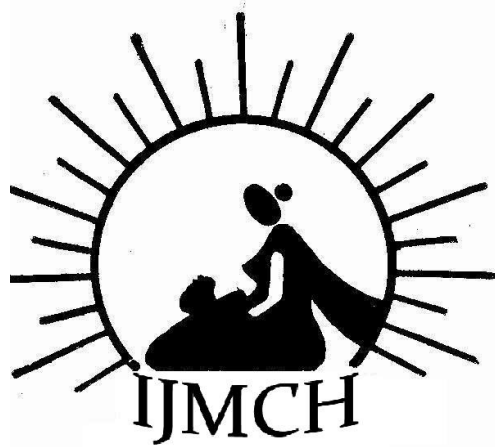


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Goal: A critical review**

*Anand Ahankari
Takawira Marufu*

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India's progress toward the 5th Millennium Development Goal: A critical review

¹Anand Ahankari, ²Takawira Marufu

¹Project Coordinator, Halo Medical Foundation, Block Tuljapur, District Osmanabad Maharashtra, India and PhD Scholar, University of Nottingham,²PhD Scholar, University of Nottingham, UK.

Correspondence: Dr. Anand Ahankari

ABSTRACT

Rational: The 5th millennium development goal is primarily aimed to reduce maternal deaths by 2015. In response, various maternal and child health initiatives are implemented at national level in India. However maternal health in the country showed a little progress. Therefore, we conducted a narrative review to understand the progress towards the 5th MDG and challenges in the existing healthcare system. **Methodology:** We conducted electronic search involving four databases and included 22 English language studies. We presented overall data along with the narrative synthesis. **Result:** We observed that maternal mortality is declining with an average annual reduction of 4%, which is inadequate to achieve the goal by 2015. It is observed that the reduction of mortality is not only dependent on availability of health services, but it is linked to socioeconomic factors. Issue of poverty, infrastructure deficiencies, inadequate healthcare facilities and limited access are primary challenges to achieve the 5th MDG in the available timeframe.

Keywords: Maternal mortality, Millennium development goal, India, Maternal health, 5th MDG

BACKGROUND

Globally maternal health advancement and healthcare improvements have been key topical issues to address preventable maternal and child deaths. It is part of the Millennium Development Goals (MDGs), which is a blue print agreed by most of the countries and development institutions to galvanise unprecedented efforts to meet the needs of the poorest countries. The 5th MDG is designed to improve maternal health at global level, by establishing universal healthcare access throughout the reproductive life of a woman (1). The main objective is to reduce the global incidence of maternal deaths to 100 per 100,000 deliveries by 2015 (1). There is a major difference in healthcare systems in developed and developing parts of the world, e.g., a woman in the developing world is subjected to 36

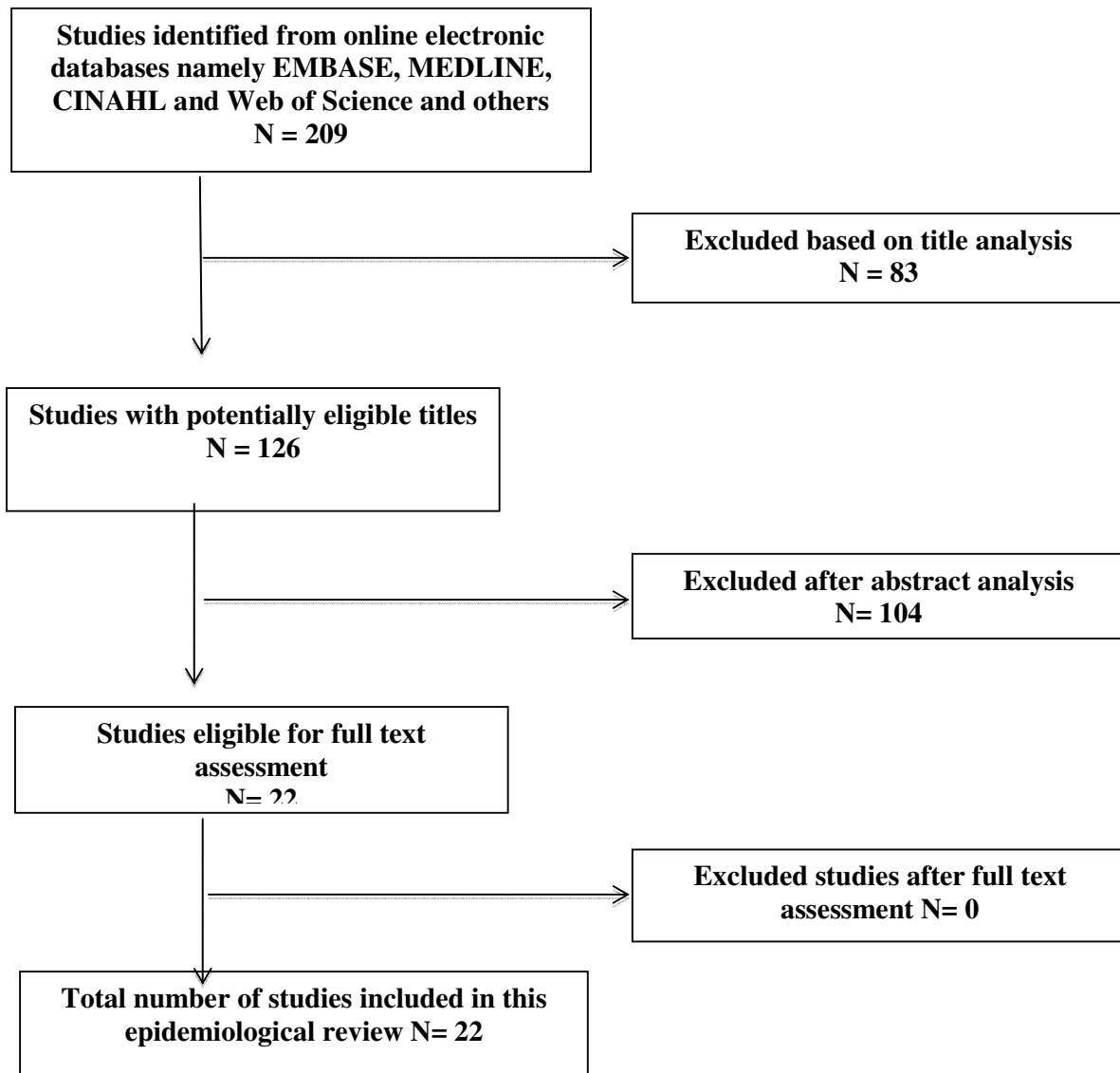
times of higher risk of death during pregnancy, compared to a woman in the developed world (2). Only 35% deliveries are conducted by skilled birth attendants (SBAs) in developing countries, and nearly 85% were performed under observation in the developed nations (3). Similar disparities are observed in several healthcare areas such as; provision of family planning needs, antenatal visits coverage, postnatal care services, vaccination and access to emergency obstetrics care (1,2,3).

Underpinned by these inequalities, programs to achieve the MDG received great eminence in the last decade with progress at global level reported to be very slow and unsatisfactory. The global reduction in Maternal Mortality Ratio (MMR) is less than 0.4% per year, and thus nearly 188 years will be required to achieve MDG 5 with the current progress rate (4). Maternal health services in India showed little improvements over a ten-year period from 1998 to 2008 (5). WHO estimated about 358,000 maternal deaths in 2008, and nearly 22% (78,000) of these deaths occurred in India (6). The MMR is declining in the country, but it remained higher compared to the expected decline rate. As a result, three quarter reduction by 2015 is challenging (7). Reducing MMR is certainly important area to focus in India, therefore we conducted the review to assess the progress of India as a nation towards the 5th MDG, and we also aim to address challenges in the existing healthcare system.

MATERIAL AND METHODS

We conducted an online search through EMBASE, MEDLINE, CINAHL and Web of Science databases by using the medical search terms (maternal health, pregnancy, maternal mortality, maternal death, India and Millennium Development Goals). These terms were also combined as part of the search strategy for relevant articles. We used a three-stage approach for study selection, initially by the title then the abstract screening and full text analysis. Detailed online database search is outlined in Figure 1. Two authors independently conducted the search and differences were resolved by consensus. We obtained full text of those where decision could not be made based on title or abstract alone. We included cross sectional surveys, reports, reviews, case studies, and both qualitative and quantitative data were extracted on pre-piloted forms.

Figure 1: Flow diagram of included and excluded studies



Studies who had information about the 5th MDG and India, was the primary criteria of inclusion. Only English language studies indexed on above four databases until March 2012 were included in the review. Papers addressing major challenges to achieve the MDG were identified and information was extracted on forms separately. Additionally, we searched publications by the UN and WHO regarding MDG and India. Based on extracted data from included studies, we conducted information synthesis to evaluate India's progress to achieve the 5th MDG. Search outcomes are detailed in Figure 1 and characteristics of included studies are described in Table 1. Individual statistical results and data were presented in the results, and critical analysis was performed in the discussion section. Data extraction was confirmed between two authors and synthesis was agreed within the group. Ethical approval was not required for this research.

RESULTS

The electronic search generated 209 articles. Out of which, 83 were excluded based on title screening and remaining 126 were considered for abstract analysis. Twenty-two articles were found eligible for full text assessment and were included in the review. Articles were grouped in two areas; a) studies which conducted statistical analysis to assess India's progress to achieve 5th MDG and, b) studies addressing challenges in achieving 5th MDG in India. Out of 22 studies, eight studies were cross sectional studies, two were evaluation reports, one was a case-control design, seven were reports, three were systematic reviews and one was a case study (Table 1).

There were eight surveys of which, seven were conducted in more than one country, based on national health survey data (3,7,8,9,10,11,12) and one study was conducted based on national level data of India (13). In cross sectional studies, we observed similarities in methods, indicators used and outcomes in these studies. Most common indicators used were vaccinations, emergency obstetrics facilities, delivery outcome and family planning services. Data from the 1990s was considered as baseline measurement and surveys found that MMR is declining in India with the 4% of annual reduction rate (7). The study showed that the decline rate was higher compared to Indonesia (0.4%), Mexico (1.9%) and Brazil (3.9%). In India the MMR was 637 in the 1990, reduced to 310 in the 2008 (62.48% of reduction in the last 28 years), an estimated annual decline range of 3.8% to 4.6% (7).

Two evaluation reports were based on pre and post questionnaire surveys, where maternal health services were assessed (14,15). Studies conducted analysis of government health records in North India and suggested importance of holistic approach to understand maternal health issues. The case control study identified primary reasons of maternal mortality as; young age at marriage, obstetrics complication, poverty, and home deliveries (16).

Seven reports included in this review considered the challenges in the Indian health system (5, 17-22). We also included a case report in the review (27). We obtained three systematic reviews related with maternal mortality and MDG 5 (4,23,24). Primary healthcare challenges faced by the Indian healthcare sector unanimously identified in these reports and commentaries were; infrastructure, emergency care facilities and transport resources. The necessity of modern obstetric medical expertise and insurance coverage were reported to be fundamental requirements to achieve the goal. Consensus from included studies outlined that millennium goals are interlinked and their outcomes often influence each other. Systematic reviews presented main causes of maternal mortality and highlighted challenges in the existing health facilities in developing countries.

Table 1: Included study table

No	Study title	Author, year and journal	Study design	Countries involved or Sample size if mentioned
1	Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5	Hogan et al (2010) The Lancet	Cross sectional	181 countries
2	Countdown to 2015 decade report (2000-10): taking stock of maternal, newborn, and child survival	Bhutta et al (2010) The Lancet	Cross sectional	68 countries
3	Mind the gap: equity and trends in coverage of maternal, newborn and child health services in 54 Countdown countries.	Boerma et al (2008) The Lancet	Cross sectional	54 countries
4	Estimates of maternal mortality worldwide between 1990 and 2005: an assessment of available data	Hill et al (2007) The Lancet	Cross sectional	161 countries
5	The Millennium Development Goals: a cross-sectoral analysis and principles for goal setting after 2015	Waag et al (2010) The Lancet	Cross sectional	181 countries
6	Factors that determine the use of skilled care during delivery in India: implications for achievement of mdg-5 targets	Hazarika I (2011) Maternal and Child Health Journal	Cross sectional	India 31,797 women
7	Maternal, neonatal, and child health in Southeast Asia: towards greater regional collaboration.	Acuin et al (2011) The Lancet	Cross sectional	4 countries
8	Progress towards Millennium Development Goals 4 and 5 on maternal and child	Lazano et al (2011) The Lancet	Cross sectional	9 countries

	mortality: an updated systematic analysis			
9	Maternal Mortality Ratio and Predictors of Maternal Deaths in Selected Desert Districts in Rajasthan	Gupta et al (2009) Women health Issues	Case-control	411 villages with 25,925 households India
10	Achieving millennium development goals 4 and 5: A snapshot of life in rural India	Mullick S and Serle E (2011) BJOG	Case study	3 cases
11	India's progress towards achieving the targets set in the millennium development goals.	Elizabeth K (2008) Journal of Pediatrics	Report	Not applicable
12	Towards achieving millennium development goals in the health sector in India.	Agarwal S (2005) Journal of Indian Academy of Clinical Medicine	Report	Not applicable
13	Looking beyond statistics for MDG 5	Bick D and Sandall J (2010) Journal of Midwifery	Report	Not applicable
14	Midlevel health-care providers' key to MDG 5	Chong Y and Tan E (2011) The Lancet	Report	Not applicable
15	Millennium Goal 5	Falconer A (2011) OGRH	Report	Not applicable
16	22) Meeting MDG5: good news from India	Paul V (2007) The Lancet	Report	Not applicable
17	Meeting MDG-5: an impossible dream	Rosenfield et al (2006) The Lancet	Report	Not applicable
18	Achieving Millennium Development Goals 4 and 5 in India.	Chatterjee A and Paily V (2011) BJOG	Evaluation study	India
19	Saving mothers and newborns through an innovative partnership with private sector obstetricians:	Mavalankar et al (2009) Women Health Issues	Evaluation study	India

	Chiranjeevi scheme of Gujarat, India			
20	Evidences-based practices to reduce maternal mortality: A systematic review.	Piane G (2008) Journal of Public Health	Systematic review	Not applicable
21	WHO analysis of causes of maternal death: a systematic review	Khan et al (2006) The Lancet	Systematic review	Not applicable
22	Reducing maternal mortality: A review of progress and evidence based strategies to achieve millennium development goal 5	Sullvian T and Hirst J (2011) Health Care for Women	Systematic review	Not applicable

DISCUSSION

All papers included in this study have shown that MMR is declining in India, but the rate is not adequate to achieve the goal by 2015. The rate is significantly lower compared to China, Sri Lanka and Bangladesh, where reduction rate remained higher compared to India. Bangladesh had increased the number of SBAs since 1998 and nearly 50% of reduction in mortality has been observed in ten-years (25). Similarly Morocco and Mongolia showed notable progress, where 70% of reduction has been achieved (7). A Report highlighted that Sri Lanka, Malaysia and China achieved the 5th MDG in 2008 (Table 2) and these countries showed significant reduction in child mortality (7).

Challenges within the Indian healthcare system

Maternal health is influenced by various factors such as socioeconomic status, health inequality, gender imbalances, nutrition support and access to emergency obstetric care (1,2). Across the whole of India, it is estimated that only 51% of deliveries are performed under professional supervision, less than 5% of rural population has access to emergency obstetrics care, only 51% of rural zones are powered with electricity, 55% pregnant women are anaemic and only 55% are able to read and write (12). It has been observed that comprehensive health programs were the major contribution in the countries where more than 70% of reduction in MMR is achieved. The 'Lives Saved Tool Analysis' by Acuin and associates (11) identified that there is a strong association between poverty, inequality and maternal mortality. The lack of health resources in India such as deficiency of health professionals (mainly in rural areas), limited emergency services, electricity interruptions and restricted transport infrastructure were the principal barriers to improve service coverage and thus health outcomes (3).

Table 2: Maternal Mortality Ratio (Uncertainty interval) per 100,000 live births (Source Hogan et al 2010)

No.	Country	Year 1980	1990	2000	2008
1	India	677 (408-1080)	523 (310- 835)	318 (190-506)	254 (153-395)
2	Bangladesh	1329 (800- 2105)	724 (420-1196)	574 (344-900)	338 (195-546)
3	Maldives	1059 (405- 2777)	366 (145 -776)	125 (48-272)	75 (28-167)
4	Sri Lanka	92 (81-105)	52 (46-60)	40 (36-46)	30 (25-35)
5	Iraq	241 (136- 404)	212 (131-335)	174 (107-270)	130 (73-211)
6	Mongolia	959 (745-1193)	404 (366 -501)	257 (203-320)	207 (163- 255)
7	Morocco	601 (396-885)	384 (240-570)	262 (165- 402)	142 (70-200)

India is currently facing a dilemma in training and retaining SBAs and the proportion of SBAs varies across Indian states. In the State of Kerala, in 2005, 99% of deliveries were conducted under observation, but in the north India, Nagaland state had only 25% of deliveries by SBAs (13). Moreover, Chatterjee and Paily (14) showed a serious infrastructure deficit regarding availability of obstetrics beds in the country. It is estimated that about 26 million women get pregnant every year and there are only 20 million obstetric beds the country. These differences are widespread with the impact compounded in rural regions, where availability of SBAs, antenatal clinics, vaccination and healthcare providers are relatively less compared to urban regions (12).

The five major causes of death during pregnancy (20) include haemorrhage (causing 31% of deaths during pregnancy), followed by sepsis (12%), hypertension (9%), obstruction (9%) and labour complications (6%). A review by Khan and associates (23) reported that 25.7% of deaths in South Asia are caused by haemorrhage during delivery. Recording each maternal death at national level is obviously challenging, however a uniform data collection system specifically developed for maternal deaths could be valuable a) to develop evidence-based interventions and b) to design future public health programs.

Included studies had some limitations mainly associated with study designs. In case of cross sectional surveys, temporal relationship could not be established, and thus it is challenging to provide confirmed reasons of each maternal death. The global level comparison is challenging where large numbers of countries are involved and data being collected in different ways. However, in some included studies, predictive model sampling such as the Gakidou-King weights were applied to correct biases and design limitations (7). We consider the review to be of high necessity to update and provide recent information about MMR and India, which is the primary strength of the paper.

CONCLUSION

Maternal health is an important area of research in India. The complex issue is influenced by several factors such as infrastructure, skills of healthcare workers, health resources and community awareness. The issues need to be addressed based on holistic approach where health system and community development progresses simultaneously. Differences in culture, language, and health resources across the country should be considered while designing maternal health programs. The process requires multi-level interventions where

grassroots workers such as Accredited Social Health Activist, village based health committees should be rigorously involved along with medical officers, government officials and policy makers. It is important to note that a central database at national level could be vital to monitor the progress of 5th MDG (26). There is a clear demarcation in maternal healthcare between North and South India, which needs to be addressed. Deprived and rural regions of the country could be focused, where more work and additional efforts are required. Future projects should include programs to increase awareness about pregnancy health, women empowerment projects, health education, income generation initiatives and government health system strengthening, these could be important areas to concentrate in the coming year. Some of these parameters were focused through the on-going National Health Programs (21). The post 2015 MDG evaluation will provide important evidences of maternal health status and possibly will also address future requirements in maternal health sector in the country.

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Authors contribution: Both authors (AA and TM) developed the hypothesis, conducted online search and analysis. Both authors equally contributed in manuscript preparation.

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