MATERNAL MORTALITY AT A TERTIARY CARE HOSPITAL; A 10-YEAR REVIEW

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Abstract

Objectives: To determine the burden of maternal deaths and its causes over the last decade at a tertiary care hospital of Pakistan.

Methodology: This retrospective study was done at the Department of Obstetrics & Gynecology, Ayub Teaching Hospital, Abbottabad. Data from July 2010 to June 2020 was reviewed, including demographic information, diagnosis, and causes of maternal deaths.

Results: During the total 10-year duration of study period, a total of 35,660 births were documented, out of which, 32,498 were live births. During the study period, 193 maternal deaths occurred yielding a maternal mortality ratio (MMR) of 594 / 100,000 live births. These 193 cases were further analyzed. Majority of the women were primigravidas 115 (59.6%), non-booked cases 181 (93.8%), illiterate 187 (96.9%) and belonged to poor socioeconomic background 183 (94.8%). Most common cause of maternal mortality was hypertensive disorders 69 (35.7%) while hemorrhage and pulmonary embolism were some of the other most commonly noted causes of maternal mortality observed in 49 (25.4%) and 20 (10.4%) cases respectively.

Conclusion: Poverty, lack of education, living far from hospital facilities and first pregnancy were the major contributors leading to maternal death. As hypertensive disorders and hemorrhage contributes to majority of maternal deaths, regular antenatal booking, identification of high-risk pregnant population and timely referral to well-equipped hospitals need to be emphasized to save precious maternal lives.

Keywords: maternal mortality

Introduction

According to the World Health Organization "Maternal Mortality is defined as death of a women while pregnant or within 42 days of termination of pregnancy irrespective of duration and site of pregnancy, from any cause related to or aggravated by pregnancy or its management (World Health Organization; International Classification of Disease10).[1] Maternal Mortality is still the foremost global challenge, with more than 0.3 million deaths occurring due to pregnancy and its complications in the year 2015. The Aim of Sustainable developmental goals (SDGs), adopted in September 2015 is comprehensive people centered target to be implemented by 2030.[2]

Though Pakistan made significant progress on some of the health-related indicators like maternal mortality but we are still behind the targets set by SDGs.[3] The current MMR in Pakistan has decreased from 294 deaths per 100,000 live births in 2000 to 178 deaths per 100,000 live births. Despite these improvements, there are still the differences in number of maternal deaths between provinces, districts and rural-urban areas. This improvement is still far behind the targets, (MMR of 140) set for 2015, in millennium development goals (MDG). The number of maternal deaths during delivery in Pakistan is also highest in South Asia.[4]

By the year 2030, MMR in Pakistan needs to be reduced to a value of 70 to achieve SDG targets.As most of the data on maternal deaths is collected form tertiary care hospitals of the country, there are many maternal deaths which remain unreported, specifically the deaths occurring in private hospitals and during home births, hence not included in the survey.[5] As far as causes of maternal mortality are concerned, hemorrhage, hypertensive disorders and sepsis account for more than half of maternal mortality globally, during the last decade.[6]

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Lack of access to health care facilities, poverty, and local trends towards home births contribute to higher MMR in Pakistan.[7]

As the process of SDG localization has already started in Pakistan and adopted in national development agenda[2], it's the need of hour to assess the trends in MMR to predict future targets. The objective of our study is to find the trends of maternal mortality in our tertiary care hospital and to asses underlying causes of maternal death over a period of 10 years. This will not only help measure where MMR is positioned currently, but also help in planning and making policies to deliver appropriate and targeted services to population.

Methodology

This study was conducted at the department of Obstetrics and Gynecology, Unit C, Ayub Medical Teaching Institute (AMTI). Data of maternal deaths during last 10 years from July 2010 to June 2020 was taken from ward statistical registers and reviewed.

AMTI is a tertiary care hospital and a referral center for almost all health care facilities in Hazara division of Khyber Pakhtunkhwa (KPK) province. Approval of this study was taken from hospital ethical committee. Data was collected retrospectively from ward mortality register, which had been recorded at the time of maternal death by registrar on duty and from patient's record files. It consisted of detailed maternal history including maternal demographic characteristics, socioeconomic status, booking status, risk factors and cause of death in each case.

A special proforma was designed to record all study data. Data analysis was performed through "Statistical Package for Social Sciences (SPSS)" version 26.0. Qualitative data like socio-demographic and obstetrical characteristics and causes of mortality were represented as frequencies and percentages while quantitative data like age were calculated as mean and standard deviation (SD)

Results

During the total 10-year duration of study period, a total of 35,660 births were documented, out of which, 32,498 were live births. During the study period, 193 maternal deaths occurred yielding a maternal mortality ratio (MMR) of 594 / 100,000 live births. These 193 cases were further analyzed, and demographic and obstetrical characteristics of these women are shown in table-1. Mean age was noted to be 28.95±5.3years. Majority of the women were primigravidas 115 (59.6%), non-booked cases 181 (93.8%), illiterate 187 (96.9%) and belonged to poor socioeconomic background 183 (94.8%).

Table 1: Maternal Demographics and Obstetrical Characteristics (n=193)

Characteristics		**Number (%)**
Age in Years	<20	9 (4.6%)
	20-35	156 (81%)
	>35	28 (15%)
Parity Status	Primigravida	115 (59.6%)
	Multigravida	43 (22.3%)
	Grand Multigravida	35 (18.1%)
Booking Status	Booked	12 (6.2%)
	Non-booked	181 (93.8%)
Socio Economic	Poor	183 (94.8%)
	Middle Class of Higher Class	10 (5.2%)
Education	Illiterate	187 (96.9%)
	Literate	6 (3.1%)
Residence	Urban	80 (41.5%)
	Rural	113 (58.5%)

Figure-1 is showing MMR per 100,000 live births during the 10-year study period and it was noted that highest MMR was noted in the 1st year of study period showing MMR as 1159/100,000 live-births while last three years of the study period (2018 to 2020) noted relatively lesser MMR/100,000 live-births.

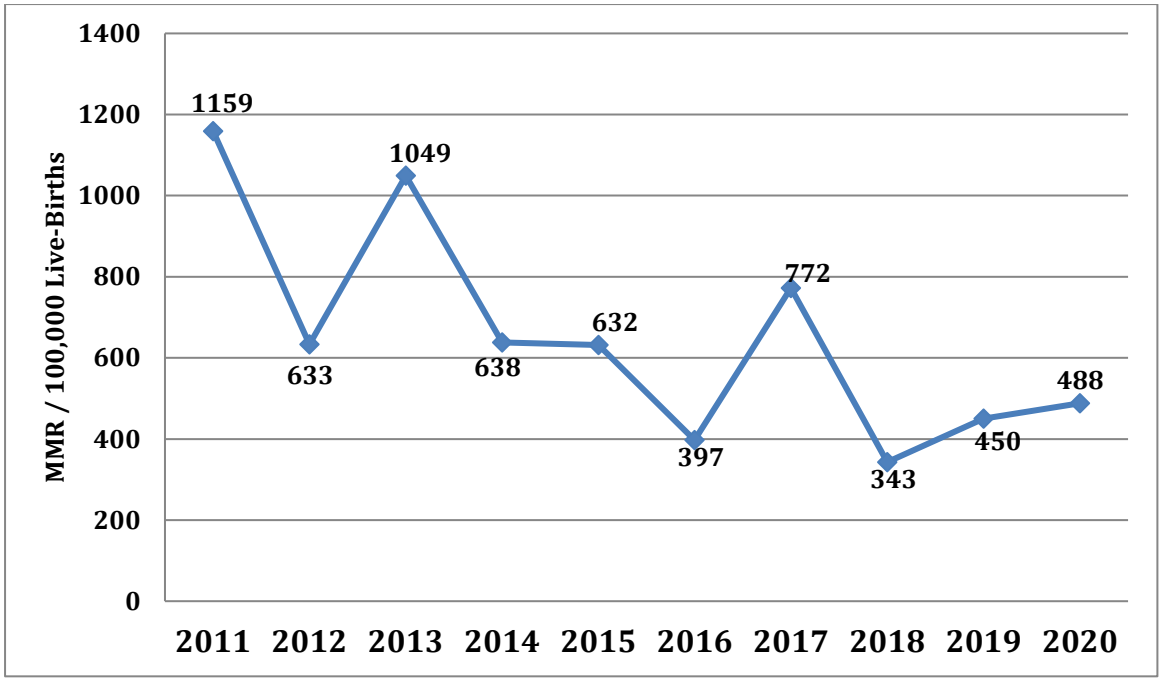
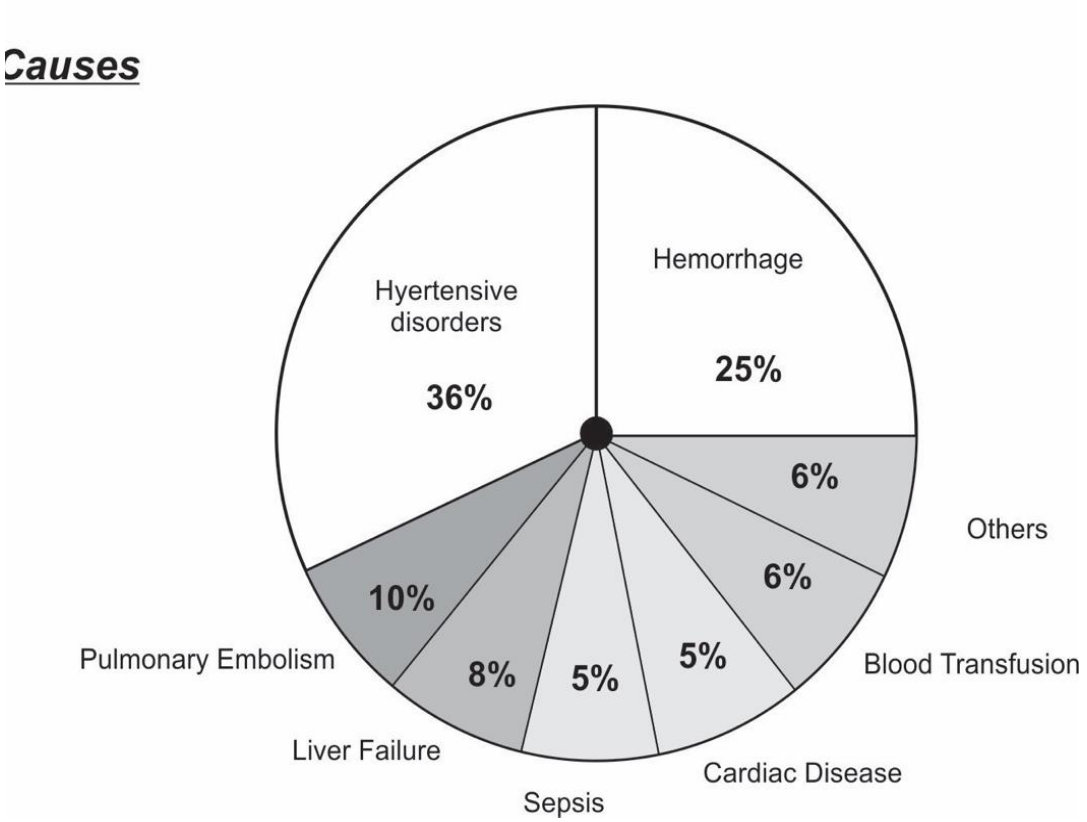


Figure-1: Maternal Mortality Rate per 100,000 cases during the 10 year study period

The records showed that 183 (94.8%) deaths were due to direct maternal causes while and 10 (5.2%) were indirect maternal deaths. Most common cause of maternal mortality was hypertensive disorders 69 (35.7%) while hemorrhage and pulmonary embolism were some of the other most noted causes of maternal mortality observed in 49 (25.4%) and 20 (10.4%) cases respectively.

Table-2: Direct and Indirect Causes of Maternal Mortality (n=193)

Causes of Maternal Mortality		**Number (%)**
DIRECT CAUSES (183)	Hypertensive disorders.	69 (35.7%)
	Hemorrhage	49 (25.4%)
	Pulmonary embolism	20 (10.4%)
	Sepsis	11 (5.7%)
	Liver failure	15 (7.8%)
	Blood transfusion reaction	12 (6.2%)
	Amniotic fluid embolism	6 (3.1%)
	Idiopathic thrombocytopenic purpura	3 (1.6%)
INDIRECT CAUSES (10)	Breast carcinoma.	2 (1.0%)
	Diabetic ketoacidosis.	3 (1.6%)
	Acute myocardial infarction	2 (1.0%)
	Cardiac disease.	2 (1.0%)
	Asthma	1 (0.5%)



Discussion

During the study period, average MMR was 594/100,000 live births, ranging from minimum of 343 during the year 2018 to maximum of 1159 in 2011. MMR in our study is significantly lower than reported in previous studies in the same institute. Study conducted by Begum e tal[7] in 2001 showed MMR of 1270/100,000, while Khan B, et al[8] in 2012 reported MMR 772/100000 in the same hospital. This fall in MMR in low-income countries has also been reported by WHO fact sheet 2019. This achievement was due to their continuous efforts to reduce MMR, to achieve MDG 3 by 2030.[8]

MMR reported by B.K. Murphy e tal[9] in 2013 in a tertiary care hospital of India was 302, while B. Bhadra eta al[10] reported it as 233/100,000 live births in Bangladesh in 2017. Comparing data from other developing countries like India and Bangladesh, our study showed higher maternal mortality. In Afghanistan MMR ranged from 418 to 6501 in different studies as quoted by Linda A e tal[11] in their study published in Lancet.

Certain studies done across the country showed a wide variation in MMR, ranging from 433/100,000 live births reported by Fawad A e tal[12] in KPK in 2011 to as high as 4740/100,000 in a study conducted by Baloch R in 1997 among rural population of Larkana, Sindh.[13] This depicts a great variation in MMR across the country. Though deaths occurring in a tertiary care setting are reported but in rural areas many women die during home birthing or on way to hospital or in basic or rural health centers where there is no definitive statistical record.[14]

As far as causes of MM are concerned, our study showed 92% as direct maternal deaths, while 8% deaths were attributed to indirect causes. Khan e tal[8] reported 87.7% due to direct causes while studies by BK Murphy e tal[9] and S.N Jaffery e tal[15] also showed 72.5% and 80% deaths due to direct causes.

Majority of deaths occurred in age group 20-35 year (81%), who were non booked (94%) belonging to poor socioeconomic backgrounds (95%) and rural areas (59%). Data from other studies across the country shows similar trends. S. Rafiq e tal[1] also reported more maternal deaths in non-booked women of age group 20-30 years. Similarly study by Fawad A. et al[12] reported more maternal deaths in age group 28-37 years, in non-booked patients from poor families. Other studies from low resource countries also reported similar results. B. Bhadra et al[12] & J.U.E Onakewhor et al[16] also reported that factors like non-booked status, being resident of rural areas and age group 20-30 years as major demographic features contributing to maternal deaths.

Comparing with data from other studies, our study showed a greater number of women with low parity and nulliparity (6%) who suffered maternal death, compared to multi gravida (40%). Onakewhor et al[16] also reported similar trends of more maternal deaths (37%) in women who were nulliparous or of low parity. Hypertensive disorders are the commonest cause of MM in our study and nulliparity or women in their first pregnancy is the significant risk factor for eclampsia and preeclampsia.

About 9 out of 193 (4.6%) deaths occurred in teenager mothers in our study. Reason being child marriages are very common in KPK province of Pakistan. According to demographic & health survey 2012-13 every 1 in 3 girls is married before reaching age of 18 years[14]. Teenagers are more at risk of death due to pregnancy related complications than women in there 20's.[17] Similarly Onakewhor et al[16] reported 9.4% deaths among teenage pregnancy in Nigeria in their study.

Hypertensive disorders of pregnancy, including eclampsia, severe preeclampsia with Help syndrome, abruptio placentae, multi organ failure, and intracranial hemorrhage; altogether contributed to 35.7% of maternal deaths in our study. Among the hypertensive disorders, 54% pregnant women had severe pre-eclampsia and 46% had eclampsia. Fawad et al, reported complications of hypertensive disorders as leading cause of maternal death in the same hospital in year 2011[12]. Linda B et al[11] also showed hypertensive diseases as the commonest factor leading to maternal deaths in Kabul and Ragh, Afghanistan in their study, published in 2017. Majority of national studies (Rafiq S et al[1], SN- Jaffery Begum S et al[7]) reported hemorrhage as the leading cause of maternal death, while in our study obstetric hemorrhage resulted in 25.4% of maternal deaths and was the second commonest cause of maternal mortality. Studies from other low resource countries like India, Nigeria and Bengal as reported by Bhasker K Murthy e tal[9] and B. Bhadra et al[10]. Onakewhor et al[16] respectively, clearly depict hemorrhage being the leading cause of maternal death, followed closely by complications of hypertensive disorders. Similar trends were reported in ACOG Bulletin 2019, which depicts hypertensive disorders of pregnancy as leading cause of maternal mortality worldwide.[19] Singh et al[20] and Paul et al[21], both reported hypertensive disorder as the commonest cause of maternal death (24%) and (32.6%), conducted in India in 2009 and 2011 respectively. Our hospital being a tertiary care hospital is fully equipped with facilities to cope with obstetric hemorrhage which has resulted in less proportion of deaths due to hemorrhage as compared to hypertension.

Pulmonary embolism was the third leading cause of maternal deaths in our study followed closely by sepsis and blood transfusion. Pulmonary embolism (PE) causes only 2% of maternal deaths in developing countries. RN Qureshi et al[22] reported PE as among the three leading causes of death in their study conducted in Agha khan hospital Karachi. WHO has reported hemorrhage as the leading cause of maternal mortality in low resource countries. Oladapo et al[23] reported hypertensive disorders as leading cause of MM followed by obstetric hemorrhage (21%) and sepsis (20%) in their study in Nigeria. These studies strongly support results of our study. Deaths due to blood transfusion reactors have been reported in similar fashion by khan B, et al in their study. This indirectly shows burden of severe anemia, this part of world is dealing with. Deaths due to hepatic disorders has been reported as 4% by Khan B et al[8] and 2.5-9.7% by S N Jaffery et al[15] which is more or less similar to our study. Fawad A et al[12] also reported trends in MM due to hepatic (3.8%) and cardiac disease (3.8%).

Almost >90% of the deaths in our study occurred in uneducated women, belonging to poor families and having a non-booked status. Similarly, > 80% of women were in young reproductive age group (20-35yrs) and unfortunately of these women, >6% were having their first pregnancy. Poverty, illiteracy, and non-booked status has also been highlighted as significant causes of maternal death by Murphy e tal[9] and B Bhadra e tal[10] in their studies conducted in India and Bangladesh respectively.

Conclusion

There is a decreasing trend in MMR in our tertiary care hospital over the last decade but we are still far behind the set targets (70/100,000 live births) for 2030 by sustainable development goals. Poverty, lack of education, living far from hospital facilities and first pregnancy were the major contributors leading to maternal death. As hypertensive disorders and hemorrhage contributes to majority of maternal deaths, regular antenatal booking, identification of high-risk pregnant population and timely referral to well-equipped hospitals need to be emphasized to save precious maternal lives. Diverting the resources

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