 live births. Haemorrhage was the commonest cause (36%) followed by uterine rupture (34%) and hypertensive disorders (21%). Most of the cases seen were in uneducated women belonging to the poor socioeconomic stratum (85%) aged 20 to 35 years (55%). 51% of the women were multigravidae coming from within a distance of 25–50 km from the hospital (53%) Majority of the dying mothers (57%) had no antenatal care and were seen arriving at the hospital in the evening shifts (48%). **Conclusions:** Causes and determinants of maternal death are complex and inter sectorial. Poverty, lack of education, antenatal care, family spacing and prompt access to emergency care contribute to maternal death.

**Keywords:** Maternal death; Maternal mortality; Causes; Determinants; Rural area; Pakistan

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## INTRODUCTION

Maternal death is a tragedy that not only affects a family but also the community as a whole, to add to it, maternal death is preventable in most scenarios. Almost all cases can be prevented by a strong primary healthcare system and a wider understanding of pregnancy related knowledge by the masses. Thus, it indicates the strength and efficiency of the healthcare system of a country; making it a focus in the development goals of nations across the globe. Despite the efforts at regional and global level to reduce the burden of maternal mortality, the incidence remains high in the low- and middle-income countries of the world including Pakistan.<sup>1</sup>

A 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.<sup>2</sup> Globally, each year for every 100,000 live births, 216 women die with an estimated 303,000 maternal deaths occurring in the year 2015 alone.<sup>1</sup>

In a social setting where antenatal care enrolment is as low as 55.9% due to socioeconomic restraints and lesser utilization of primary healthcare, often there is no early recognition of the ‘red-flags’

during pregnancy and childbirth.<sup>3</sup> Often when the expectant mother seeks expert obstetric care, it is too late to save her. Annually, an estimated 9700 women in Pakistan die due to pregnancy and related causes contributing a 3.2% to the global figure of maternal death.<sup>4</sup> Out of these, 38.2% women die due to haemorrhage before or after delivery<sup>4</sup> which if identified on time can be prevented medically or surgically. While the official figure still places Pakistan among the countries with a high maternal mortality, the actual numbers may be higher due to under registration of vital events especially in the rural parts of the country.<sup>5</sup> As compared to other low- and middle-income countries, Pakistan’s figure for maternal mortality has shown stagnation and even worsening indicating a lack of focus on maternal health services.<sup>6</sup>

Haemorrhage and hypertensive disorders are identified to be the most common causes followed by sepsis, abortion, obstructed labour, ectopic pregnancy and embolism.<sup>4</sup>

In practice, the determinants of maternal death are summarized into the three delays; delay in seeking care, delay in access to a healthcare facility and delay in receiving proper medical care after reaching a healthcare facility.<sup>7</sup>

Over the years, strategies like birth attendance by skilled personnel and timely referral to an emergency care centre have shown to reduce the maternal mortality significantly.<sup>8</sup> There has been an increase in skilled birth attendance from 39–52% and institutional deliveries from 34–48% between 2001 and 2012-13 and a subsequent reduction in the national figure for maternal mortality but the situation still needs to be improved.<sup>9</sup> Not only a high coverage of essential interventions but the overall quality of maternal healthcare implies a reduction in maternal mortality.<sup>10</sup>

This study was designed in order to understand the factors contributing towards maternal death at the level of secondary healthcare. Several studies have been previously conducted in the province to determine the maternal mortality and its causes at tertiary care level centers<sup>11-14</sup> but no study has been previously undertaken at secondary care level which is often the most common centre for referral of complicated cases from domiciliary care and primary health care centres. This will not only help assess the current situation but also contribute to identification of measures necessary for prevention of maternal death in the area.

## MATERIAL AND METHODS

The cross-sectional study was conducted in the Gynaecology department of District Headquarter Hospital Timergara. The hospital serves a population of 1.5 million of District Lower Dir of Pakistan. It was a retrospective analysis done in 2018 on hospital data for the previous 5 years (2013-17) regarding maternal mortality. All pregnant women dying due to complications of pregnancy were included in the study. Data for the previous 5 years (2013-17) regarding maternal mortality was retrieved from the hospital records and trends analysed for cause of death. Patient age, parity, education status, socioeconomic status, number of antenatal care visits at any level of healthcare, distance of residence from hospital and time of arrival in the hospital was noted on a self-

structured *Proforma* and analysed using SPSS 16.0. Patients with non-obstetric causes of death or those pronounced dead on arrival were excluded from the study.

## RESULTS

During the study period, a total of 49202 deliveries were conducted in the hospital with 42678 live births and 177 maternal deaths giving an average maternal mortality ratio of 418 deaths per 100000 live births. Mean age was 32 years±5.3 (Range 15–43 years) and mean parity was 7 (Range 0–14). Haemorrhage was seen to be the commonest cause of death (n=64, 36.1%) followed by uterine rupture (n=60, 33.9%) and hypertensive disorders (n=37, 20.9%).

Most frequent factor contributing to maternal death was seen to be poverty as 84.7% (n=150) of the women belonged to poor socioeconomic stratum with a monthly income less than Rs. 30,000 thus determining the second delay to be most common. Lack of antenatal care was the other most frequent factor observed in the study present in 79.6% women (n=141). The third delay was seen to be the least frequent.

**Table-1: Yearly trends in maternal mortality ratio**

Year	Total deaths	Total live births	MMR/100000 Live births
2013	27	7284	370
2014	27	7556	357
2015	39	6967	560
2016	49	10422	470
2017	35	10449	335
<b>Total</b>	<b>177</b>	<b>42678</b>	<b>418</b>

**Table-2: Distribution of maternal deaths in relation to cause**

Cause of death	Frequency	Percentage
Haemorrhage	64	36.1
Uterine Rupture	60	33.9
Hypertensive disorders	37	20.9
Cardiac problems	4	2.2
Ruptured ectopic pregnancy	4	2.2
Sepsis	4	2.2
Others	4	2.2
Total	177	

**Table-3: Summary of the determinants of maternal death**

First Delay		Second Delay		Third Delay	
Lack of education	n=120 (67.8%)	Poverty	n=150 (84.7%)	Delay in acquiring blood/blood products	n= 72 (40.7%)
Lack of antenatal care	n=141 (79.6%)	Long distance (More than 2 hours travel)	n=135 (76.2%)	Delay in surgery	n= 45 (25.4%)

## DISCUSSION

Looking into the evolutionary perspective, the figure for maternal mortality in humans is enormous as compared to the animal kingdom where the female does not even require assistance from members of the

same species for delivering offspring. An interesting viewpoint that tries to explain it is termed as the ‘obstetrical dilemma hypothesis’, according to which humans have to pay the price for being intelligent upright bipeds in the form of narrower pelvises and bigger heads which make the human birthing process

riskier making antepartum, intrapartum and postpartum care necessary.<sup>15</sup>

From a social point of view, causes of maternal death and the factors leading to them are seen to be multidimensional. Poverty, lack of access to maternal healthcare, lack of resources and socio-cultural hierarchies are largely responsible for the attitude that neglects women as an important part of the society.<sup>7</sup> In this study, however, a simple assessment of the determinants was attempted by adopting the Thaddeus and Maine three delay model.<sup>6</sup> The first delay is caused by a lack of timely decision to seek care which was in turn assessed by the patient level of education and level of antenatal care received. The second delay is a consequence of lack of accessibility and so the delay in transporting the patient to a healthcare facility that is determined in our study by the socioeconomic status and distance of her residence from the hospital. The third delay is due to lack of prompt treatment upon arrival at a healthcare facility.

In the study, it was assessed by the delay in receiving blood or blood products and a delay in performing the life-saving surgery. All these factors were seen widely prevalent in the observed deaths but the most common was the second delay while least common was seen to be the third delay. Most important determinants of maternal mortality in a rural setup were seen to be poverty, lack of antenatal care and long travelling distances to reach a healthcare facility with comprehensive emergency obstetric care. Poverty and lack of female literacy were also shown to be the key factors contributing to maternal mortality previously by Abbasi S<sup>16</sup> and Agha S<sup>17</sup> whereas lack of antenatal care particularly in grand multigravidae was determined to be positively related to adverse maternal outcomes by Khan NR<sup>18</sup>.

With a growing concern in the world nations about health and healthcare systems, the maternal mortality in some higher income countries has been reduced to 16 deaths per 100,000 live births but in other regions like the sub-Saharan Africa, the figure still remains as high as 546 deaths per 100,000.<sup>1</sup> As per the local studies, a variable maternal mortality ratio has been shown around different parts of Khyber Pakhtunkhwa province.<sup>11,12</sup> Our study determines the average maternal mortality ratio to be 418/100000 live births over the 5 years which is comparable to the study by Humayun S *et al.*<sup>14</sup> This is an unexpectedly low figure for an area considered to be 'backward' in terms of development. Availability of prompt resuscitation and surgical facilities and

referral to tertiary care centres after stabilizing the patient might be the contributing factor for this lower figure. The actual figures might be higher because of the under reporting of vital statistics<sup>1</sup> and the fact that many women die before arrival in to the hospital. The maternal mortality ratio in the nearest tertiary care centre in Peshawar to which most of the complicated cases are referred is shown to be 1018/100,000 live births in a study by Fahim *et al.* which may in part be the reason for a lower mortality rate at secondary healthcare level.

Haemorrhage was shown to be the commonest cause of maternal death (n=64, 36.1%) followed by rupture uterus (n=60, 33.9%) and hypertensive disorders (n=37, 20.9%) in congruence with previous studies conducted in the province<sup>11,13</sup> and the country<sup>14,19</sup>. This reflects a clear need for educating the general public and healthcare providers at all levels to be well versed with the identification and management of these complications and that facilities be available for timely management and referral in case these complications are encountered.

The study was limited to analysis of reported data from only one major secondary level hospital of the region over only a five-year period. Larger studies over wider time frames with data from other hospitals both from public and private sectors also need to be undertaken. However, the extent of reporting of maternal death is still low given the social circumstances prevalent in the region and bringing out the true picture in context of maternal death may actually be more complex than it seems. For overcoming this deficiency of under reporting, community informants have been successfully recruited by previous studies<sup>20</sup> and the model can be used in this rural area as well.

## CONCLUSION

In the setup considered, maternal death is most commonly a consequence of a lack of adequate infrastructure for transport to a healthcare centre, a weak referral system and a lack of affordability of these facilities. This shows that accessibility to healthcare services i.e. second delay is the weakest link in saving a mother's life rather than the largely highlighted third delay.

**Suggestions:** Provision of a better infrastructure in remote areas of the region and strengthening of referral system to ensure provision of a wider coverage of emergency health services should be a priority of the programs focusing on maternal healthcare.

## AUTHORS' CONTRIBUTION

SN: Study concept, manuscript writing. NW: Data acquisition, critical revision, proof reading. SA:

Study design, data analysis and interpretation. SA:  
Critical revision, proof reading

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