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Utilization of Intergovernmental Funds to Implement Maternal and Child Health Plans of a Multi-Strategy Community Intervention in Haryana, North India: A Retrospective Assessment

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Abstract

Introduction A multi-strategy community intervention known as the National Rural Health Mission (NRHM) was implemented in India from 2005 to 2012 in an attempt to reduce maternal and child mortality.

Objective This study examined the extent to which the NRHM's maternal and child health (MCH) sector plans were implemented. We observed trends in how intergovernmental (use of central government funds by state

governments) budgets were allocated and used to implement MCH plans in Haryana, India.

Methods We conducted a retrospective assessment of programme implementation plans, MCH budget allocation and expenditure and financial monitoring reports during the NRHM implementation period. The yearly budget utilization rate was calculated for each MCH strategy implemented. On the basis of this budget utilization rate, we classed the extent of MCH strategy implementation as fully, partially or not implemented. The status of MCH indicators before, during and after the NRHM period was obtained from national demographic surveys. The budget utilization rate was correlated with MCH outcomes.

Results The overall budget allocated for MCH plans increased from \$US6.6 million during the 2005–2006 period to \$US66.7 million in the 2012–2013 period. The rate of budget utilization increased from 20.6% in 2007–2008 to 89% in 2012–2013. Expenditure exceeded the initially allocated budget for patient referral services (111.5%), human resources (110.1%), drugs and logistics (170%), accredited social health activists (133.3%) and immunization (106.4%). Additional budget was obtained from the state health budget. Plans for referral services, human resources, drug provision, accredited social health activists and immunization were fully implemented, few schemes (<1%) were not implemented, and all other schemes were only partially implemented. MCH indicators improved significantly ($p < 0.05$). The rate of institutional childbirth was highly and positively correlated with rates of budget utilization for implementing accredited social health activists ($r = 0.96$) and financial incentives for hospital delivery schemes ($r = 0.5$).

Conclusions The trend for increasing use of the allocated budget for MCH strategies, improvement in MCH indicators and their positive correlation indicate better and more

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effective implementation of NRHM MCH strategies than in the past in Haryana, India. However, overall, the NRHM was only partially implemented.

Key Points for Decision Makers

We observed a trend for increasing use of the budget allocated for National Rural Health Mission (NRHM) maternal and child health (MCH) strategies and significant improvements in MCH indicators.

These findings provide important insights into how the state used national funds to implement the NRHM to improve MCH.

These findings could have implications for the implementation and evaluation of national programmes in low- and middle-income countries.

1 Introduction

In India, from 1990 to 2015, the maternal mortality ratio (MMR) declined from 554 to 174 per 100,000 live births [1], and the infant mortality rate (IMR) declined from 165 to 38 per 1000 live births [2]. However, the millennium development goals for India included reducing the MMR to <100 per 100,000 live births and the IMR to 30 per 1000 live births, which were not achieved by 2015 [3]. Reasons for this slow reduction in maternal and infant mortality included the high proportion of home deliveries (up to 70%), the inadequate number of skilled birth attendants, poor-quality services in health facilities (lack of equipment, blood storage units or drugs and poor logistics [4]), lack of community involvement in the planning and monitoring of the national programme [5, 6] and lack of sufficient state health funding in the public healthcare delivery system. Accordingly, a multi-strategy community intervention, the National Rural Health Mission (NRHM), was implemented in India from 2005 to 2012; after 2012, it continued as the National Health Mission.

The aim of the NRHM was to improve the availability of and access to better-quality healthcare, especially for low-income mothers and children by implementing four major health sector plans: health system strengthening, communitization, and specific maternal and child healthcare strategies [7, 8]. Strengthening of the health system included improving infrastructure and increasing human resources, drugs and logistics, mobile medical units and patient transport services. Communitization included

appointing accredited social health activists within villages, creating village health nutrition and sanitation committees, celebrating village health and nutrition days, and creating Patient Welfare Committees (*Rogi Kalyan Samities*) in health facilities. Maternal and child health (MCH) schemes included offering financial incentives for pregnant women to deliver in hospital (Mother Security Scheme [*Janani Suraksha Yojana*]), free delivery services and medical treatment for infants (*Janani Shishu Suraksha Karyakaram*), integrated management of neonatal and childhood illnesses, facility-based and home-based newborn care, and nutritional rehabilitation centres. These MCH plans were adopted on the basis of their proven effectiveness in reducing maternal and child mortality [8–12].

Several evaluations of the NRHM [13, 14] and its MCH strategies [15–17] and of national demographic surveys have shown that the use of MCH services in the public sector increased [18] and that MCH inequalities decreased [19] during the NRHM implementation period [18]. On the other hand, geographical and socioeconomic inequalities and inefficiencies in infrastructure and human resources remained. None of the evaluations conducted thus far have investigated what proportion of the budget dedicated to implementing MCH strategies under NRHM was actually used by individual states. Such budgetary information is important for efficient use of resources and effective implementation of strategies, especially in resource-constrained low- and middle-income countries. Similar investigations relating to MCH have also been carried out in Tanzania and the USA [20, 21]. The objective of this study was to examine trends relating to the intergovernmental (use of central government funds by state governments) budgets allocated to NRHM from 2005–2006 to 2012–2013 in Haryana, North India. This indirectly quantifies the extent to which these plans were implemented in each state.

2 Methods

Ethical approval for this study was provided by the author's institute in India.

2.1 Study Design and Area

We undertook a retrospective assessment of the budgetary outlay of NRHM MCH plans in Haryana, a state in North India that is assumed to be representative of other North Indian states. An outline of the healthcare delivery system within the state can be found in the protocol study [22]. We estimated the extent of implementation by comparing the budget allocated versus the budget utilized. Health

financing is a basic building block of a health system and affects the availability of a sufficiently large health workforce and of essential medicines, impacting service delivery and ultimately mortality statistics [23].

2.2 Budgeting Process for Implementing Maternal and Child Health (MCH) Sector Plans Under the National Rural Health Mission (NRHM)

To implement the NRHM strategies, institutional arrangement and financial management groups were created at national, state and district levels [24, 25]. Each state prepared an annual programme implementation plan for the NRHM health sector plans, including the budgetary requirements for the following financial year [26, 27]. These programmes comprised five major parts: Part A included reproductive, maternal, child and adolescent health strategies, human resources, programme management, institutional strengthening and training; part B included communitization, new constructions, medical mobile units, referral transport and procurement, among others; part C related to immunization; part D to other national disease control programmes; and part E to funds required for convergence with other sectors. This study is restricted to parts A, B and C, which cover all the MCH strategies under the NRHM. Once district action plans were created, they were sent to the state, which then compiled all district health action plans and prepared the final state programme implementation plan. This was then sent to the central government for funding approval; once this approval was granted, funds were released to the states.

Initially, full funding was provided by the central government to implement the NRHM health sector plans within the individual states [28]. Gradually, the states had to contribute up to 25% of the state health budget to increase total expenditure on health from 0.9 to 3% of the gross domestic product. The NRHM provided flexible financing of the health sector plans/schemes so states could prioritize the expenditure based upon their needs; unspent funds under one scheme could be reallocated to another scheme.

2.3 Data

We obtained information about the total funds sanctioned under each NRHM MCH activity in a given financial year from records of meetings conducted for central government approval of state programme implementation plans [29]. The amount of budget spent for each NRHM activity was obtained from financial monitoring reports from 2005–2006 to 2012–2013. Financial monitoring reports are financial statements that have been thoroughly audited by an external agency and thus serve as proof of expenditure. The implementation status of the various MCH activities

was obtained from yearly NRHM progress reports for Haryana [30]. The status of MCH indicators before, during and after the NRHM (2002–2004, 2007–2008 and 2012–2013, respectively) implementation period was obtained from national demographic surveys, i.e., district-level household surveys (DLHS) [31–33].

2.4 Data Analysis

The budget utilization rate for each NRHM health plan was estimated as the proportion of expenditure incurred relative to the budget sanctioned for implementing the MCH plan. A conversion rate of \$US1 equivalent to 62 Indian rupees (2013–2014) was used. The MCH plan was considered fully implemented if the budget utilization rate was $\geq 100\%$, partial if the rate was 1–99% and nil if the rate was $< 1\%$ at the end of the 2012–2013 financial year. Partial implementation was further categorized as high (80–99%), mid (20–79%) and low (1–19%). Trends in MCH indicators before, during and after NRHM were observed and compared using a Chi squared test. p values < 0.05 were considered significant. MCH indicators were carefully chosen from DLHS reports using a logic model (input-process-output-outcome/impact indicators); the purpose was to include those indicators most likely to have been affected by the NRHM MCH strategies [34]. For example, when implementing the financial incentive scheme for pregnant women, the availability of funds is the input, the number of women registered under the scheme is the process, and the number of registered women who availed themselves of this scheme and delivered in an institution was the output indicator. Furthermore, these MCH indicators represented the major aspects of the preventive (e.g., registration of pregnant woman in the first trimester, three or more antenatal check-ups, tetanus immunization, fully immunized children, institutional delivery rate, etc.) and treatment-related (e.g., children with diarrhoea who received oral rehydration solution) interventions intended to improve MCH.

A correlation analysis between MCH indicators (such as number of patients referred through referral transport, the number of pregnant women registered under the financial incentive scheme, the institutional delivery rate, the availability of accredited social health activists, the immunization status of children) and the respective budget utilization rates was also conducted.

3 Results

Table 1 shows the total amount of budget sanctioned and spent to implement the NRHM health sector plans from 2005–2006 to 2011–2012. The sanctioned amount

Table 1 Total funds received and spent (\$US millions) on implementing maternal and child health sector plans under the National Rural Health Mission for the financial years 2005–2006 to 2012–2013 in Haryana

Year	Amount received	Actual expenditure	Utilization rate (%)
2005–2006	6.6	5.7	86.4
2006–2007	13.8	7.6	55.1
2007–2008	32.1	6.6	20.6
2008–2009	27.4	22.9	83.7
2009–2010	39.1	44.2	113.2
2010–2011	50.0	47.3	94.7
2011–2012	46.9	47.5	101.3
2012–2013	66.7	59.3	89

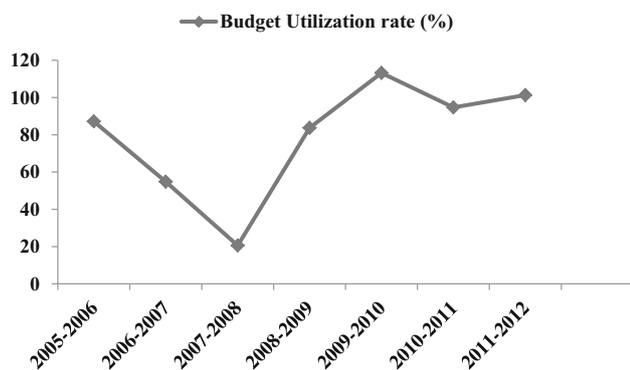


Fig. 1 Trend of budget utilization rate of maternal and child health sector plans under National Rural Health Mission from financial year 2005–2006 to 2012–2013 in Haryana, India

increased from \$US6.6 million in 2005–2006 to \$US66.7 million by 2012–2013. The budget utilization rate decreased during 2006–2008 but increased thereafter (Fig. 1). Financial monitoring reports regarding the implementation of NRHM schemes were available from the year 2007–2008 onwards. Table 2 presents the yearly allocation of funds, expenditure incurred and the budget utilization rate under each scheme from the financial year 2007–2008 to 2012–2013. The state initially focussed on strengthening the health system, mainly through the provision of drugs and logistics, as indicated by the budget allocated to these schemes in the initial year. Subsequently, infrastructure was strengthened, more human resources were promoted and referral services were introduced. For the communitization strategy, the main focus was on implementing the scheme to recruit accredited social health activists. Although the state initially implemented the village health nutrition scheme, it appeared unable to maintain it. From the year 2008–2009 onwards, planning under NRHM improved considerably, with funds being allocated to other schemes relating to health system strengthening, communitization and MCH components.

Figure 2 provides a comparison between the components (e.g., health system strengthening, communitization, MCH strategies). Overall, the budget for implementing

communitization and health system-strengthening strategies was fully utilized, followed by MCH strategies. Funds were over-utilized for patient transport services (115%), human resources (110%) and drugs and logistics (170%), under health system strengthening in 2012–2013 (Fig. 3). Under communitization, the state over-spent on social health activists (133.3%) and patient welfare committees in hospitals (112.5%) (Fig. 4). For the maternal healthcare strategy providing financial incentives for institutional deliveries, the rate of budget utilization increased steadily from 0.8% in 2007–2008 to 80% in 2012–2013 (Fig. 5). Under child healthcare strategies, the rate of budget utilization increased from 0 to 37.5% for the integrated management of neonatal and childhood healthcare, and from 66.7 to 106.4% for immunization (from 2005–2006 to 2012–2013, respectively) (Fig. 6). For the home-based newborn care scheme, budget utilization increased drastically from 7.7% (2011–2012) to 485.7% (2012–2013). The budget utilized to implement national rehabilitation centres was minimal at 0.6%.

The state's NRHM progress report indicated that the number of health facilities and healthcare providers increased (Table 3). Table 4 summarizes the extent of NRHM plan implementation on the basis of the rate of budget use for various MCH schemes. Schemes that were fully implemented included the referral transport service; the availability of human resources, drugs and logistics; the accredited social health activists scheme; the patient welfare committees scheme; the immunization scheme; and the home-based newborn care scheme. The nutrition rehabilitation centre scheme and village health nutrition days were only minimally implemented, and most of the other schemes were partially implemented.

Implementation of the communitization component was better than that of others, with two of its strategies—accredited social health activists and formation of patient welfare committees in health facilities—fully implemented. The village health and sanitation committees were partially implemented (mid-level). Similarly, the health system strengthening component was also well implemented, with three—human resources, provision of drugs

Table 2 Year-wise distribution of budget sanctioned, expenditure incurred (\$US million) and budget utilization rate (%) for the National Rural Health Mission maternal and child health sector plans for the financial years 2007–2008 to 2012–2013

NRHM plans	2007–2008			2008–2009			2009–2010			2010–2011			2011–2012			2012–13		
	S	E	% ^a	S	E	% ^a	S	E	% ^a	S	E	% ^a	S	E	% ^a	S	E	% ^a
1. Health system strengthening	3.50	1.80	51.4	3.54	2.50	70.6	5.90	4.05	68.6	9.3	7.3	78.5	12.9	13.5	104.6*	13.3	15.1	113.5*
Patient transport service	0	0	0	0	0	0	0.9	1.3	144.4*	2.5	1.4	56	2.4	3	125*	2	2.3	115*
Infrastructure development and strengthening	0.4	0.2	50	1	0.5	50	0.6	0.3	50	0.3	0.2	66.7	0.1	0.2	200*	0.3	0.1	33.3
Human resources	2.1	1.3	62	2	0.8	40	3.5	2	57.1	3.3	2.6	78.8	7.5	7.1	94.7	7.9	8.7	110*
Drugs and logistics	1	0.3	30	0.447	1.254	280.5*	0.3	0.2	66.7	2.4	2.8	116.7*	2.4	2.9	120.8*	2	3.4	170*
Mobile medical units	0	0	0	0	0	0	0.1	0.1	100*	0.1	0	0	0.1	0	0	0.1	0	0
New initiatives	0	0	0	0	0	0	0.5	0.1	20	0.8	0.3	37.5	0.5	0.4	80	1.1	0.5	45.5
2. Communitization	0.56	0.23	41.1	0.58	0.80	137.93*	1.90	1.67	87.89	2.1	2.5	120.19*	1.90	1.78	93.7	3.07	3.73	121.5*
Accredited social health activists	0.5	0.2	40	0.6	0.9	150*	1	0.8	80	1.2	1.7	141.67*	1	0.95	95	2.1	2.8	133.3*
Village health nutrition and sanitation scheme	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.001	2.5	0.1	0.049	49
Village health and nutrition day	0.04	0.01	25	0.02	0.002	10	0	0.001	0	0	0	0	0	0	0	0	0	0
Patient welfare committees	0	0	0	0	0	0	0.9	0.9	100	0.9	0.8	88.9	0.9	0.8	88.9	0.8	0.9	112.5*
3. Maternal healthcare strategies	0.0034	0	0	0.79	0.5	63.29	0.90	0.70	77.78	0.9	0.7	81.2	1.09	1.01	92.66	4.80	2.80	58.33
<i>Janani Suraksha Yojana</i> ^b	0.003	0	0	0.8	0.5	62.50	0.9	0.7	77.8	0.8	0.7	87.5	1.1	0.8	72.7	1	0.8	80
<i>Janani Shishu Suraksha Karyakaram</i> ^c	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.14	0	3.8	1.9	50
Delivery points with 24 × 7 delivery services	0	0	0	0.005	0	0.00	0.03	0.01	33.33	0	0	0	0.03	0.02	58.8	0	0.002	0
Provision of safe abortion services	0	0	0	0	0	0.00	0	0	0.00	0.04	0	0	0	0.001	0	0.004	0.002	50
4. Child healthcare strategies	0.36	0.18	50	0.55	0.22	40	0.80	0.40	50	2.8	2.1	75.72	1.44	0.97	67.36	3.87	3.54	91.47
Facility-based newborn care	0	0	0	0	0	0.00	0	0	0.00	0.3	0.2	66.7	0.5	0.4	80	0.48	0.15	31.3
Integrated management of neonatal and childhood illnesses	0.03	0	0	0.03	0.001	3.33	0.05	0.01	20.00	0.03	0.005	16.7	0.03	0.04	129*	0.032	0.012	37.5
Home-based newborn care	0	0	0	0	0	0.00	0	0	0.00	0	0	0	0.13	0.01	7.7	0.007	0.034	486*
Infant and young child feeding	0.001	0	0	0.05	0.002	4.00	0.04	0.02	50.00	0	0	0	0.02	0.01	50	0.009	0.005	55.6
Nutritional rehabilitation centres	0	0	0	0	0	0.00	0.003	0	0.00	0	0	0	0.004	0.0002	5	0.017	0.0001	0.6
Immunization	0.3	0.2	66.67	0.46	0.22	47.83	0.7	0.37	52.86	2.4	1.9	79.2	0.75	0.49	65.3	3.1	3.3	106*

E expenditure, NRHM National Rural Health Mission, S sanctioned

* Extra budget was received from state budget

^a Budget utilization rate

^b *Janani Suraksha Yojana* is a financial incentive scheme for pregnant women to increase rate of institutional deliveries

^c *Janani Shishu Suraksha Karyakaram* is a scheme to provide free delivery services for pregnant women, including antenatal, natal and postnatal diagnostic, curative and transport services, and free treatment of sick infants in public health facilities

Fig. 2 Comparison of budget utilization rate of health system strengthening, communitization, maternal and child healthcare strategies components of National Rural Health Mission from 2007–2008 to 2012–2013

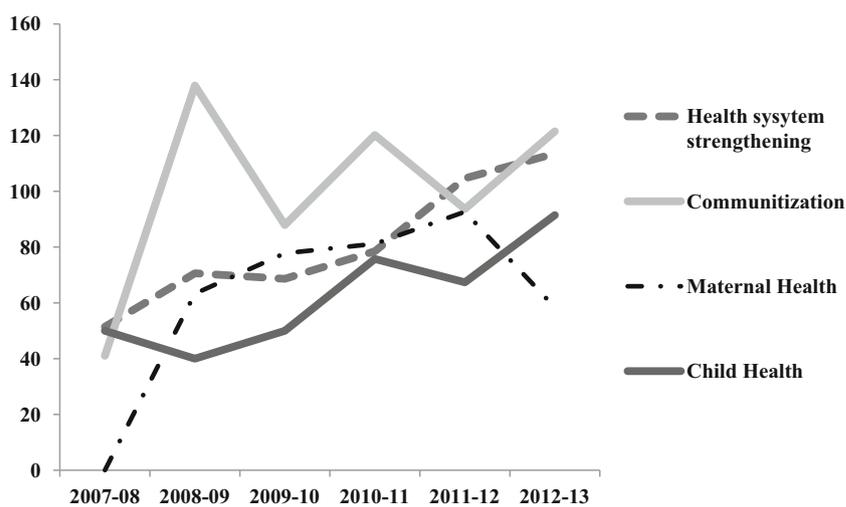


Fig. 3 Trend of budget utilization rate under health system strengthening component of National Rural Health Mission from 2007–2008 to 2012–2013

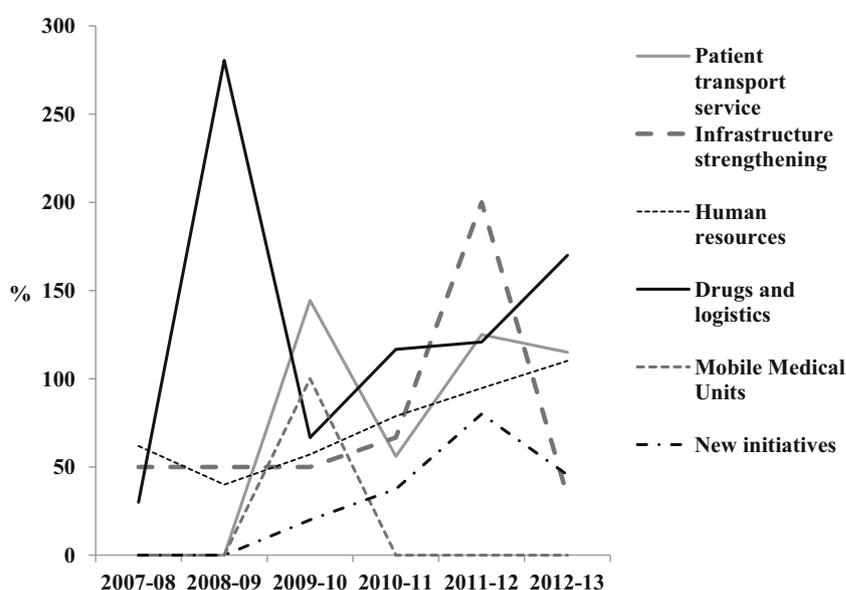


Fig. 4 Trend of budget utilization rate under communitization component of National Rural Health Mission from 2007–2008 to 2012–2013

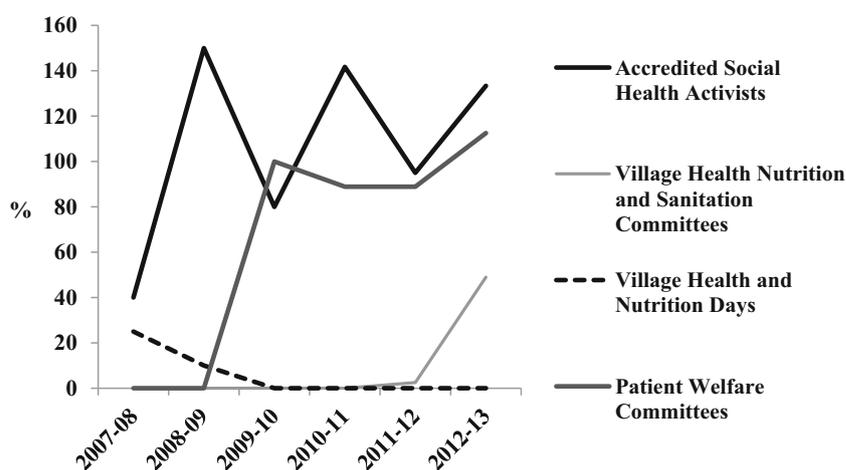


Fig. 5 Trend of budget utilization rate under maternal healthcare strategies of National Rural Health Mission from 2007–2008 to 2012–2013

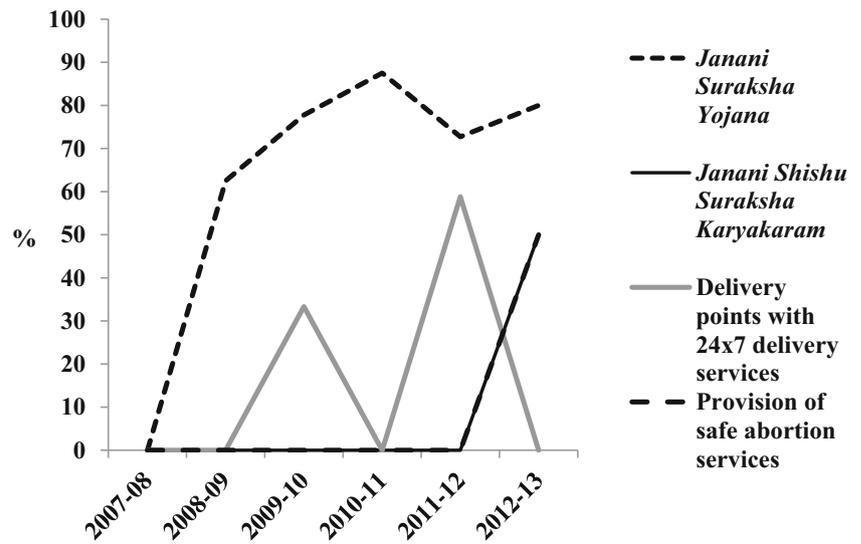


Fig. 6 Trend of budget utilization rate under child healthcare strategies of National Rural Health Mission from 2007–2008 to 2012–2013

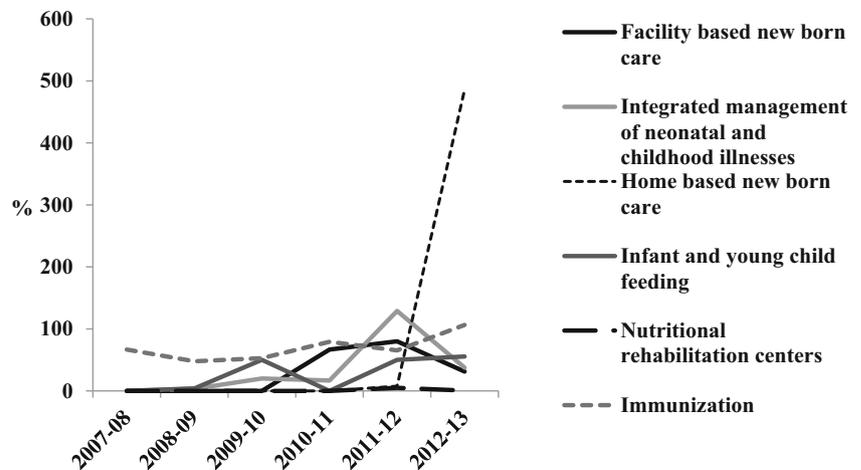


Table 3 Status of health facilities and healthcare providers in Haryana [30]

Health facilities	2005–2006	2007–2008	2012–2013
District hospitals	19	20	21
Sub-district hospitals	24	23	25
Community health centres	81	83	110
Primary health centres	408	420	440
Subcentres	2433	2465	2630
Accredited social health activists recruitment status	3639	11,108	13,787 ^a
Healthcare providers (as at 2011)	Regular	Contractual	Total
Doctors	2239	113	2352
Specialists	475	246	721
Paramedics	697	18	715
Staff Nurses	1554	1295	2849
Auxiliary nurse midwife	2077	2532	4609

^a For the years 2011–2012

Table 4 Status of implementation on National Rural Health Mission maternal and child health sector plans in Haryana

NRHM plans	Extent of implementation (budget utilization rate)				Nil (<1%)
	Full (≥100%)	Partial			
		High level (80–99%)	Mid level (20–79%)	Low level (1–19%)	
1. Health system strengthening	✓	–	–	–	–
Patient transport service/referral services	✓	–	–	–	–
Infrastructure development and strengthening	–	–	✓	–	–
Human resources	✓	–	–	–	–
Drugs and logistics	✓	–	–	–	–
Mobile medical units	–	–	–	–	✓
New initiative	–	–	✓	–	–
2. Communitization	✓	–	–	–	–
Accredited female health activist	✓	–	–	–	–
Village health and sanitation committees	–	–	✓	–	–
Village health and nutrition days	–	–	–	–	✓
Patient welfare committees	✓	–	–	–	–
3. Maternal healthcare strategies	–	–	✓	–	–
<i>Janani Suraksha Yojana</i>	–	✓	–	–	–
<i>Janani Shishu Suraksha Karyakaram</i>	–	–	✓	–	–
Delivery points with provision of 24 × 7 delivery services	–	–	–	–	✓
Provision of safe MTP services	–	–	✓	–	–
4. Child healthcare strategies	✓	–	–	–	–
Facility-based newborn care	–	–	✓	–	–
Integrated management of childhood illnesses	–	–	✓	–	–
Home-based newborn care	✓	–	–	–	–
Infant and young child feeding	–	–	✓	–	–
Nutrition rehabilitation centres	–	–	–	–	✓
Immunization	✓	–	–	–	–

MTP Medical Termination of Pregnancy, NRHM National Rural Health Mission

**p* value is the probability due to chance

and logistics and patient referral transport services—of six strategies fully implemented and infrastructure development partially implemented (mid-level). Child healthcare strategies were better implemented than the specific maternal healthcare strategies, with both home-based newborn care and immunization strategies but none of the maternal health schemes fully implemented.

MCH indicator trends before, during and after the NRHM period improved significantly (Table 5). The rate of institutional deliveries increased significantly from 35.7 to 77%. The MMR decreased from 1.85 (2002–2004) to 1.21 (2012–2013) per 1000 live births at the state level, and the IMR decreased significantly ($p < 0.05$) from 59 to 40 per 1000 live births.

A strong positive correlation was observed between the increase in institutional deliveries and the rate of budget use to implement the accredited social health activists

scheme ($r = 0.96$), and a moderate correlation was also observed with the financial incentive scheme for pregnant women ($r = 0.5$) over the years. Positive correlations were observed between the rate of budget utilization for the social health activists scheme and the corresponding number of health activists ($r = 0.44$) and between the financial incentive scheme and the corresponding number of beneficiaries registered under this scheme ($r = 0.3$). A negative correlation was observed between the budget utilization rate for immunization and fully immunized children (-0.79). However, these results were statistically non-significant ($p > 0.05$) because the estimates were conducted over limited time periods (because of the lack of available MCH output indicators from periodic surveys: DLHS rounds 3 [2007–2008] and 4 [2012–2013] and UNICEF coverage evaluation survey, 2009) (Table 6).

Table 5 Status of maternal and child health indicators pre, during and after implementation of the National Rural Health Mission in Haryana as per district-level household surveys rounds 2, 3 and 4

Indicators	Before NRHM (2002–2004)	During NRHM (2007–2008)	After NRHM (2012–2013)	<i>p</i> value
Maternal mortality ratio	1.86	1.53	1.21	0.13
Infant mortality rate	61	55	41	0.09
Antenatal care: percentage of pregnant women				
Who registered in the first trimester	13.7	55.1	82.1	0.00
With three or more antenatal check ups	43.1	51.9	74.5	0.00
With full antenatal check ups	11.8	13.3	21.8	0.06
Who got at least one tetanus toxoid injection	83.5	86.1	93.6	0.04
Who had at least 100 iron folic acid tablets	16.5	29.0	29.5	0.00
Natal care (%)				
Institutional delivery rate	35.7	46.9	76.9	0.00
Post-natal care (%): mothers who received post-natal care within 2 weeks of delivery	8.9	49.5	69	0.07
Child health (%): children aged 12–23 months who received				
Full immunization	59.1	59.6	52.1	0.28
No vaccination	11.8	1.9	5.9	0.00
BCG vaccine	83.5	86.5	84.2	0.96
Three doses of DPT vaccine	72.9	67.9	71.1	0.72
Three doses of polio vaccine	73.6	69.0	72.7	0.83
Measles vaccine	65.4	69.0	70.0	0.53
Women's awareness about				
Diarrhoea management	49.8	79	81.7	0.00
Danger signs of acute respiratory infection	49.8	76.3	75.2	0.00
Percentage of women whose child suffered from illness in last two weeks				
Diarrhoea	18.1	16.0	4.0	0.00
Acute respiratory infections	10.8	8.3	3.6	0.00
Childhood diseases: children with (illness reported in last 2 weeks)				
Diarrhoea who received oral rehydration solution	32.3	31.7	44.8	0.08

BCG Bacillus Calmette Guerin, *DPT* Diphtheria Pertussis Tetanus

4 Discussion

The results of this study indicate an overall trend for an increasing use of budgets for NRHM MCH strategies in Haryana from 2007–2008 to 2012–2013. Simultaneously, MCH indicators improved significantly during and after compared with before the NRHM period. This indicates improvements in the implementation of MCH strategies over these years. The patient referral transport services, human resources, drugs and logistics, accredited social health activists, patient welfare committees and immunization strategies were fully implemented. However, overall, the NRHM maternal and child health sector plans were only partially implemented in Haryana, which may explain the slow pace at which millennium development goals are being achieved.

The rates of budget use for implementation of the NRHM MCH sector plans vary widely from financial year 2005–2006 to 2011–2012. This is because, initially (2005–2006), funds were allocated as per the reproductive and child health (RCH-II) programme. Under this previous programme, fewer funds were available for the health system strengthening and communitization components as it mainly focused on implementing specific MCH plans. However, utilization of the funds was high because of the health sector reforms (e.g., decentralization) in RCH since 1999 in the state [35]. In later years, the planning and budgeting for additional NRHM interventions (e.g., infrastructure development, human resources, patient referral services, accredited social health activists linking the community and the health facility, patient welfare committees, financial incentive schemes for pregnant

Table 6 Correlation between budget utilization rate and maternal and child health services/indicators

Financial year	Budget utilization rate of MCH plans (%)	Maternal and child services/indicators	Correlation coefficient (<i>r</i>)	<i>p</i> value
1.	Patient referral transport	Number of patients referred ^a	-0.26	0.743
2009–2010	135.6	25,891		
2010–2011	56	99,075		
2011–2012	121.5	131,692		
2012–2013	111.5	143,046		
2.	Accredited social health activists scheme	Number of accredited social health activists recruited ^a	0.44	0.387
2007–2008	45.6	11,108		
2008–2009	154.9	12,152		
2009–2010	73.4	12,753		
2010–2011	141.7	12,861		
2011–2012	99.1	13,787		
2012–2013	132.2	14,622		
3.	Accredited social health activists scheme	Institutional delivery rate (%) ^b	0.96	0.164
2007–2008	45.6	46.9		
2009–2010	73.4	63.3		
2012–2013	132.2	76.9		
4.	Financial incentive scheme for pregnant women (<i>Janani Suraksha</i> scheme)	Number of beneficiaries registered under <i>Janani Suraksha</i> scheme ^a	0.3	0.808
2007–2008	0	48,076		
2010–2011	85.6	63,171		
2011–2012	79	41,758		
5.	Financial incentive scheme for pregnant women	Institutional delivery rate (%) ^b	0.5	0.658
2007–2008	63	46.9		
2009–2010	100	63.3		
2012–2013	80.2	76.9		
6.	Immunization	Fully immunized children between 12–23 months (%) ^b	-0.8	0.416
2007–2008	53.2	59.6		
2009–2010	52.9	71.7		
2012–2013	105.4	52.1		

^a Source: NRHM progress reports

^b Source: district-level household survey data, round 3 (2007–2008) and round 4 (2012–2013), and UNICEF coverage evaluation survey 2009

women, increased delivery points, and trained human resources to implement integrated management of neonatal and childhood illnesses) considerably increased the sanctioned budget. The utilization rate was only 20% during 2007–2008 but increased to almost 100% by 2011–2012. The change in leadership during 2009 (i.e., a new Mission Director joined the state) might also have contributed to this change. Under his stewardship and vision, the state annually not only received more budget but also increased utilization. Brinkerhoff and Bossert [36] emphasized that good governance is crucial for the strengthening of the health system. This is also demonstrated locally, where reforms for decentralization in Haryana between 2002 and

2004 were strongly influenced by improved local leadership [37]. Hence, the ruling government has a role in influencing the public health expenditure at different levels within the state; this was also documented in China [38].

Haryana state focused on implementing some of the aforementioned key interventions, such as providing free patient transport services; increasing human resources, drugs and logistics; appointing a local woman as a social health activist (a woman resident in the same village in which she was appointed had studied at least till eighth standard) eighth standard (i.e., till first year of high school), and married to a husband belonging to that village) as a link between the community and the health facility; and

trained human resources to implement integrated management of neonatal and childhood illnesses. However, it also needed to place more emphasis on developing and strengthening infrastructure, creating 24-h delivery services, enabling treatment of sick children at health facilities, and implementing communitization activities. The improvement in MCH indicators, particularly the institutional delivery rate (from 46.9 to 76.9%), could be because of the better implementation of NRHM schemes (e.g., referral transport, financial incentives for institutional deliveries and the appointment of accredited social health activists in villages) that focus on improving institutional delivery. Prinja et al. [39] also reported positive effects from a referral transport service, and Jain et al. [15] found positive effects from health activists in terms of increased numbers of deliveries in institutions. Financial investments in public health have the potential to improve community health [40], and a direct correlation between the level of public health spending and its impact on improving equitable utilization of health services has also been reported for India [41].

As per the logical framework model using input-process-output-outcome/impact indicators, we assumed that the proportion of allocated budget actually utilized was one of the inputs for improving MCH outcomes [34]. Also, as per the World Health Organization (WHO) framework of health system building blocks, health financing is one of the major building blocks of the health system [23], building and strengthening other building blocks such as the health workforce, infrastructure and supplies. If programme implementation plans are well prepared and executed, budget utilization rates can provide a good indication of the status of plan implementation. Districts were required to prepare action plans for all MCH activities to be implemented in the next financial year. These budget plans were then compiled at the state level and sent to central government for funding. The central government sanctioned the funds on the basis of the rate of budget utilization from the previous year and proper justification of the plans for the next year [42]. Therefore, a kind of blueprint existed for the budgetary outlay before implementation of the MCH plans at the beginning of a given financial year. These budgets had to be used for implementation; if not, fewer funds could be allocated for the following year. Therefore, at the end of the financial year and for any activity, the budget sanctioned can be compared with the budget used to provide a reliable proxy for complete or incomplete implementation of the activity [43]. Similar budget estimations were also conducted to study the healthcare financing system in Sierra Leone, Africa [44]. Our study adds to the existing literature, as earlier evaluations of NRHM did not investigate fund allocation and utilization patterns for MCH schemes [13].

It is possible for health outcomes to only show minimal improvement despite full utilization of the budget for a given activity. Our study found that only 52% of children were fully immunized in the year 2012–2013, despite full use of the budget for this strategy (105%). This indicates the presence of other factors that could not be directly controlled by just spending money, which could include the arrival of families with unimmunized children from neighbouring states, lack of trained vaccinators and poor acceptance of the strategy in the community. Hence, after 2013, budget allocation was started on the basis of performance indicators rather than on the budget utilization rate in India.

The results of this study provide new insight into the use of intergovernmental funds to implement NRHM MCH plans, which has not previously been documented in India. It also delineates the state's priorities in implementing such schemes. Increased budget use correlated well with improved MCH indicators during the NRHM implementation period, further strengthening our findings.

Our findings raise several issues related to the over- or underutilization of funds. Possible explanations for discrepancies in utilization compared with the allocated budget could include inadequate budget estimation, inadequate registration of actual costs incurred, more efficient resource use than originally planned, or less money spent on MCH, leading to an insufficient decline in maternal and child mortality.

Underlying reasons for partial implementation and underutilization of the budget could include insufficient capacity of the state to spend the budget or late release of funds by central government. States usually send the programme implementation plans in the last quarter of a financial year (January–March), and the budget is approved in the first quarter of the next financial year (April–June), after which it is released in either the second or the third quarter. This leads to a last quarter rush, as reported by Gupta et al. [42] and Fan et al. [45]. Further reasons for underutilization might include improper planning for implementation of activities (e.g., the activity is implemented at the end of the year); inadequate number of programme managers (e.g., one programme manager looking after many programmes); different priorities set by the state, leading to one plan being prioritized over another; and a lack of regular monitoring and supervision of the implementation of activities and the utilization of funds [46]. Common and joint review mission reports have also documented partial implementation of NRHM activities and reported that scope for improvement certainly exists. Overutilization of funds on certain schemes could be because of the flexibility of NRHM funds and because the state could choose to provide additional funds from the state's health budget. Unsynchronized budget and

expenditure cycles that lead to a delay in budget execution and complications in programme implementation has also been documented in China [47]. This study did not assess district-level variations in budget expenditure and utilization in implementing NRHM plans; this warrants further study.

One limitation of this study is that the role of confounding factors, such as improved socioeconomic conditions and their relationship with MCH indicators, cannot be ruled out. It is also difficult to comment on the effectiveness of budget utilization, as that depends on simultaneous measurement of MCH outcomes and was not the objective of this study. We investigated the surrogate parameter budget spent on state-level MCH care, but it would be better to evaluate actual care. Underlying our argument is the assumption that all separate measures and the budget allocated to them are equally important for the reduction of maternal and child mortality. More research is warranted to find out whether some measures with different budgets allocated and used might be more effective than others. One could even speculate whether a model could be made that estimates the actual care on the basis of measured budget spent. A prospective field survey to simultaneously look at budget use, the implementation process and the outcomes may also be conducted to investigate the effectiveness of the budget used to improve MCH outcomes. However, this is costly and time consuming, and lack of funding and inadequate timeframes are major barriers for comprehensive health system evaluations in low- and middle-income countries [48]. The advantage of our indirect method is the feasibility and ease with which existing information could be used to ultimately improve implementation of future health plans.

5 Conclusions

Our findings provide important insights into how the state uses national funds (intergovernmental funds) to implement centrally funded (large) programmes such as the NRHM. Our findings might be useful for policy makers and programme managers as they can be used to improve planning and implementation of the national MCH programme. The budget utilization rate can be used to monitor successes and failures of the national programme and its components. Our findings might also assist other low- and middle-income countries when thinking about how to implement and evaluate national programmes.

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Author Contributions MG, FA, HB, MK and OVS made substantial contributions to conception and design. MG and FA made substantial contributions to the acquisition of data. HB, MK, SP, MG and FA made substantial contributions to data analysis. MG, FA, HB, MK, SP and OVS made substantial contributions to interpretation of the data. MG was involved in drafting the manuscript. FA, HB, SP, MK and OVS were involved in drafting the manuscript and revising it critically for important intellectual content. All authors provided final approval for publication of the manuscript.

Compliance with Ethical Standards

Madhu Gupta, Federica Angeli, Hans Bosma, Shankar Prinja, Manmeet Kaur and Onno CP van Schayck have no conflicts of interest. There are no financial or non-financial competing interests. The institute or position of MG, MK and SP was funded by NRHM; however, this did not bias the data collection, analysis or interpretation of the results of this study, as the aim of this study was to evaluate NRHM in a neutral, scientific, impartial and independent manner. The ethics committee of PGIMER, Chandigarh approved this study. Prior permission and informed consent was provided by officials to obtain records from the NRHM Haryana office.

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Data Availability Statement Data are provided in the following supplementary files.

S File 1. Approved record of proceedings Haryana, 2007-08.pdf

S File 2. Approved record of proceedings Haryana, 2008-09.pdf

S File 3. Approved record of proceedings Haryana, 2009-10.pdf

S File 4. Approved record of proceedings Haryana, 2011-12.pdf

S File 5. Approved record of proceedings Haryana, 2012-13.pdf

S File 6. Approved record of proceedings Haryana, 2007-08.pdf

S File 7. Financial Monitoring report, Haryana, 2007-08.excel

S File 8. Financial Monitoring report, Haryana, 2008-09.excel

S File 9. Financial Monitoring report, Haryana, 2009-10.excel

S File 10. Financial Monitoring report, Haryana, 2010-11.excel

S File 11. Financial Monitoring report, Haryana, 2011-12.excel

S File 12. Financial Monitoring report, Haryana, 2012-13.excel

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