

Maternal and Perinatal Death Inquiry and Response Project Implementation Review in India

Dikid Tanzin · Gupta Madhu · Kaur Manmeet ·
Goel Sonu · Aggarwal Arun Kumar ·
Caravotta Jorge

Received: 19 May 2012 / Accepted: 5 July 2012 / Published online: 4 October 2012
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Abstract

Purpose Profile of maternal deaths in selected districts of four Indian states was studied to examine the regional differences in non-biological causal factors (socioeconomic and sociocultural) in maternal mortality and to examine the method and completeness of implementation of Maternal and Perinatal Death Inquiry and Response (MAPEDIR) process.

Methods An integrated qualitative and quantitative method was used to study the MAPEDIR process in selected districts of four states in India, through the use of standardized questionnaire for key informant interviews, participant observation checklist, analysis of verbal autopsy questionnaire, and maternal death reports.

Results A comparison of Profile's maternal deaths investigated showed that women died between 25 and 27 years of age. Half of the women died at home because of inability to afford transport (Delay II) and treatment costs. One third of the deaths had occurred in a health facility (Delay III) because of lack of specialists, equipments or blood. Two thirds of the delays (Delay I) were in seeking medical care. Review of the implementation process of

MAPEDIR highlighted that the social audit review model is a unique field based collaborative initiative comprising of stakeholders from various sector in order to improve maternal health programming by reducing maternal mortality.

Conclusions MAPEDIR has been able to identify socio-cultural, economic and health care systems related determinants of maternal deaths. Standardization the mechanism for information data sharing at district, sub-district and village level can maximize the use of available evidence for advocacy and policy shifts by developing policies and interventions suited to local needs.

Keywords Maternal death · India · Social audit · MAPEDIR

Introduction

World wide, maternal mortality ratio has declined by 34 % from 1990 to 2008. However, still 358,000 maternal deaths occur every year. Developing countries, especially India contributes about 18 % of the global maternal deaths [1]. Sample registration system (SRS) has estimated 254 deaths per 100,000 live births in 2006–2008 in India. (SRS 2006–2008) [2]. A majority of these deaths are due to postpartum hemorrhage, sepsis, and abortion, with anemia and malnutrition playing critical roles [2]. If India has to achieve the millennium development goal of slashing the maternal mortality ratio by three quarters by 2015

Dikid T. · Gupta M. (✉), Assistant Professor · Kaur M. ·
Goel S. · Aggarwal A. K.
School of Public Health, Post Graduate Institute of Medical
Education and Research, Chandigarh 160 012, India
e-mail: madhugupta21@gmail.com

Caravotta J.
Country Office, UNICEF, New Delhi, India

(MMR of 109/100,000 lb), then determinants of maternal mortality need to be identified and tackled on priority basis. Recording of maternal deaths remains complex and problematic, and many maternal deaths either go unreported or are misreported [3, 4]. Maternal death inquiry as used in several countries has focused only on deaths occurring in health facilities, whereas many deaths occur at home in developing countries [5]. Therefore, a combined community and facility approach is vital to make maternal deaths more visible to the community and policy makers to develop focused and effective interventions.

To understand the role of maternal death audit as a stimulus for generating and increasing demand for quality health care, UNICEF supported the introduction of Maternal and Perinatal Death Inquiry and Response (MAPEDIR) [6]. Piloted in Purulia, one of the poorest and most backward districts in West Bengal in June 2005, MAPEDIR was implemented in 16 districts in six Indian states (West Bengal, Rajasthan, Jharkhand, Bihar, Orissa, and Madhya Pradesh) with high maternal mortality. Review of MAPEDIR was done in four states, i.e., Rajasthan, Orissa, Bihar, and Jharkhand in this study with aim of understanding the MAPEDIR implementation processes, i.e., maternal death information flow, the profile of the personnel conducting the inquiry, involvement of key stakeholders¹, data sharing systems, and stakeholder's response mechanisms; and to ascertain the non-biological causes (socioeconomic, cultural, and health systems related) of maternal deaths in selected districts.

Methodology

In India, each state is divided into administrative districts, and each district has several administrative blocks. Chief medical officer (CMO) is the overall in-charge of the national health programs at district level. The health care infrastructure has a three-tier system; sub-health centre for 5,000 population, primary health centre for 30,000 population, and community health centre (block level) for 1,00,000 population. At sub-health centre, one auxiliary nurse midwife (ANM) is responsible for implementation of

maternal and child health programs. She is assisted by one Accredited Social Health Activist (ASHA) and one child care volunteer called anganwadi worker (AWW) in a locality with about 1000 population [7, 8].

Review Procedures

Teams from PGIMER School of Public Health, Chandigarh visited three states (Bihar, Rajasthan, and Orissa) to observe the implementation process from March to December 2009. These teams generally comprised two individuals, including community physicians and master of public health scholars having a mix of medical and social science backgrounds. Teams were given orientation in a 1-day training session. Data collection responsibilities of each team member were assigned. All field teams had terms of reference, structured questionnaire, and checklists for collecting the required information. Primary data (verbal autopsies) were also collected during visit to the states/districts. Local staff working for MAPEDIR was contacted before the visit. Each team stayed in the district for about 1 week. The primary data collected from the field were triangulated with the reported death summaries available with the UNICEF country office which had been sent directly by the states officials participating in the MAPEDIR.

Teams were not able to visit the state of Jharkhand because of logistic constraints. Hence, key informant interviews using structured questionnaires and checklists were conducted with those responsible for MAPEDIR implementation in this state, on two occasions in Delhi and Chandigarh where they had come to participate in maternal health-related workshops. The primary data of maternal death verbal autopsies for Jharkhand were obtained from UNICEF country office.

Results

The review process highlighted that MAPEDIR was managed at district level by one district level officer. At block level, MAPEDIR team comprised one supervisor, one recorder, and two or three interviewers. This team first worked with the local community groups to sensitize the community about maternal and perinatal health issues and about the presence of MAPEDIR teams in community. These community groups included Panchayati Raj Institutions, village health committees, and self-help groups. Panchayati Raj Institutions are elected constitutional bodies at three levels, i.e., Gram Panchayat at village,

¹ At the institutional level, the MAPEDIR process has spawned new strategic partnerships between government agencies, NGOs, academic institutions, and the UN system. A collaborative initiative, it has elicited the involvement of several key institutions and groups including the Government of India, State Governments, District Administrations, Panchayati Raj (village-level institutions), women's self-help groups, local non-governmental organisations (NGOs), medical faculties of Indian universities, the Johns Hopkins Bloomberg School of Public Health (USA), WHO, UNFPA, and UNICEF.

Panchayat Samitis at block and Zilla Parishad at district level and are involved in general administration, public works, agriculture, health, education, social welfare, etc. [9].

Identification and Reporting of Deaths

With the support of a death notifier, i.e., ANM, AWW, ASHA, civil society organization (CSO), or non-government organization (NGO) volunteers and community members, all suspected maternal and perinatal deaths in the block were identified. Death notifier investigated the community reports of suspected maternal/perinatal deaths, and reported these deaths to the MAPEDIR supervisor. Supervisor then assigned an interviewing team (a recorder and an interviewer) to conduct the in-depth enquiry into the circumstances of the maternal death using standard questionnaire (translated into the local language) by visiting the families where a maternal death took place. Interviewer was usually a lady supervisor from health or social welfare or NGO/CSO working in the state (e.g., White Ribbon Alliance in Orissa) or block-level public health nurse. UNICEF provided financial support for the mobility of field teams, data analysis, and advocacy. In Bihar, medical college was also involved in training of the staff (Table 1).

Maternal death inquiry questionnaire included information about socio-demographic and medical aspects (history of illness before or during pregnancy, care seeking, and events that possibly lead to the death, etc.). In the “open history” section of the questionnaire, respondent was asked to report everything that he or she knew about the circumstances surrounding the death. Respondents were selected based on their proximity to the deceased at the time of death. Most often husband, mother, sister, mother-in-law, or sister-in-law was interviewed. Respondents were aged 18 years or more, and informed consent was obtained before the interview.

Data Analysis and Information Sharing

All data were kept strictly confidential. After collection of the data at the block level, all the death reports were handed over to the district level for analysis. Technical support for data analysis is provided by UNICEF in all the five states. The local medical college was also involved in West Bengal. A computer program designed by a private company was used for data analysis. After analysis, information was then shared at a district meeting attended by block level officials and NGO partners who work with

the local community. Leaving aside Orissa, none of the other states shared information at the village level. States were yet to strengthen their data sharing mechanisms as frequency of review meeting were not yet fixed at the district and sub-district level.

Data from the MAPEDIR Audit System

A total of 1,120 maternal deaths were identified in four states (Orissa, Rajasthan, Jharkhand and Bihar); 98 % (1103) of the identified maternal deaths had been investigated. About 40 % of the maternal deaths had occurred in the age group of 15–24 years. Majority (93 %) of the deceased were Hindus. Most of them (65 %) were illiterate. Forty two percent of the husbands of the deceased were also illiterate. Tribe population although make-up a small part of the general population, they had a disproportionately large proportion of maternal deaths. For example, 67 % of maternal deaths in eight districts in Orissa were among SC/ST groups. Overall, two third (63.4 %) of the deceased women were from backward caste. Majority (63 %) of the maternal deaths belonged to below poverty line (BPL) families (Table 2).

Overall, half of the maternal deaths had occurred at home (56.6 %), one third (30.9 %) in health facility, and 9 % died while being taken to health facility. However, more than half (44/79) of the maternal deaths had occurred in a health facility in Bihar (Table 2). Further analysis showed that 31.6 and 16.4 % of maternal deaths in Bihar occurred in the first and second referral facilities, respectively, while 7.6 % had died in third-level referral facilities. Auto-rickshaw, tractor, or hired cars were the predominant modes of transport (75.4 %). Ambulance was used only in 8.3 % cases. In Bihar, 46 % of the women used “other” mode of transport to the health facility, such as a *Rickshaw Cart*.

Overall, 54 % of the delays could be attributed to delay in deciding to seek care for an obstetric complication (delay-I), followed by 30 % delay in coordinating transportation (delay-II), and 16 % delay in obtaining care at the facility (delay-III) (Table 3). Major delay in seeking care was reported as the care giver “did not think the deceased was sick enough to need health care” followed by “lack of finances to pay for care provider/facility”. In most of the states, delay in coordinating transportation was either due to “inability to pay for transportation or non availability of transportation.” The delay at facility level was due to “lack of blood or specialist doctor or equipment” (Table 4).

Nearly half (46 %) of the women who were taken to first referral units were referred cases. However, out of 86 cases

Table 1 MAPEDIR implementation models in selected districts of six states of India

State	Rajasthan	West Bengal	Jharkhand	Madhya Pradesh	Orissa	Bihar
Districts	Dholpur, Tonk Udaipur	Purulia	Ranchi, Khunti	Guna, Shivpuri	Nuapada, Koraput, Kalahandi, Bolangir, Sonepur, Malkangiri, Nabarangpur, Rayagada	Vaishali
Maternal deaths identified/ Investigated (up to September, 2008)	122/122	375/285	112/101	127/117	800/800	76/63
Partners and their roles						
1. Health and Integrated Child development scheme department	Death information and death inquiries	Death information and death inquiries	Death information and death inquiries	Death information and death inquiries	Coordination, data collection, review and monitoring	Death information and death inquiries
2. NGO	Training, sensitizing and data sharing with community, conducting inquiries	Sensitizing and data sharing with community, advocacy with PRI	Assist in death inquiries	Assist in death inquiries, coordinating an rapport building with community	White Ribbon Alliance Coordination, data collection, data review, analysis and monitoring Private contractor Data cleaning and processing	Maternal death notification, inquiry and computer data entry
3. Medical college		Training and data analysis				Training orientation meeting as well as field visit
4. UNICEF	Data analysis, technical and mobility support, advocacy	Data analysis, technical and mobility support, advocacy	Technical and mobility support	Data analysis, technical and mobility support to field workers and monitoring	Advocacy, technical and mobility support	Data analysis, technical and mobility support, advocacy
Who reported?	ANM, ASHA, AWW	ANM, ASHA, AWW	ANM, AWW	LHV, ANM, MPW	ANM, ASHA, AWW, CSO volunteers	ASHA, AWW, NGO volunteers
Who investigated?	Govt. staff, NGO	BPHN	BPHN, NGO	LHV, ANM, MPW	CDS Supervisor/Health Supervisor(M)/Health supervisor(F)/Block extension educator/CSO staff from White ribbon alliance	ANM, LHV, HE, staff from NGO
Who analyzed?	UNICEF	Medical college, UNICEF	UNICEF	UNICEF	UNICEF and white ribbon alliance Orissa	UNICEF

ANM auxiliary nurse midwife, ASHA accredited social health activist, AWW anganwadi worker, LHV lady health visitor, NGO nongovernmental organization, BPHN block public health nurse, HE health educator, CSO civil society organization

in Jharkhand, only 15 % women were referred cases, and the rest were managed in the first health facility. This indicates a serious gap in the availability of emergency obstetric care facilities.

Overall, in half of the maternal death cases, husband was the main decision maker for care seeking (51.7 %) followed by the mother (12 %). However, in Rajasthan and Jharkhand, the mother of the deceased woman was the main decision maker: 45.7 and 61.6 %, respectively.

Preventable Causes of Death

Hemorrhage was the most common cause of death in all states, with almost all hemorrhage occurring after delivery (For example, 42 % in Vaishali, Bihar). Women were often sent home from hospital and started bleeding. Many health facilities discharge women within 2–3 h after giving birth, and few women receive postpartum care. Eclampsia was the second most common cause of death (e.g., 17 % in

Table 2 Socio-demographic and economic characteristics of maternal deaths

Characteristics	Orissa <i>N</i> = 785	Rajasthan <i>N</i> = 35	Jharkhand <i>N</i> = 84	Bihar <i>N</i> = 80
Maternal deaths investigated/identified	800/800	122/122	101/112	80/86
Age (years)				
Median	26.6	27.7	25.7	26.2
Religion %				
Hindu	96.4	97	64.3	89
Muslim	1.5	0	9.5	11
Christian	2.1	0	10.7	0
Caste %				
Backward	65.6	48.5	NA	48
Others	34.4	51.5	NA	52
Education %				
Illiterate	67.8	68.8	53.6	56.1
Primary	21.9	28.1	8.3	17.1
Secondary	9.6	3.1	38.1	25.6
Above matric	0.8	0	0	1.2
Family status %				
Below poverty line	64.6	31.4	60.4	79.0

N number of maternal deaths for which information was available, *NA* not available

Table 3 Place of maternal death

Place of death	Orissa <i>N</i> = 800 <i>n</i> (%)	Rajasthan <i>N</i> = 35 <i>n</i> (%)	Jharkhand <i>N</i> = 86 <i>n</i> (%)	Bihar <i>N</i> = 79 <i>n</i> (%)	Total <i>N</i> = 1,000 <i>n</i> (%)
Home	482 (60.2)	17 (48.6)	42 (48.8)	25 (31.6)	566 (56.6)
Enroute to health facility	56 (7)	6 (17.1)	15 (17.4)	10 (12.6)	87 (8.7)
Health facility	242 (30.2)	8 (22.9)	18 (20.9)	44 (55.7)	312 (31.2)
Others ^a	20 (2.5)	4 (11.4)	11 (12.8)	0	35 (3.5)

^a Others include those who returned home from the health facility and died, non-formal clinical settings like private clinics of quacks, or subcentre where sometimes mothers come for unsafe abortions/health services which are not always equipped for managing complications
N number of maternal deaths for which information was available

Dholpur, Rajasthan) followed by sepsis (e.g., 20 % in Dholpur, Rajasthan).

Maternal Health Innovations

In Orissa, blood banks and blood storage units were set up in eight Navajyoti districts. An obstetric help line and referral transport system have been set up in Dholpur, Rajasthan.

Discussion

MAPEDIR initiative is unique as it not only seeks to identify social, cultural, economic, and healthcare factors that are responsible for maternal deaths irrespective of the place of death (home or hospital) but also seeks to provide a systemic means to change these factors. Inclusion of civil administration, local elected constitutional bodies, and social welfare department has resulted in greater attention to issues that were not solely in the domain of health sector. A maternal and perinatal audit system adopted in Indonesia also had a similar active engagement of agencies, policy-makers, and community members [10]. Such collaborations foster the accountability needed to improve the responsiveness of the health sector to high level of maternal mortality.

MAPEDIR data revealed that two-thirds of all maternal deaths were among illiterate women. Most of the maternal deaths (65 %) belonged to socio-economically disadvantaged groups. These findings are comparable to other studies in developing countries [11, 12]. Most of the maternal deaths were among young. Chowdhury et al. [13], while examining the causes of maternal mortality decline in Bangladesh, noted that higher age of women at first birth impacts maternal mortality rate decline.

Pathway analysis for place of death shows that two-thirds of the deceased women never made it to the hospital and died at home or enroute to hospital, while 31 % died in a health facility. However, in a district of Bihar, more than half of the women (55.7 %) died in a health facility indicating a serious gap in the quality of emergency obstetric care at first referral unit level. The main reason for not seeking appropriate care (delay-I) was due to inability to afford treatment or transportation to distant health care facilities or lack of knowledge regarding severity of illness. This was similar to findings by Iyengar et al. [14] in rural Rajasthan, where 74 % of deaths occurred at home because of the inability to afford treatment.

Another major reason for delay in seeking care was lack of awareness of risk factors and danger signs of pregnancy and child birth by the family members of the deceased, which often resulted in a casual healthcare-seeking path. Care seeking usually started with a traditional birth attendant who called a local ‘doctor’ (unregistered medical practitioner) in case she was unable to manage the case. In majority of the cases, local ‘doctors’ advised referral only when the woman was near death and moribund. Overall, 28 % family members did not think the deceased to be sick enough to need any health care. This type of delay in seeking care has been reported earlier [12, 15].

Jafarey et al. [12] reported findings contrary to the findings of our study in two districts of Pakistan where majority (64 %) of mothers died in tertiary hospitals. Such

Table 4 Main reasons for delays in provision of healthcare for maternal deaths

Reasons for delay	Orissa <i>N</i> = 787 <i>n</i> (%)	Rajasthan <i>N</i> = 18 <i>n</i> (%)	Jharkhand <i>N</i> = 41 <i>n</i> (%)	Bihar <i>N</i> = 56 <i>n</i> (%)	Total <i>N</i> = 902 <i>n</i> (%)
Delay I (at home level)					
Not satisfied with the available health care	8 (1)	0 (0)	2 (4.8)	2 (3.5)	12 (1.3)
Her problem required traditional care	38 (4.8)	0 (0)	3 (7.3)	1 (1.8)	42 (4.6)
She was too sick to travel	27 (3.4)	0 (0)	4 (9.7)	1 (1.8)	32 (3.5)
She would die no matter what	20 (2.5)	0 (0)	1 (2.4)	1 (1.8)	22 (2.4)
She had to attend to household duties	16 (2)	0 (0)	1 (2.4)	1 (1.8)	18 (1.9)
Did not think she was sick enough to need health care	221 (28)	2 (11.1)	8 (19.5)	23 (41)	254 (28.1)
Could not pay for the care provider/facility	71 (9)	3 (16.6)	5 (12.2)	2 (3.5)	81 (9.0)
No one was available to accompany her	22 (2.7)	1 (5.5)	0 (0)	2 (3.5)	25 (28.2)
Delay II (at transport level)					
Could not pay for transportation	119 (15.1)	2 (11.1)	3 (7.3)	4 (7.14)	128 (8.9)
Transportation not available	91 (11.5)	0 (0)	8 (19.5)	5 (8.9)	104 (11.5)
Other cost	26 (3.3)	8 (44.4)	0 (0)	2 (3.5)	36 (3.9)
Delay III (at facility level)					
Lack of equipment	24 (3)	1 (5.5)	2 (4.8)	5 (8.9)	32 (3.5)
Lack of specialist doctor	57 (7.24)	0 (0)	3 (7.3)	2 (3.5)	62 (6.8)
Needed blood	47 (5.9)	1 (5.5)	1 (2.4)	5 (8.9)	54 (6.0)

N number of maternal deaths for which information was available

differences may arise because of differential accessibility to health care in different areas. The districts, where MAPEDIR was implemented in India, were largely rural with poor access to health care as compared with the districts of Sindh in Pakistan. Among women who managed to go to a hospital, 46 % were referred to the next higher facility. The referrals were due to lack of blood or specialist doctor or equipment. This raises serious questions about the quality of care especially emergency obstetric care in rural areas. Such observations were made in other studies from developing countries also [10, 12].

The MAPEDIR model in its present form was found not to have clearly defined channels for disseminating information to various stakeholders. This seriously hinders the effectiveness of the audit system. The death audit conducted in South Kalimantan, Indonesia also felt that such audits could benefit from a greater involvement of the carers, policy makers, and community members [10].

The MAPEDIR initiative in India has created a magnifying lens to identify and rectify obstacles in existing social system and health care services which had led to maternal deaths. However, the collaborative approach adopted by MAPEDIR is a strength which needs to be nurtured and scaled up or extended to perinatal deaths. The audit could benefit from greater involvement and clearer definitions of the role of various stakeholders. Standardization of the mechanism for information sharing at district, sub-district, and village level will maximize use of available evidence

for development of policies and interventions suited to local needs.

Acknowledgments The authors are thankful to Dr. Jeyashree Kathiresan, Junior Resident, and Ms Nadia Diamond-Smith, visiting fellow in School of Public Health, PGIMER, Chandigarh for their contribution in conducting data analysis. Funding from UNICEF, New Delhi, India is gratefully acknowledged.

Conflict of interest There is no conflict of interests.

Ethical standard Not applicable, as this study did not involve conducting intervention among human or animal subjects and medical records were not evaluated.

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