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# Situational analysis of Maternal Death Review and factors influencing adverse maternal outcome by verbal autopsy in central part of Gujarat.

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**Abstract**

**Background:** The Indian government institutionalized the Maternal Death Review (MDR) process at the facilities and community level to identify the medical causes and socio-economic, cultural, and gaps in the health system that caused the delay in such deaths. However MDSR remains a statutory procedure; keeping aside main purpose of identifying the preventable cause. **Methods:** Mixed design study (Cross-sectional & qualitative designs) was conducted in the community from December 2021 to January 2022 (2 months) in the Kheda district. Situational Analysis of the existing maternal death review mechanism & Verbal Autopsy of maternal deaths that occurred during 1st April 2020 to 31st March 2021 were carried out. **Results:** There has been a rising trend in maternal mortality rate in the Kheda district for the last two years. 60% of maternal deaths were due to direct obstetric causes like hemorrhage, eclampsia, sepsis etc. 7.5% of maternal deaths occurred at home, while 22.5% of maternal deaths occurred en route. Ignorance of medical advice, Delay in reaching an appropriate medical facility and receiving inadequate treatment were the common contributing factors found in the qualitative analysis. **Conclusion:** Data accuracy & completeness, Governance and operational failures were identified as major contributing factors in the poor processing of Maternal Death Review (MDR). Identifying high-risk cases, appropriate referral & transport, up-gradation of hospitals, and monitoring of health services can reduce maternal mortality.

**Keywords:** Situational analysis, Maternal Death review, Verbal autopsy, MDSR

**Introduction: -**

Maternal mortality is a critical public health challenge for developing countries. Pregnancy is a normal physiological process that happens in all mammals still, women die due to complications during pregnancy and childbirth. Over 80% of maternal deaths could be avoided or prevented by actions that have proven to be affordable and effective, even in the poorer countries of the World.[1,2,3,4]

Despite achieving a sustainable reduction in maternal mortality ratio (MMR) in the last two decades, the MMR of India for 2017-19 is 103 per 100000 live births[5], which is far more than the majority of developed & many developing countries. India still represents 2nd highest maternal deaths in absolute number globally.[6,7,8] The Government of India is endeavoring to reduce the maternal mortality rate to <70 per 100,000 live births by 2030 to achieve the sustainable development goals (SDGs).[9] For Gujarat state, MMR has shown a steady declining trend but is still on the higher side of 70 (SRS 2017-2019) as compared to Maharashtra (38) and Kerala (30)[5].

In India, there is a well-documented understanding of the obstetric causes of maternal deaths.[10] However, insufficient attention has been given to exploring the contributing factors. Addressing this challenge requires an action-oriented approach to gather information on the specific locations, circumstances, and reasons behind maternal deaths, as well as the actions that have been taken.[11] The maternal death surveillance and response (MDSR) is one such system in which a continuous cycle of notification, identification, and review of maternal deaths is followed by actions to enhance the quality of care and prevent future deaths.

The Ministry of Health and Family Welfare (MOHFW) in India has established and institutionalized the MDSR process at both the facility and community levels. The objective is to identify socio-economic, cultural, and systemic gaps apart from medical causes of maternal deaths that contribute to delays in addressing such deaths.[12] However, MDSR is frequently performed solely as a mandatory requirement, with little effort made to uncover preventable factors.[13]

For further progress to be made in reducing MMR, the focus needs to change from analyzing group maternal data to individual maternal death, which gives in-depth information

about the population felt need, geographical area, medical and systemic causes leading to mortality among them.[14] Present study was conducted to do a situational analysis of the existing maternal death review (MDR) along with undertaking a verbal autopsy to capture the circumstances of death, sequence of events and identification of avoidable factors and action to improve health care at all levels of the health system, from home to hospital in the Kheda district.

**Material and Method:**

Present mixed design study (Cross-sectional & qualitative designs) was conducted in the community from December 2021 to January 2022 (2 months) in the Kheda district. A total of 40 maternal deaths reported during 1st April 2020 to 31st March 2021 in the Kheda district were included in the study. Data was collected in Maternal Death Surveillance & Response (MDSR) Verbal Autopsy Questionnaire,[13] after obtaining Ethical approval from the institutional ethics committee of Dr. N. D. Desai faculty of medical science and research. All appropriate consent from informants and authorities were taken.

In cross-sectional study, Situational Analysis of existing maternal death review mechanism was carried out for all 40 maternal deaths to collect the relevant information like, All norms of Maternal Death Surveillance & Response (Community Based Death review & Facility-Based Death Review) being followed, Notification of deaths Vs. expected deaths, Timeliness of notification, Completeness, correctness, consistency of forms, Compare & contrast maternal death data with past 3 years, analysis of Demographic & obstetrics profile etc. Data entry and analysis was done in Microsoft Office Excel and SPSS.

In qualitative design, out of 40 maternal deaths 20% (Total 8) were selected to conduct in-depth interviews. Our selection criteria prioritized common causes of death and ensured that there was no repetition of geographic areas or causes of death in subsequent cases. First we visited home of the deceased women and in depth interview was conducted with the person who was present with her starting from the development of illness till death. Aim was to identify chain (sequence of events) & missed preventable actions that contributed to the deaths. To get comprehensive view of the event, ASHA's interview were also taken separately.

During the interviews, extensive notes were taken along with an audio recording in Gujarati language. The interviews were transcribed verbatim and a thematic approach was adopted to analyze the qualitative data findings. The principal investigators (Patwa J. and Patel M.) conducted the interviews, transcription, translation, and theme analysis independently, each following the six stages described by Braun and Clarke (2006).15 Both are proficient in Gujarati and English. The researchers reviewed their preliminary analyses and came to an agreement on theme definitions and a common thematic structure. In the event of a disagreement, the themes

and codes were reviewed by a third author (Patel D.). Other authors reviewed the codes and themes before reporting.

**Result:**

In the year 2018-19 & 2019-20; 23 and 27 maternal deaths were reported in Kheda district respectively while in the year 2020-21, 40 maternal deaths were reported in the district. Reported maternal deaths in the year 2020-21 in the Kheda district were 74% and 48% higher than the year 2018-19 and 2019-20 respectively.

**Situational analysis**

Community Based Death review (CBDR) forms were available for all maternal deaths. Most of the CBDR forms were consistently filled however majority of forms were incomplete e.g., Open history (Narrative format) was blank in some of the forms. Information of GPLA (Gravida, Para, Abortion, Live birth) was filled wrong in almost all forms. Cause of death in all CBDR forms was correct, which was validated as per the available information.

Out of 40 maternal deaths, only 4 Facility-Based Death Review (FBDR) forms were available with the district health authority. Collector did four maternal death review meetings during the year 2020-21 for which Minutes of the meeting was prepared & recommendations were given.

**Table 1: Distribution of maternal death according to demographic profile.**

| | **Characteristics** | **Number (N=40)** | **Percentage (%)** |
|---|---|---|---|
| **Age (years)** | 18-25 years | 22 | 55.0% |
| | 26-30 years | 11 | 27.5% |

| | | | |
|---|---|---|---|
| | 31-35 years | 4 | 10.0% |
| | >36 years | 3 | 7.5% |
| **Area** | Rural | 35 | 87.5% |
| | Urban | 5 | 12.5% |
| **Religion** | Hindu | 35 | 88% |
| | Muslim | 5 | 13% |
| **Education ofmother** | Illiterate | 6 | 15% |
| | Primary | 26 | 65% |
| | Secondary | 8 | 20% |

The epidemiological characteristics of maternal deaths are shown in Table 1. Majority (55.0%) deaths were from 18- 25 years of age, 87.5% deaths were from rural area and 88.0% women were Hindu.

**Table 2: Distribution of maternal death according to obstetric profile.**

| | **Characteristics** | **Number (N=40)** | **Percentage (%)** |
|---|---|---|---|
| **ANC check-ups** | 0 to 3 | 6 | 17.5% |
| | 4 and above | 33 | 82.5% |
| **Place ofdelivery** | Trust/Private Hospital | 18 | 52.2% |
| | District hospital | 12 | 33.80% |
| | Medical College Hospital | 5 | 14.0% |
| **Type ofdelivery** | Caesarean section | 13 | 37.2% |
| | Normal delivery | 22 | 62.8% |
| **Outcome ofdelivery** | Alive | 26 | 74.4% |
| | Stillbirth | 9 | 25.6% |
| **Place ofdeath** | Medical College & hospital | 15 | 37.5% |
| | Trust/Private Hospital | 10 | 25% |
| | Transit/on the way | 9 | 22.5% |
| | Home | 3 | 7.5% |
| | Government Hospital | 3 | 7.5% |
| **Time ofdeath** | Ante-partum | 5 | 13% |
| | Intra-partum | 1 | 3% |
| | Post-partum | 34 | 85% |

| | | | |
|---|---|---|---|
| **Death as perGravida** | 1 or 2 | 22 | 55.0% |
| | 3 or 4 | 15 | 37.5% |
| | 5 or more | 3 | 7.5% |

The obstetric characteristics of maternal deaths are shown in Table 2. Majority maternal deaths were reported during postpartum period (85.0%), delivered at private hospitals (52.2%) and in primi or secondary gravida (55.0%).

**Figure 1:- Distribution of maternal deaths according to causes**

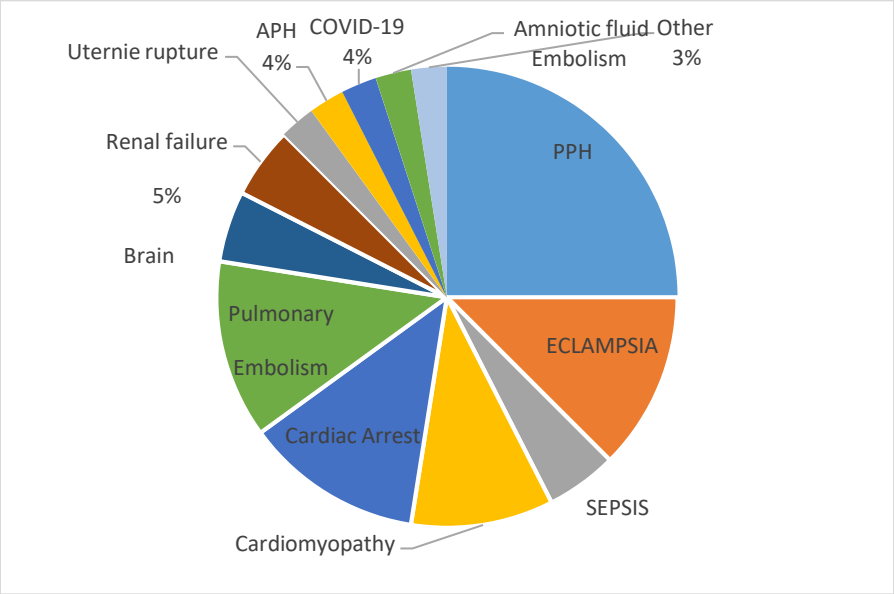


Figure 1 shows 60% of the maternal deaths were due to direct obstetric causes, while 40% of the maternal deaths were due to indirect causes.

**Figure 2: Pathway analysis of maternal death (n=40)**

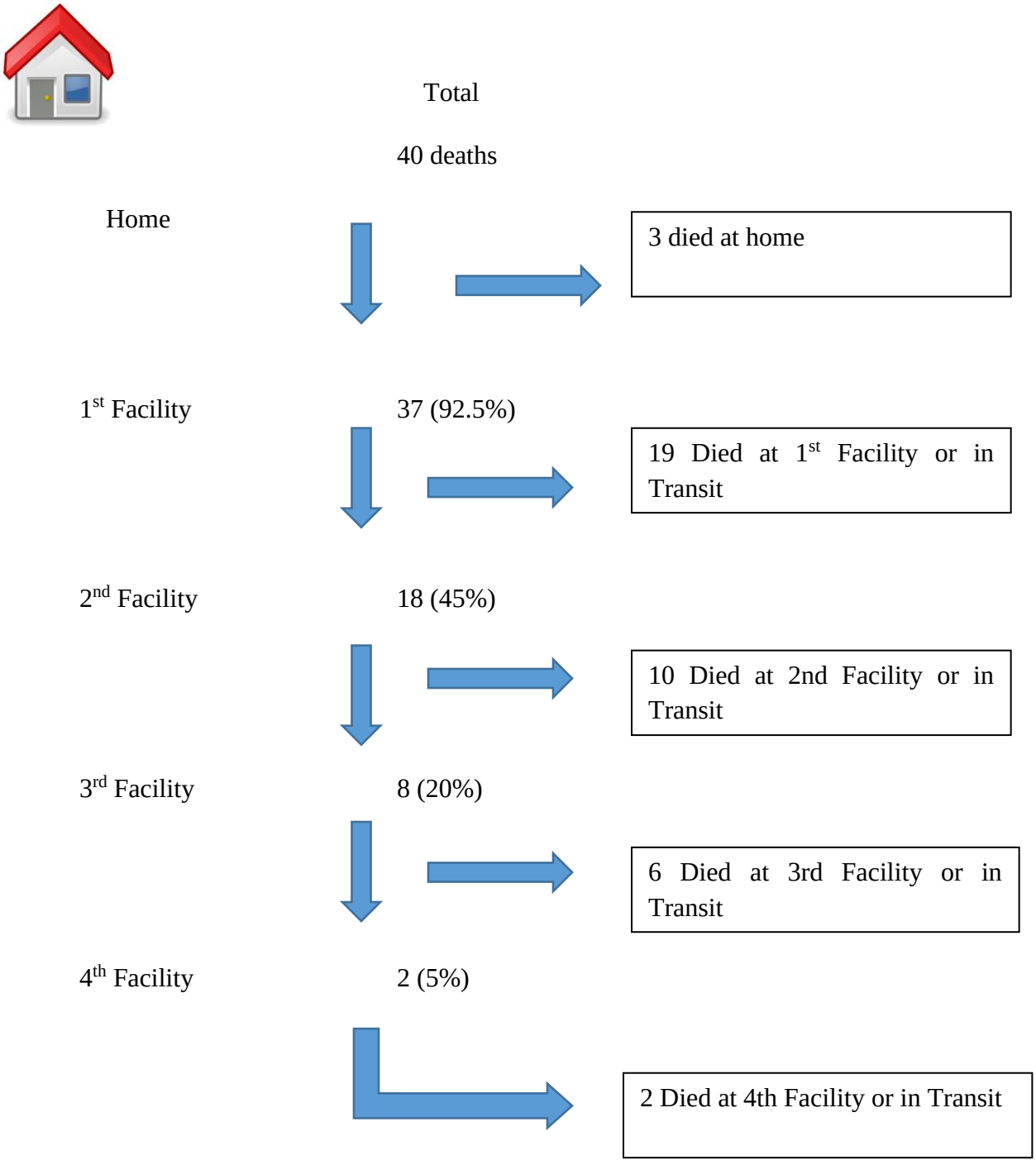


Figure 2 shows 25.0% of women were visited more than 2 facilities.

**Ignorance of medical advice**

Although pregnancy is considered as physiological condition, it is advisable to get expert medical opinion before conceiving as complications may start before, during or after pregnancy. Ignorance of such medical advice can lead to adverse maternal outcome.

**a. Illiteracy**

Poor health literacy can lead to underestimation of severity of medical condition or its complication. ASHA worker narrated

“She had congenital heart problem. Doctor explained her in detail about her heart problem & complications that will arise during pregnancy. Doctor had strictly advised her not to conceive. Despite that she ignored medical advice & conceived.”

**b. Socio-cultural belief**

"Son preference" is rooted in the traditional belief that a male child would carry forward the family lineage, provide financial support and look after the parents in their old age, while daughters would leave them after marriage. This social problem leads to multiple pregnancies within short span until they achieve their desire “Male Child” while totally ignoring physical & mental health of women. ASHA worker narrated

“She had 3 girl children before. They wanted male child. In her last delivery only, she had low Hemoglobin & developed complication. We repeatedly advised her to undergo for Operation (Tubal Ligation)”

**Delay in reaching an appropriate medical facility**

Once a decision to seek medical care has been made, other obstacle is delay in reaching an appropriate medical facility on time. At times crucial hour post-complication is lost either in scouting for vehicle or in transit.

**a. Lack of transportation**

Transportation difficulties, such as long distance and lack of readily available transport leads to delay in reaching an appropriate medical facility. Husband of deceased women narrated

"She started leaking. I called 108 ambulance. They told there was no ambulance available nearby and it will take time to attend. Then I called few private vehicles. They hesitated to come, citing that after dropping us at the hospital, returning would be difficult due to covid related restrictions."

**b. Seeking care at more than one medical facility**

Access to appropriate treatment is delayed when care is sought at the inappropriate level of health facility. The inability to provide comprehensive obstetrical care forces peripheral health centers to refer women needing such services. Mother-in-law of deceased women narrated

"We took her to the nearby government health center. She was examined by the nurse who later transferred her to another government health center. There she was treated with blood bottles. Next day morning she was again transferred to higher government health center which was 60 km away. On the way before reaching that center she died in ambulance."

**Receiving inadequate treatment**

**a. Experience with health care system**

Lack of oxygen & other basic medical supplies and disrespectful care were mentioned in the testimonies. Husband of deceased women narrated

"We took her to private hospital for delivery. After delivery she started feeling breathlessness. Hospital gave her treatment, but oxygen was not available in the hospital. After some time, her condition started deteriorating. So, doctor referred her to another hospital. She died in the transit before reaching to another hospital."

In another case, mother of deceased women narrated

"She started complaining of pain. We took private vehicle to reach nearby Government health center. Doctor was not available & nursing staff told to wait. No one attended her for 2 hours. She was screaming in pain, but they (health staff) didn't bother to give treatment. They were talking so rudely. So, we took her to another private hospital."

**Discussion: -**

Over the last two decades in India, maternal deaths have plummeted significantly due to socio-economic development and improved public health services being provided to the community. Maternal Death Review has had a significant role in defining the paths to be taken in further reducing the Maternal Mortality Ratio in India. In the year 2020-21 total 40 maternal deaths were reported in the Kheda district of Gujarat state. There has been a rising trend in maternal mortality rate in the Kheda district for the last two years.

Most Community Based Death review (CBDR) forms were filled in the Old Format of CBDR, while the new format of the form has been available for quite a long time. Information of GPLA (Gravida, Para, Abortion, Live birth) was filled wrong in almost all forms. This could be because the investigator might be copying this information from the mamta card, which is filled at the time of pregnancy detection; however, GPLA changes after delivery at the time of maternal death. It was observed that most of the maternal deaths were notified timely & filling of CBDR forms as per the guideline. However, there was a delay in Notification & filling of CBDR forms in a few cases because healthcare staff was busy in managing the Covid-19 pandemic.

Out of 40 maternal deaths, only 4 Facility-Based Death Review (FBDR) forms were available with the district health authority because they were unaware about the system of submitting the FBDR form. Similar findings were seen in study done by Kranti Vora et al in Gujarat state.[2] Collector did four maternal death review meetings during the year 2020-21. However, there was a gross deficiency in the number of maternal death review meetings conducted vs expected. One meeting/district/month might be due to district authorities being busy in the Covid-19 pandemic. More or less similar findings were seen in Chmielewska B et al. and Naik S et al. study.[16,14]

In the present study, most of the maternal deaths were among the younger age group, from rural areas and having low literacy level. In the present study, the majority of deaths occurred at Tertiary level hospitals & in transit; however, percentage of delivery conducted by such tertiary hospitals among deceased women is less which shows referral to higher center have been done at later stage of complication. In the present study, around three-fifths of the maternal deaths occurred due to direct causes like hemorrhage, eclampsia, sepsis etc., while the remaining two fifth were attributed by cardiac, renal, covid-19 etc., like indirect causes. The present study's

demographic and obstetric profile of maternal deaths were similar to previously published studies.[14,10,17]

In the present study, 7.5% of maternal deaths occurred at home, while 22.5% of maternal deaths occurred en route. Also, it was noticed that 5% of deceased women visited four health facilities, 20% visited 3 facilities and 45% visited 2 health facilities before she succumbed. These multiple referrals might have wasted crucial time, which suggests that no good higher obstetrics care facility was available nearby or might be a poor referral decision. Henry Kalter et al. & C Meh et al. study shown similar findings in their study.[18,19]

Contrary to common belief that women do not seek care, findings of the present qualitative research shows that almost all women sought care. Although factors like illiteracy & male child desire weighted more heavily than medical advice which lost their life.14 Seeking care at more than one medical facility compelled them to lose precious time in transit.[20,21] Although availability of good infrastructure like roads and prompt services of 108 ambulance has improved significantly over the last decade to reduce travel time, lack of transportation was spotted as common finding in the present study. However, covid-19 pandemic & covid related restrictions were the major contributing factors behind this.[16] Despite ongoing efforts to improve overall services at government health centers, the current study found delays in attending patients and disrespectful care.[20]

**Conclusion**

In the last decade, Gujarat state had made remarkable improvements in maternal mortality by implementing various policies; however rising trend of maternal mortality in the Kheda district is alarming. Although the Maternal death review (MDR) is functioning since 2006, data accuracy & completeness, Governance and operational failures were identified as major contributing factors in the poor processing of MDR. Most maternal deaths were seen in women from rural areas, less educated and who had to travel a lot to reach a tertiary care center. Ignorance of medical advice, lack of transportation, seeking care at more than one facility and poor experience at health care system were common missed preventable actions. Directly or indirectly Covid-19 pandemic also played vital role in maternal death by impacting health

services. Identifying high-risk cases, appropriate referral & transport, up-gradation of hospitals, and monitoring of health services can reduce maternal mortality.

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