RESEARCH PAPER

Effectiveness of *Muskaan Ek Abhiyan* (The Smile Campaign) for Strengthening Routine Immunization in Bihar, India

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Background: In Bihar State, proportion of fully immunized children was only 19% in Coverage Evaluation Survey of 2005. In October 2007, a special campaign called *Muskaan Ek Abhiyan* (The Smile Campaign) was launched under National Rural Health Mission to give a fillip to the immunization program.

Objectives: To evaluate improvement in the performance and coverage of the Routine Immunization Program consequent to the launch of *Muskaan Ek Abhiyan*

Intervention: The main strategies of the *Muskaan* campaign were reviewing and strengthening immunization micro-plans, enhanced inter-sectoral coordination between the Departments of Health, and Women and Child Development, increased involvement of women groups in awareness generation, enhanced political commitment and budgetary support, strengthening of monitoring and supervision mechanisms, and provision of performance based incentive to service providers.

Methods: Immunization Coverage Evaluation Surveys conducted in various states of India during 2005 and 2009 were used for evaluation of the effect of *Muskaan* campaign by measuring the increase in immunization coverage in Bihar in comparison to other Empowered Action Group (EAG) states using the difference-in-difference method. Interviews of the key stakeholders were also done to substantiate the findings.

Results: The proportion of fully immunized 12-23 month old children in Bihar has increased significantly from 19% in 2005 to 49% in 2009. The coverage of BCG also increased significantly from 52.8% to 82.3%, DPT-3 from 36.5 to 59.3%, OPV-3 from 27.1% to 61.6% and measles from 28.4 to 58.2%. In comparison to other states, the coverage of fully immunized children increased significantly from 16 to 26% in Bihar.

Conclusions: There was a marked improvement in immunization coverage after the launch of the Campaign in Bihar. Therefore, best practices of the Campaign may be replicated in other areas where full immunization coverage is low.

Key words: *Evaluation, Immunization, India, Inter-sectoral coordination, Performance-based incentives.*

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Bihar had the second largest pool of susceptible children in India in year 2001 and routine immunization (RI) rates have been substantially below national average [1]. Fully immunized children in the 12-23 months age group was 11.6% in NFHS-2 and 32.8% in NFHS-3 [2,3]. In eleven districts of the state, immunization coverage in fact had declined in 2002-04 (DLHS-2) [4] compared to 1998-2000 (DLHS-1) [5]. Coverage of BCG was 36% in NFHS-2 indicating poor access to immunization services [2]. These findings indicated a strong need to focus greater efforts on strengthening immunization in the state. Therefore, Health and Family Welfare Department of Government of Bihar with the support of Bihar State Office of UNICEF launched a special campaign in October 2007 called *Muskaan Ek Abhiyan* (The Smile Campaign) to give a major fillip to the RI program. The aim of this study was to evaluate improvement in the performance and coverage of the Routine Immunization programme consequent to the launch of *Muskaan Ek Abhiyan*.

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METHODS

This observational study was conducted by collecting program data retrospectively to measure the impact of a package of interventions implemented under the *Muskaan Ek Abhiyan* campaign in Bihar, which were over and above the ongoing routine program efforts. The study design involved comparison of the immunization coverage before and after the launch of *Muskaan* campaign in Bihar with other Empowered Action Group (EAG) states in the corresponding period.

Campaign Interventions

The Campaign was guided by the Plan of Action of National Rural Health Mission (NRHM) prepared by the Bihar Health Society with the technical support of UNICEF and the National Polio Surveillance Project (NPSP) supported by WHO [1]. The goal of the campaign was to provide timely and safe immunization with all antigens to all eligible children and pregnant women throughout the state. The guiding principles of the plan were to increase access by increasing the number and reach of immunization sessions, decreasing the drop outs, increasing the demand, improving management, and intensifying supervision for achieving and sustaining high immunization coverage. The interventions implemented in the Campaign are detailed in ***Fig.* 1**.

Reviewing and strengthening micro-plans: Traditionally, Routine Immunization (RI) sessions were held at sub centers on every Wednesday and in one anganwadi center (AWC) on every Saturday. The micro plan was revamped and Auxiliary Nurse Midwife (ANM) also conducted RI sessions on every Friday in 2 to 3 AWCs. In first phase of *Muskaan* (October 2007 to August 2009), immunization sessions were also based at health facilities and AWCs. However, in the second phase (September 2009 onwards), immunization sessions were also extended to villages and hamlets where health facility/ AWC's did not exist. The revised microplan ensured that all AWCs are covered at least once every month. Anganwadi workers (AWWs) and Accredited Social Health Activist (ASHA) of the AWC mobilized the pregnant women and children using the tracking register. ANMs recorded the service delivered in the vaccination session on reporting formats, MCH and immunization registers. After the session, AWW and ASHA updated the tracking registers on the same day or latest by the next immunization session. In addition to routine immunization activity, three rounds of special immunization weeks were carried out throughout the State from December 2006 to April 2007 to reach all vulnerable areas. A special post-flood catch-up immunization campaign was carried out in the five most flood affected districts of Bihar following massive floods in year 2007.

Intersectoral co-ordination: Operational strategy for convergence between Integrated Child Development Scheme (ICDS) and Health Department was facilitated by joint commitment of the highest level functionaries in the form of a joint government order which enforced inter-sectoral coordination. The ANM acted as the team leader of 5 to 10 AWCs. AWWs and ANMs conducted a time bound cross sectional house-to-house survey to identify all currently pregnant women and children in 0–2 year age group. Follow-up surveys were conducted on monthly basis to identify new pregnancies and newborns. All identified pregnant women and 0-2 year old children were registered in pregnancy and newborn tracking registers, respectively. Before each immunization session, AWW and ASHA conducted mass mobilization activities for identification and mobilization of eligible children and pregnant women (based on tracking register) to the immunization site in the village.

Involvement of Mahila Mandals (women groups) for awareness generation: *Mahila Mandal* meetings were organized on third Friday of every month for pregnant women and mothers of young children to create awareness on issues related to health, immunization, and nutrition. Initially (2007-08), Rs 150 per month was allocated per AWC per month for *Mahila Mandal* meeting expenses, which was later raised to Rs 250 in 2009. However, this grant was discontinued in phase-2 as the budget allotted for *Mahila Mandal* meetings were tagged with the Village Health and Sanitation Committee (VHSC) funds.

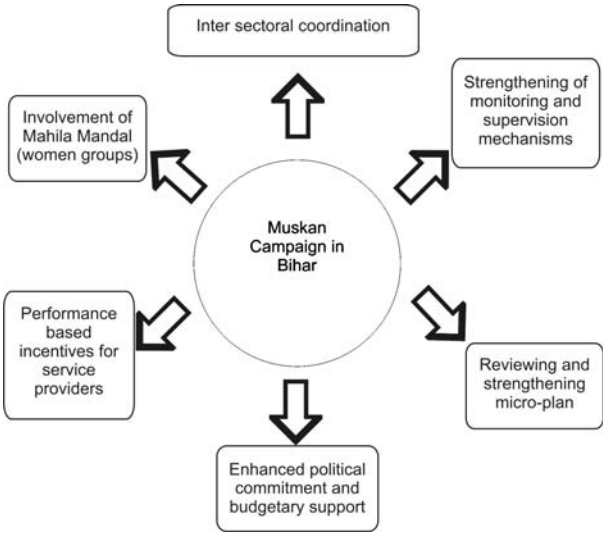


FIG. 1 *Interventions during Muskaan campaign in Bihar.*

Performance based incentive to service providers: In phase-1, incentive of Rs 200 per month each for AWW and ASHA and Rs 150 for ANM was provided for coverage above 90%, and Rs 100 each for AWW and ASHA and Rs 75 for ANM for 80-90% coverage. For coverage of less than 60%, explanation were sought in their weekly and monthly review meetings. Under phase-2, the incentive for AWW and ASHA was Rs 200 each per session for more than 21 beneficiaries, Rs 150 for 16-20, Rs 100 for 11-15 and Rs 50 for 5-10 beneficiaries. Similarly, the incentive for vaccinators, i.e., ANM was Rs 100 per session for 15 and more beneficiaries per session and Rs 50 for 1-15 beneficiaries [1].

Enhanced political commitment and budgetary support: District Immunization Officers and Medical officer In-charges were trained at state level; who in-turn trained all health workers in their respective districts**.** A system of delivering vaccines at the immunization site through couriers (a person who delivers and brings back vaccines from the vaccination site on the same day) was implemented throughout the state. Alternate vaccinators were proposed to counter the shortage of ANM in year 2007-08. Alternate vaccinators were paid an honorarium of Rs 350 per session for up to 4 sessions a month (a maximum of Rs 1400/- per month). Vacant posts of Medical Officers and ANMs were filled on contractual basis.

Strengthening of monitoring and supervision mechanism: Updating and cross verification of beneficiaries was envisaged as a core component of monitoring wherein 2% of all registers had to be verified by line supervisors. At the level of primary health centers, an integrated approach to supportive supervision was adopted by Medical Officers and Integrated Child Development Scheme officials who randomly verified immunized beneficiaries using tracking registers to release the monetary incentives. The percentage of sessions held against those planned was assessed by monitoring whether the vaccine was lifted from the storage sites and whether ANM, ASHA and AWW were present at the vaccination site.

At block level, a steering committee consisting of Medical Officer In-charge, Child Development Project Officer, Senior Medical Officer, and Health Manager was formed to facilitate implementation and monitoring of the campaign related activities. At district level the campaign was under the control of District Health Society (DHS). The District Magistrate chaired the meetings of the District Task Force to review the monthly immunization progress report. A system of regular monitoring was carried out independently by the state and district officials of Government of Bihar, UNICEF and NPSP-WHO. The monitoring feedback was sent to Divisional Commissioners and Regional Deputy Directors of Health for necessary action. Selective indicators were reviewed weekly by the Executive Director, NRHM. Monitoring presentations were made to all District Immunization officers in monthly meetings. The political leadership also maintained a strong oversight of all campaign activities.

Performance and Coverage Evaluation

National Family Health Survey (NFHS) [2, 3], Rapid Household Survey (RHS) [6], Immunization Survey of Bihar (ISB) [7], District Level Household Surveys (DLHS) [4,5,8], and Coverage Evaluation Surveys (CES) [9-10], conducted by various agencies that used standard survey methodology were used for assessment of the immunization coverage. Super-vision reports were also reviewed to ascertain the quality of immunization services. Interviews of the key stakeholders in the state were also conducted to substantiate the findings. The data collection was done from September to December 2009, and analysis was done in January and February 2010. Informed consent was obtained from the Government Officials and UNICEF office of Bihar state.

RESULTS

All monitoring indictors related to immunization performance showed a significant improvement since the launch of the *Muskaan* campaign (***Table* I**). It was also found that the presence of AWW and ASHA workers had increased from 57% and 14% in 2006-07 to 75% and 64% in 2008-09, respectively after the implementation of the campaign [7]. The functioning of Deep Freezers (DF) and Ice-lined Refrigerators (ILR) had also improved after the launch of the campaign (***Fig. 2***). The downtime of various cold chain equipments had decreased [7].

The trend of fully immunized children before and after the *Muskaan* campaign is presented in ***Fig.* 3**. The

TABLE I MONITORING INDICATORS OF ROUTINE IMMUNIZATION SESSIONS IN BIHAR

Session indicator	2005-06	2006-07	2007-08	2008-09
Sessions held	91%	93%	92%	91%
Session with				
ANM	91%	94%	96%	95%
ASHA	0%	14%	55%	64%
AWW	54%	57%	52%	75%

ANM: Auxiliary Nurse Midwife; Asha: Accredited Social Health Activitist; AWW: Anganwadi worker.

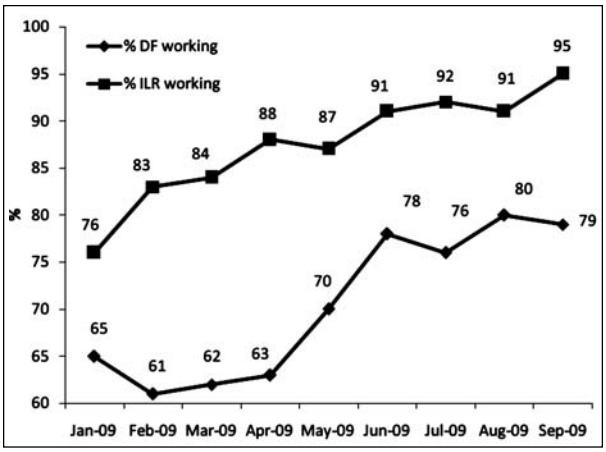
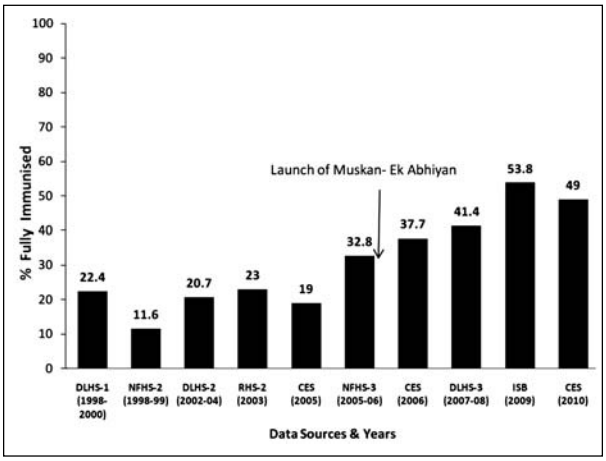


FIG. 2 *Functional status of Deep freezers and Ice-lined refrigerators at Primary Health Centers in Bihar.*



NFHS-National Family and Health Survey, DLHS- District Level Household Survey, CES- Coverage Evaluation Survey, ISB-Immunization Survey of Bihar, RHS- Rapid Household Survey

FIG. 3 *Fully immunized children (12-23 months) in Bihar.*

Coverage Evaluation Surveys show that the proportion of fully immunized children has increased from 19% in 2005 to 49% in 2009 ($P<0.001$). The coverage of BCG increased from 52.8% to 82.3% ($P<0.001$), DPT-3 from 36.5% to 59.3% ($P<0.001$), OPV-3 from 27.1% to 61.6% ($P<0.001$) and measles vaccine from 28.4% to 58.2% ($P<0.001$). Between 2005 and 2009, there was a statistically significant improvement (16% to 26%) in immunization coverage among 12-23 month old children in Bihar as compared to other EAG states [9,11] (***Table* II**).

DISCUSSION

The proportion of fully immunized children increased almost two and a half times after the launch of *Muskaan* campaign. Antigen-wise coverage indicates that nearly two third children are being vaccinated against DPT-3 and measles in Bihar. Several factors such as the launch of NRHM which has brought additional funding and human resources (such as ASHAs) may have contributed to this positive change; however, the package of interventions implemented under the *Muskaan* campaign seem to be a key factor behind such positive impact as the improvements in Bihar were 16 to 26% higher than other EAG states where NRHM inputs were available over the same time period.

A study in district Yamunanagar in Haryana reported significant increase in age appropriate immunization coverage with involvement of Community Health workers and vaccinators, revamping of micro plans and regular monitoring [11]. It has also been shown in Indonesia that only training the health workers is not sufficient for effective routine immunization, but the guidance provided through supportive supervision has helped in improving various aspects of immunization such as logistics recording, cold chain management, stock management, vaccine management and reporting and recording [12]. In this study also, the supportive supervision mechanism may have helped to identify the areas of continued weakness which need further on job training and supervision. Integrated efforts of ICDS and health department at all levels especially revision of micro plans and hiring of additional ANMs along with additional day for immunization may have helped to increase the overall immunization coverage in Bihar. Moreover, a meticulously planned 'coverage based

TABLE II PERCENTAGE OF FULLY IMMUNIZED CHILDREN (12-23 MONTHS) IN EMPOWERED ACTION GROUP (EAG) STATES IN COVERAGE EVALUATION SURVEY 2005 AND 2009

State	2005a	2009b	Difference d=(b-a)	*Diff-in-Diff for Bihar
Bihar	19.0	49.0	30.0	-
Chhattisgarh	44.4	57.3	12.9	17.1
Uttar Pradesh	33.8	40.9	7.1	22.9
Madhya Pradesh	38.9	42.9	4.0	26
Orissa	53.2	59.5	6.3	23.7
Uttaranchal	61.1	71.5	10.4	19.6
Jharkhand	45.7	59.7	14.0	16.0
Rajasthan	49.9	53.8	3.9	26.1

**Diff-in-Diff (Difference-in-Difference) = Bihar (column d first row) – Each State (column d row for each state). It reflects net increase between 2005 and 2009 in Bihar after taking into account increase in each of the other states during the same period; All diff-in-diff were statically significant.*

incentive' strategy might also have worked to increase immunization coverage in Bihar, as it inculcated a motivation among the service providers and mobilizers at the grass root level. A global review of performance based incentives by Eichler, *et al*. [13]. showed that incentivizing will be effective only when there is careful planning, implementation, monitoring and supervision [13]. *Muskaan* strategy has given importance to all the components of immunization starting from the planning, implementation, monitoring and supervision along with provision of performance based incentives, and political commitment.

The main area of concern has always been to reduce 'left-outs' and 'drop-outs', which was addressed by tracking registers and 'immunization due' list maintained at sub centre level. In Bihar, the number of drop-outs and left-outs has decreased since the launch of *Muskaan* campaign. It has been observed that improving health facility practices can increase immunization coverage through reducing "drop-outs" and "missed opportunities". In Ethiopia, the use of reminder stickers for parents resulted in nearly 50% decrease in dropout between DPT1 and DPT3 [14]. The introduction of electronic immunization registry and tracking system in Rajshahi City Corporation in Bangladesh has helped in the planning and execution of effective immunization at an operational level by providing a back-up even if parents forget their child's vaccination dates, guiding health workers towards those who need their doses, and potentially reducing vaccine wastage [15].

Link workers involved as mobilizers encouraged people to seek immunization services, which were brought closer to the communities. In our study, the presence of AWW and ASHA workers had increased after the implementation of the *Muskaan* campaign. Similar findings were observed in Bangladesh, where semiliterate and illiterate local women employed in an urban setting to track defaulters, to refer them to services and accompany mothers to immunization clinics has improved immunization coverage rates [16]. In Kenya, school buildings were utilized as immunization centers, with schoolchildren circulating immunization information within their communities [17]. In Nigeria, access to immunization services was improved by increasing the number of locations offering immunization and adding mobile clinics in the evenings [18].

It is difficult to extract the effect of individual interventions of *Muskaan* campaign. Prospective studies are required to measure the effect of each intervention; however, it is often difficult to conduct such studies in program settings. About half of the children still remain to be immunized against various antigens in Bihar, and selective use of specific interventions in different district may reveal the effect of different interventions on the coverage.

Overall, the strategies employed under *Muskaan* campaign seem to be successful in most parts of the state. A key strength of the model appears to be that the interventions were directed through existing public health system frontline providers. Improvement in availability of skilled human resources, quality of microplans, review of *Muskaan* registers by supervisors, timely disbursement of monetary incentives, and inclusion of urban area in micro planning can further improve immunization coverage in Bihar. Although a sound supervision mechanism is in place in Bihar, it needs to be sustained in future as well, since the *Muskaan* Campaign was very much dependent on support of partner organizations. A downward trend in immunization coverage rates was observed in DLHS 2 (2002-04) [4] and in CES 2009 as well, hence, in-depth review of causes of such reversal should be looked into so as to sustain the gains in the longer term.

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