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Original Research Article

Determinants Affecting Infant and Maternal Mortality in Madhya Pradesh

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ABSTRACT

India is among those countries which have very high infant and maternal mortality rate. In Madhya Pradesh, IMR and MMR are much higher. About 303,000 women die each year due to pregnancy related causes. Various social, economic, demographic and environment factors play essential role in infant and maternal morbidity and mortality. The objective of this study is to analyze determinants and magnitude of maternal and infant mortality in different districts of Madhya Pradesh with several performance indicators and institutional delivery affecting infant and maternal mortality rate. The data collected from available health records such as AHS and SRS. The data presents that there are regional variations in the level of infant and maternal mortality therefore priority to be given to the districts where mortality rates are high. The reason mother's non-availing hospital treatments were financial constraints, illiteracy, and distance to health facilities, cultural factors, quality care and lack of health awareness.

Infant mortality is consistently higher among children born to illiterate mothers, home births assisted by traditional birth attendants and lowest among the hospital births. Maternal and infant mortality is also higher in households that do not have access to safe drinking water and sanitation. Only few doctors were available for several institutional deliveries. Thus, to improve the status of institutional deliveries in real sense the healthcare system in the state need to be updated with expansion of bed capacities and enhanced health facilities with quality care. It is significant to improve road and transport infrastructure to reduce inequity in access to health facilities. The birth preparedness and complication readiness schemes in health settings should be enforced for effectively bringing down infant and maternal mortality rates. An increase in the density of health facilities and providers in rural areas will significantly help in improving maternal and infant care.

Key Words- MMR, IMR, Determinants, Institutional delivery

INTRODUCTION

[1] Women and children are the supreme asset of a nation. Their health is the basis of better health of the family and of the nation as well. Maternal and infant health care is an extremely focused concern in the development of a country. Delivery service to pregnant women is the most vital component of reproductive health care. In spite of the national and global efforts for reducing maternal and infant morbidity and mortality, there is no significant reduction in maternal and infant mortality in developing countries. [2] Around the world about 830 women die daily due to complications of pregnancy and child birth. In 2015, it was estimated that around 303,000 women died during pregnancy and childbirth and almost all of these deaths occurred in low-resource

settings, and most could have been prevented.

[3] In recent years Madhya Pradesh has implemented evidence-based strategies to bring down maternal mortality (MMR), infant mortality (IMR) and total fertility rate (TFR) in the state. This has led the state in making some progress towards achievement of the MDG targets. At present as per AHS 2012-13, the state has MMR of 227 (compared to 310 from AHS-2010-11), IMR of 62 (as compared to 67 from AHS 2010-11) and TFR of 3 (as compared to 3.1 from AHS 2010-11). These rates are still high in Madhya Pradesh compared to Empowered Action Group states with similar socio-demographic, economic and cultural characteristics. Furthermore, there exist wide variations among the districts in the state with notable rural-urban differentials on these vital indicators. This evidently signifies that the state needs special efforts to meet MDG goals. Though National Health Mission has led to substantial investment and attention in revitalizing public health systems with increase in deployment of skilled human resource and strengthening of community process with improved management and decentralized planning. The challenge for the State is to sustain and improve the acceleration in maternal health indicators. [4] In order to bring attention to the achievement of MDG targets and to give impetus to the evidence-based strategies Government of Madhya Pradesh has initiated the Mamta Abhiyan on 'Safe Motherhood Day' since 11 April 2013. The objective of the Mamta Abhiyan is to bring improvement in important indicators of the state using evidence-based approach. Phase-I of Mamta Abhiyan was launched on 11th April 2013 which shows a strong political and programmatic commitment for reduction of MMR. It focused on strengthening of infrastructure, human resource, and supportive services at facilities such as drugs, diet, diagnostic services, cleanliness and security. Subsequently Phase-II was launched on 26 June 2014 to focus on improving quality of services through supportive supervision, generating awareness among the community through IEC and BCC. Madhya Pradesh envisions achieving the goal of reduction of MMR to 100 by 2017 as per the 12th five year plan.

REVIEW OF LITERATURE

[5] Globally, the developing economies accounts for about 99% (302,000) of the global maternal deaths in 2015, with sub-Saharan Africa alone accounted for roughly 66% (201,000) followed by Southern Asia (66,000). Estimated MMR declined across all MDG regions between 1990 and 2015, although the magnitude of the reduction differed substantially between regions. The greatest drop over that period was observed in Eastern Asia (72%). At the country level, Nigeria and India are projected to account for over one third of all maternal deaths worldwide in 2015, with an approximate 58,000 maternal deaths (19%) and 45,000 maternal deaths (15%), respectively.

[6] In terms of child mortality, globally 76 lakh children died in 2010 before reaching their fifth birthday. Five countries – India, Nigeria, Democratic Republic of the Congo, Pakistan and China together accounted for half of all global deaths in children younger than five years. India presently accounts for nearly 20% of the world's child deaths. In terms of numbers, it is the largest number of child deaths (approximately 15.8 lakh) under the age of five years in any country. The reasons for this are a large birth cohort (2.6 crore) and child population (15.8 crore in the age group 0–6 years) and a relatively high child mortality rate (59 per 1,000 live births). Despite India being amongst the top five countries in terms of absolute numbers of maternal and child deaths, encouraging progress has been made in terms of reducing maternal and child mortality rates. In 2010, India's child mortality rate (59 per 1,000 live births) roughly equals the global average of 57. As per the report of Maternal Mortality Estimation Inter-Agency Group,

maternal mortality has shown an annual decline of 5.7% between the years 2005 and 2010. At the national level, maternal mortality ratio (MMR) declined from 254 (SRS 2005) to 212 (SRS 2007–09) – a decline of about 14 points per year on an 'All India' basis. In terms of numbers, there are still 56,000 maternal deaths each year. About two-thirds of maternal deaths ccur in just a few states – Assam, Uttar Pradesh, Rajasthan, Madhya Pradesh, Bihar and Odisha. However, these states have also shown significant decline in MMR between Sample Registration System (SRS) 2004–06 and 2007– 09 during the initial years of NRHM with Assam (90 points), Uttar Pradesh (81 points), Rajasthan (70 points), Madhya Pradesh and Chhattisgarh (66 points).

[7] India's maternal and child health outcomes still vary significantly across and within its states. Most importantly, data from national surveys such as the Annual Health Survey carried out in Assam and the eight empowered action group states which have a high burden of maternal and child mortality showed broad inter-district disparity. For example, the statewide under-five mortality rate in Madhya Pradesh is high, but rates vary widely, with a difference of 89 points between Indore (51) and Panna (140). Similar inter-district variations are found in Uttar Pradesh (AHS 2011-12) and the other EAG states. It is clear that the focus of implementation has to shift to geographical areas of greatest concern and populations that carry the highest burden of illness and mortality. Increased focus on the urban poor, who face well-documented barriers to utilization that are often due to the inequitable distribution of health services, is also needed.

[8] Madhya Pradesh has the highest IMR, second highest crude death rate and third highest MMR in the country. [9] Early pregnancy is one of the contributory factors for the high MMR and IMR in the state, where nearly 40 percent women are undernourished and suffer from some grade of chronic energy deficiency.

[10] The Mamta Abhiyaan launched in 2013 under the ambit of RMNCH+A is working on the key strategies for substantially reducing IMR, MMR, U5MR and TFR by 2015. Under RMNCH+A 17 high priority districts which are low performing in terms of process indicators (HMIS) are identified as focus districts in terms of human resources, infrastructure for achieving overall improvement in health indicators of Madhya Pradesh. Huge challenges lies ahead with diverse state like Madhya Pradesh. Geographic and socio-economic disparity such as rural areas and the areas which are more backward than other parts of the state, adds to the complexity for program implementation.

OBJECTIVES

The objective of the study is:-

-To analyze various factors such as social and economic determinants, maternal and demographic determinants, environmental determinants.

-To study several performance indicators and institutional deliveries affecting infant and maternal mortality rate in Madhya Pradesh.

MATERIALS AND METHOD

Some large data sources are used for this study such as AHS and SRS. The data is used to analyze covariates of infant and maternal mortality.

FINDINGS

DETERMINANTS OF IMR AND MMR

Social and economic determinants

[11] The infant mortality rate among children born to illiterate mothers has been consistently higher than those born to mothers with any education. The lowest mortality levels were seen among children born to women with more than 12 years of education and the highest were among those born to mothers with no education. The effect of maternal education on neonatal mortality decreases after adjusting for other social, economic, demographic and environmental factors. However, maternal

education greater than 8 years continues to have a significant protective effect on mortality and it is independent and not due to possible association with other factors.

Economic Status has an independent effect on under-five mortality and its components, and is not mediated by its possible association with other social, demographic or environmental factors. All components of under-five mortality have an inverse association with economic status as measured by Standard of Living Index. The decline in Infant mortality has been much steeper among the children born in low SLI households as compared to those born in high SLI households.

Maternal and Demographic Determinants

Levels of neonatal, post neonatal and child mortality are lowest among children born to mothers between the ages of 20-24, and highest among mothers under 20. These levels remain low up to 25-34 years of age, after which the mortality increases again. Low age of the mother has an independent effect on mortality. First order birth, as well as birth orders more than 3 is associated with a higher risk of dying in neonatal and post neonatal period. While the first order birth appears to exert an independent effect on mortality, effect of higher order births appear to be due to association with other adverse social and economic factors.

Any birth within two years of the previous birth is linked with considerable excess mortality during neonatal as well as post-neonatal period. A short birth interval not only increases the risk mortality of the subsequently born children, but also of the children born earlier. The risk increases further if the previous child had died.

Children born to mothers with low BMI (malnourished) showed small but inconsistent impact on neonatal as well as post-neonatal mortality. However, those born to mothers with high BMI (obese) had significantly higher and independent effect on mortality.

Neonatal mortality is highest among the home births attended by TBAs and lowest among those at home conducted by a health professional. Post-neonatal mortality is consistently highest among the home births assisted by health professionals, and lowest among the hospital births.

Environmental Determinants

The children living in households with access to unsafe source of water were at higher risk of deaths. However, the adverse effect of unsafe source of drinking water disappears completely after adjustment for demographic and socio-economic factors, suggesting that the observed effect may have been largely on account of the relationship between the unsafe source of water and poor socio-economic factors.

Maternal and infant mortality is also higher in households that do not have access to a flush or pit toilet, in India as a whole. For example, just because a household has an improved sanitation toilet may not mean that it is used by all members of the household. Further, the analysis also indicates that sanitation facility alone is not sufficient to prevent faeco-oral transmission. It may require the entire package of water-sanitation-hygiene (WASH) interventions to have a demonstrable impact on maternal and infant mortality.

There is steady trend of decline in the MMR which is evident from various survey data and reduction of MMR has been the priority agenda of the State Government of Madhya Pradesh which is showing that MMR of MP was 310 in 2010-11 AHS and with the constant decline in MMR it is now 227 as per AHS 2012-13 and 221 as per SRS 2011-13.

Antenatal Care

Safe motherhood is a right of all women and ante-natal care constitutes one of the key elements towards initiatives to promote safe motherhood. The indicators included in the Table-1 are percentage of

Currently Married Pregnant Women aged 15-49 years who were registered for ANC; percentage of mothers who received 3 or more ANC; percentage of mothers who had full ante-natal check-up and percentage of mothers who received ANC from Government source has increased by 2-5% as per AHS data from the year 2010-2013 while there is 3% decline in percentage of mothers who received at least one TT injection during the same period. The full ante-natal check-up comprises at least three visits for ANC, at least one TT injection received and IFA consumption for 100 days or more which increased steadily from 7.5 (2010) to 19.5 (2013). In addition, percentage of mothers whose blood pressure and blood (for Hb) were taken and percentage of mothers who underwent ultrasound has shown a considerable increase in the following years.

Table-1: Performance Status of Service Delivery Indicator

S.No	Indicators	AHS 2010-11	AHS 2011-12	AHS 2012-13
1	Currently Married Pregnant Women aged 15-49 years registered for ANC (%)	66.5	70	71.6
2	Mothers who received 3 or more Antenatal Care (%)	68.1	70.7	71.7
3	Mothers who received at least one Tetanus Toxoid (TT) injection (%)	94.8	90.6	91.8
4	Mothers who consumed IFA for 100 days or more (%)	7.5	18.9	19.5
5	Mothers whose Blood Pressure (BP) taken (%)	64.3	70.1	73.1
6	Mothers whose Blood taken for Hb (%)	53.2	56.5	60.5
7	Mothers who had Full Antenatal Check-up (%)	13.3	15.3	16.2
8	Mothers who received ANC from Govt. Source (%)	49.5	49.8	51
9	Mothers who underwent Ultrasound (%)	30.7	36.8	41.5
10	Institutional Delivery (%)	76.1	79.7	82.6
11	Delivery at Home (%)	23.5	20	17.1
12	Delivery at home conducted by skilled health personnel (%)	26	31.1	38.3
13	Delivery at Government Institution (%)	65.5	68.7	71.3
14	Delivery at Private Institution (%)	10.5	10.9	11.2
15	Caesarean out of total delivery taken place in Government Institutions (%)	3.8	4.3	5
16	Caesarean out of total delivery taken place in Private Institutions (%)	30.9	31.2	31.1
17	Less than 24 hrs. Stay in institution after delivery (%)	27.2	23.1	21.8
18	Mothers who received Post-natal Check-up within 48 hrs. Of delivery (%)	74.2	77.8	80.5
19	Mothers who did not receive any Post-natal Check-up (%)	22.1	18.6	14.1
20	Mothers who availed financial assistance for delivery under JSY (%)	61.1	69.3	72.9

Delivery Care

Safe delivery comprises institutional deliveries and home deliveries conducted by doctor/ nurse/ ANM. Under Delivery Care, percentage of deliveries taken place in institutions has overall increased by 6.5% with their distribution into Government and Private Institutions which shows there is considerable increase in delivery at government institution than private institution and these are the key indicators presented in the above table. Percentage of deliveries taken place at home has decreased by 6.4% while percentage of home deliveries conducted by skilled health personnel has increased by 12.1% from 2010-2013.

As regard to the extent of stay in institutions after delivery which is very crucial and has a direct bearing on the new born care and also on the health of the mother, the percentage of less than 24 hours stay in the institution after delivery has been presented in the table. Besides, percentage of Caesarean deliveries out of total deliveries taken place in Government and Private Institutions respectively has also been presented.

Post-natal Care

Getting a Post-natal check-up soon after the birth of baby or within 48 hours is crucial for the health of both the mother and the child. Accordingly, indicators, viz., percentage of mothers who received Post-natal check-up within 48 hours of delivery and percentage of mothers who did not receive any Post-natal check-up have been presented in the table. Along with the first post-natal check-up of mother, check-up of the new born is essential. In case of institutional delivery if the baby remained there for at least 24 hours, it was presumed

that the first check-up was done within 24 hours.

Financial assistance under Janani Suraksha Yojana

[12] The Janani Suraksha Yojana (JSY) is one of the most important programme under the overall umbrella of NRHM aimed at reducing Maternal Mortality Ratio and Neo-natal Mortality Rate by promoting institutional deliveries. Under this scheme, cash incentives are provided to mothers and they are facilitated by Accredited Social Health Activists (ASHAs) to deliver their babies in a health facility. There are also provisions for cost reimbursement for transport and incentives to ASHAs for encouraging mothers to go for institutional delivery. This scheme is sponsored by the Central Government and is implemented in all the states and union territories, with special focus on low-performing states. Also there is a provision for roping in the private sector by giving accreditation to willing private hospitals for providing delivery services. To estimate the spread and effectiveness of the JSY, the percentage of mothers who availed financial assistance for delivery has increased from 61.1 % (2010) to 72.9 % (2013).

Table no.2:-MMR, IMR and other indicators of districts in Madhya Pradesh

S.No	Districts of MP	NMR	U5MR	IMR	MMR	TFR	CBR	Complete ANC	Institutional Deliveries(%)	Delivery at Government Institution(%)	Delivery at Private Institution(%)
1	Indore	24	46	37	164	2.2	19.5	30.6	94.5	60.6	33.4
2	Bhopal	29	60	48	219	2.0	18.6	28.3	91.2	69.6	21.5
3	Jabalpur	34	54	48	246	2.4	21.4	26.8	80.4	60.2	20.2
4	Hoshangabad	44	68	59	218	2.5	21.8	18.1	92.1	76.2	15.8
5	Narsimhapur	41	69	62	246	3.1	26.5	26.4	90.4	70.9	19.4
6	Gwalior	32	63	48	181	2.1	17.8	16.8	92.9	68.7	23.8
7	Ujjain	7	70	54	176	2.8	23.6	12.3	84.7	71.5	13.0
8	Neemuch	37	70	55	176	2.5	21.7	25.8	87.1	71.4	15.2
9	Seoni	46	85	67	246	3.0	25.8	22.2	85.8	73.5	12.1
10	Shajapur	39	80	56	176	3.2	24.6	7.9	93.8	85.4	8.4
11	Ratlam	38	92	65	176	3.1	26.4	15.2	93.2	82.5	11.0
12	Harda	41	76	63	218	2.9	24.5	15.3	78.9	65.8	12.9
13	Chhindwada	45	77	69	246	2.6	22.7	24.9	81.8	70.3	11.4
14	Mandsaur	39	76	60	176	2.2	18.6	26.2	90.2	83.9	6.3
15	Balaghat	46	69	59	246	2.6	22.5	28.8	79.8	70.4	9.1
16	East Nimar	43	94	67	164	3.0	23.1	13.5	74.9	62.8	12.0
17	Dewas	32	76	56	176	2.5	21.2	16.9	91.2	76.5	14.6
18	Dhar	33	66	54	164	2.9	24.2	14.7	85.7	76.5	9.2
19	Raisen	48	88	69	219	3.4	26.9	8.8	79.3	71.2	7.8
20	West Nimar	35	76	56	164	3.1	25.6	13.6	82.8	77.0	5.7
21	Betul	44	70	61	218	2.8	23.7	28.4	86.2	74.3	11.8
22	Sehore	44	84	67	219	3.5	26.4	14.6	92.4	81.7	10.7
23	Sagar	57	92	69	322	3.3	27.7	16.4	72.1	59.2	12.6
24	Mandla	46	84	68	246	2.9	25.0	16.3	64.8	55.8	8.7
25	Datia	43	94	73	181	2.3	18.8	5.2	83.9	75.4	8.3
26	Rajgarh	41	78	60	219	3.1	25.4	8.2	89.1	82.8	6.1
27	Katni	47	83	65	246	3.2	26.6	19.8	79.6	71.6	7.9
28	Damoh	53	106	71	322	3.5	28.8	14.2	57.6	48.3	9.2
29	Morena	35	77	59	215	3.0	23.6	3.7	92.5	83.9	6.3
30	Barwani	41	89	66	164	3.9	31.2	13.0	73.7	68.9	4.4
31	Bhind	31	67	54	215	2.9	22.6	6.1	85.1	79.0	6.0
32	Vidisha	32	94	65	219	3.9	29.5	15.1	88.1	80.0	7.6
33	Sheopur	43	98	72	215	2.7	22.2	5.5	71.8	68.4	3.4
34	Shahdol	44	85	71	361	2.7	23.8	17.1	59.5	55.3	3.2
35	Rewa	45	100	68	268	3.4	26.1	13.4	82.2	75.0	7.1
36	Shivpuri	43	100	69	181	4.0	30.7	6.0	88.8	84.9	3.7
37	Guna	46	93	75	181	3.4	28.1	10.1	93.0	86.7	6.3
38	Satna	57	121	83	268	3.6	28.2	12.0	76.6	68.5	8.1
39	Dindori	44	95	66	361	3.4	29.2	14.5	49.8	44.7	5.0
40	Umaria	40	99	60	361	3.4	29.3	14.5	83.8	77.0	6.3
41	Chhatarpur	46	79	63	322	3.8	29.4	19.2	80.3	70.5	9.5
42	Jhabua	38	86	64	164	2.9	23.3	18.9	79.3	64.9	13.9
43	Tikamgarh	43	84	61	322	3.2	25.9	10.3	81.5	71.7	9.7
44	Panna	61	127	85	322	4.1	31.3	15.9	78.4	71.1	7.1
45	Sidhi	51	112	67	268	3.4	25.8	9.5	57.2	53.2	3.6

Indicators representing Neonatal Mortality Rate, Infant Mortality Rate and Under-5 mortality rate, Maternal Mortality Rate, Complete ANC, Institutional delivery, Total Fertility Rate, Crude Birth Rate, Delivery at Government and Private Institution in different districts of Madhya Pradesh.

INSTITUTIONAL DELIVERY IN MADHYA PRADESH

Maternal death is a preventable tragedy. No mother should die giving birth and little bit of care can help in averting this problem. However, the analysis of the grass root reality behind low level of institutional deliveries exposes the failure of the system to establish the health infrastructure much needed to restrain the maternal and infant mortality.

[13] Institutional deliveries are promoted for decreasing maternal and infant mortality. Still many women deliver at home without the presence of a skilled birth attendant. Women face various barriers to visiting a health facility to seek delivery care. These include cost of care, access to clinics, cultural factors, quality of care, and a lack of health awareness. Most maternal deaths occur during labor, delivery, or the first 24 hours postpartum and most complications cannot be prevented. This conveys need of effective intra partum care which is essential to prevent deaths and reduce morbidity.

Madhya Pradesh lies in the group of larger state in the country but the health infrastructure and services proves to be very small to promote safe institutional deliveries to curb high rates of maternal and infant mortality in the state. Safe mother and child birth emerged as primary target of RCH-II in Madhya Pradesh but it lacks prudence in the establishment of good health services. This sore fact about safe motherhood has been confirmed by the District Level household Survey (DLHS-III) report released by the Ministry of Health & Family Welfare, Government of India, revealing the big gap on the front of safe deliveries in the state. The survey report with district wise data presents the harshs picture that the average percentage of institutional deliveries in the state is only 47.1%. The situation is most dire in rural areas of the state with only 40.8% institutional deliveries.

[14] Safe motherhood can be ensured by availability of good quality health services. Safe deliveries demand the deliveries conducted in the presence of specialist such as qualified gynecologist. But in the state the total number of posted gynecologist is less, only one gynecologist is available per 5 CHCs. This further means that only one gynecologist was available for several institutional deliveries. To improve the status of institutional deliveries in real sense and thereby benefiting the poor women to enjoy safe motherhood, the healthcare system in the state need to be updated with expansion of bed capacities and enhanced facilities of the health institution along with filling up of all vacant posts of medical staff.

[13] The health-seeking behavior of women in rural India is mainly dependent on their literacy and awareness levels, decision-making power at home, socio-economic status, literacy levels and health awareness of the head of the household, attitude of the husband towards maternal health. Since women's status is low in rural areas, it may be better to get them into institutions where health staff with more social power can affect change, provided they are sensitized to the need for women's empowerment.

CONCLUSION AND SUGGESTIONS

[15] Maternal and child health is imperative to families and the nation due to profound effects on the health of women, immediate survival of the newborn and long term well-being of children and families. Improvement of maternal health requires availability of large number of health services early in pregnancy. These include as early antenatal registration, consumption of Iron Folic Acid tablets, regular antenatal

check-ups, monitoring of blood pressure, tetanus toxoid immunization, timely detection of high risk antenatal cases and their timely referral, delivery in safe and hygienic environment by skilled birth attendant, timely referral in case of obstetric emergency for management of hemorrhage with blood transfusions, availability of caesarean section facility and minimum 3 post-natal visits.

It is concluded that there are regional variations in the level of infant and maternal mortality therefore priority to be given to the districts where mortality rates are high. The most important indicators which need to be taken care for reducing the infant mortality are pregnant women received full ANC, institutional delivery, post natal checkup, full immunization and nutrition. It is suggested that locally relevant innovations under NHM should be encouraged in the state. The birth preparedness and complication readiness schemes in socio-cultural settings should enforced for effectively bringing down infant and maternal mortality rates. There is need to link more health workers and medical professionals with the community.

[16] In India, the access to reach a health care facility is a significant barrier to institutional delivery due to long distances in rural areas. A comprehensive cost-effective analysis must be undertaken to exhibit that the benefits would outweigh the cost of building new facilities with increase in the number of health facilities and providers in rural areas there will be significant improvement in maternal and child health care. And to reduce inequity in access to health facilities, it is significant to improve road and transport infrastructure, and thereby, increase institutional deliveries.

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