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A retrospective study to evaluate epidemiological characteristics of maternal deaths in a tertiary level government hospital of Saurashtra region of Gujarat

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Abstract
Introduction: Pregnancy, although being considered a physiological state, carries the risk of serious maternal morbidity and at times death. This is due to various complications that may occur during pregnancy, labor or thereafter. Maternal mortality is universally considered as human development indicator in a country and determines the health status of the people. Information on maternal mortality is required to determine this status and to set priorities for policy making and programmatic and operation research strategies. This study was conducted to determine the maternal mortality rate and associated epidemiological characteristics in a tertiary care hospital.
Method: A retrospective hospital-based study of 55 maternal deaths was conducted over a period of one and half year from January 2017 to June 2018. Maternal mortality rate, epidemiological factors were assessed and results were analyzed using percentage and proportion with the help of Microsoft Excel 2007.
Result: A total of 55 maternal deaths occurred per 10,413 live births in research period. Most maternal deaths occurred in the age group of 20–30 years (81.82%), and in multiparous women (76.36%). Maternal mortality rate (MMR) came out to be 528.18 per 100,000 live births.
Conclusion: Most maternal deaths are preventable by optimum utilization of existing maternal and child health care facilities and identifying the bottlenecks in health delivery system. Emphasis should be made to reduce the maternal mortality by early registration, regular ANC & PNC visit, early detection of complication & its prevention, early identification of high risk pregnancies and timely referral to higher center.

Keywords: Maternal mortality ratio (MMR), antenatal care (ANC), tertiary referral center, Gujarat

Introduction
Pregnancy and motherhood are natural processes in the lives of women of reproductive age. These processes are generally considered to be positive and fulfilling experiences. However, for various reasons many women end up dying during pregnancy, childbirth and the post-partum period. Improving maternal health and reducing maternal mortality are accepted as human rights challenges and these issues have been prioritized in several international declarations and national policies. Improved scientific knowledge and the availability of modern technology have brought several significant successes in global health over the past five decades but maternal mortality reduction remains a serious challenge in the majority of low- and middle-income countries.
According to the World Health Organization (WHO), "A maternal death is defined as death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by pregnancy or its management" (ICD10). Maternal mortality is a direct indicator of the quality of health care services provided in community. It has large variations among different countries, different region and even in different institutes which are reflecting the type of maternal care provided and health status of the community.
India has a huge toll of maternal deaths, with 50,000 deaths in 2013, which constituted 17% of the global burden of maternal mortality [1]. It has achieved a significant decline in the maternal mortality ratio (MMR) from 892 maternal deaths/100,000 live births in 1972–76 to 178 in 2010–12. Nevertheless, the country is still far away from reducing it to 109 maternal deaths per 100,000 live births, which is the millennium development goal (MDG) 5 target for the country [2].

It is a major developmental concern because maternal morbidity and mortality occurs in their most productive years (age-group of 15-45). Majority of maternal deaths occur in the developing world among the poorest and most disadvantaged women [3].
Millennium Development Goal 5 calls for a 75% reduction in the maternal mortality ratio (MMR) between 1990 and 2015 but the maternal mortality ratio fell by nearly 44% over the past 25 years. As part of the Sustainable Development Goals, the target is to reduce the global maternal mortality ratio to less than 70 per 100 000 live births between 2016 and 2030.
Maternal Mortality Ratio (MMR) In India has shown a decline from 178 per 100,000 live births in the period 2010-12 to 130 per 100,000 live births in the period 2014-16.[4] Currently maternal mortality ratio (MMR) in India is 130/100,000 live birth and of Gujarat is 91/100,000 live birth [4]. Most of the evidence for maternal mortality is obtained through hospital data and community based reports, which are situated mostly in urban areas, whereas most of the maternal deaths are from rural areas. The current study is designated to evaluate various aspects of maternal death at tertiary care centre – P D U Medical College & Hospital Civil Hospital, Rajkot, Gujarat, India.

Primary Objective

1. To Find Out Maternal Mortality Ratio In The P D U Medical College & Hospital, Rajkot, A Tertiary Care Centre, In Study Period Scrutinized From The Medical Records Of The Concerned Department.

Secondary Objective

1. Maternal Deaths And Its Characteristics According To Age, Antenatal Care, Locality And Parity
2. To Suggest Ways To Reduce The MMR.

Material and Method

This is a retrospective study conducted over the period of one and half year from January 2017 to June 2018 in the Department of Obstetrics and Gynecology, P D U Medical College (Government Medical College), Rajkot, Gujarat, India.
Our Hospital is an urban tertiary care center and gets a large number of referrals from private maternity homes, Primary health centers from rural parts, community health centers, and civil hospitals of Saurashtra and Kutch region of Gujarat state.
All maternal deaths that occurred in the hospital ware scrutinized for various aspects likely to be related to death such as age, parity, ante natal care and locality of residence, and the data was analyzed to study the cause and complications leading to maternal deaths. A total of 55 cases were obtained from the patients' files of the maternal deaths from medical records.

Inclusion criteria

- Maternal deaths that occurred within the period of pregnancy
- Maternal deaths that occurred within 42 days postpartum

Exclusion criteria

- Maternal deaths that occurred due to accidental or incidental causes
- Brought Dead cases

Descriptive data was tabulated as absolute figures and percentages. The details of number of live births from JANUARY 2017 TO JUNE 2018 were collected from labor ward register and case files. Maternal mortality ratio for the study period was calculated by using the formula.

MMR= (Total no of maternal deaths/ Total no of live births) X100000

Results

During the study period there were 55 maternal deaths out of 10413 live births giving an MMR of 528.18 per 1 lakh live birth (Table 1).

Table 1: Maternal mortality ratio in the tertiary centre from January 2017 to June 2018.

Total no. of live births	Total no. of maternal deaths	Maternal mortality ratio
10413	55	528.18 per 1 lakh live births

The data of maternal deaths obtained from the tertiary care centre have been tabulated as follows.

As shown in Table 2, out of the 55 deaths, 45 (81.82%) were in the 20-30 age group, 10 (18.18%) were more than 30 age group.

Table 2: Maternal deaths and its characteristics according to age, (n = 55).

Age	No. Of Cases	Percentage (%)
<20	0	0
20-30	45	81.82
>30	10	18.18
Total	55	100

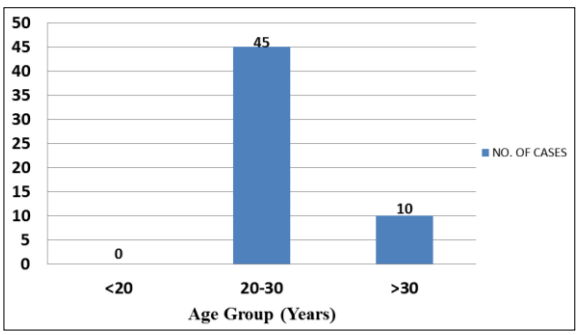

Chart 1: Maternal deaths and its characteristics according to age

Table 3: Maternal deaths and its characteristics according to parity (n = 55).

Parity	No. of Cases	Percentage (%)
Primigravida	13	23.63
Multygravida	42	76.36
Total	55	100

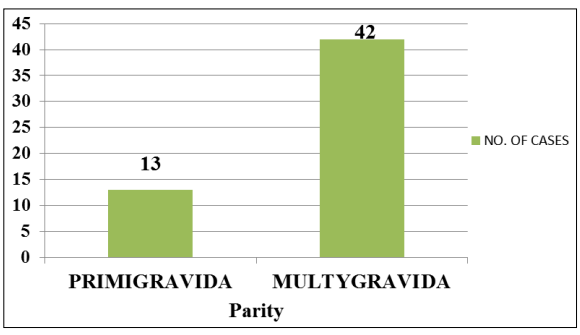

Chart 2: Maternal deaths and its characteristics according to parity (n = 55).

As shown in Table 3, out of the 55 deaths, 42 (76.36%) women were multigravida and 13 (23.63%) were Primigravida.

Table 4: Maternal deaths and its characteristics according to antenatal care (n = 55).

ANC	No. of Cases	Percentage (%)
Booked	49	89.09
Unbooked	6	10.91
Total	55	100

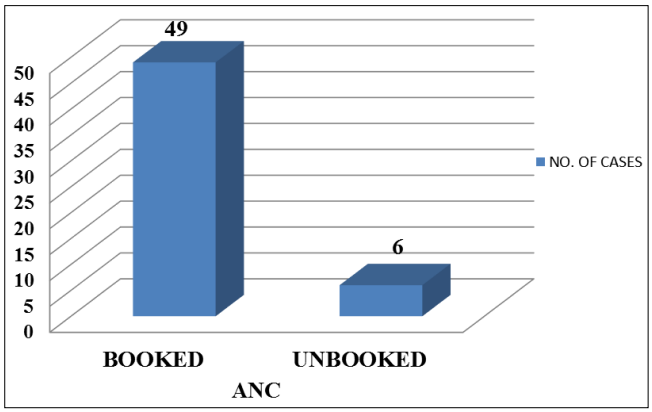

Chart 3: Maternal deaths and its characteristics according to antenatal care (n = 55).

As shown in Table 4, out of the 55 deaths, Maximum deaths 49 (89.09%) have occurred which were booked and only 6 (10.91%) cases were unbooked.

Table 5: Maternal deaths and its characteristics according to locality (n = 55).

Locality	No. of Cases	Percentage (%)
Rural	50	90.91
Urban	5	9.09
Total	55	100

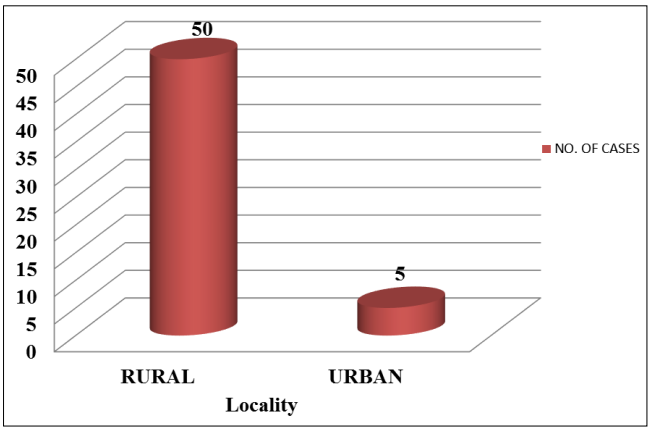

Chart 4: Maternal deaths and its characteristics according to locality (n = 55).

As shown in Table 5, out of the 55 deaths, 50 (90.91%) women deaths were belonging to rural areas and 5 (09.09%) were from urban areas.

Discussion

Death of mother is a tragic event. A vast majority of maternal deaths are preventable. High maternal mortality indicates poor maternal and child health care (MCH). This tragedy has immense effects on the family, especially on the child. In the present study, there were 55 maternal deaths among 10413 live births, giving an MMR of 528.18 per 1, 00, 000 live births, which is higher than national averages. The maternal mortality rate at teaching hospitals in India is very high. P D U Medical College, Rajkot, Gujarat, being a teaching institute and a tertiary care center gets complicated cases from rural areas. Admissions of moribund cases referred from the peripheral hospital have inflated this mortality ratio, like other teaching institutions of India. Like our study, other similar studies [5-7] from tertiary care institution reported MMR being higher than the national average.

This variation could be explained due to many variables, might be due to the effect of Janani Suraksha Yojana (JSY), under National Rural Health Mission, which on one side has tried to promote institutional deliveries to avert maternal deaths, on the other hand maximally un-booked complicated patients reaches hospital in moribund state, without any antenatal visit [8]. In our study, 81.82% of maternal deaths were in the age group of 20 to 30 years, as highest numbers of births are reported in this age group. In the study by Bhaskar K Murthy *et al*. 70% of maternal deaths were in the age group of 20 to 29 years [6]. Surekha N. Khandale, Kshama Kedar *et al*. in their study found that 78.19% of maternal deaths were in the age group of 18-30 years [7]. However, Ratan Das *et al*. in their study had found that out of total 256 deaths, 93 (36.32%) were in the age group of 19-24 years followed by 79 (30.85%) deaths in <19 years [8]. Our 81.82% figure is closer with and Ashok *et al*. [9] at 78.5% and Puri *et al*. [10] at 71.53%. Multigravidas comprised 23.63% while primigravidas 76.36% of the total deaths in our setup. On the contrary studies done by Purandare *et al*., [11] and Pal *et al*., [12] majorities of the deaths were reported in multipara (70% and 76%). Ashok *et al*. [9] observed that 50.8% of women who died were multipara.

More maternal deaths were reported in women from rural areas (90.91%). Very high percentage of booked patients in maternal deaths (89.09%) highlights the need of improvement in antenatal care. Contrary to this finding majority of studies shows higher maternal deaths in unbooked cases [7, 9-11].

Guin Gita *et al*., [5] in their study of the role of JSY on maternal mortality have also stated the importance of antenatal care in reducing MMR. They state that unfortunately JSY has put an undue stress on institutional delivery without making a sincere effort to promote the importance of antenatal care for reducing maternal mortality and morbidity. All our findings were similar to studies by Pal [12], Jain [13], Jadhav [14], Onakewhor [15].

Correction of anemia at grass root level is very important to prevent these deaths. MCH is essential as regular ANC check-ups can help detect and correct anemia. In summary, improvements in maternal nutrition; early identification and registration of all pregnant women in the first trimester of pregnancy; identification of high-risk pregnancies promptly and referred in time to a hospital for appropriate interventions and management, including swift access to lifesaving technology are available if things go wrong; would be the measures needed to make motherhood safe. Obstetricians and public health planners will need to identify women at an elevated risk of maternal death and to develop prevention strategies to avoid the conditions that cause these deaths.

Maternal deaths can be prevented by improving the health care facilities in rural areas by ensuring round the clock availability of certain basic drugs like injection magnesium sulfate, tablet misoprostol as most maternal deaths in rural areas are still due to eclampsia and post-partum hemorrhage. Early detection of high risk pregnancies and referring them to a tertiary center at the

earliest can reduce the complications of high risk pregnancies. The MMR in our study is higher than the national averages. Most deaths could have been avoided with the help of early referral, quick, efficient and well equipped transport facilities, availability of adequate blood and blood components, and by promoting overall safe mother hood. Even today most maternal deaths are seen in patients from rural areas, un-booked, illiterate patients and patients from low socioeconomic status. Improvement in primary health care in rural areas and proper implementation of NRHM programs and up gradation of hospitals in rural areas can definitely bring down the number of maternal deaths.

Conclusion

An attempt has been made in this study to throw light upon some of the factors which had contributed to maternal deaths in this tertiary care hospital so that timely measures can be taken to prevent such type of incidences in future. MMR in our study is very high as compared to national average of 130/1,00,000 live births, being a tertiary care hospital as most of the patients are referred from peripheral centers.

In our study the maternal mortality ratio has been recorded at the higher side with majority of death occurring between 20-30 years of age group. The present study highlights the importance of early antenatal registration of all pregnancies and regular follow-up of cases by trained staff. The lessons learnt through review of records of maternal deaths have helped us to identify the high-risk group, solely for the purpose of improving service-delivery system by ascertaining the cause of death, reason(s) for inability to provide appropriate care at appropriate time, and finding the key interventions at service-delivery level to prevent similar deaths. Most deaths could have been avoided with the help of quality antenatal; evidence based intranatal and good postnatal care, early referral, quick, efficient and well-equipped transport facilities, availability of adequate blood and blood components, and by promoting overall safe motherhood. We can also prevent it by optimum utilization of existing MCH facilities, identifying loopholes in health delivery system, early identification of high risk pregnancies and their timely referral to higher center. To reduce maternal mortality and morbidity, the main thrust should be on implementing basic and comprehensive obstetrics care. Analysis of every maternal death through maternal death audit, either at the community level or at the institutional level should be carried out. It will help in identifying the actual cause of maternal deaths and deficiencies in the health care delivery system that might contribute in formulating preventive measures to reduce pregnancy-related deaths.

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