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Maternal Mortality in India: Current status and alternative strategies to reduce

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Abstract
According to WHO, Maternal mortality is the annual number of female deaths from any cause related to or aggravated by the pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy. The leading cause of maternal mortality is hemorrhage. The primary complications that account for nearly 75% of all maternal deaths are severe bleeding, high blood pressure during pregnancy, infections, unsafe abortions, and complications from delivery. The sample registration system encourages India's maternal mortality ratio to fall to 113 in 2016-2018 from 122 in 2015-16 and 130 in 2014-16. To decrease the maternal mortality rate, the health care system should be reinforced with high-excellence services that should be equally and successfully distributed to remote and hilly areas. Families need to have frequent contact with skilled frontline workers, and continuous education of employees is essential. Family planning, safe abortion services, emergency obstetric care, research, and identification of high-risk pregnancies are also essential to reduce maternal mortality in India.

Keywords: Maternal mortality, strategies, current status, sample registration system, family planning, emergency obstetric care

Introduction
Maternal mortality refers to death due to complications during pregnancy and childbirth [1]. Maternal mortality in a region is an indicator of women's reproductive health [2]. According to World Health Organisation (WHO), maternal mortality is the annual number of female deaths from any cause related to or aggravated by the pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy [3]. The maternal mortality ratio is calculated by dividing the number of maternal deaths over a specific time period by the number of live births [4]. The devastation of a woman dying in childbirth extends beyond her death, distressing her newborn, her family, her other children, and her community [5].

The leading cause of maternal mortality is hemorrhage. A similar percentage of maternal deaths were caused by pre-existing medical disorders aggravated by pregnancy. During pregnancy and childbirth, complications leading to maternal death can occur without warning at any time [1]. The primary complications that account for nearly 75% of all maternal deaths are severe bleeding, high blood pressure during pregnancy, infections, unsafe abortions, and complications from delivery [4]. Illegally induced abortion is linked to 50 % of mother fatalities from infection [6]. (Fig.1) Traditional practices followed during perinatal period contributes crucial role in the maternal and neonatal health and mortality [7]. In low-income countries, major causing factors are inadequate facilities, services, and equipments and inadequate prenatal, intranatal, and postnatal care by skilled birth attendants. Family planning is the most critical intervention for reducing maternal mortality for non-pregnant women [8].

Search Strategy
The search was conducted on current status of maternal mortality and different strategies to reduce maternal mortality rate in India. Majority of research articles includes studies conducted in India as well as reliable data provided by government of India.

A concept paper was completed by searching the published literature in PubMed, Embase, Google Scholar, Medline, Cochrane Library, clinical key, books, references list of relevant articles and direct databases through electronic media to identify the current status and strategies to reduce maternal mortality rate in India. Integrative reading, thorough literature search and review of published and unpublished work has been done to have complete information about the topic. We have used free text and controlled vocabulary such as medical subject heading for electronic literature search. The free text has been cut where necessary to accommodate alternate word endings. In the search result, only the article written in English were found. The search terms used were "maternal mortality rate in India", "MMR current status given by Ministry of Health and family welfare", "Causes of MMR in India", Strategies to reduce MMR", "WHO Recommendations". Terms were also narrowed down to get an exact relevant literature representing our topic. Finally, total of 34 articles have been selected for our concept paper. Any disagreement and discrepancy among reviewers were resolved by further detailed search and discussion.

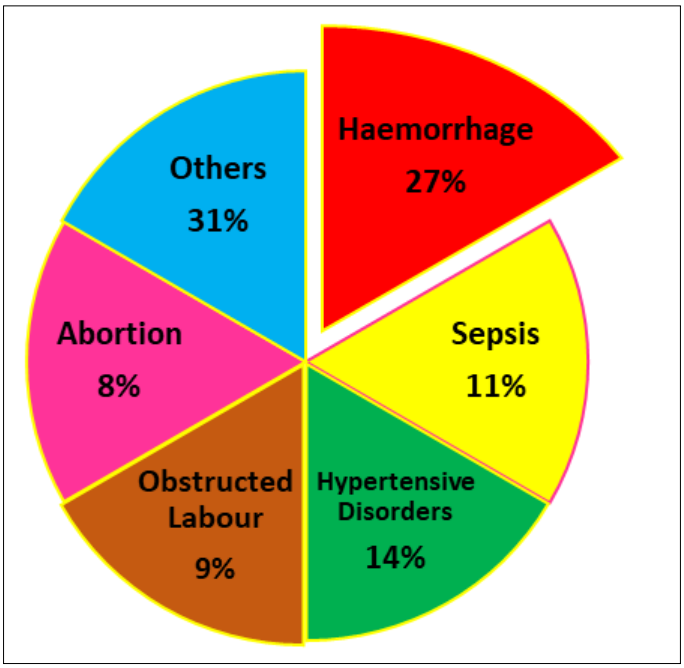

Fig 1: Causes of maternal Mortality in India

Maternal Mortality Ratio: Current Status

In 2017, over 295000 women died worldwide during and after pregnancy and childbirth. The vast majority of these deaths (94%) happened in low-resource areas, and the majority of them could have been avoided. The maternal mortality ratio (Fig.2) decreased by about 38% globally between 2000 and 2017. Sustainable Development Goals 3 include a primary target 'reducing the global Maternal Mortality Ratio (MMR) to less than 70 per 100000 births, with no country having a maternal death rate more than twice the global average' [4].

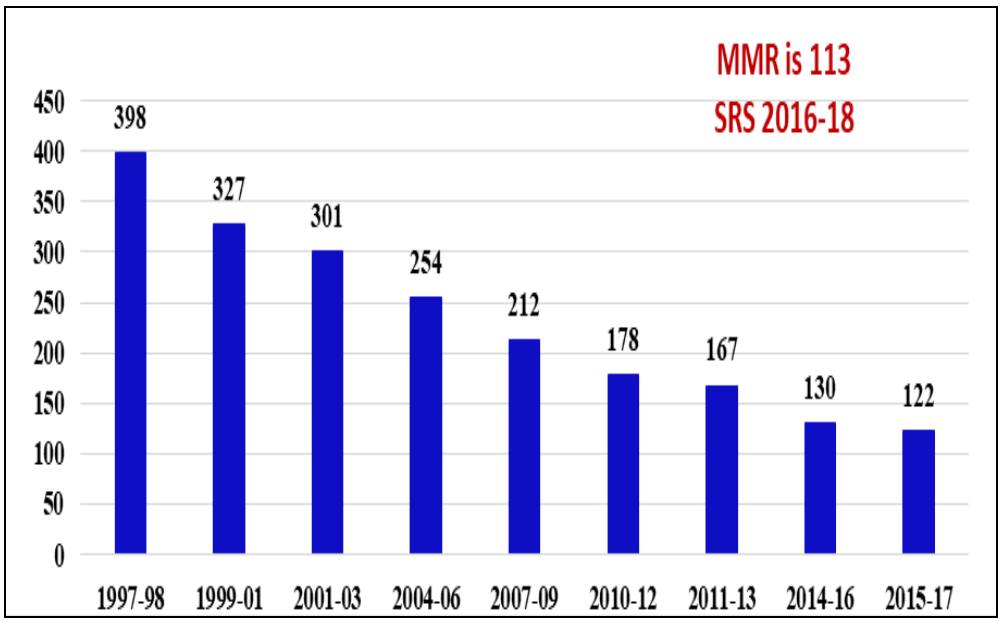

Fig 2: Trends in Maternal Mortality Ratio in India

The Sample Registration System (SRS) is the country's largest demographic sample survey, and it provides direct estimates of maternal mortality through a nationally representative sample. It is encouraging that India's maternal mortality ratio fell to 113 in 2016-2018 from 122 in 2015-16 and 130 in 2014-16 [2]. India has made impressive achievements in reducing MMR substantially over the years [9]. In 1997-98, India's maternal mortality rate was unusually high, with 398 women dying during childbirth per 100,000 live births. MMR in the country has declined to 113, which shows a 7.4% decrease in MMR from previous data (2016-18) [10]. However, it is still nearly double the world health organization's sustainable development goals. With an MMR of 113, India has missed reducing MMR to 100 by the National health policy 2017 [11].

As per the states of India, Assam had the country's highest MMR of 215, followed by Uttar Pradesh and Madhya Pradesh, which had MMRs of 197 and 173, respectively. Kerala had the lowest MMR of 43, followed by Maharashtra and Tamil Nadu, which had MMRs of 46 and 60 [2]. The number of states that have met the Sustainable Development Goals (SDGs) target has increased from three to five, with Kerala (43), Maharashtra (46), Tamil Nadu (60), Telangana (63), and Andhra Pradesh (65). 11 states achieved the target of MMR set by NHP which include the above five states as well as Jharkhand (71), Gujarat (75), Haryana (91), Karnataka (92), West-Bengal (98) and Uttarakhand (99), according to the ministry [12].

How has India been successful in reducing MMR?

WHO applauds India for making significant progress in recent years in lowering the maternal mortality ratio from 556 per 100000 live births in 1990 to 113 per 100000 live births in 2018. India's exceptional performance is due to four major initiatives.

- Essential maternal health service coverage has doubled since 2005, while the proportion of institutional deliveries in public institutions has nearly tripled, from 18% in 2005 to 52% in 2016.
- Second state-subsidized demand-side financing like the Janani Shishu Suraksha Karyakram provides free transportation and no-cost delivery to all pregnant women, including cesarean section.
- Third, India has prioritized the reduction of social determinants of maternal health. India's women are more literate than ever before, with 68 percent reading and writing. They are also marrying later in life, with only 27% of them marrying before the age of 18. These reasons gave Indian women more autonomy over their reproductive life.
- Finally, the government has made significant efforts to promote campaigns like Pradhan Mantri Surakshit Matritva Abhiyan, which is needed to make further progress and meet the SDG targets. [13, 14].

Strategies to reduce the maternal mortality rate

In the post-2015 agenda maternal well-being, safety, survival, and continuous development must remain a major goal and prime concern for expenditure. Non-clinical features of respectful maternity care are just as vital as suitable clinical interventions. To decrease the maternal mortality rate, health care system should be reinforced with high-excellence services which should be equally and successfully distributed to remote and hilly areas with inter-sectoral coordination and support at all levels. Maternity services should be distributed according to local maternity problems and hurdles they face to get benefits from services. [15].

The heart of this idea of change is improving interactions between families and frontline workers. For more life-saving interventions to be adopted and spread, more families need to have frequent contacts with skilled and motivated frontline workers who provide good quality care [16]. To increase clinical understanding and handling of complex cases, there is a definite need to continuously educate employees in the public and private sectors. Throughout the process, vigilance must be maintained. It is essential to develop new protocols and prioritize those that already exist [17]. It was recommended in a systematic review of breastfeeding practices in India to follow exclusive breastfeeding practices until 6 months to cut off the rates of neonatal mortality [18].

Well-trained midwives (Midwifery Led Clinics)

Any country serious about lowering maternal mortality must concentrate on well-trained midwives in the hospital and the community [19, 20]. In the care and treatment of a mother and child during the birth process, the midwife's function is unique; it is comprehensive and includes teaching, treatment, and collaboration with a highly competent medical team [21]. The midwives must be prepared for all emergencies, including medical factors such as obstetrics complications, referral problems such as transportation inadequacies, and belief factors such as fear of hospitals. Midwives are one group of healthcare workers that will reduce the maternal mortality rate [22]. One of the most critical initiatives for minimizing maternal mortality is to ensure that all women give birth with a qualified attendant. [23].

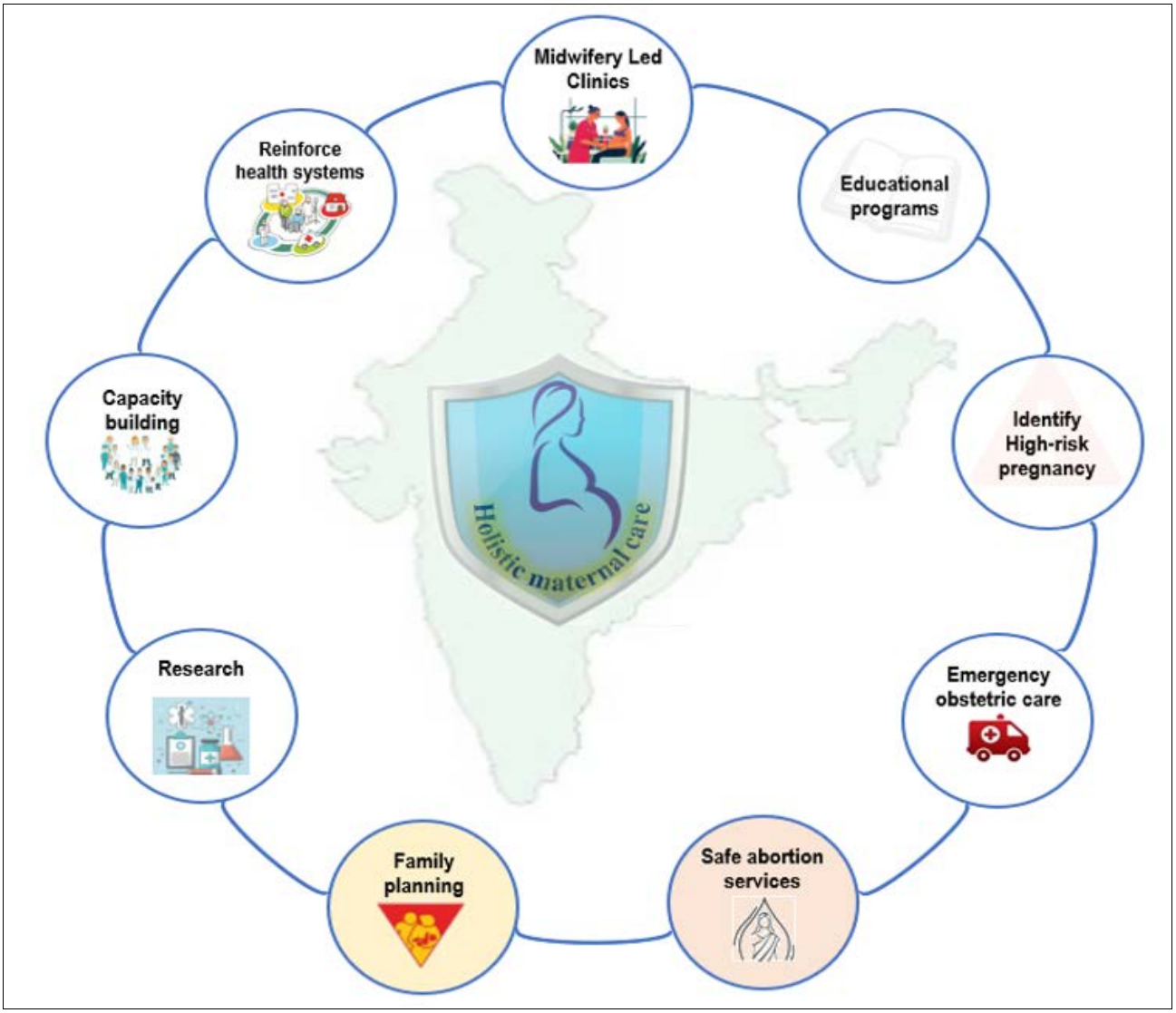

Fig 3: Model to reduce maternal mortality rate

Family Planning

It is one of the safe motherhood initiatives' four pillars for reducing maternal death in developing countries. It may be the single most significant intervention for attaining this aim [24]. Family planning can reduce mortality in women in several ways, like reducing unwanted pregnancies, allowing the mother to recover between pregnancies, and reducing ectopic pregnancies and some cancers [25].

Safe abortion services

Abortion is safe when approved by a method that WHO recommends and appropriate to pregnancy duration and when the individual is performing the abortion has the necessary skills. Complete sexual education, unwanted pregnancy prevention and legal abortions can help to prevent unsafe abortions [26, 27].

Emergency obstetric care

The significant countries decided to incorporate emergency obstetric care within their national health care system. Emergency obstetric care refers to skilled health practitioners providing life-saving services for maternal and newborn problems. Hypertensive illnesses with eclampsia, postpartum hemorrhage, infections, obstructed labour, ruptured uterus, and unsafe abortions are the leading cause of maternal mortality, which can be prevented by emergency obstetric care [28].

Capacity building for staff

A skilled birth attendant is someone trained in the abilities needed to manage normal labour and delivery, such as a nurse, midwife, or physician [29]. Development of skills through training programs for all types of service providers. For example, MBBS doctors receive training in life-saving anaesthesia techniques, emergency obstetric care including C-sections, training of ANM and nurses for skilled birth attendants, and MO training in comprehensive abortion care. Emergency obstetric care, including C-sections, has been taught to 1352 doctors. There are 69760 SNs/LHVs/ANMs who have been trained as SBAs as per the state report [30].

Reinforce health systems

Both hardware (confirming the accessibility of vital health set-up, facilities and supplies) and software (determining and handling service distribution, enhancing transparency, confirming community involvement and engagement, and providing humble maternity care) are important to reinforce the health system. Professional associations are critical in establishing standards for education and fundamental competencies of healthcare workers which will eventually

help in reinforcing our healthcare system [15, 31].

Research

Research efforts must continue as new approaches to studying maternal morbidity are developed. Furthermore, more assessments of severe maternal morbidity are conducted, and data from the investigation is reviewed. These reviews have been demonstrated to minimize maternal mortality [32]. Evidence-based practices related to antennal, intranatal, and postnatal periods are essential to implement at the ground level to reduce maternal mortality.

Educational programs for pregnant women

Prenatal education is crucial for ensuring a healthy pregnancy. Prenatal education encourages expectant mothers to maintain a healthy lifestyle, manage stress, promote a healthy diet, avoid harmful chemicals, and recognize warning signs [33]. Creating awareness among local women of childbearing age will ultimately increase their satisfaction and improve perinatal outcomes [34].

Identify High-risk pregnancy

A key action point is improving antenatal care in a focus to identify high-risk pregnancies [35]. To guarantee the best possible outcome, women with high-risk pregnancies should be cared for by a specific team of healthcare experts. The Pradhan Mantri Surakshit Matriva Abhiyan is an initiative of India's Ministry of Health and family welfare to identify high-risk pregnancies early and follow them up to be referred to healthcare centres with higher facilities so that women can have healthy delivery [36].

Conclusion

It is encouraging that India's maternal mortality ratio fell to 113 in 2016-2018 from 122 in 2015-16. WHO applauds India for making significant progress in recent years in lowering the maternal mortality Rate. As per the states of India, Assam had the country's highest MMR of 215 and Kerala had the lowest MMR of 43. According to sustainable development goals 3, a major target is 'reducing the global MMR to less than 70 per 100000 births. This can be further achieved by family planning, safe abortion services, emergency obstetric care, skilled birth attendant, capacity building, research, identification of high-risk pregnancies, and educational programs for pregnant women.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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