

# Mass Measles Vaccination Campaign in Aila Cyclone-Affected Areas of West Bengal, India: An In-depth Analysis and Experiences

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## Abstract

Disaster-affected populations are highly vulnerable to outbreaks of measles. Therefore, a mass vaccination against measles was conducted in Aila cyclone-affected blocks of West Bengal, India in July 2009. The objectives of the present report were to conduct an in depth analysis of the campaign, and to discuss the major challenges. A block level micro-plan, which included mapping of the villages, health facilities, temporary settlements of disaster-affected population, communications available, formation of vaccination team, information education communication, vaccine storage, waste disposal, surveillance for adverse events following immunization, supervision and monitoring was developed. The rate of six months to five years old children, who were vaccinated by measles vaccine, was 70.7% and that of those who received one dose of vitamin A was 71.3%. Wastage factor for vaccine doses and auto-disable syringes were 1.09 and 1.07, respectively. Only 13 cases of adverse events following immunization were reported. An average of 0.91 puncture-proof containers per vaccination session was used. Despite the major challenges faced due to difficult to reach areas, inadequate infrastructure, manpower and communication, problems of vaccine storage and transport, the campaign achieved a remarkable success regarding measles vaccine coverage, improvements of cold chain infrastructure, formulating an efficient surveillance and reporting system for adverse events following immunization, building self-confidence of the stakeholders, and developing a biomedical waste disposal system.

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**Keywords** • Disaster • cold chain • adverse events • immunization

## Introduction

Outbreaks of measles continue to be a common occurrence among disaster-affected children in emergency relief camps,<sup>1,2</sup> due to population migration and overcrowding. The fatality of measles in children in emergencies have been as high as 20–30%.<sup>3,4</sup> It was also reported to be 22% and 17% in children under five years and 5-14 years, respectively during a famine in Ethiopia.<sup>5</sup>

World Health Organization (WHO) and UNICEF recommend vaccinating all children from six months to 14 years along with vitamin A supplementation during emergencies.<sup>6</sup> At the minimum, children from six months through five years must be

vaccinated, while vaccine availability, funding, human resources and local measles epidemiology may influence the choice of the age groups covered.<sup>6</sup> Infants, who have been vaccinated at six months should be revaccinated again at nine months.<sup>7</sup>

On 25<sup>th</sup> of May 2009, a devastating cyclone named Aila struck the coastal areas of West Bengal, an eastern state of India. The worst affected blocks were Sandeshkhali I & II and Hingalgunj in the district of North Twenty Four Parganas and Basanti, Gosaba, Patharpratima and Kultali in the district of South Twenty Four Parganas affecting a population of 1,629,762 living in 703 villages. These blocks situated along rivers, have a delta geographic feature, (as evident from the attached map), (figure 1) dense forest (famous as Sundarban Tiger Reserve, which was declared as World Heritage Site by UNESCO), scattered population and poor communication facilities.

Fearing the possibilities of measles outbreaks in this disaster situation, Government of West Bengal decided to launch a special measles and Vitamin-A campaign in the affected blocks. West Bengal State Immunization Support Cell (WBSISC), based at the Department Of Community Medicine, Medical College, Kolkata, was entrusted to provide techno-managerial support for program planning and

management of the campaign. The whole campaign was organized in collaboration with UNICEF, Kolkata and WHO-National Polio Surveillance Project (NPSP).

The objectives of the present study were to analyze the mass measles vaccination campaign activities in the worst affected blocks of West Bengal by Aila cyclone, and to identify the major challenges during the campaign.

## Methods

Based on the local epidemiology and feasibility in the disaster situation, it was decided to vaccinate all children between six months to five years with measles vaccines and to supply them with one dose of vitamin A irrespective of their immunization status. Considering 10% of the census population of the study area the target population was estimated to be 163,040 people.

West Bengal State Immunization Support Cell organized a workshop with district and block's health officials, and partner nongovernmental organizations (NGOs) to finalize the plan of implementation and the campaign guidelines. After participatory exercise with frontline health workers, the block level micro-plan was developed. The plan comprised of mapping of the blocks including villages, health facilities, temporary settlements of disaster-

### MAP SHOWING AREA FOR MASS MEASLES VACCINATION

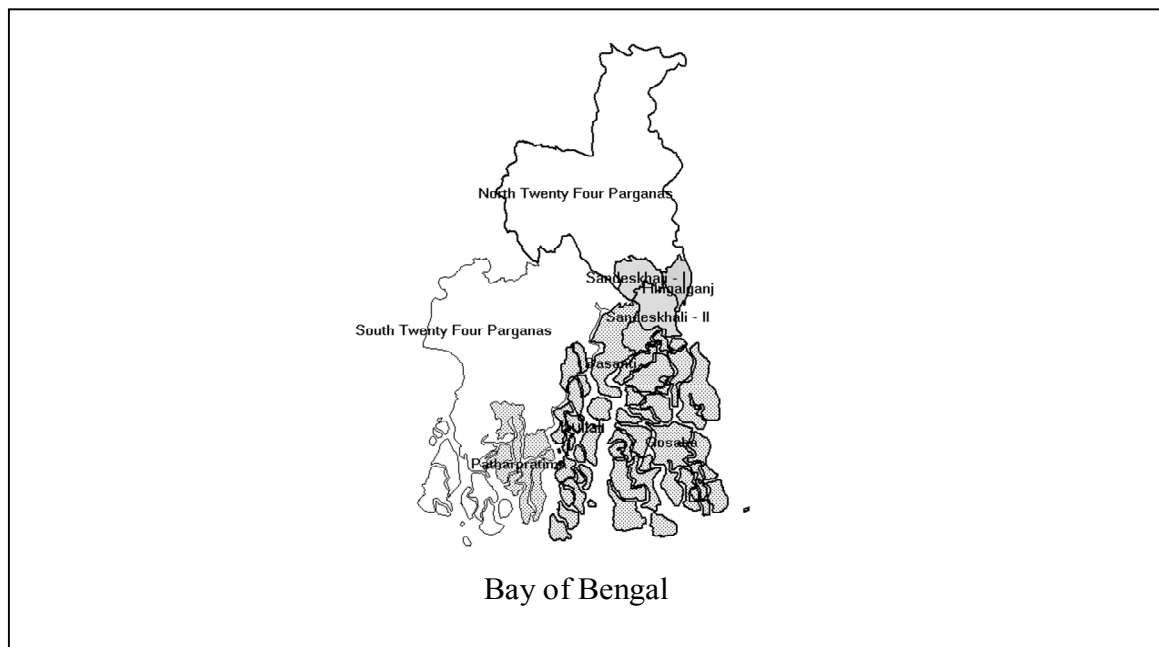


Figure 1: The map was reproduced from Health on the March 2010, Department of Health and Family Welfare, Government of West Bengal.

affected population, and communications and transport available in the villages. It also included plan for the formation of four-membered village level team for campaign and vaccination, selection of session site at prominent locations, Information Education Communication (IEC), vaccine storage, waste disposal, supervision, and monitoring. In each session, a maximum of 75 beneficiaries could be vaccinated in one day to maintain the quality of vaccination as per guidelines from government of India.<sup>8</sup> Information Education Communication was conducted using loudspeakers, posters, leaflet distribution and interpersonal communication by community level volunteers.

Vaccine storage was planned in each block's primary health centers with provisions of 24 hours generator back up and supply of cold chain logistics in cases of shortage. To ensure safe disposal of immunization waste, bio-medical waste (Management and handling) rules of Ministry of Health and Family Welfare, Government of India,<sup>9</sup> were followed.

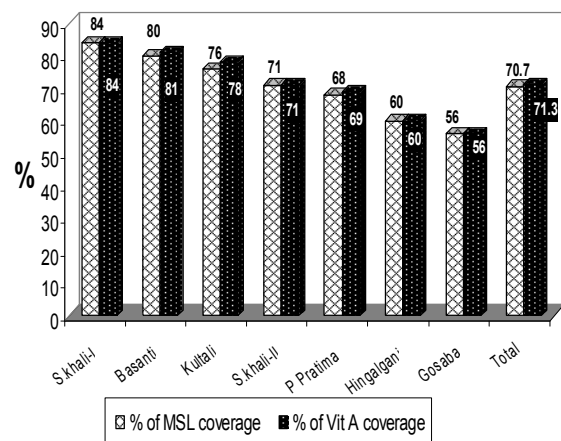
In each block, one district extender, who was designated person employed and trained by WBSISC, and deployed in every district of West Bengal to perform field level monitoring and supervision regarding routine immunization activities and maintain the liaison between different levels of administration, and one faculty member of Department of Community Medicine, Medical College, Kolkata were assigned as nodal point for the implementation and supervision of the campaign. Both internal and external monitoring and supervision were planned to evaluate the coverage and Adverse Events Following Immunization (AEFI).

The campaign was launched on 16<sup>th</sup> July 2009 and continued in two phases up to 7<sup>th</sup> August the same year. Activities included vaccination and Vitamin A supplementation using fixed posts, and the use of checklists to monitor vaccination sessions. Adverse Events Following Immunization was reported on a standard format recommended by the Government of India.<sup>8</sup> A pretested and predesigned proforma was used for data collection by the district extender under the supervision of the faculty for quality check. The variables for which data were collected were age and sex distribution of beneficiaries, infrastructure, manpower used, logistics of cold chain maintenance, doses of vaccine and auto-disable syringes used, wastage of vaccine, vaccine and vitamin A coverage, IEC components, biomedical waste management following vaccination, and AEFI. Data was collected and analyzed by the authors using standard statistical procedures and Epi

Info statistical software (version 6.0).At the state level, meetings were held at the end of each working day to review the progress and address the problems.

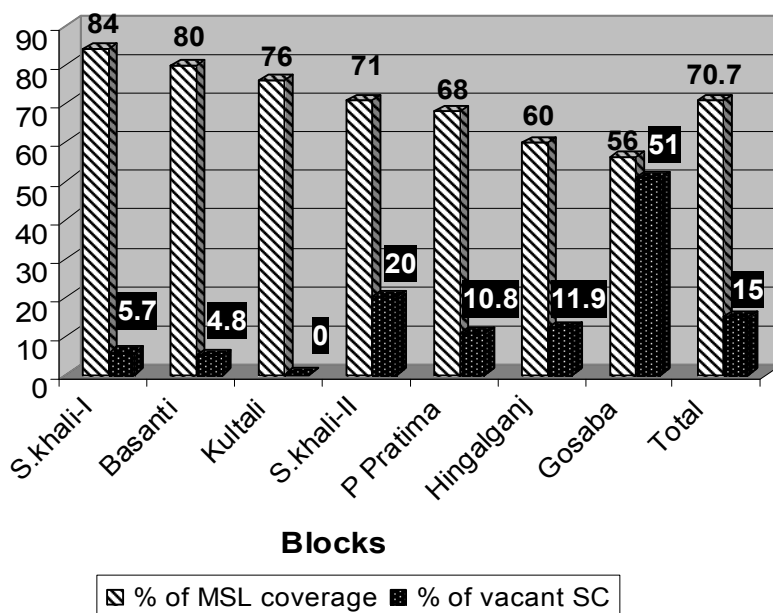
## Results

The number of vaccinated children with an age range of six months to five years was 115,339 people (70.7% of the predicted number), of which 117,957 (71.3%) received one dose of 100000 or 200000 International Unit or of vitamin A. Children under one year received the lower dose, and those above one year received the higher dose (figure 2). Out of total vaccinated children, 58,509 (50.7%) were male and 56,830 (49.3%) female. The reasons of low coverage in some blocks might be inadequate manpower in Health sector of subcenters (figure 3). The subcenters were the rural health posts catering to a population of 5,000 in India where two Auxiliary Nurse and Midwives (ANMs) were supposed to be present. As a whole, in Aila cyclone-affected blocks, 43.4% of subcenters were seen to have only one ANM, and 14.9% of subcenters were completely vacant. Hingalgunj block had also 77.8% vacancy of supervisors. As filling-up of vacancies was not feasible within the campaign time-frame, such areas were covered by deputing ANMs from other subcenters after their scheduled campaign work was over. Difference between measles and Vitamin A coverage was minimal in all the blocks.



**Figure 2:** The percentage of children with an age range of six months to five years receiving measles vaccine or vitamin A supplementation in areas of West Bengal, India affected by Aila cyclone. MSL; measles.

The duration of vaccination varied from 20 days in Gosaba to eight days in Sandeshkhali I due to difference in approaches and availability of manpower. A total of 1,747 sessions were



**Figure 3:** The percentage of children with an age range of six months to five years receiving measles vaccination and the number of vacant subcenters in areas of West Bengal, India affected by Aila cyclone. MSL; measles.

held in the first phase, and 422 sessions in the second phase to immunize the number of children who might miss the vaccination. The number of sessions held per day varied from 64 to one, where one session had to be organized in second phase to cover small number of left out children in far off hamlets due to riverine characteristics of the area. Average number of the children vaccinated in one day ranged from 698 in Sandeskhali II to 2026 in Patharpratima.

There was no statistically significant difference between the the age of children vaccinated in various blocks (table 1).

#### Vaccines and Logistics Used

To accomplish the vaccination of measles for 115,339 children, the total number of vaccine doses and autodisable syringes used were 125,285 and 123,554, respectively. Wastage factors were seen to be 1.09 for vaccine doses and 1.07 for AD syringes.

#### Cold Chain

For measles campaign in 7 blocks a cold chain comprising of 16 points was created, and one person was designated to each point for cold chain handling during the period of campaign. All instruments had functional thermometers. Twenty four-hour generators back up services were ensured throughout the period. Twice-a-day monitoring of temperature showed vaccine temperature was within an optimal range. Vaccines were sent in zipper bag in vaccine carriers and all the modes of transport such as boats, auto rickshaws, engine vans, paddle vans and link persons were utilized for vaccine transportation to the operation sites.

#### Extensive Information Education Communication and Social Mobilization

Extensive IEC and social mobilization were undertaken. The average number of days of using loudspeakers was 4.14 and the minimum was two days. The device was used for interper-

**Table1:** The number and (percentage) of children with an age range of six months to five years vaccinated for measles in areas (blocks) of West Bengal, India affected by Aila Cyclone stratified based on the age of children

Age	Basanti	Kultali	Gosaba	Pathar pratima	Hingal gunj	Sandes khali I	Sandes khali II	Total
6-9 months	1613 (6.1)	1151 (6.6)	873 (6.06)	1431 (6.4)	559 (5.3)	714 (5.3)	660 (5.9)	7001 (6.06)
9-12 months	1955 (7.4)	1422 (8.2)	1064 (7.4)	1549 (6.9)	683 (6.5)	987 (7.4)	709 (6.3)	8369 (7.2)
1 to 5 years	22717 (86.4)	14811 (85.2)	12456 (86.5)	19310 (86.6)	9195 (88.1)	11678 (87.3)	9802 (87.7)	99969 (86.7)
Total	26285	17384	14393	22290	10437	13379	11171	115339

sonal communication in each subcenter area, communicating the venue, date, time, and the specified age group for whom the vaccination was intended. Banners were displayed in the operation sites, and 70,000 leaflets were distributed. For IEC activities, 22 boats, 71 auto rickshaws and 108 engine vans were used.

#### *Injection Safety and Waste Disposal*

To ensure injection safety, a puncture proof container was sent to each operation site along with the vaccines and logistics for disposal of biomedical waste, and was returned along with unused vaccines and AD syringes at the end of the day. Puncture proof containers (n=1985) were used for 2,169 operation site with an average of 0.91 per site. An organization was entrusted to collect biomedical wastes from block primary health centers and final disposal.

#### *Adverse Events Following Immunization*

Only 13 cases of AEFI (0.09% of measles coverage) were observed. Types of AEFI included minor ones like fever, skin rash and vertigo, all of which were treated conservatively.

The major challenges in the campaign were riverine and deltaic characteristics of campaign area, which was mostly accessible by boats, vacant subcenter, which made the formation of vaccination team difficult, inadequate communication facilities, absence of electricity, which used to pose a great problem for the maintenance of cold chain in some block's primary health centers, and inadequate cold chain equipments especially deep freezer, ice lined refrigerator and stabilizers, transport of vaccine and biomedical waste.

## Discussion

Measles coverage through routine immunization, as reflected from various large scale national surveys in West Bengal, was 82.8% in 2007-08 (District Level Household Survey-3) and 77.2% in 2009 (Coverage Evaluation Survey, 2009).<sup>10,11</sup> Although the routine immunization coverage is higher than the national statistics, still in unreached pockets of unimmunized groups remain vulnerable to mortality and morbidity from measles and related illnesses. In the present setting, 70.7% were vaccinated, whereas 77% of the total target population (six months to 15 years) was vaccinated during a mass measles campaign in war-inflicted Darfur, Sudan,<sup>12</sup> in 2004. In prolonged terror-inflicted Afghanistan,<sup>13</sup> measles vaccination coverage was more than 80% among six months to 12 years children in 2001, but the duration of the campaign was

extended for years. Considering the epidemiology of measles in the affected areas, feasibility and resource constraints, children aging 5-14 years could not be included in the campaign discussed in the present study.

No major adverse event was observed in the present campaign. Similarly, Pless and colleagues,<sup>14</sup> did not observe serious adverse events, even under the increased scrutiny extended, during a measles vaccination campaign. A similar rate of AEFI was also seen in Hong Kong.<sup>15</sup> Vaccine and AD syringe wastage was also within normal limits.<sup>8</sup> The experience of vaccination campaigns from Bihar following Koshi flood,<sup>16</sup> Darfur, Sudan,<sup>12</sup> and the present study show that proper microplanning is absolutely essential for an effective campaign.

## Conclusion

There were many challenges to conduct vaccination successfully in a geographically difficult terrain under unfavorable conditions. However, the achievements accomplished by the campaign were the coverage of a large number of vulnerable children with measles vaccine and vitamin A, and improvement of cold chain infrastructure in the campaign areas. The achievement also included formulating an efficient surveillance and reporting system for AEFI, building self-confidence of the stakeholders at all levels, and developing a biomedical waste disposal system in a camp situation.

The present study highlighted that a mass vaccination campaign with good quality organized in a short period of time can be implemented with excellent biomedical waste management, and negligible AEFIs. This campaign can be followed to increase measles vaccination coverage in areas of India with moderate to low coverage as well as in difficult to reach areas. The future challenge will be to ensure rebuilding of the EPI infrastructure and reestablishing of routine vaccination services in Aila cyclone-affected areas when the overall situation return to normal.

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**Conflict of Interest:** None declared

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