

# BANGLADESH

Findings from the 2014 Gavi Full Country Evaluation

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This brief presents findings for Bangladesh from the 2014 Gavi Full Country Evaluation (FCE) Annual Dissemination Report. It was prepared by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington in collaboration with members of the Gavi FCE Team: International Centre for Diarrhoeal Disease Research, Bangladesh (icdr, b), Bangladesh; University of Eduardo Mondlane (UEM), Mozambique; Health Alliance International (HAI), Mozambique; the Infectious Diseases Research Collaboration (IDRC), Uganda; the University of Zambia (UNZA), Zambia; and PATH, USA. This work is intended to inform evidence-based improvements for immunization delivery in Bangladesh, partner FCE countries, and more broadly, in low-income countries, with a focus on Gavi funding.

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Citation: Gavi Full Country Evaluation Team. *Bangladesh: Findings from the 2014 Gavi Full Country Evaluation*. Seattle, WA: IHME, 2015.

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## 2014 evaluation activities

### Assessment of progress, successes, and challenges

- Collected and reviewed documents relevant to Gavi funding, operational plans and budgets, and guidelines.
- Conducted brief interviews to confirm factual information.

### Key informant interviews

- Conducted 58 interviews at the national to subdistrict levels and with government, Gavi partners, non-governmental organizations, World Health Organization, and UNICEF.
- Conducted nine interviews with the Gavi Secretariat and Vaccine Alliance partners.

### Pre-MR campaign household survey

- Conducted household survey of vaccination coverage, including dried blood spot measurement, in representative sample of high- and low-performing divisions and city corporations within these divisions.

### MR campaign vaccination session observations

- Observed campaign sessions in both rural and urban areas of high- and low-performing regions.
- Observation of routine EPI centers and educational institutes where campaign was implemented.

### MR campaign exit interviews

- Conducted exit interviews with mothers at facilities where the campaign was carried out.

### MR campaign EPI service providers' survey

- Immediately following the campaign, interviews were carried out with vaccinators.
- Service providers' survey was conducted in the abovementioned divisions.

### Post-MR campaign household survey

- Nationally representative survey with intentional oversampling in the same districts of the baseline household survey to allow pre-post comparison.

### Small area analysis

- Compiled and analyzed all available survey and census data sources.

### Inequality analysis

- Compiled and analyzed all available survey data sources of household wealth and vaccination coverage.

# ANALYSIS

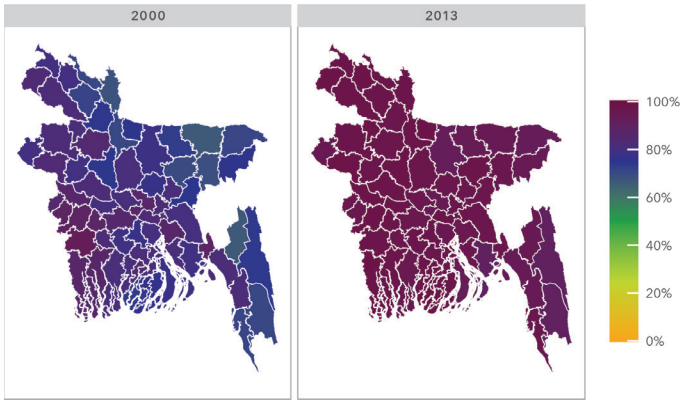
of immunization coverage,  
child mortality, and inequality

### There are highly variable coverage rates among districts since 2000.

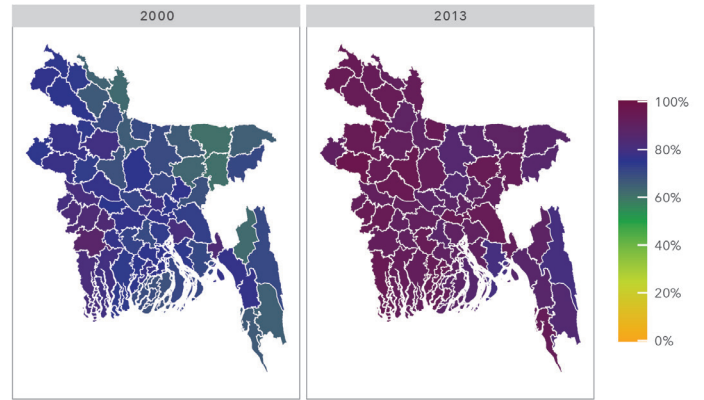
The 2014 Annual Dissemination Report provides district-level maps for 2000 and 2013 for all antigens.

- **Diphtheria, pertussis, tetanus vaccine (DPT3).** Coverage increased in every district between 2000 and 2013 and now exceeds 90% in all districts (Figure 1).
- **Fully vaccinated child** (received Bacillus Calmette–Guérin [BCG] vaccine, three doses of oral polio vaccine [OPV3], three doses of DPT, and measles vaccine). Coverage is diverse and remains at comparatively lower levels than DPT3. Districts in Chittagong and Sylhet divisions tend to have the lowest coverage of full vaccination. (Figure 2).

**Figure 1:** District-level DPT3 coverage, using small area estimation techniques



**Figure 2:** District-level fully vaccinated child coverage, using small area estimation techniques

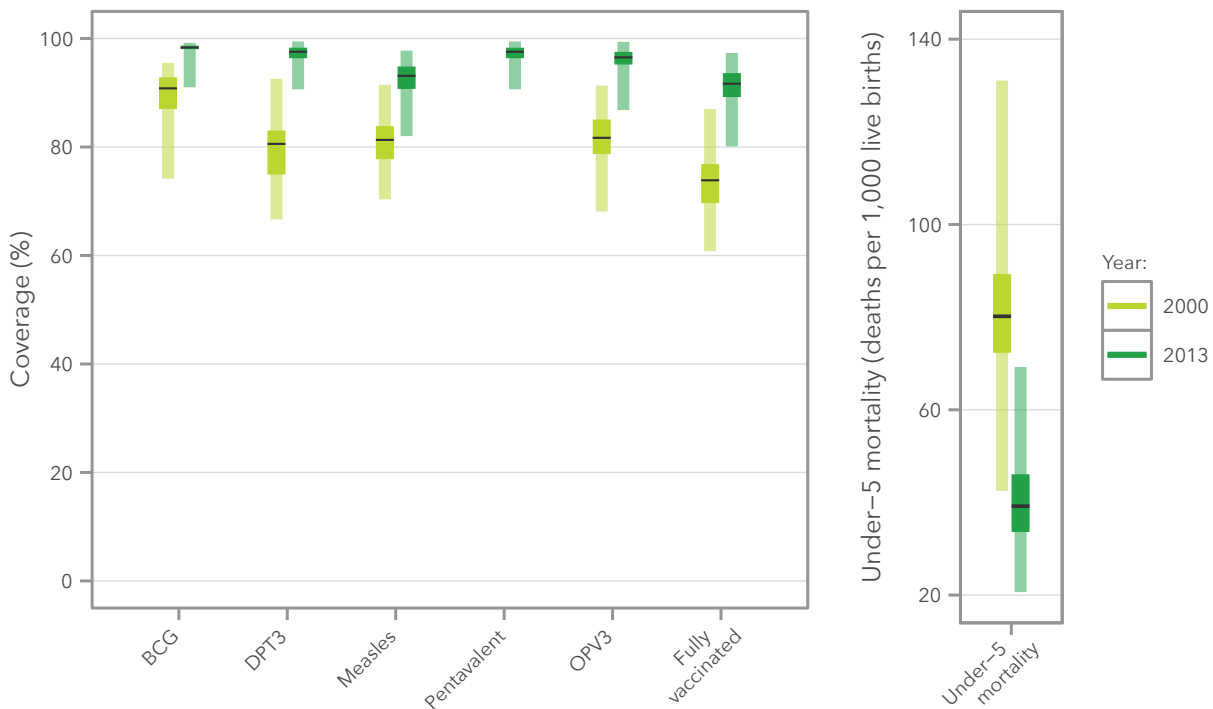


District-level estimates of vaccine coverage since 2000 across vaccine antigens show sizeable improvements in the median coverage across all antigens at the district level.

- There have been dramatic reductions in geographical inequality across districts, as measured by the range and interquartile range of coverage across districts (Figure 3).
- All districts had at least 80% coverage for fully vaccinated children in 2013.
- Most districts have achieved coverage greater than 90%.

**Figure 3:** Distribution of district-level vaccine coverage and under-5 mortality

The horizontal line represents the median across provinces. The thick vertical bar represents the interquartile range, while the thin vertical bar represents the range across provinces.

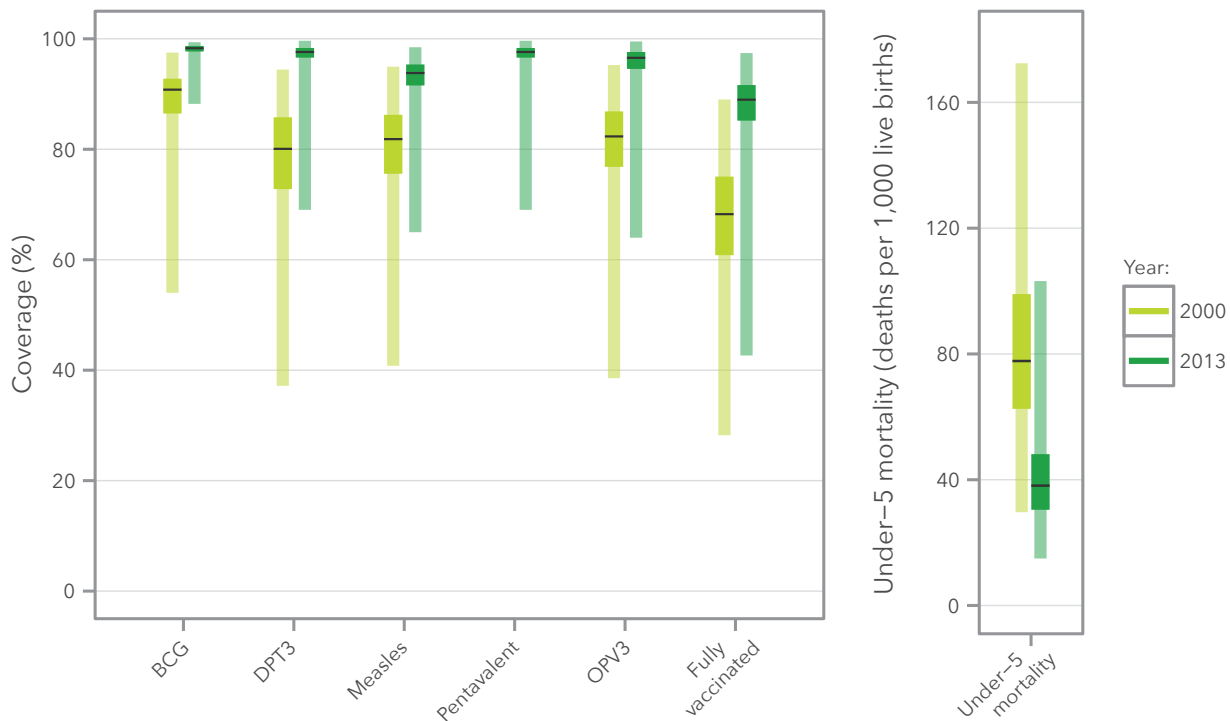


**Upazila-level estimates of vaccine coverage show within-district improvements in coverage.**

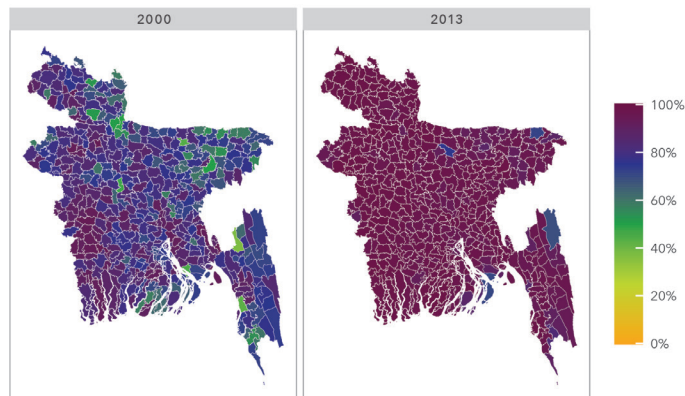
- There was a reduction of upazila-level inequality across all antigens, as measured by the range and interquartile range of coverage (Figure 4).
- In general, coverage of both DPT3 and fully vaccinated children has increased in all upazilas since 2000. However, there is considerable variation (Figure 5 and Figure 6).
- Outlier upazilas could be a focus of studies to confirm and understand the drivers of lower coverage and may be specific targets for health system strengthening activities to close gaps.

**Figure 4:** Distribution of upazila-level vaccine coverage and under-5 mortality

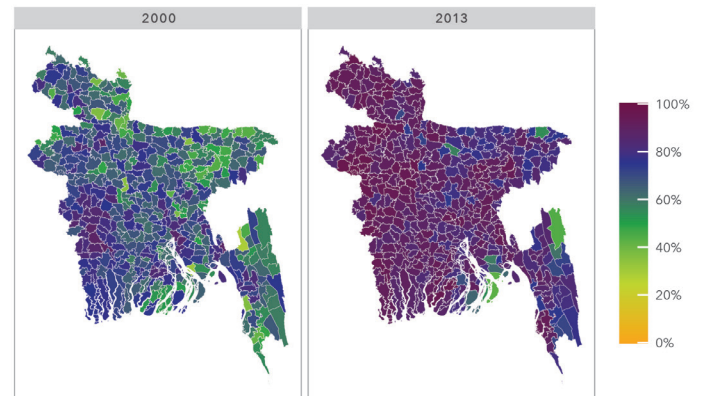
The horizontal line represents the median across provinces. The thick vertical bar represents the interquartile range, while the thin vertical bar represents the range across provinces.



**Figure 5:** Upazila-level DPT3 coverage, using small area estimation techniques



**Figure 6:** Upazila-level fully vaccinated child coverage, using small area estimation techniques

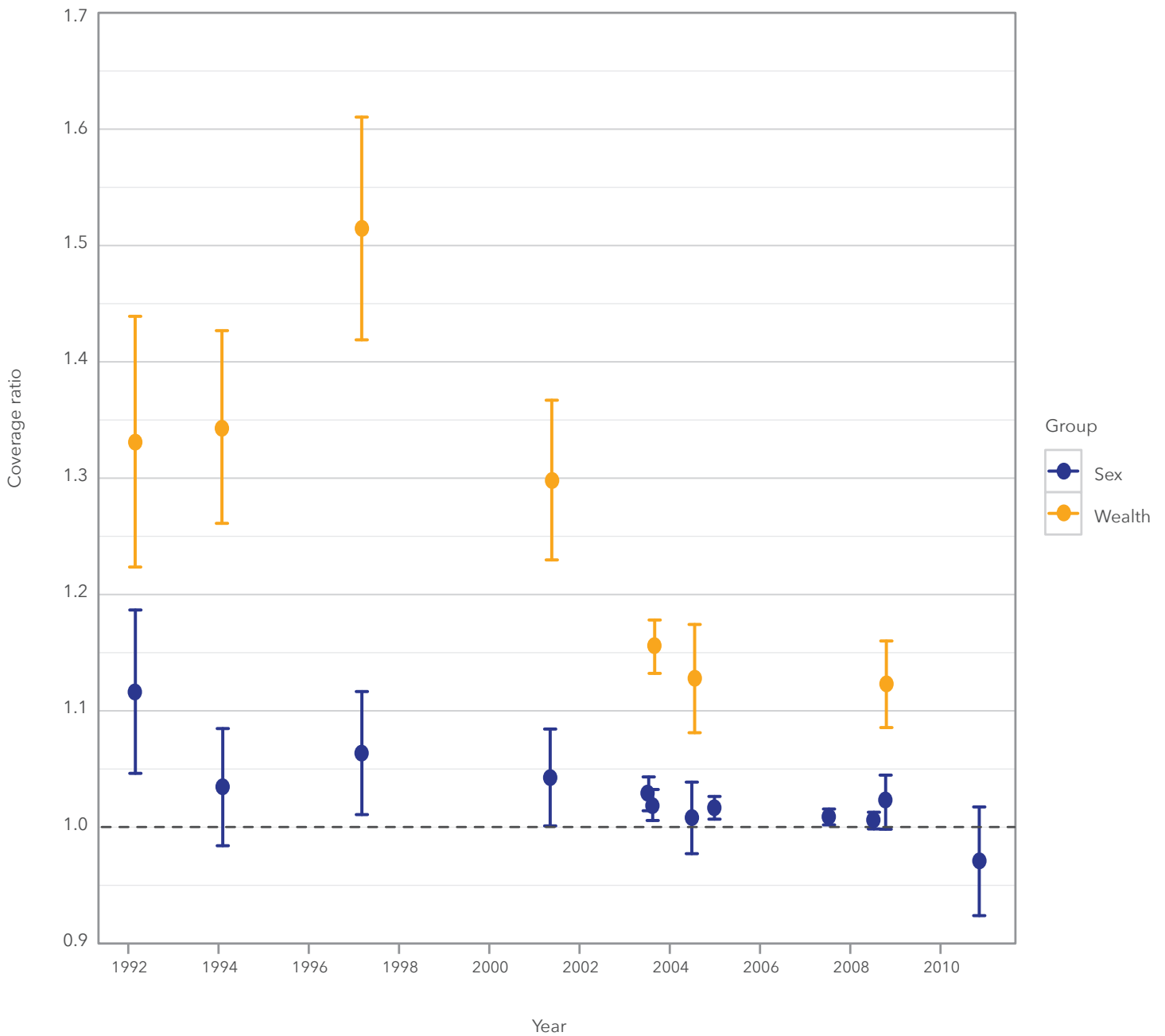


## In addition to geographic inequalities, there is inequality of coverage by level of household wealth.

- Although the ratio of DPT3 vaccine coverage in the richest income quintile compared to the poorest income quintile has generally decreased over time, indicating reductions in inequality, recent estimates of wealth ratios greater than 1 indicate that there is inequality of coverage between richer and poorer households (Figure 7).
- There were improvements in gender equality with respect to DPT3 coverage (Figure 7).

**Figure 7:** Ratios of DPT3 coverage by sex and wealth

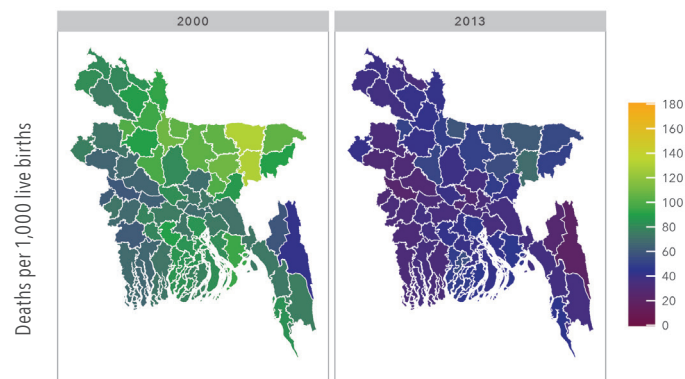
*Wealth ratio is the ratio of DPT3 coverage in the richest quintile to coverage in the poorest quintile.  
Sex ratio is the ratio of DPT3 coverage in males versus females.*



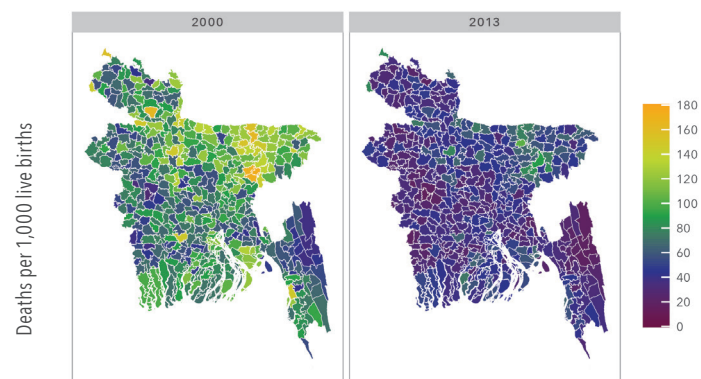
**There is considerable variation of under-5 mortality at the district and upazila levels.**

- While between 2000 and 2013 all districts experienced a decline in under-5 mortality, there are districts and upazilas in which under-5 mortality remains noticeably higher than in other parts of the country (Figure 8 and Figure 9).
- These areas are concentrated in the Sylhet and Barisal divisions, as well as the northern part of the Dhaka division; many of the areas with elevated under-5 mortality are also those where we find lower than expected vaccine coverage.

**Figure 8:** District-level under-5 mortality, using small area estimation techniques



**Figure 9:** Upazila-level under-5 mortality, using small area estimation techniques



*These estimates should be interpreted with caution. In some cases different surveys give disparate results, suggesting data quality issues. Additionally, not all data are identified at the lowest geographic level.*

# ANALYSIS of major challenges and successes

We used a Root Cause Analysis (RCA) approach to identify the root causes of observed successes and failures.

- A “root cause” is a key factor in a causal chain of events that, if removed from the sequence, would prevent the final undesirable or desirable event from occurring or recurring.
- The RCA and accompanying diagrams were produced by testing assumptions against multiple data sources and through collective deliberation.

Each finding is accompanied by a ranking that reflects the robustness of evidence. The four-point ranking scale is summarized below:

Ranking	Rationale
A	The finding is supported by multiple data sources (good triangulation) which are generally of good quality. Where fewer data sources exist, the supporting evidence is more factual than subjective.
B	The finding is supported by multiple data sources (good triangulation) of lesser quality. Where fewer data sources of good quality support the finding (limited triangulation), the supporting evidence is perhaps more perception-based than factual.
C	The finding is supported by few data sources (limited triangulation) and is perception-based, or generally based on data that are considered to be of lesser quality.
D	The finding is supported by limited evidence (single source) or by incomplete or unreliable evidence. Findings with this ranking may be preliminary or emerging, with active and ongoing data collection to follow.

# MEASLES-RUBELLA campaign

Gavi supported the measles-rubella (MR) campaign in Bangladesh in 2014, which supplemented the delivery of the MR vaccine through the routine system. The Ministry of Health and Family Welfare (MOHFW) of the government of Bangladesh implemented the national MR campaign in January 2014.

## FINDING 1

Bangladesh achieved high awareness of the MR campaign among the population and, subsequently, achieved high coverage of the MR vaccine among the target age group. Differences in coverage were observed, with coverage lower in traditionally lower-performing areas, among children with caregivers with no education, and children less than 5

years of age. High coverage led to large reductions in susceptibility to rubella in the target population. Measles susceptibility was already low prior to the campaign, reflecting historically high sustained routine coverage of measles vaccination and previous measles vaccine campaigns.

### Ranking: A

#### Measles-rubella antibody coverage

- Coverage varied by division. Rajshahi had 94% coverage while Sylhet had only 82% (Figure 10).
- Within every division, school-aged children 5 to 9 years old had the highest coverage (Figure 10).

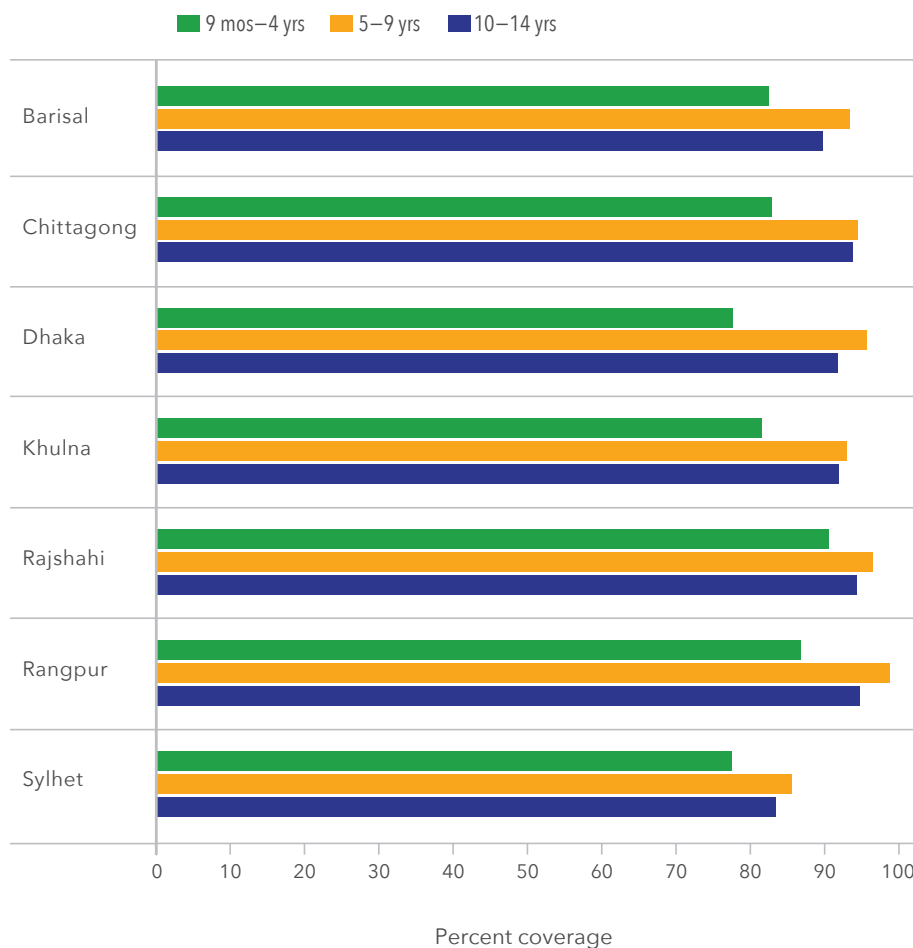
#### Measles antibody prevalence

- The prevalence of measles antibodies in the target population was universal in both the pre- and post-campaign surveys, reflecting a combination of high routine measles vaccine coverage, previous measles vaccine campaigns, and exposure to disease.

#### Rubella antibody prevalence

- The pre-campaign prevalence of rubella antibodies was substantially lower than that of measles antibodies, with an overall rubella antibody prevalence of 58%.
- Rubella antibody prevalence increased substantially and significantly between the pre- and post-campaign surveys (Figure 11). At the national level, rubella antibody prevalence was 93% and was broadly similar across divisions.
- The age gradient reflects longer disease exposure periods for older children; pre-campaign rubella antibody prevalence in younger children also reflects provision of MR vaccine through routine Expanded Program on Immunization (EPI) beginning in 2012 (Figure 12).

Figure 10: Measles-rubella vaccine coverage by division and age

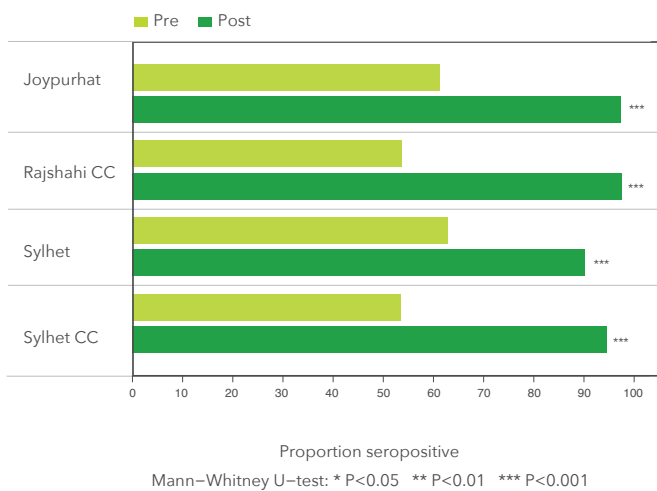


## RECOMMENDATIONS

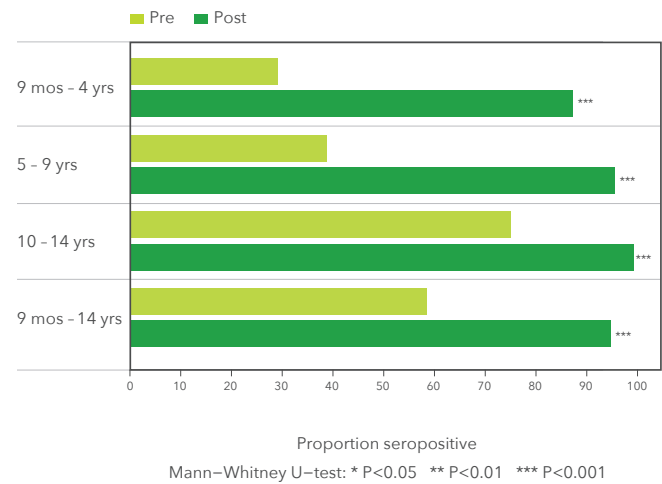
1. Following an overall successful MR campaign, the Bangladesh EPI program and country-level partners should consider targeted efforts that focus on low-coverage areas and groups, as identified by surveillance and coverage data, and shift attention to maintaining high routine MR vaccine coverage.
2. The Bangladesh EPI program and country-level partners should focus future social mobilization and demand-generation activities on increasing awareness and understanding of rubella.



**Figure 11:** Changes in rubella antibody prevalence between the pre- and post-campaign surveys in selected districts and city corporations (CC)



**Figure 12:** Changes in rubella antibody prevalence between the pre- and post-campaign surveys in selected districts by age



## FINDING 2

The MR campaign had a range of positive effects on the routine immunization system, ranging from strengthened delivery systems to increased demand for vaccination. Some negative effects were also noted, including reduced monitoring and supervision of routine EPI due to campaign demands on health worker time. There were also some missed opportunities for catch-up of other vaccines.

### Ranking: A

#### Increased public awareness and acceptance

- The government was concerned that persistent fears among the population about adverse events and child death stemming from a 2013 vitamin A campaign would influence demand for the MR vaccine.
- Our findings suggest that overall, the campaign increased public awareness of the intended effects of the vaccine and acceptance of the vaccine during both the campaign and routine EPI sessions.

#### Improved provider-caregiver communication

- The campaign improved communication between service providers and caregivers during the preparation phase of the campaign as a result of the door-to-door registration process.

#### Improved logistics

- Many logistics, including vaccine carriers, ice packs, ice-lined refrigerators, deep freezers, and vehicles, were either repaired or newly purchased during the campaign.
- Though costly, these items were critical for preserving the quality of the vaccines and are available to the routine EPI.

## Strengthened intersectoral coordination

- Strong coordination and integration at various levels and across sectors were necessary to conduct this large nationwide program.
- Lessons learned will be incorporated in the EPI sector for future immunization campaigns and large-scale health interventions.

## Demand on health worker time and implications on routine activities

- The design of the MR campaign, which intended to minimize interference of routine EPI activities by combining routine EPI activities with campaign activities two days a week, created a significant workload for EPI service providers.
- Despite evidence suggesting that health workers were highly motivated to work extra hours, the heavy workload during the campaign weeks resulted in reduced supervision and monitoring of routine immunization.

## Catch-up immunizations for MR vaccine recipients

- While the MR campaign was not explicitly designed to catch patients up on vaccines for other antigens, interviews indicate that some health workers used the opportunity for catch-up. There were, however, some missed opportunities identified from the post-campaign survey.

## RECOMMENDATION

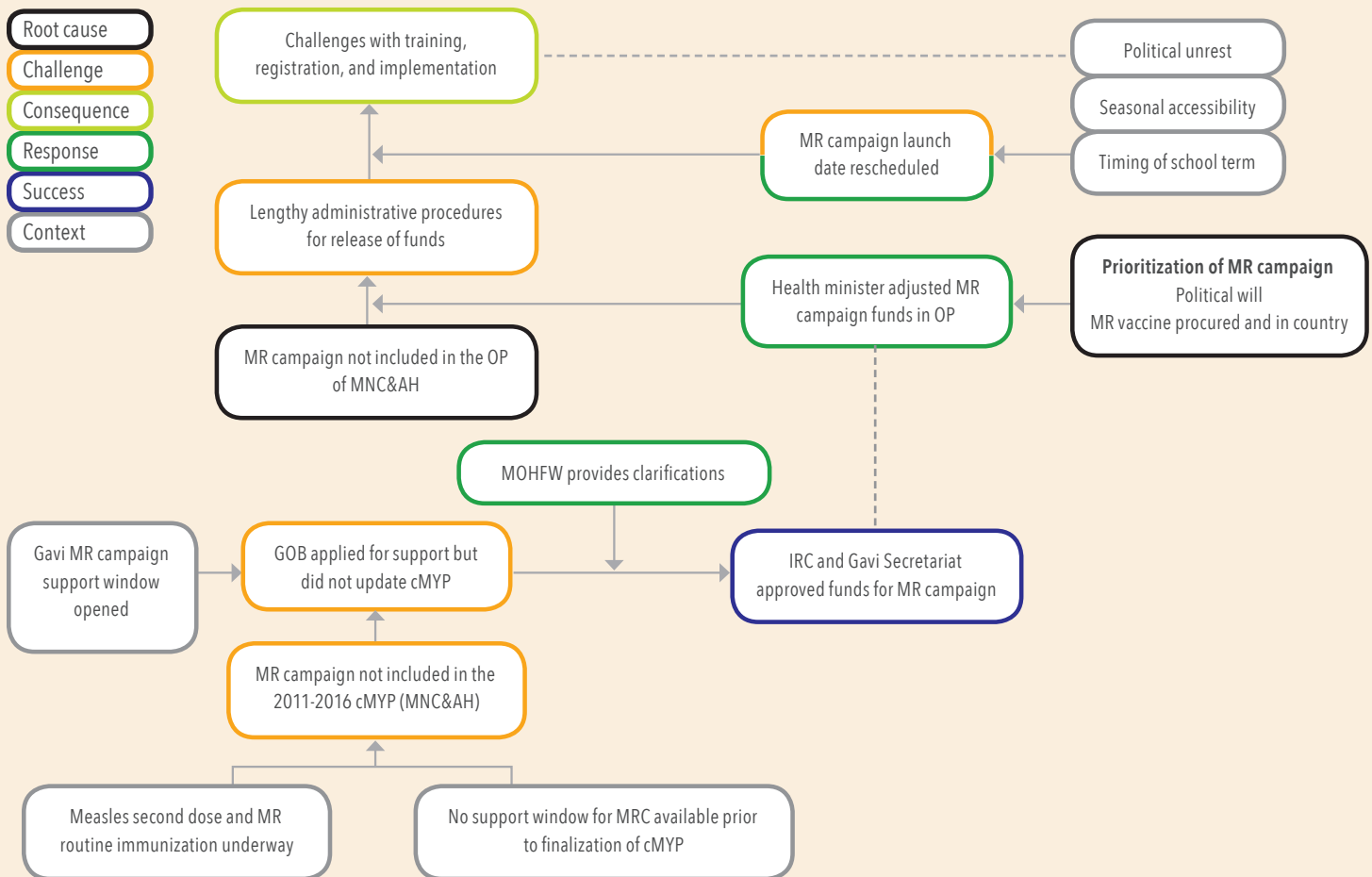
Gavi and partners should ensure that appropriate technical guidance is provided to EPI programs in the design of campaigns so that positive impacts are maximized and negative impacts are minimized. This includes, but is not limited to, designing campaigns as opportunities to provide catch-up for other vaccines.

### FINDING 3

The MR campaign was not included under the operational plan (OP) of Maternal, Neonatal, Child and Adolescent Health (MNC&AH) as the plan was developed prior to the opening of the Gavi support window for the MR campaign. In the context of Bangladesh, no money can be allocated or spent for any activities except the line items described in the endorsed OP. The subsequent lengthy administrative procedures required for the release of funds resulted in a delay in approval of the budget for preparatory activities and launch.

#### RCA for delays in approval of the budget for the MR campaign

Ranking: C



### RECOMMENDATION

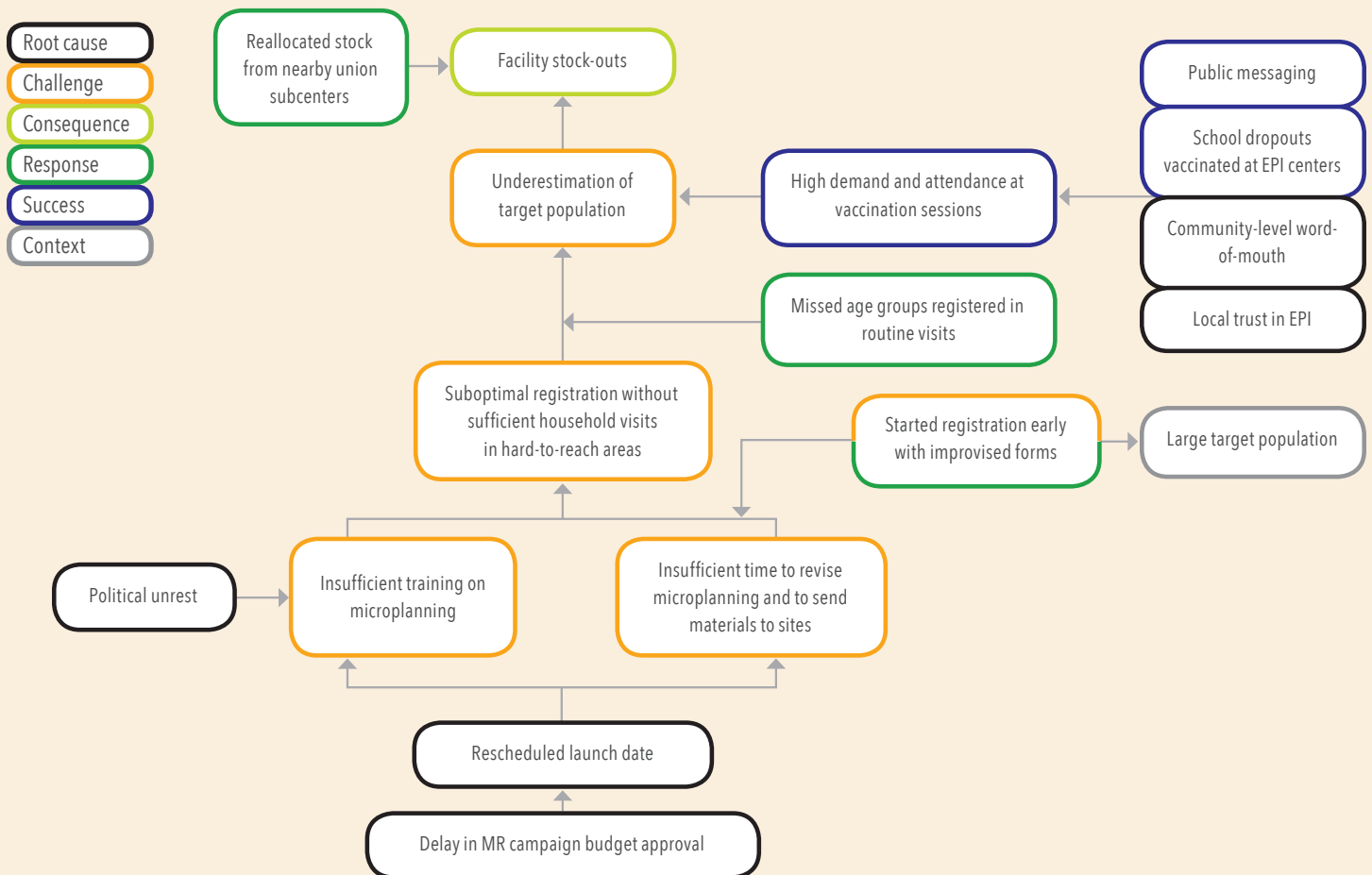
Country governments should initiate dialogue internally and with the Gavi Secretariat about country needs and administrative requirements for new support streams well in advance of the opening of the support window to enable timely updating of key operational documents (e.g., cMYP and operational plan).

## FINDING 4

Some campaign delivery points experienced vaccine stock-outs caused by a number of factors. Suboptimal microplanning and target population registration led to underestimation of the target population, which converged with high vaccine demand resulting from successful planning activities to result in stock-outs.

### RCA for MR vaccine stock-outs

Ranking: A



## RECOMMENDATIONS

1. The MOHFW and country-level partners should draw on MR campaign lessons and continue to invest in maintaining and institutionalizing the strong capacity for contingency management that can be carried forward for future vaccine introductions.
2. The MOHFW and EPI program should explore methods to better incorporate perspectives of stakeholders from various levels of the health system into higher-level decision-making with the goals of strengthening alignment and effectively implementing activities.

## HEALTH SYSTEM Strengthening

Bangladesh first received HSS funds from Gavi for 2009–2013. After the majority of these funds went unspent, the government of Bangladesh reprogrammed these funds for a second wave of HSS with activities expanded to 19 new districts. Gavi approved the proposal for reprogrammed activities in March 2013.

We describe initial challenges and successes observed in the funding stream. Future reports will include further evaluation efforts and triangulation of findings.

The Planning Department, charged with HSS funds disbursement, was concerned about the changing national health strategy as a result of a newly elected national government, and the possible reprioritization of the HSS grant. Preliminary analysis suggests that disbursement of funds to key implementation departments was delayed for two years due to these factors. However, further investigation and triangulation are needed to obtain a clearer understanding.

### Recruitment process

- The recruitment of various positions necessary for HSS activities (health assistants, family welfare assistants, community maternal and child health and immunization workers, cold-chain engineers) was delayed and incomplete, despite the formation of two committees to recruit key staff.

## UPCOMING

### areas of evaluation

#### Pneumococcal conjugate vaccine

The introduction of PCV, planned as part of the routine EPI schedule in 2013, was postponed due to the unavailability of vaccines in the global market. PCV was originally scheduled for introduction in December 2014 but was postponed, with ongoing discussion to set a new date. Actions are being taken to ensure timely vaccine shipment and supply provision; training of trainers and district- and upazila-level planning are in progress.

#### Inactivated polio vaccine

In March 2014, the government of Bangladesh submitted an application for IPV introduction to Gavi; the approval letter for New Vaccine Support (NVS) was received four months later. While it was intended that IPV roll out in unison with PCV in the fourth quarter of 2014, the absence of IPV from the current Comprehensive Multi-Year Plan resulted in the postponement of IPV introduction until the first quarter of 2015.

#### Infrastructural development

- Cold stores were successfully completed on time with the first wave of HSS funds. The reprogrammed HSS includes a provision for constructing additional regional cold stores, a 100-bed district-level hospital, and various other health facilities at the subdistrict level.
- The construction of birthing rooms in community clinics was about 10 months late, due to slow progress on the part of the Health Engineering Department, which was responsible for the construction.

#### Monitoring activities

- Without disbursement of the first-round HSS funds for vehicles, minimal monitoring activities were performed, which resulted in an incomplete APR with poor data quality.

#### Reprogramming of HSS

- Preliminary analysis suggests that the reprogramming of the first-phase HSS funds was protracted due to limited familiarity with FMA guidelines at the central level, namely regarding submission of the External Audit Report. Factors related to political transition also slowed the process. Support from the Gavi Secretariat enabled the eventual submission of the External Audit Report. However, further investigation and triangulation are needed to obtain a clearer understanding.

#### Human papillomavirus vaccine

The government of Bangladesh submitted an Expression of Interest to Gavi in May 2014 for the introduction of HPV vaccine into routine EPI. To prepare for national introduction, GOB intends to carry out a demonstration project in February 2015, targeting a single-year cohort of 10-year-old females.

The government selected the two-dose-per-vial bivalent HPV vaccine, Cervarix, for the demonstration project, considering limitations in cold-chain space. The one-dose-per-vial quadrivalent HPV vaccine, Gardasil, requires three times the amount of space as the bivalent preparation. Pending the expansion of cold-chain space, the Interagency Coordinating Committee agreed to switch from the bivalent to quadrivalent HPV vaccine in the near future.

# CROSS-STREAM

## findings for Bangladesh

### Bottlenecks in the subnational disbursement and utilization of funds

**Lengthy administrative procedures at the central level resulted in the delayed disbursement and utilization of funds for key immunization and system-strengthening activities in both the MR campaign and the first-phase HSS support streams.**

- Absence of an updated program implementation plan and top-down budgeting practices impacted microplanning, registration, and training activities for the MR campaign.
- The challenges within the HSS funding stream appear to be linked to unclear roles and responsibilities and lengthy administrative procedures.
- Elections and political transition might also be significant drivers of unspent funds and uncompleted activities.
- Clear contingency management of funds approval and disbursement are important steps toward avoiding future bottlenecks in New and Under-utilized Vaccines Implementation (NUVI) and HSS. Gavi Secretariat may also explore with countries ways to strengthen both the mechanisms around technical assistance from partners and the accountability of country stakeholders for the implementation of NVS and cash-based support.

### Limited vaccine storage capacity

**Limited vaccine storage capacity at the central EPI store resulted in challenges storing the MR vaccine for the campaign.**

- Additional public storage facilities were used at the central level to accommodate MR vaccine inventory.
- Addressing improvements in cold-chain capacity is a key priority of the HSS support stream.

### Negative effects of political unrest

**While hartals (political unrest), elections, and government transition impacted the implementation of the MR campaign and HSS, stakeholders at many levels effectively responded to these obstacles.**

- Hartals hindered transportation and delivery of vaccines and logistics to sites for the MR campaign, limited health worker mobility, reduced time for training activities, and stalled registration.
- Elections and government transition led to a long delay in mobilizing the first tranche of HSS funds to key MOHFW departments.

- During the MR campaign, stakeholders and partners at central and lower levels demonstrated their ability to manage these obstacles.
- Given the nature of political unrest in the country, it is important that the government draw from lessons learned from the MR campaign and HSS to develop clear contingency management plans for EPI to ensure that activities are not slowed by turbulent political climates.
- As the ability to adapt to challenges often stems from experience, investment in retaining human resources from the central level down will facilitate flexible responses to future challenges.

### Human resource capacity and partnership

**Strong human resource capacity and partner engagement, which drew from a depth of experience with EPI from past programs, were evident during the MR campaign.**

- Strong intersectoral engagement and capacity to administer vaccines by injection on a large scale were established in the 2006 demonstration project; this capacity was evident in the MR campaign, which required a large number of skilled vaccinators from multiple sectors.
- Prior experience with school-based campaigns informed the successful design of the school-based component of the MR campaign.
- There is strong human resource capacity to manage challenges, from the Ministry to the subnational level.
- Effective local partnership was exemplified by the assistance provided by WHO to hire extra vehicles to navigate hartal-related transportation challenges, by partnership with local ice cream factories to maintain the cold chain, and through social mobilization activities for the MR campaign.
- Lessons from the successful school-based design for the MR campaign should be carried forward to inform the design and implementation of school-based vaccine delivery for the upcoming HPV vaccine demonstration in 2015.

# CONCLUSIONS

The MR campaign is the largest campaign conducted globally to date and was considered a success by the MOHFW in terms of coverage, antibody status, quality of services, providers' perspectives, quality of implementation, and recipients' perspectives.

- The government showed strong political commitment to the introduction of the MR campaign, as evidenced by the government's recognition of rubella disease burden, its prioritization of the MR campaign, and the Ministry of Health and Family Welfare's swift and effective response to adjust the MR campaign budget to mobilize funds for a timely disbursement.
- Despite some challenges, the successful implementation of the MR campaign was supported by a dedicated workforce.
- Adaptive management strategies at various levels of EPI contributed to a successful launch. The ability to manage the vicissitudes of political unrest, challenges with cold-chain space and logistics, and intermittent stock-outs indicate the strong capacity of EPI. The government should aim to maintain and build on the existing workforce at different levels to ensure successful NUVI in the future.
- The EPI capacity was bolstered by strong partnership at various levels and, by extension, the initiative of partners around preparation for the campaign.
- Despite the successes, there were some limitations of the campaign, with the rate of unvaccinated children (about 10%) reflecting inequalities in coverage and suboptimal levels of registration.

## Positive and negative unintended consequences of Gavi support

- **Positive influences.** From the MR campaign, as in other settings, there were positive influences on routine EPI: improved communication, procurement of additional supplies, improved health care worker confidence and motivation, and reduced fear of vaccination in the community.
- **Negative influences.** Negative influences of the MR campaign on EPI were monitoring activities of routine EPI (i.e., greater demands on health workers' time) and in some cases failure to fulfill routine vaccination programs.
- The FCE team will continue to evaluate the positive and negative unintended consequences of Gavi support in 2015.

# TIMELINE of major immunization events in Bangladesh

2012

AUG 39th Interagency Coordinating Committee (ICC) meeting: draft application for the MR campaign was endorsed

SEPT

OCT

NOV Work started on expanded HSS activities

DEC

2013

JAN Application submission date HSS expanded to 19 districts (32 in total); second tranche of Gavi funds received (prior to official reprogram approval)

FEB

MAR Approval letter from Gavi for reprogrammed funds received

APR Gavi approval letter received

MAY 40th ICC meeting: plan to conduct the MR campaign along with National Immunization Day in November 2013 approved

JUN Preparatory meeting held at Expanded Programme for Immunization (EPI) headquarters for upcoming MR campaign; four subcommittees for MR campaign planning and implementation formed

JUL 41st ICC meeting: budget breakdown for MR campaign approved

AUG

SEPT Budget and schedule approved for the MR campaign

OCT Date of MR campaign suspended

NOV

DEC District dissemination workshop held; two-day district-level training held; registration activities conducted including interpersonal communication; microplan reviewed at upazilas/municipalities

JAN Elections MR campaign inauguration; mobile miking performed; district coordination workshop held; control room for adverse events following immunization case management established; MR campaign monitoring; MR campaign conducted at educational institutes

FEB EPI conducted MR campaign in communities, through routine EPI centers Postponement of introduction to March due to global PCV shortage

MAR Government of Bangladesh (GOB) submitted application to Gavi following the approval of respective oversight committees

APR

MAY GOB submitted an Expression of Interest to Gavi for introduction of HPV vaccine into routine EPI

2014

JUN Ministry of Health and Family Welfare received the approval letter for New Vaccine Support for IPV from Gavi; Scientific and Technical Sub-Committee of National Committee for Immunization Practice recommended incorporating IPV at 14 weeks of immunization schedule with a third dose of oral polio vaccine and pentavalent vaccine

JUL Gavi approval letter of the budget received

AUG Effective Vaccine Management Assessment (EVMA)

SEPT GOB postponed the launch date to the first quarter of 2015 so that revision of the Comprehensive Multi-Year Plan (cMYP) to include IPV could be completed; application for the demonstration project was submitted to Gavi HPV demonstration application submitted

OCT National training of trainers conducted

NOV District-level training conducted

DEC Upazila-level trainings planned, readiness assessments planned, PCV introduction scheduled

## Streams of support evaluated in 2014

Implementation of pneumococcal conjugate vaccine (PCV)

Human papillomavirus (HPV) vaccine demonstration

Cash-based support through Health Systems Strengthening (HSS)

Inactivated polio vaccine (IPV)

Measles-rubella (MR) campaign

Not vaccine-specific

GOB submitted the NVS PCV application in May 2011; Gavi approved the application in April 2012 for the period of 2013–2016. GOB submitted HSS proposal in March 2008. In 2009 the first tranche of HSS funds was received. No HSS funds were used in 2010. In 2011 Gavi requested reprogramming of HSS funds.

