

# Exemplars in Under-5 Mortality: Bangladesh Case Study

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## Abbreviations

|          |  |
|----------|--|
| 3TC:     | Lamivudine   |
| AAP:     | American Academy of Pediatrics                                       |
| ABC:     | Abacavir   |
| ACT:     | Artemisinin-based Combination Therapy                                |
| ANC:     | Antenatal Care   |
| ANC1+:   | At least 1 visit of Antenatal Care                                   |
| ANC4+:   | At least 4 Visits of Antenatal Care                                  |
| ARI:     | Acute Respiratory Infection  |
| ARV:     | Antiretroviral   |
| AZT:     | Zidovudine   |
| BCG:     | Bacillus Calmette–Guérin   |
| BINP:    | Bangladesh Integrated Nutrition Program                              |
| BNF:     | Bangladesh Neonatal Forum  |
| BPA:     | Bangladesh Pediatrics Association                                    |
| BRAC:    | Bangladesh Rural Advancement Committee                               |
| BSMMU:   | Bangabandhu Sheikh Mujib Medical University                          |
| CB-IMCI: | Community-Based Integrated Management of Childhood Illness           |
| CBD:     | Community-Based Delivery   |
| CCI:     | Composite Coverage Index   |
| CD4:     | Cluster of Differentiation 4   |
| CDC:     | Centers for Disease Control and Prevention                           |
| CDD:     | Control of Diarrhea Diseases   |
| CHCP:    | Community Health Care Provider                                       |
| CHW:     | Community Health Worker  |
| CKMC:    | Community-Based Kangaroo Mother Care                                 |
| CMAM:    | Community-Based Management of Severe Acute Malnutrition              |
| COD:     | Causes of Death  |
| DDT:     | Dichlorodiphenyltrichloroethane                                      |
| DGFP:    | Directorate General of Family Planning                               |
| DGHS:    | Directorate General of Health Services                               |
| DHS:     | Demographic and Health Survey  |
| DTP3:    | Diphtheria-Tetanus-Pertussis   |
| e-HIS:   | Electronic Health Information System                                 |
| e.g:     | Example Given  |
| EBI:     | Evidence-Based Intervention  |
| EmOC:    | Emergency Obstetric Care   |
| EPI:     | Expanded Programme on Immunization                                   |
| EPIAS:   | Exploration, Preparation, Implementation, Adaptation and Sustainment |
| EPIS:    | Exploration, Preparation, Implementation, and Sustainment            |
| EPV:     | Efavirenz  |
| ERC:     | Ethical Review Committee   |
| FB-IMCI: | Facility-Based Integrated Management of Childhood Illness            |
| FBD:     | Facility-Based Delivery  |



|                    |   |
|--------------------|---|
| <b>FP:</b>         | Family Planning   |
| <b>FWA:</b>        | Family Welfare Assistant  |
| <b>GAVI:</b>       | Global Alliance for Vaccines and Immunizations                    |
| <b>GDP:</b>        | Gross Domestic Product  |
| <b>HA:</b>         | Health Assistant  |
| <b>HBB:</b>        | Helping Babies Breathe  |
| <b>Hib:</b>        | Hemophilus influenzae b   |
| <b>HIV/AIDS:</b>   | Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome  |
| <b>HIV+:</b>       | Human Immunodeficiency Virus Positive                             |
| <b>HMIS:</b>       | Health Management Information System                              |
| <b>HPNSDP:</b>     | Health, Population and Nutrition Sector Development Plan          |
| <b>HPNSP:</b>      | Health Nutrition and Population Sector Program                    |
| <b>HR:</b>         | Human Resource  |
| <b>icddr,b:</b>    | International Center for Diarrhoeal Disease Research, Bangladesh  |
| <b>ICMH:</b>       | Institute of Child and Maternal Health                            |
| <b>IFA:</b>        | Iron and Folic Acid   |
| <b>IHME:</b>       | Institute of Health Metrics and Evaluation                        |
| <b>IMCI:</b>       | Integrated Management of Childhood Illness                        |
| <b>IPT:</b>        | Intermittent Preventive Treatment                                 |
| <b>IRS:</b>        | Indoor Residual Spraying  |
| <b>ITN:</b>        | Insecticide-Treated Net   |
| <b>IVAC:</b>       | International Vaccine Access Center                               |
| <b>JICA:</b>       | Japan International Cooperation Agency                            |
| <b>KI:</b>         | Key Informant   |
| <b>KII:</b>        | Key Informant Interviews  |
| <b>KMC:</b>        | Kangaroo Mother Care  |
| <b>LBW:</b>        | Low Birth Weight  |
| <b>LLIN:</b>       | Long-Lasting Insecticidal Net                                     |
| <b>LMIC:</b>       | Low- and Middle-Income Country                                    |
| <b>LPV/r:</b>      | Lopinavir/Ritonavir   |
| <b>M&amp;E:</b>    | Monitoring and Evaluation   |
| <b>MCAP:</b>       | Measles Control Action Plan                                       |
| <b>MCHIP:</b>      | Maternal and Child Health Integrated Program                      |
| <b>MCHTI:</b>      | Maternal and Child Health Training Institute                      |
| <b>MCV1:</b>       | One dose of the measles vaccine                                   |
| <b>MDG:</b>        | Millennium Development Goals                                      |
| <b>MICS:</b>       | Multiple Indicator Cluster Survey                                 |
| <b>MIS:</b>        | Management Information System                                     |
| <b>MNC&amp;AH:</b> | Maternal, Newborn, Child and Adolescent Health                    |
| <b>MOH:</b>        | Ministry of Health  |
| <b>MOHFW:</b>      | Ministry of Health and Family Welfare                             |
| <b>MOLGRDC:</b>    | Ministry of Local Government, Rural Development and Co-operatives |
| <b>MTCT:</b>       | Mother-To-Child-Transmission                                      |
| <b>NA:</b>         | Not Applicable  |
| <b>NBPP:</b>       | National Blindness Prevention Programme                           |



|                    |   |
|--------------------|---|
| <b>NGO:</b>        | Non-Governmental Organization                                       |
| <b>NICHD:</b>      | National Institute of Child Health and Development                  |
| <b>NICU:</b>       | Neonatal Intensive Care Units                                       |
| <b>NMR:</b>        | Neonatal Mortality Rate   |
| <b>NNHP:</b>       | National Newborn Health Programme                                   |
| <b>NNP:</b>        | National Nutrition Program  |
| <b>NORP:</b>       | National Oral Rehydration Project                                   |
| <b>OGSB:</b>       | Obstetrical and Gynecological Society of Bangladesh                 |
| <b>OOP:</b>        | Out-Of-Pocket   |
| <b>ORS:</b>        | Oral Rehydration Salts  |
| <b>ORT:</b>        | Oral Rehydration Therapy  |
| <b>ORW:</b>        | Oral rehydration worker   |
| <b>PCV:</b>        | Pneumococcal conjugate vaccine                                      |
| <b>PHC:</b>        | Primary Health Care   |
| <b>PI:</b>         | Principal Investigator  |
| <b>PMTCT:</b>      | Prevention of Mother to Child Transmission                          |
| <b>PNC:</b>        | Postnatal Care  |
| <b>PneumoADIP:</b> | Pneumococcal Vaccines Accelerated Development and Introduction Plan |
| <b>PPP:</b>        | Public Private Partnership  |
| <b>ProjAHNMo:</b>  | Project for Advancing the Health of Newborns and Mothers            |
| <b>QI:</b>         | Quality Improvement   |
| <b>RCT:</b>        | Randomized Controlled Trial   |
| <b>RDT:</b>        | Rapid Diagnostic Test   |
| <b>RHF:</b>        | Recommended Home Fluids   |
| <b>RRC:</b>        | Research Review Committee   |
| <b>RUTF:</b>       | Ready-to-Use Therapeutic Food                                       |
| <b>SBA:</b>        | Skilled Birth Attendant   |
| <b>SIA:</b>        | Supplementary Immunization Activity                                 |
| <b>SK:</b>         | Shasthya Kormi  |
| <b>SNL:</b>        | Saving Newborn Lives  |
| <b>SPA:</b>        | Service Provision Assessment  |
| <b>SRI:</b>        | Service Readiness Index   |
| <b>SS:</b>         | Shasthya Shebika  |
| <b>STD:</b>        | Sexually-Transmitted Diseases                                       |
| <b>SUZY:</b>       | Scaling Up Zinc for Young Children                                  |
| <b>SWAp:</b>       | Sector Wide Approach  |
| <b>TBA:</b>        | Traditional Birth Attendant   |
| <b>TDF:</b>        | Tenofovir   |
| <b>TOT:</b>        | Training of Trainers  |
| <b>TV:</b>         | Television  |
| <b>U15:</b>        | Under-15  |
| <b>U5:</b>         | Under-5   |
| <b>U5M:</b>        | Under-5 Mortality   |
| <b>UGHE:</b>       | University of Global Health Equity                                  |
| <b>UHC:</b>        | Universal Health Coverage   |



|                |  |
|----------------|--|
| <b>UNAIDS:</b> | Joint United Nations Programme on HIV and AIDS     |
| <b>UNDP:</b>   | United Nations Development Program                 |
| <b>UNFPA:</b>  | United Nations Population Fund                     |
| <b>UNICEF:</b> | United Nations Children's Fund                     |
| <b>US\$:</b>   | United States Dollar                               |
| <b>USAID:</b>  | United States Agency for International Development |
| <b>WASH:</b>   | Water, Sanitation and Hygiene                      |
| <b>WHO:</b>    | World Health Organization                          |



# 1 EXECUTIVE SUMMARY

## 1.1 Background

### 1.1.1 Exemplars in Global Health: Under-5 Mortality Project

The Exemplars in Under-5 Mortality (U5M) Project aims to identify lessons from countries' successes in reducing under-5 mortality to inform the decision-making of leaders, policymakers, and funders. University of Global Health Equity (UGHE) is collaborating with Gates Ventures and the Bill & Melinda Gates Foundation to understand exemplar countries' successful reduction of under-5 mortality – a high priority issue within global health. The Exemplars in U5M Project collaborated with the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) to understand the reduction in U5M in Bangladesh. The project is designed to identify and disseminate cross-cutting implementation strategies and policy lessons that can be adapted and adopted in other countries working to achieve similar progress. The scope is limited to deaths amenable to improvement in health care delivery and quality and focuses on the uptake of recommended evidence-based interventions (EBIs) to reduce U5M between 2000 and 2015. We applied an implementation science lens and mixed methods to understand not just what was selected and quantitative outcomes, but how and why the EBIs were implemented and the contextual factors which challenged or facilitated their impact and sustainability.

### 1.1.2 Bangladesh

Bangladesh is a predominantly low-lying country in the Ganges River Delta on the Bay of Bengal, in southern Asia. Bangladesh's population is predominantly rural with 77% of the population living in rural areas. The population of Bangladesh has doubled from 76 million in 1974 to 158 million in 2014. As of 2014, Bangladesh was the most densely populated country in the world, with a population density of 1,070 persons per square kilometer. The main religion in Bangladesh is Islam (90%) followed by Hinduism (9%). Bengali is the main ethnic group (over 98%). Bangladesh's gross domestic product (GDP) per capita maintained an upward trend from US\$509 in 2000 to US\$758 in 2010, and US\$972 in 2015. The Human Development Index showed gradual improvements, from 0.468 in 2000 to 0.505 in 2005, and 0.592 in 2015. Despite these improvements, in 2015 Bangladesh's GDP per capita remained below the South Asian average of US\$1,603. However, the proportion of the population living below the national poverty line declined substantially from 48.9% in 2000 to 40% in 2005, 31.5% in 2010, and 24.3% in 2016. The proportion of people living in extreme poverty also dropped from 34.3% in 2000 to 12.9% in 2016.

According to estimates from the Institute for Health Metrics and Evaluation (IHME), U5M dropped from 86 per 1,000 live births in 2000 to 34 per 1,000 live births in 2015, a decline of 60%, although Bangladesh's Demographic and Health Survey (DHS) showed that between 2000 to 2014 – the last DHS survey during the case study period – U5M dropped from 94 per 1000 live births to 46 per 1000 live births, a decline of 51%. This reduction in U5M occurred across wealth quintiles with a narrowing of the equity gap and greatly exceeded expectations based on GDP growth and U5M reduction rates regionally and globally. According to IHME estimates, the reduction in neonatal mortality was slightly less, with a decline of 51% from 43 per 1,000 live births in 2000 to 21 per 1,000 live births in 2015, occurring across wealth quintiles. Similar to overall U5M, Bangladesh's DHS showed that between 2000 to 2014, the drop in neonatal mortality was less than estimated by IHME, from 42 per 1000 live births to 28 per 1000 live births, a decline of only 33%. Overall, Bangladesh made substantial improvements in U5M and neonatal mortality in comparison to its regional low- and middle-income country (LMIC) neighbors with higher GDPs, including Myanmar, India, and Pakistan.



### 1.1.3 Methods

We carried out a desk review of published and gray literature on Bangladesh's general political, cultural, health, and economic context as well as EBIs implemented to reduce U5M. The UGHE team partnered with icddr,b to conduct and analyze over 18 key informant interviews (KIIs) with policymakers, implementers at the national and subnational levels, and partners to understand the implementation strategies, policies, and contextual factors most relevant to the success in reducing U5M in Bangladesh. Additional analyses of existing quantitative data including coverage from DHS were also performed. Using qualitative methods, implementation strategies and approaches (transferable knowledge) that could be implemented in other countries were extracted. Additional analyses from the International Center for Equity in Health (Federal University of Pelotas) and geospatial mapping from IHME (University of Washington) were used to further understand changes in equity for mortality and EBI coverage.

## 1.2 Key Findings

### 1.2.1 Coverage and Equity of Selected Under-5 Mortality Interventions

Bangladesh was found to have implemented many of the EBIs designed to reduce U5M in low- and middle-income countries. We identified a group of implementation strategies described below to implement and sustain the EBIs, though some did not achieve national scale-up. Some examples of successes included oral rehydration therapy (ORT) for diarrhea, tetanus protection at birth, and selected vaccinations including pneumococcal vaccine (PCV); Hemophilus influenzae b (Hib, as part of pentavalent vaccine); and measles vaccination that achieved and sustained high coverage (Table 1). Coverage of other EBIs increased while remaining low such as at least 4 visits of antenatal care (ANC4+). However, some EBIs (especially neonatal EBIs) did not achieve high rates of coverage, such as facility-based delivery (FBD). Inequity of coverage was seen among the different wealth quintiles in some indicators, including antenatal care (ANC) by skilled provider, skilled birth attendant (SBA), and vitamin A, although some success was achieved in narrowing the equity gaps for family planning (FP) need satisfied, measles, and diphtheria-tetanus-pertussis (DTP3) vaccination (Figure 1). The incidence of a number of underlying conditions including diarrhea and fever remained largely the same while others, including acute respiratory infections (ARIs), stunting, wasting, and underweight, decreased before and during the case study period (Table 1).

*Table 1. Coverage of Selected EBIs in Bangladesh (Based on Available Nationally Representative Data) (1996-97 to 2014) (STAT Compiler and Bangladesh DHS)<sup>12,13,14,15,16,17,18,19</sup>*

| Under-5 (U5) Causes of Death | Intervention   | 1996-1997  | 1999-2000  | 2004       | 2007       | 2011       | 2014       |
|------------------------------|--|------------|------------|------------|------------|------------|------------|
| Acute Respiratory Infections | Children with symptoms of ARI taken to health facility   | 36%        | 28%        | 23%        | 41%        | 40%        | 46%        |
|                              | Children with Symptoms of ARI who received antibiotics   |            |            |            |            | 73%        | 34%        |
|                              | <b>Vaccination: Hib (as part of Pentavalent)</b>   |            |            |            |            | <b>93%</b> | <b>91%</b> |
|                              | <b>U5 with symptoms of ARI – 2 weeks preceding survey</b>  | <b>13%</b> | <b>17%</b> | <b>19%</b> | <b>5%</b>  | <b>6%</b>  | <b>5%</b>  |
| Diarrheal Diseases           | <b>Oral Rehydration Therapy (Either Oral Rehydration Salts- ORS or Recommended Home Fluids- RHF)</b> | <b>62%</b> | <b>72%</b> | <b>75%</b> | <b>82%</b> | <b>78%</b> | <b>83%</b> |
|                              | Treatment of diarrhea with zinc supplements  |            |            |            | 23%        |            | 44%        |



|   |  |            |            |            |            |            |            |
|---|--|------------|------------|------------|------------|------------|------------|
|   | Children with diarrhea taken to health facility  | 26%        | 27%        | 18%        | 46%        | 28%        | 39%        |
|   | <b>U5 with diarrhea – 2 weeks preceding survey</b>   | <b>8%</b>  | <b>6%</b>  | <b>8%</b>  | <b>10%</b> | <b>5%</b>  | <b>6%</b>  |
| Malaria*                                  | Advice or treatment for fever sought from a health facility or provider                                      | 21%        | 25%        | 21%        | 25%        | 30%        | 35%        |
|   | Treatment of children with fever by artemisinin-based combination therapy (ACT)                              |            |            |            |            | 1%         | 4%         |
|   | <b>U5 with fever – 2 weeks preceding survey</b>  | <b>31%</b> | <b>37%</b> | <b>40%</b> | <b>38%</b> | <b>37%</b> | <b>37%</b> |
| <b>Measles</b>                            | <b>Measles vaccination coverage</b>  | <b>70%</b> | <b>71%</b> | <b>76%</b> | <b>83%</b> | <b>88%</b> | <b>86%</b> |
| Malnutrition                              | Exclusive breastfeeding from 0-5 months  | 45%        | 47%        |            | 50%        | 64%        | 55%        |
|   | U5 receiving vitamin A supplements in the six months preceding survey  | 67%        | 73%        | 82%        | 88%        | 60%        | 62%        |
|   | U5 stunted   | 60%        | 51%        | 51%        | 43%        | 41%        | 36%        |
|   | U5 wasted  | 21%        | 12%        | 15%        | 17%        | 16%        | 14%        |
|   | U5 underweight   | 52%        | 42%        | 43%        | 41%        | 36%        | 33%        |
| <b>Other Vaccine Preventable Diseases</b> | <b>Full vaccination coverage with 3 doses DPT, 3 doses polio, measles and Bacillus Calmette–Guérin (BCG)</b> | <b>54%</b> | <b>60%</b> | <b>73%</b> | <b>82%</b> | <b>86%</b> | <b>84%</b> |
| Neonatal Causes of Death                  | Total fertility rate (15-49)   | 3          | 3          | 3          | 3          | 2          | 2          |
|   | Teenagers who are pregnant with their first child  | 5%         | 5%         | 5%         | 6%         | 6%         | 6%         |
|   | <b>Tetanus protection at birth</b>   |            |            |            | <b>88%</b> | <b>91%</b> |            |
|   | Antenatal care: 4+ visits  | 7%         | 11%        | 17%        | 22%        | 26%        | 31%        |
|   | Delivery attended by skilled provider  | 8%         | 12%        | 15%        | 21%        | 32%        | 42%        |
|   | Facility-based delivery  | 5%         | 9%         | 12%        | 17%        | 29%        | 37%        |
|   | Delivery by Caesarean section  |            | 3%         | 5%         | 9%         | 17%        | 23%        |
|   | Newborn's 1st postnatal care (PNC) in first two days after birth   |            |            |            |            | 39%        | 53%        |
|   | Doctor/nurse/midwife provided 1 <sup>st</sup> PNC  |            |            |            |            | 30%        | 32%        |

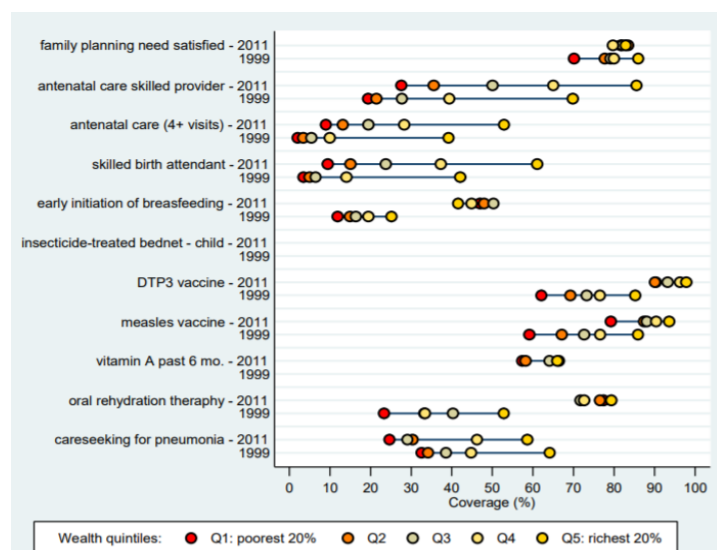


Figure 1. Bangladesh's Equity Profile: Coverage of Selected Under-5 Mortality Interventions (Source: Countdown2030 Equity Profile)

IHME modeling found that throughout the period of interest (2000-2015), major amenable causes of death (COD) included lower respiratory infections, diarrhea, and nutritional deficiencies, as well as neonatal disorders. Mortality rates for each of these CODs decreased over this time period as Bangladesh implemented many of the EBIs that addressed the major CODs. Before or during the study period, other vaccination and maternal care EBIs were also implemented. The work to reduce U5M in Bangladesh also included broader initiatives which impacted U5M, such as access to FP (with decline in fertility rates), and water, sanitation, and hygiene (WASH) activities, and were likely to



have contributed to the decline in mortality. Even more important were non-health-directed interventions including education for women and other female empowerment interventions, as well as the general increase in income and infrastructure improvements such as road-building and telecommunications.

### **1.2.2 Common Implementation Strategies**

We identified a number of implementation strategies that were applied to many of the EBIs, though some strategies were implemented with variable success, such as integrating equity focus into implementation. Commonly identified strategies included:

- National leadership and accountability
- Small-scale testing prior to national scale-up, typically using local research partners
- Early integration of professional societies as key stakeholders in decision-making and policy development
- Data use for decision-making (to understand disease, to ensure appropriateness of EBI, for prioritization, for monitoring and evaluation and supervision for all EBIs, and for adaptation for effectiveness and coverage)
- Adaptation of interventions to local settings and national realities driven by evidence (quantitative and qualitative) during and after implementation
- Leveraging a strong existing community-based care delivery system
  - Both government and local non-governmental organizations
- Leveraging other existing programs and systems (versus vertical programs)
- Training and supervision
- Engagement and coordination of implementing partners and donors
- Data systems strengthening
- Community engagement and sensitization and education
- Integration into systems and policy for sustainability and scale
- Increase in national financial commitment to EBIs by increasing budget
- Community-based delivery (CBD)
- Integrating equity focus into policy and implementation

### **1.2.3 Examples of Implementation of Evidence-Based Interventions to Address Major causes of death**

We summarize three illustrative EBI implementations, the implementation strategies chosen, and implementation outcomes. Complete descriptions of the range of initiatives can be found in the full report.

#### **Facility-Based Integrated Management of Childhood Illness**

In the 1980s and 1990s, Bangladesh implemented the Control of Diarrhea Diseases (CDD) and ARI programs reflecting the country's high burden of diarrhea and ARI among children under 5. Based on World Health Organization (WHO) and United Nations Children's Fund (UNICEF)'s recommendations and recognizing the need for an integrated approach, Bangladesh rapidly decided in 1995 to implement Facility-Based Integrated Management of Childhood Illness (FB-IMCI). Preparations for implementing FB-IMCI began in 1998 with the set-up of a national steering committee which included professional bodies such as the Bangladesh Pediatric Association (BPA) and Bangladesh Neonatal Forum (BNF) as well as donors and partners such as WHO and UNICEF. Bangladesh also built on WHO and existing program protocols and guidelines such as CDD, ARI, and





malnutrition in developing protocols and guidelines for FB-IMCI. Implementation began with small-scale testing as part of a multi-country evaluation of the Integrated Management of Childhood Illness (IMCI) strategy to identify its feasibility and effectiveness before scale-up, as well as to contribute to the evidence base for IMCI globally. Using the results of the findings of the testing phase, the national steering committee developed a plan for a phased national scale-up of the FB-IMCI program reflecting in part the limitations of existing financial resources but most importantly the need to reach areas with the highest U5M first. By December 2004, as planned, FB-IMCI was scaled up to 48 sub-districts (out of 490) prioritized because of their relatively higher U5M. A decentralized model was used with training of trainers (TOT) and FB-IMCI training centers established in divisional medical colleges, to reach more health facility workers nationwide. In 2009, Bangladesh adapted its FB-IMCI by integrating the IMCI strategy into the doctors' undergraduate training curriculum and shortening in-service training for doctors on the IMCI strategy to eight days. In 2015, UNICEF and WHO ended their financial support for FB-IMCI in Bangladesh and the Government of Bangladesh increased its budget allocation for IMCI implementation to account for the loss of donor funding and ensure sustainability of the program.

***Implementation outcomes:*** Appropriateness and sustainability were positive with FB-IMCI targeting the three main CODs for U5s, diarrhea, ARIs, and malnutrition, and establishment of the IMCI program unit at the Ministry of Health and Family Welfare (MOHFW). Reach was high with FB-IMCI implemented in 98% of all sub-districts by 2016. With respect to equity, however, persistent gaps were seen in care-seeking rates for pneumonia, diarrhea, and fever among the different wealth quintiles.

### **Insecticide-Treated Nets**

A country-led insecticide-treated nets (ITN) program was not feasible throughout the 1980s and 1990s because of unavailability of funding and increasing turnover of malaria program staff. However, by 2002, Bangladesh began planning to implement a long-lasting insecticidal nets (LLIN) program targeting all households in three districts in the southeast with the highest malaria burden, and 80% of households in the other 10 malaria-endemic districts in the southeast and northeast, consistent with the country's focus on targeting areas with the most need. Preparations for the LLIN program began in 2005 with the development of a Global Fund grant proposal, training guidelines, and net distribution protocols based on WHO recommendations on lifespan of LLINs, as well as community engagement activities targeted at community leaders and women to create awareness of malaria symptoms and the importance of LLIN use. Consistent with Bangladesh's history of leveraging partner support and capacity for implementation, a consortium of 21 non-governmental organizations (NGOs) with prior experience in the malaria-endemic districts, including Bangladesh Rural Advancement Committee (BRAC), was set up to lead the implementation of the LLIN program, with oversight from the country's malaria program. As planned, Bangladesh began implementing an LLIN program in 2007 with WHO-led trainings for the NGO community health workers (CHWs). The nets were distributed for free through outreach activities conducted every three years at community spaces such as schools.

***Implementation outcomes:*** Although national DHS data on ITN use, including LLINs, were unavailable given the targeted implementation of the program, studies overall showed that the ITN program in Bangladesh was successful during the study period, achieving a high coverage and narrowing geographic equity gaps. A study conducted between 2008–2011 found that the proportion of households with at least one LLIN in the northeast increased from 22% in 2008, one year after the program began, to 62% in 2011. In the southeast, this proportion increased from 60% in 2008 to 67% in 2011. The same study found that the proportion of children under 5 sleeping under an LLIN or other ITN was stable at 92% between 2008–2011 in the southeast and 87% in the



northeast, while the proportion of pregnant women sleeping under an LLIN or other ITN increased from 84% to 91% in the southeast, and from 77% to 83% in the northeast, within the same time period.

### **Pneumococcal Vaccination**

Very early on – by 1993 – Bangladesh began research into drug resistance of *Streptococcus pneumonia* and disease burden of pneumococcal infection, led by a champion at Dhaka Shishu Hospital. In 2000, Global Alliance for Vaccines and Immunization (GAVI) began supporting the introduction of PCV into the immunization programs of developing countries and Bangladesh began advocating for funds for the introduction of PCV in Bangladesh. By 2006, WHO recommended the introduction of PCV and in 2010 Bangladesh's interagency coordination committee recommended the introduction of the vaccine to reduce child mortality. Between 2007-2013 Bangladesh also conducted a study to determine the appropriateness of existing PCV types for Bangladesh's serotype prevalence. The findings of this study showed that PCV-10 and PCV-13 serotypes accounted for 46% and 50% of cases, respectively. However, given the comparable effectiveness of both vaccine types and increased cold chain capacity requirements of PCV-13, Bangladesh decided to introduce PCV-10 to ensure feasibility. In preparation for introducing PCV Bangladesh began leveraging the Global Pneumonia Day to conduct community engagement and awareness creation activities around PCV introduction. Other preparations included cold chain assessments at national-, district-, and sub-district levels with support from UNICEF and WHO. These assessments informed cold chain strengthening efforts in 2013. The electronic Health Information System (e-HIS) and vaccination cards were updated to include PCV as well. In 2015, Bangladesh rolled out PCV nationwide without any small-scale testing because of the country's history of acceptability of vaccines and initial implementation of the PCV program was co-financed by GAVI. Bangladesh also leveraged the existing pediatric bacterial meningitis and pneumococcal disease sentinel surveillance systems at the MOHFW to monitor adverse events following immunization. In 2016, after the case study period ended, the initial immunization schedule of PCV (at 6, 10, and 14 weeks) was changed to 6, 10, and 18 weeks to coincide with the third dose of inactivated polio vaccine because routine monitoring data showed that children were missing the last dose as mothers were unable to take them to facilities multiple times.

*Implementation outcomes:* Appropriateness was positive with PCV introduction reflecting the high pneumococcal disease burden. High acceptability and reach were also seen with coverage of PCV at 97% in 2016 and 2017.

## **1.3 Cross-Cutting Contextual Factors**

A number of contextual factors at the global, national, subnational, community, and implementing partner levels were identified that were critical to successes and challenges in implementing the targeted EBIs in Bangladesh, as well as others which influenced other causes of U5M. The facilitating contextual factors were critical in creating the environment and providing the support that contributed to the country's success directly or indirectly. KIs mentioned that they accounted for the drop in U5M in Bangladesh despite low coverage of some EBIs. The challenging contextual factors, on the other hand, represented barriers to success in achieving equitable and quality coverage.

**Strong Community Health Systems and Structure:** The existence of a strong community health system and CHWs was key to facilitating the U5M reduction work through community engagement activities and direct service delivery. Before and during the case study period, Bangladesh continued to strengthen its community health system including the introduction of new CHW cadres and establishment of community-owned and -managed community clinics between 1998-2001 and after 2009, both through the government and local implementing



NGOs which were leveraged for broader scale. Bangladesh's community health system also reflected much of WHO's recommendations on factors critical to ensuring a strong community health system including in selection, duration of training, and remuneration. However, while this was identified as successful, reported coverage of a number of initiatives remained lower than expected and efforts to expand, including skilled birth attendance through CHWs, were not successful because of challenges with inadequate supervision and overburdening of CHWs (see Human Resources for Health).

**Increased Access to and Uptake of Family Planning and Decreased Fertility Rates:** Very early on, in the 1960s and 1970s, Bangladesh identified its rapid population growth as a major challenge to its development and began implementing a number of initiatives to increase access to FP and decrease fertility rates. Steps included the establishment of the Directorate General of Family Planning (DGFP) at the MOHFW in 1975 and the drafting of Bangladesh's Population Policy in 1976, though this was only formally introduced in 2004. According to many key informants (KIs), these initiatives were successful in facilitating Bangladesh's drop in U5M with one KI describing it as *"the number one contributor."* Bangladesh's total fertility rate dropped from six in 1975 to two in 2014; the unmet need for FP dropped from 22% in 1993-94 to 12% in 2014; and demand for FP satisfied by modern methods increased from 55% in 1993-94 to 73% in 2014.

**Women's Education and Empowerment:** Women's empowerment was a key facilitator of U5M reduction in Bangladesh, before and during the study period. A key component of Bangladesh's women's empowerment initiative was the introduction of micro-credit schemes in the 1980s. Research conducted in 2003 found these to have resulted in increases in women's roles in household decision-making as a result of having greater access to financial and economic resources, having greater social networks and, overall, greater freedom of mobility. Another women's empowerment initiative was the Female Secondary School Stipend Project which was introduced in 1994 and aimed to improve girls' enrolment and retention in secondary school. The project provided girls in rural areas with stipends for attending school 75% or more of the time, maintaining a passing grade, and delaying marriage until they were 18 years old or had completed secondary school. These initiatives were effective in improving Bangladesh's adult female literacy rate which rose from 26% in 1991 to 62% in 2016. Multiple KIs explained that the geographic inequities in U5M reduction seen in the northeast (Sylhet division) lagging behind the rest of the country was partly a result of lower levels of women's empowerment in the area, reflected in attitudes towards health care. Despite these achievements, gender equity remained a challenge in Bangladesh with the country ranked 72 out of 144 in gender equity in the World Economic Forum's 2016 Global Gender Gap Report.

**Culture (Facilitator and Barrier):** KIs noted that culture in certain parts of Bangladesh (for example Sylhet) was linked to religion and reflected in attitudes towards women's empowerment, education, and health care practices. As noted above, this was responsible for the geographic inequity in U5M reduction seen in Sylhet compared to other areas like Khulna, where the culture was more favorable to factors which drove the reduction in U5M.

**Donor and Implementing Partner Resources (External):** These resources included financial and technical expertise as well as direct capacity for implementation. Donor and partner support was a major facilitator of Bangladesh's success in U5M reduction with multilateral organizations such as the World Bank, GAVI, and the Global Fund investing in Bangladesh's U5M reduction initiatives between 2000-2015.

**National Implementing and Research Capacity and Professional Bodies (Internal):** A number of the U5M reduction initiatives were implemented by strong partners within Bangladesh (internal) and national research organizations



(mostly icddr,b) were often relied on for evidence generation. Professional bodies, and particularly the Obstetrical and Gynecological Society of Bangladesh (OGSB), BNF, and BPA were also key facilitators of Bangladesh's successes in U5M reduction through early engagement and leadership in a number of new efforts. For example, these professional bodies were often key to the preparation process of adapting selected EBIs (such as FB-IMCI) to the local context, designing protocols and guidelines, and providing approval and acceptance from providers and policymakers. Overall national stakeholders were engaged at a high level with the government throughout the process of decision-making.

**Donor and Implementing Partner Coordination:** Coordination and collaboration amongst the MOHFW, implementing partners, and donors was generally a major facilitator of U5M reduction in Bangladesh, during the case study period. This was reflected in the different U5M-related programs within the MOHFW introducing technical working groups to coordinate all government-donor activities. For example, there was a National Technical Working Committee for Newborn Health which provided coordination for all neonatal programming activities in Bangladesh. The different technical working groups were then coordinated by the Maternal, Newborn, Child and Adolescent Health (MNC&AH) program at the MOHFW. Another key component of Bangladesh's coordination mechanism was the introduction of a health Sector Wide Approach (SWAp) in 1998, changing emphasis from a vertical, project-based funding and programming approach to a horizontal approach to support the health sector. During the case study period, different EBIs were integrated into the SWAp.

**Effective Leadership, Setting Clear Goals and Priorities:** Effective leadership was a key facilitating factor of U5M reduction in Bangladesh between 2000 and 2015. This commitment to effective leadership was reflected in key national goals and priorities which also reflected global goals and priorities. For example, the 2000-2015 Millennium Development Goals (MDGs) informed much of the child and newborn mortality reduction targets set as part of Bangladesh's health SWAps. This was seen at the national level and at subnational levels such as in Khulna which had more rapid decline of U5M and high coverage rates.

**Data Availability:** Bangladesh had a long history of ensuring data availability and had been conducting standard DHS since 1993-94. Other surveys such as the Multiple Indicator Cluster Survey (MICS), Service Provision Assessment (SPA), and Health Facility Survey were also implemented beginning in 1993, 2000, and 2014, respectively.

**Data Quality and Use (Facilitator and Barrier):** Bangladesh ensured data availability and surveys were used for designing, planning, implementing, monitoring, and evaluating specific EBIs before and during the case study period. According to KIs, broader value for data use for decision-making only increased during the case study period and led to broader data systems strengthening efforts including the development of a Health Management Information System (HMIS) unit at the MOHFW in June 2014. However, there remained challenges with the completeness and quality of HMIS data in Bangladesh as of 2016, after the case study period ended.

**Other Public Health Initiatives with Impact on U5M:** The MOHFW's efforts to improve U5M between 2000-2015 were complemented by corresponding efforts which addressed broader public health issues beyond amenable causes of U5M. Between 2000-2015, Bangladesh invested in WASH initiatives focused on improving access to clean water and improving sanitation facilities. By 2011, 83% of Bangladesh's population had access to clean



water and 55% had access to improved sanitation facilities, a moderate increase compared to 76% and 38% in 1990, respectively.

**Geography (Including Hard-to-reach Areas and Civil Unrest) (Facilitator and Barrier):** The hard-to-reach geography of the hill tracts area in the Chittagong division in southeastern Bangladesh accounted for some of the geographic inequity seen in U5M reduction in Bangladesh. Although the difficult geography did not reflect on human resources (HRs) for health distribution with Chittagong having the second highest density of doctors and nurses after Dhaka, overall, the area had consistently lower coverage of U5M-related indicators compared to other divisions. Some areas of Chittagong near the country borders also saw instability leading to challenges in attaining coverage. In addition, KIs noted that the influx of refugees from Myanmar into the Chittagong division may exacerbate already existing inequity in U5M reduction. However, KIs added that geography was not always a barrier given that Bangladesh is a small country and densely populated. Physical access to health facilities was not a challenge with more than 87% reporting that they were within 1km of a public or private health facility or community clinic by 2014.

**Infrastructure (Non-Health Systems Strengthening):** Major improvements in the transportation and road system were a key facilitator of improvements in child health in the country, including U5M, because the roads facilitated improved access to health services for rural communities. By 1991, the number of paved roads in Bangladesh was 9,704 and by 2007 had increased to 17,321. In addition, between 1991 and 2006, 11,560 bridges were built. Another infrastructural development facilitating the drop in U5M was the increase in the proportion of households using mobile phones from 35% in 2007 to 78% in 2010, leading to improved communication links with health services. This increased use was also seen among rural populations with the proportion of households in rural areas who used mobile phones rising from 29% to 75%.

**Human Resources for Health (Barrier):** The HRs for health capacity in Bangladesh remained an ongoing challenge with the number of physicians and nurses/midwives well below the WHO target of 2.28 doctors, nurses, and midwives per 1,000 people. In 2011 estimates were 0.3 physicians and 0.1 nurses per 1,000 people. Efforts to address this including through a strong CHW program designed to address gaps in SBA rates, for example, were not successful.

**Health System Structure and Strengthening (Facilitator and Barrier):** The health system structure posed a number of challenges to the effective implementation and sustainment of EBIs. This included some components of the decentralization and the underlying structure within the MOHFW. Bangladesh implemented a number of steps to decentralize its health care system, although besides care delivery – for example, CHWs' delivery of ORS and FP services – management of Bangladesh's health system remained heavily centralized with fiscal and policy functions such as disbursement, allocation, and mobilization of resources remaining activities led predominantly by the central level. Additionally, the dual structure of the MOHFW continued to pose a barrier to effective and efficient health delivery in Bangladesh and attempts to merge both the Directorate General of Health Services (DGHS) and DGFP between 1998-2003 were not popular with health care workers and were not successful. Bangladesh also invested in strengthening its health system to expand access to health services through the introduction of community clinics which reached high coverage and the expansion of the capacity of family welfare centers to provide 24-hour delivery services.



**Economic Development (Facilitator and Barrier):** Bangladesh experienced improvements in its economy with increases in its GDP per capita, though it remained below the South Asian average and below that of its regional neighbors. The proportion of the population living below the national poverty line showed major declines from 48.9% in 2000 to 40% in 2005, 31.5% in 2010, and 24.3% in 2016, after the case study period ended, while remaining high. These economic improvements were linked to the increase in private health facility use.

**Private Sector (Facilitator and Barrier):** Bangladesh supported its private sector to fill gaps in public health service delivery before and during the case study period, including through a loan scheme, and this was reflected in the proportion of facility-based deliveries which occurred in private health facilities. However, this was also linked to the distrust for public facilities as a result of poor quality of care and absenteeism of health care providers. Sub-optimal coordination between the public and private care delivery sectors and lack of accountability for quality presented a barrier to ensuring good quality of care in Bangladesh as reflected in the rise of Caesarean section rates from 3% in 2000 to 23% in 2014. Bangladesh also leveraged the private sector in implementation of EBIs, such as in the production of zinc and ORS.

## 1.4 Ongoing Challenges in Reducing Under-5 Mortality

A number of ongoing challenges were identified, some of which reflect the negative contextual factors. They are discussed below.

**Quality of Care:** Similar to many countries, quality of care remained a significant challenge to U5M reduction efforts in Bangladesh. Although there was a quality improvement (QI) unit at the MOHFW during the study period, it was not functioning optimally until 2009 when implementing partners and donors began to prioritize and advocate for QI as a means to improve the effectiveness of U5M reduction efforts. This advocacy led to the introduction of a National QI Strategic Plan in 2015 with donors and implementing partners providing capacity building support to the QI unit including clarifying the roles and responsibilities of its personnel and providing trainings. Despite these efforts, KIs noted that quality of care remained an ongoing challenge.

**Reducing Neonatal Mortality:** While neonatal mortality rates (NMRs) decreased, addressing mortality in low birth weight (LBW) and premature infants, increasing FBD, and quality of care were recognized as priorities towards the end of the study period. KIs added that these health systems-focused improvements were required for the drop in neonatal mortality in Bangladesh to continue, as the decline in neonatal mortality before and during the study period were largely due to contextual factors.

**Government Funding for Health:** Although Bangladesh prioritized funding for some EBIs such as vaccinations, all-cause government expenditure, as a percentage of overall health expenditure, remained low and decreased between 2000-2015, from 26% in 2000 to 21% in 2005, 20% in 2010, and 15% in 2015.<sup>29</sup> In 2015, total health expenditure in Bangladesh was only 2.9% of GDP – one of the lowest proportions in the world.<sup>30</sup> KIs noted that this remained a challenge for the sustainability of programs required to ensure continued improvements in U5M reduction.

**Out-Of-Pocket Expenditure and Insurance Coverage:** The very high out-of-pocket (OOP) expenditures and resulting risk of catastrophic health expenditure posed a continuing threat to achieving equity and further reduction in U5M. The impact of more recent efforts to reduce OOP through initiatives such as insurance schemes was beyond the time period of the study.





**Dependence on Donor Funding:** KIs mentioned that Bangladesh's ongoing dependence on donor funding for much of its U5M reduction programs which had implications for sustainability of key programmatic activities remained a challenge.

**Geography (Hard-to-reach Areas):** The hard-to-reach geography of the Chittagong division continued to pose a challenge to U5M reduction efforts with persisting inequities despite national reductions.

**Geographic and Equity Gaps in Coverage of EBIs and Selected Underlying Conditions:** Despite the strategy of focusing on equity, Bangladesh continued to experience challenges with equity of coverage of important EBIs and prevalence of U5M-related CODs. Examples of this include wealth quintile disparities in measles vaccination as well as in stunting and underweight prevalence. Notably, some of the geographic coverage gaps represented equity-driven strategies such as a data-driven focus on implementation of malaria EBIs targeting endemic areas. There was some narrowing of wealth-based equity gaps in overall U5M reduction which KIs explained was due to the influence of other factors noted above including female empowerment and education, economic strengthening, and reduced fertility rates.

**Data Systems Challenges:** Bangladesh's history of data systems strengthening and use as part of EBI implementation and, more recently, broader data systems strengthening, was noted by KIs as a facilitator. However, the country continued to have challenges with its broader data systems, for example with the completeness and quality of the HMIS.

**Human Resources for Health:** The HRs for health capacity remained an ongoing challenge with the number of physicians, nurses, and midwives well below the WHO target.

**Political Unrest (Country and Regional):** Political unrest within the Chittagong division represented an ongoing challenge to U5M reduction efforts. Also, KIs mentioned that the more recent influx of refugees from Myanmar into the Chittagong division may exacerbate already existing inequity in U5M reduction because of pressure on public services in the area, and inability to meet the needs of the increasing population.

**Economic Development:** Despite improvements in Bangladesh's economy with growth in its GDP per capita, the proportion of the population living below the poverty line remained high and presented an ongoing challenge to U5M reduction efforts.

**Private For-Profit Sector:** The sub-optimal coordination and oversight of the private sector remained a challenge for ensuring good quality of care in Bangladesh. This was reflected in rising Caesarean section rates.

**Health System Structure:** The continued centralization of the management of Bangladesh's health system and dual governance structure of the MOHFW remained an ongoing challenge.

**Culture:** The culture in certain parts of Bangladesh such as Sylhet was unfavorable to factors which facilitated the drop in U5M. For example, women's empowerment and education were identified as ongoing challenges.

## 1.5 Transferrable Knowledge for Other Countries

A number of implementation strategies from Bangladesh have the potential to be adapted and adopted by other countries looking to accelerate decline in U5M learning from Bangladesh's successes and challenges. These include building a strong paid, supervised CHW program, which was used to implement multiple initiatives and expand access and community engagement, and reflects recent WHO recommendations.<sup>1</sup> Bangladesh worked to



strengthen and build on existing health system capacity through integrating new initiatives rather than developing vertical systems, with some exceptions. Similar to other countries, Bangladesh also prioritized generating local evidence to inform implementation of new EBIs while leveraging global evidence where appropriate. The country was able to largely rely on internal expertise through professional organizations and in-country research organizations such as icddr,b, and research studies often reflected a goal of scale as evidence was generated. Bangladesh also planned for equity from the start of EBI implementation, prioritizing reaching populations in greatest need.

Other transferable lessons include consultations and engagements with researchers, who were encouraged to engage with donors and policymakers to ensure evidence-based decision-making. Further engagement with stakeholders, multi-sectoral collaboration from early in implementation and throughout, planning for sustainability by integrating into systems, private sector engagement to expand health care service delivery – which also represented a challenge due to limited oversight – ensuring financing for EBIs, quality training and supervision, and insurance to reduce OOP were all important. Like a number of other exemplar countries, looking outside direct causes of mortality was also critical. For example, female empowerment, infrastructure investments and identifying and addressing other public health issues such as WASH activities were all valuable.

### **Areas of strength and recognized challenges:**

#### **1. Develop and/or ensure CHW program suited to local context and adaptable to current needs, with standardized training, management, and accountability system that involves community and health professionals**

Government CHWs were key implementers of U5M EBIs in Bangladesh with multiple EBIs incorporated into their scope of work. The success of Bangladesh's CHW program was related to a number of factors such as the female-only cadres of CHWs (family welfare assistants- FWAs and community-based SBAs) to provide FP and delivery services, respectively, which contributed to acceptability. Also, the strong governance structure, which involved both DGHS and DGFP union-level health workers, assistant health inspectors, health inspectors who supervised health assistants (HAs), and FP inspectors who supervised FWAs, was key to the success of Bangladesh's community health program. Further, the participation of the community through community groups which shared the cost of construction of community clinics with the government and were responsible for the cleanliness and general maintenance of the clinics, contributed to ownership and the success of the program. Lastly, Bangladesh's willingness to adapt to current needs and demands by introducing additional cadres – community-based SBAs and community health care providers (CHCPs)– to implement new EBIs and meet emerging needs for increased CHW capacity, respectively, was identified as key to the success of the CHW program. However, Bangladesh's community health program's efforts were not always successful. For example, despite efforts to ensure acceptability of the community-based SBAs, they were not fully accepted in their new role. They remained known as HAs and FWAs within communities, and because they were overburdened, accounted for only a minimal proportion of skilled birth attendance. As such, countries looking to achieve Bangladesh's success, and improve on its challenges, should ensure these constraints are addressed.

#### **2. Integrate new initiatives by building on existing health system capacity**

New initiatives were integrated into existing structures and existing initiatives. This was important to reduce risk for vertical projects and duplication of work while providing resources to increase overall capacity. Notable examples of this include:





FB-IMCI leveraged existing programs including CDD and ARI, protocols, and guidelines, and CB-IMCI was integrated into the existing community health system involving two existing cadres of CHWs, HAs and FWAs.

### **3. Leverage and ensure integration of data collection for new initiatives into existing health information systems to assess need and monitor effectiveness and coverage of new EBIs**

Bangladesh leveraged existing data collection systems rather than building new systems. This contributed to successful implementation of EBIs and supported sustainability through integrating into routine data systems. Some examples include:

Integration of IMCI and new vaccines – PCV, and Hib as part of Pentavalent vaccine – into the HMIS system.

Bangladesh leveraged the existing pediatric bacterial meningitis and pneumococcal disease sentinel surveillance systems at the MOHFW to monitor adverse events following immunization after the introduction of PCV.

Bangladesh's measles surveillance was set up to leverage the existing acute flaccid paralysis surveillance system for polio detection including its surveillance medical officers.

### **4. Value evidence-based decision-making and use it to determine need and appropriateness of EBIs and create implementation strategies based on global and local scientific evidence. Balancing the need for local evidence with the strength of existing global evidence and prioritizing rapid adoption and scale-up of EBIs where appropriate**

Bangladesh led in the introduction of globally emerging EBIs, for example with its IMCI strategy, often based on already identified disease burden. Small-scale testing would then be required to determine feasibility and effectiveness before scaling up. However, Bangladesh also recognized the importance of rapid introduction of some EBIs which did not require context-specific adaptation, in cases where global evidence already existed or there was a history of acceptability of similar EBIs. For example, rapid diagnostic tests (RDTs) for malaria were introduced based on the strength of global evidence, and PCV was rapidly introduced and scaled based on the history of acceptability of vaccines. Specific lessons include:

#### ***Value evidence-based policymaking***

Bangladesh valued evidence-based decision-making through engaging professional leaders and internal research organizations such as icddr,b regularly, and at a high-level. The interaction of these leaders and organizations with the government encouraged their commitment through the long and iterative process of the evidence-policy continuum.

#### ***Prioritize locally produced evidence to inform decisions and implementation***

Bangladesh adopted new EBIs and adapted them to suit the local context based on local research to determine its appropriateness and feasibility. Importantly, this effort engaged and gave leadership to in-country research institutions which fostered a culture of data-driven decision-making. For example:

The lower age limit for Bangladesh's FB-IMCI was set at 24 hours as opposed to seven days (the recommendation by WHO and UNICEF) because of data showing high burden of neonatal deaths in the country.

Studies conducted by icddr,b and surveillance studies by Bangladesh's Institute of Epidemiology, Disease Control and Research into rotavirus infections provided the basis for Bangladesh's decision to introduce rotavirus vaccine.



Bangladesh conducted small-scale testing, often done by or with in-country institutions, for selected EBIs before scale-up to determine feasibility, acceptability, and effectiveness. The small-scale testing phase was used to inform implementation strategies, as in phased scale-up or leveraging NGOs as implementers. For example:

Small-scale testing of FB-IMCI and CB-IMCI assessed feasibility and effectiveness. Findings from the small-scale testing phase informed phased scale-up of FB-IMCI and CB-IMCI and leveraging of implementing partner NGOs such as Save the Children for implementation of CB-IMCI.

EBIs were adapted based on emerging local data. For example:

Addition of drowning to CB-IMCI based on evidence that drowning was a cause of death (COD) among children.

## **5. Plan for equity from the beginning and adapt systems for equity**

Multiple systems were implemented to address equity. While this was not always successful in achieving wealth-based equity of coverage for specific EBIs, other factors including female empowerment and education, economic strengthening, and reduced fertility rates contributed to closing these gaps in U5M reduction overall. Specific examples include:

### ***Ensure financial accessibility through systems designed to ensure equity***

Free distribution of ORS packets as part of National Oral Rehydration Project (NORP).

Free distribution of ITNs and free test-to-treat with RDT and ACT.

### ***Integrate an equity agenda into program implementation and governance decisions***

Community groups which in collaboration with the government oversaw community clinics, had membership comprising at least one-third women and adolescent girls or boys, to ensure representation of these groups most often accessing community-level services in decision-making. To further ensure equity, the community groups were required to have at least the president or vice-president be female.

Prioritizing sub-districts with high U5M for initial phase of FB-IMCI implementation reflected a focus on equity rather than equality.

### ***Adapt existing systems to ensure equity***

#### ***Ensure accessibility through adapting existing systems***

Phase two of CDD Program had an increased focus on rural children under 5 compared to phase one.

## **6. Consultations and participation: Engage and consult stakeholders and leverage their expertise including within Ministry of Health (MOH), other sectors, donors, implementing partners, professional bodies, and community**

This approach ensured better acceptability and feasibility of scale-up through broad engagement. Consultations were typically done through committees at the national level, but also during actual implementation at the subnational level.

### ***Leverage and engage donors and implementing partners***

Bangladesh's interagency coordination committee led preparations for introduction of rotavirus vaccine and had donor and civil society representatives such as BRAC and Rotary International. In addition, Bangladesh's Country Coordinating Mechanism, a coordinating committee responsible for overseeing the implementation of malaria, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), and tuberculosis interventions, had NGO and civil society members.



Bangladesh had a history of leveraging implementing partner capacity for implementation of EBIs which contributed to the feasibility of implementation. For example, BRAC's oral rehydration workers implemented the ORT program, BRAC's shasthya shebikas implemented the indoor residual spraying (IRS) program, and NGO CHWs – community nutrition promoters and community nutrition organizers – implemented the Bangladesh Integrated Nutrition Program (BINP).

### ***Leverage national and local stakeholders including professional bodies***

Bangladesh leveraged its professional bodies and existing program implementers through discussions during exploration and preparation and throughout implementation. Specific examples include:

The national steering committee for FB-IMCI included the program managers of the CDD and ARI programs as well as the BPA and BNF. BPA provided training to health workers as part of the Scaling Up Zinc for Young Children (SUZY) project.

### ***Ensure focus on communities in program design and implementation***

Bangladesh integrated a focus on communities into the design of its U5M reduction programs. Examples include: The CDD program targeted community-level influencers such as religious leaders, schoolteachers, and caregivers, to promote the use of ORT. Schoolteachers were provided with sample skits, quizzes, and games to include in the curriculum to increase awareness of ORT among children. Orientation activities were organized for religious leaders to emphasize their status in the society and the importance of their role in promoting ORT use. Posters with Koranic metaphor were put up at mosques and other places of worship to highlight the importance of ORT use and caregivers were provided with reference booklets on dehydration symptoms, ORT use, and symptoms requiring referral.

## **7. Ensure multi-sectoral collaboration**

Bangladesh addressed U5M by engaging multiple sectors. For example, the CDD program was implemented in collaboration with different ministries. The National AIDS Committee had members from multiple ministries. Further, Bangladesh designated oversight of the Expanded Programme on Immunization (EPI) program in urban areas to the Ministry of Local Government, Rural Development and Co-operatives (MOLGRDC), city corporations, and municipal authorities. According to KIs, however, this was not very efficient given the inadequate coordination with the MOHFW.

## **8. Plan for sustainability**

Bangladesh used a range of strategies to ensure sustainability in the implementation of EBIs through integration of EBIs into the health system and related policy. In some cases, this was done earlier in the program implementation, reflecting an early focus and plan for sustainability including setting up an IMCI program unit within the directorate of health services at the MOHFW and integration of IMCI into the SWAp, development of a national HIV policy and reflecting it in the first National HIV/AIDS Strategic Plan, establishment of the National AIDS/Sexually Transmitted Diseases (STD) Programme at the MOHFW, and development of a nutrition policy document – the National Plan of Action for Nutrition. In other cases, this was done later, for example integration of the IMCI strategy into doctors' undergraduate training.

## **9. Encourage private sector engagement, including for direct service delivery, and provide sufficient oversight**

Bangladesh encouraged its private sector through a number of strategies to expand access to health service delivery which serves as a lesson for other countries looking to achieve similar success in U5M reduction.



For EBI implementation, Bangladesh also encouraged private sector engagement which contributed to feasibility such as commissioning Acme Laboratories, a local pharmaceutical firm, to manufacture zinc tablets for the SUZY project. However, in order to ensure quality delivery of care, countries must provide sufficient oversight for the private sector, an area which remained a challenge in Bangladesh.

#### **10. Ensure financing for EBIs**

Bangladesh ensured financing for EBIs through both donor and government funding – though government funding was identified in some cases as insufficient, with an overreliance on donors. This was shown in Bangladesh's all-cause government expenditure, as a percentage of overall health expenditure, which remained low and decreased between 2000-2015, from 26% in 2000 to 21% in 2005, 20% in 2010, and 15% in 2015. Nonetheless, to account for loss or reduction in donor funding and to ensure sustainability, the Government of Bangladesh increased its budget for selected EBIs. Notable examples include increase in budget for FB-IMCI after WHO and UNICEF ended financial support, and increase in budget for vaccines as part of the fifth SWAp in response to the Government of Bangladesh's increasing co-funding requirement for PCV.

#### **11. Invest in initiatives outside direct U5M interventions**

Bangladesh's investment in infrastructure, for example, roads, telecommunications, and WASH, facilitated its drop in U5M. Investment in improving FP and dropping fertility rate as well as improving women's education and overall empowerment were key in decreasing U5M and provide a valuable lesson for other countries. As noted, Bangladesh's investment in economic growth also increased the capacity of its population to access care from the private sector and contributed to the drop in U5M.

#### **12. Invest in good quality training and ensure supervision**

Bangladesh invested in good quality trainings for EBIs, although supervision remained a challenge for some, which limited success of some EBIs such as the Helping Babies Breathe (HBB) initiative. Countries looking to achieve sustainable success in implementation of EBIs and overall drop in U5M need to invest in ensuring both quality training and supervision.

#### **13. Ensure insurance to reduce OOP spending**

Although this was an area which posed a challenge for Bangladesh before and during the case study period, it provides a lesson for other countries looking to improve financial access to health care for all and especially for the poor. By introducing an insurance system which reduces OOP spending for citizens, which was a challenge for Bangladesh, countries may improve financial access to health care services for all.

## **1.6 Conclusions**

Bangladesh achieved remarkable drops in U5M and neonatal mortality despite ongoing challenges with equity and coverage of some EBIs. A strong community health system, women's empowerment initiatives, dropping fertility rate, supporting and leveraging in-country clinical, research, and implementation expertise, effective leadership, donor and implementing partner engagement and coordination, integration of new initiatives into existing systems, data systems strengthening and data use, community engagement, planning for sustainability, and multi-sectoral collaboration, were identified as some of the facilitators of this drop. However, challenges such as overreliance on donor funding, significant OOP spending on health care, inadequate HRs for health, and low quality of care, amongst other challenges, remained.



## 2 INTRODUCTION

### 2.1 Exemplars in Global Health

The Exemplars in Global Health Project aims to support high-impact global health decisions by making it easier to replicate large-scale global health successes through evidence-based narratives, to inform decision-making. The core of the project involves deep and rigorous content detailing the successes, as well as drivers of those successes, among “exemplars” – positive outlier countries or regions that have demonstrated outperformance relative to peers or beyond what might be expected given context and/or financing. This content, organized across several global health sub-topics, is designed to be data-driven and rigorous, but also accessible and broad.

Exemplars content is intended primarily for an audience of national policymakers, implementers, and funders – people with the potential to significantly impact global health policy at scale. It will be complemented by delivery mechanisms that maximize its reach and impact.

### 2.2 Exemplars in Under-5 Mortality

The University of Global Health Equity (UGHE) is working with the team at Gates Ventures and the Bill & Melinda Gates Foundation to better understand countries’ successes in reducing under-5 mortality (U5M). This work was initially designed with two aims:

1. Developing and testing an implementation framework and mixed methods approach to understand the successes of these countries; and
2. Extracting actionable knowledge focused on implementation strategies and key contextual factors to inform other countries working towards the same goal.

The scope of mortality was limited to amenable CODs – those which are potentially preventable with a stronger and higher quality health care system. The work was divided into a number of activities. These included:

1. Identifying evidence-based interventions (EBIs) in use in low- and middle-income countries (LMICs);
2. Developing and applying an implementation science-based approach to understanding how the EBIs put into place by these exemplar countries were prioritized, adapted, implemented, and sustained;
3. Understanding how the EBIs implemented by a country were prioritized, adapted, implemented, and sustained through both existing publicly available sources and primary key informant interviews (KIIs); and
4. Identifying the key contextual factors and policy interventions critical to each country’s success (see Appendix A: Exemplars in U5M Project Methodology and Framework).

The work was guided by the development of a framework which was informed by a number of existing frameworks in use for U5M (including Countdown 2015, WHO) and implementation science.

Seven countries meeting “exemplar” criteria for U5M were chosen based on the rates of decline in U5M compared with countries in their region or with similar economic resources. One of the selected countries was Bangladesh. This selection process was performed with input from a Technical Advisory Panel. These countries were chosen to represent a range of locations and sizes, with the goal of identifying implementation success factors common to countries that have over-performed in U5M.



## 2.3 Bangladesh

### Background

Bangladesh is a predominantly low-lying riverine country, in the Ganges River Delta on the Bay of Bengal, in Southern Asia. It is bordered by India to the north, west, and east, and also shares a border with Myanmar in the southeast.<sup>2</sup> In southeastern Bangladesh, the Chittagong Hill Tracts are in the Chittagong division, a hilly area which covers an area of 13,184km<sup>2</sup> (approximately 10% of the total area of Bangladesh). The highest point in the Chittagong Hill Tracts is the Mowdok range with an elevation of approximately 1,000m.<sup>3</sup>

Bangladesh is divided into eight divisions: Barisal, Chittagong, Dhaka, Mymensingh, Khulna, Rajshahi, Rangpur, and Sylhet (see Figure 2), 64 districts, and 490 sub-districts (upazilas). In the rural areas the sub-districts are further divided into 4,553 union councils, while in the urban areas they are divided into 323 municipalities and 12 city corporations.<sup>4</sup> Union councils, municipalities, and city corporations are further divided into 7,739 wards.<sup>5</sup>

Bengalis comprise the main ethnic group in Bangladesh, making up more than 98% of the population.<sup>6</sup> The languages spoken include the two official languages, English and Bangla/Bengali, as well as nearly 40 other languages including Sylheti, Rangpuri, Chittagonian, and Chakma.<sup>7</sup> The main religion is Islam (90%), followed by Hinduism (9%).<sup>8</sup>



Figure 2. Map of Bangladesh showing the different divisions (Source: Vector Stock, 2019)

The population has grown rapidly over time, from 76 million in 1974 to 111 million in 1991, and 158 million in 2014. As of 2014, Bangladesh was the most densely populated country in the world, with a population density of 1,070 persons per square kilometer although the country's population was still predominantly (77%) rural.<sup>9,10</sup>

### Economic Status and Development

Beginning in the early 1970s, after Bangladesh's independence from Pakistan in 1971 (see Political Context and Unrest section for details), the country introduced socialist economic policies which involved the nationalization of much of its manufacturing and agricultural sector. These policies resulted in economic hardships within the country and, by the mid-1970s, a new regime began moving away from the socialist policies and began implementing measures such as deregulation and tariff reductions to boost the private sector, with the view to improving the economy. These reform measures resulted in economic growth throughout the 1990s and were implemented with support from the International Monetary Fund and the World Bank.<sup>11,12</sup>

World Bank estimates showed that Bangladesh's gross domestic product (GDP) per capita (constant 2010 US\$) grew steadily, from US\$509 in 2000 to US\$599 in 2005, US\$758 in 2010, and US\$972 in 2015 (Figure 3).<sup>13</sup> Despite these increases, in 2015 Bangladesh's GDP per capita remained below the South Asian average of US\$1,603 as well as below that of its regional neighbors: India (US\$1,759) and Myanmar (US\$1,342).<sup>13</sup>

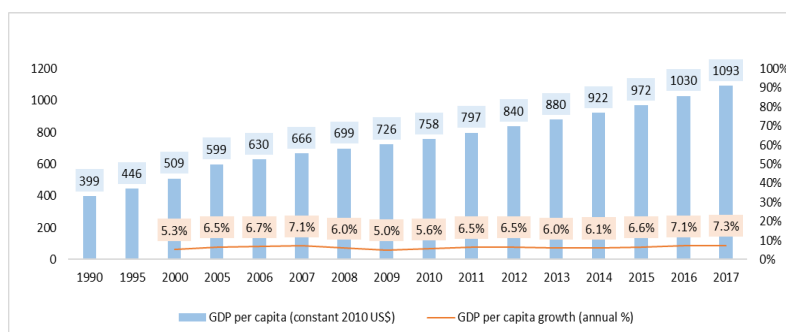


Figure 3. GDP Per Capita (Constant 2010 US\$) and Annual GDP Per Capita Growth (1990-2016) (Source: World Bank, 2018)

The Human Development Index in Bangladesh showed gradual improvements from 0.468 in 2000 to 0.505 in 2005 and 0.592 in 2015.<sup>14</sup> The proportion of the population living below the national poverty line declined substantially from 48.9% in 2000 to 40% in 2005, 31.5% in 2010, and 24.3% in 2016, with the proportion living in extreme poverty also dropping from 34.3% in 2000 to 12.9% in 2016.<sup>15,16</sup>

Throughout the 1990s and between 2000-2015, Bangladesh's economy was predominantly driven by an agricultural sector with rice and jute as the primary crop. However, there was increasing contribution from manufacturing of mainly ready-made garments which accounted for most of Bangladesh's exports between 2000-2015, increasing from 20% to 80% of total exports (US\$21.5 billion) in 2015.<sup>10,17,18</sup> Remittances from Bangladeshis living abroad also grew steadily between 2000-2015 from US\$1.96 billion (4% of GDP) in 2000 to US\$15.27 billion (8% of GDP) in 2015.<sup>19</sup> Other contributors to economic development included the pharmaceutical industry, shipbuilding, and the leather industry (mainly exports).

## Political Context and Unrest

In 1947, British rule ended in India and the country was partitioned to create a new independent nation, Pakistan, which comprised the Muslim-majority areas in the northwest (West Pakistan) and northeast (East Pakistan) of India. Over the years, West Pakistan's economic and political domination of the more populous East Pakistan fueled nationalist agitations and demands for autonomy and unrest arose in response. In 1971, the newly independent East Pakistan was renamed the People's Republic of Bangladesh.

Bangladesh's independence was not supported by all groups within the country. Notably, the Chakma and Jumma ethnic groups in the Chittagong Hill Tracts had been displaced as a result of ongoing government projects within their area. As a result, by 1977, the separatist United People's Party of the Chittagong Hill Tracts and its armed wing – Shanti Bahini – set up by the Chakma and Jumma ethnic groups, launched a war on the Government of Bangladesh. The unrest lasted 20 years until the Chittagong Hill Tract Accord was signed in 1997.<sup>3</sup> During the case study period, there was some ongoing political unrest with implications for U5M reduction efforts which are discussed in the Cross-Cutting Contextual Factors section.



## Under-5 Mortality in Bangladesh

According to Institute of Health Metrics and Evaluation (IHME) estimates, U5M dropped from 86 per 1,000 live births in 2000 to 34 per 1,000 live births in 2015, a decline of 60% (Figure 4),<sup>20</sup> although Bangladesh's Demographic and Health Survey (DHS) showed that between 2000 to 2014 (the most recent DHS during the case study period), U5M dropped from 94 per 1000 live births in 2000 to 46 per 1000 live births in 2014, a decline of 51%. This reduction in U5M occurred across wealth quintiles, with a narrowing of the equity gap by 71% from 184/1,000 live births among the poorest quintile and 97/1,000 among the wealthiest quintile, in 1993, to 62/1,000 among the poorest quintile and 37/1,000 among the wealthiest quintile in 2014. U5M also dropped across all regions although the northwest, northeast, and southeast lagged behind the rest of the country (Figures 5 and 6).<sup>20,21</sup> See Contextual Factors and Remaining Challenges sections.

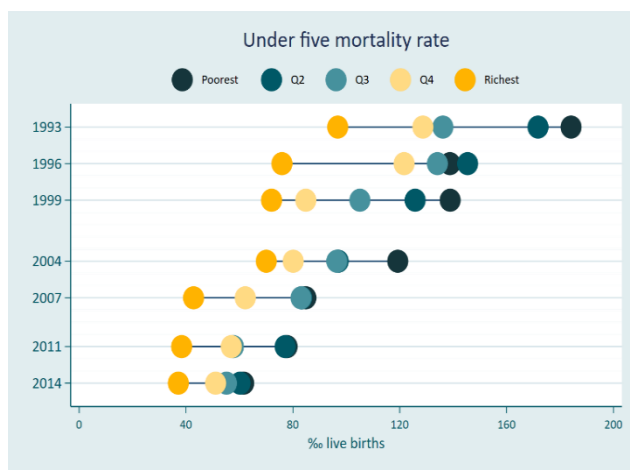


Figure 5. Equity Analysis of Under-5 Mortality Rate in Bangladesh (1993-2014) (Source: Victora, et al 2018)

The reduction in neonatal mortality was less than overall U5M, with a decline of 51%, from 43 per 1,000 live births in 2000 to 21 per 1,000 live births in 2015 (Figure 7).<sup>20</sup> Similar to overall U5M, Bangladesh's DHS showed that between 2000 to 2014, the drop in neonatal mortality was less than estimated by IHME, from 42 per 1,000 live births to 28 per 1,000 live births, a decline of only 33%. The decline in neonatal mortality occurred across wealth quintiles with a narrowing of the equity gap by 22%. Neonatal mortality was 41/1,000 live births among the poorest quintile in 2014, down from 69/1,000 in 1993. For the

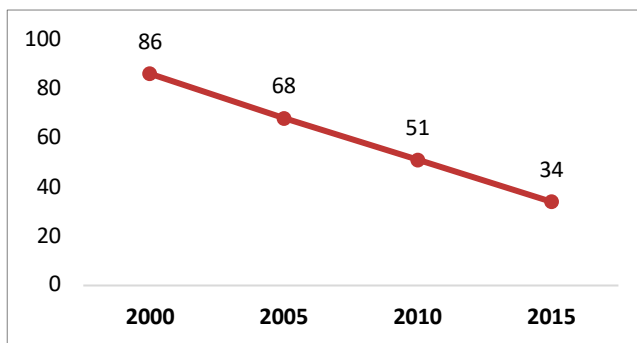


Figure 6. Under-5 mortality rate in Bangladesh (per 1,000 live births) (2000-2015). (Source: IHME, 2018)

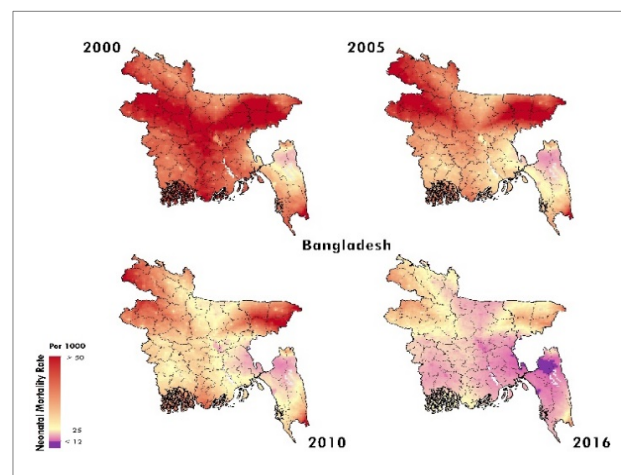


Figure 4. Map of Bangladesh Showing the Trend of Under-5 Mortality Across the Different Regions (2000-2016) (Source: IHME 2018)

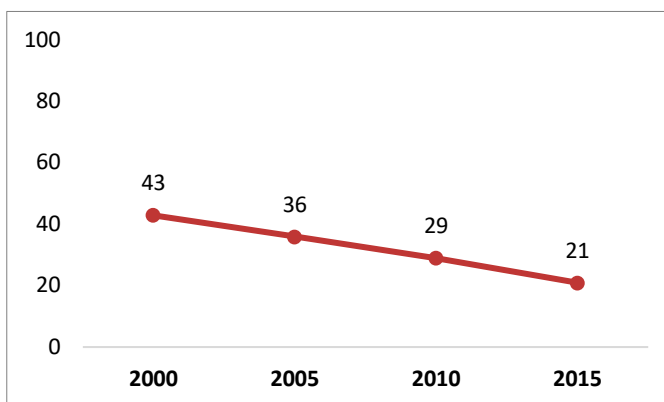


Figure 7. Neonatal mortality rate in Bangladesh (per 1,000 live births) (2000-2015) (Source: IHME, 2018)



wealthiest quintile, neonatal mortality in 1993 was 42/1,000 but dropped to 20/1,000 in 2014 (Figure 8). Neonatal mortality also dropped across all regions, although similar to overall U5M reduction, the northwest, northeast, and southeast lagged behind the rest of the country (Figure 9).<sup>22,23</sup> (See Contextual Factors and Remaining Challenges section.)

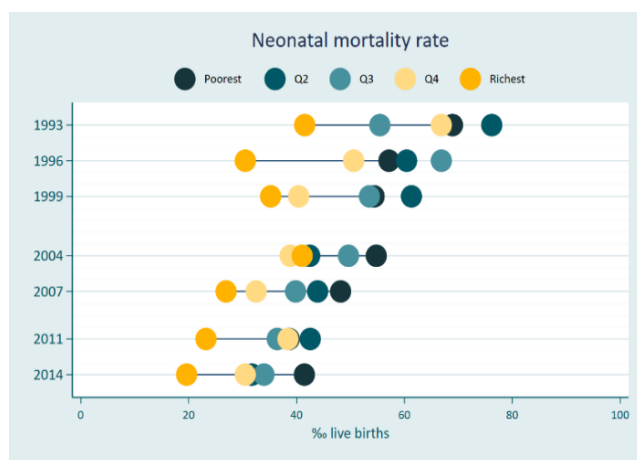


Figure 8. Equity Analysis of Neonatal Mortality Rate in Bangladesh (1993-2014) (Source: Victora, et al 2018)

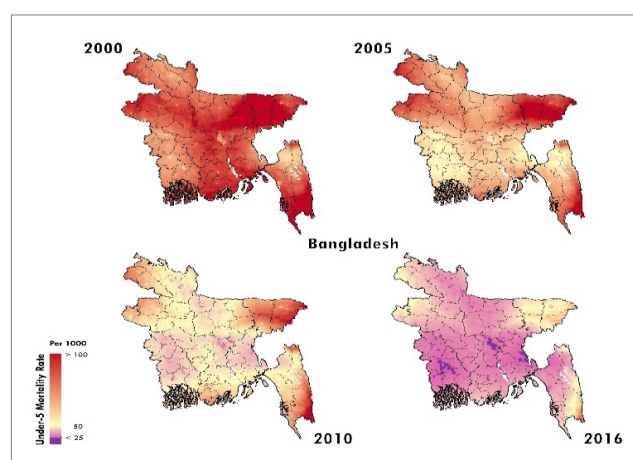


Figure 9. Map of Bangladesh Showing the Trend of Neonatal Mortality across the Different Regions (2000-2016) (Source: IHME 2018)

Further, Bangladesh made substantial improvements in U5M and neonatal mortality in comparison to its LMIC regional neighbors with higher GDPs (constant US\$ 2010) including Myanmar, India, and Pakistan (Table 2).<sup>24</sup>

Table 2. A Comparison of Bangladesh's U5M and Neonatal Mortality Rates with those of its LMIC Regional Neighbors with Higher GDPs (Constant US\$ 2010) in South Asia, 2000-2015 (based on IHME estimates)<sup>24</sup>

| Indicators | Under-5 mortality rate (per 1,000 live births) |      | Neonatal mortality rate (per 1,000 live births) |      |
|------------|--|------|---|------|
|            | 2000   | 2015 | 2000  | 2015 |
| Bangladesh | 86   | 34   | 43  | 21   |
| Myanmar    | 111  | 49   | 42  | 23   |
| Pakistan   | 91   | 65   | 47  | 39   |
| India      | 83   | 48   | 38  | 26   |

## Causes of Death in Children Under 5 in Bangladesh

IHME modeling found the three main causes of death (COD) among under-5s (U5) between 2000-2016 were lower respiratory infections, diarrheal diseases, and malnutrition, with a similar percentage of total U5 deaths attributable to each COD over time (Table 3). Other leading CODs between 2000-2016 included meningitis, tetanus, measles, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), diphtheria, and malaria. In neonates, the main CODs also remained constant with neonatal encephalopathy due to birth asphyxia, neonatal preterm births, and lower respiratory infections estimated to account for most neonatal deaths. Congenital birth defects, neonatal sepsis and other neonatal infections, and tetanus were also leading CODs in this age group (Table 4). Bangladesh differed from other exemplar cases in the more limited drop in birth asphyxia in its contribution to neonatal mortality, which may be related to continued lower coverage of skilled birth attendants (SBAs) at delivery (see coverage data in Table 8).



Table 3. Causes of Death in Bangladesh, Ordered by Rate of Deaths per 100,000 Children Under 5 (2000-2016) (IHME Modeling)<sup>24</sup>

| Cause of Death               | Rate of deaths per 100,000 population (% of deaths) |                |                |
|------------------------------|---|----------------|----------------|
|                              | 2000  | 2005           | 2016           |
| Lower respiratory infections | 424 (23%)   | 310 (21%)      | 117 (17%)      |
| Diarrheal diseases           | 129 (6.9%)  | 70 (4.8%)      | 22 (3.3%)      |
| Malnutrition                 | 56 (3%)   | 47 (3.3%)      | 17 (2.5%)      |
| Meningitis                   | 8.9 (0.5%)  | 12 (0.8%)      | 4.5 (0.7%)     |
| Tetanus                      | 20 (1.1%)   | 4.4 (0.3%)     | 2.4 (0.4%)     |
| Measles                      | 41 (2.2%)   | 18 (1.2%)      | 0.6 (0.1%)     |
| HIV/AIDS                     | 0.009 (0.0005%)                                     | 0.04 (0.003%)  | 0.08 (0.01%)   |
| Diphtheria                   | 0.12 (0.006%)                                       | 0.05 (0.004%)  | 0.01 (0.002%)  |
| Malaria                      | 0.02 (0.001%)                                       | 0.01 (0.0009%) | 0.008 (0.001%) |

Table 4. Causes of Death in Bangladesh, Ordered by Rate of Deaths per 100,000 of Neonatal Population (2000-2016) (IHME Modeling)<sup>24</sup>

| Cause of Death                                | Rate of deaths per 100,000 of neonatal population (% of deaths) |              |              |
|---|---|--------------|--------------|
|   | 2000  | 2005         | 2016         |
| Neonatal encephalopathy due to birth asphyxia | 10,060 (17%)  | 12,285 (26%) | 8,645 (31%)  |
| Neonatal preterm birth                        | 14,855 (26%)  | 9,778 (20%)  | 4,504 (16%)  |
| Lower respiratory infections                  | 8,745 (15%)   | 6,043 (13%)  | 2,721 (9.8%) |
| Congenital birth defects                      | 1,850 (3.2%)  | 2,049 (4.3%) | 1,673 (6%)   |
| Neonatal sepsis and other neonatal infections | 2,580 (4.5%)  | 2,322 (4.8%) | 1,466 (5.3%) |
| Diarrheal diseases                            | 905 (0.8%)  | 555 (0.6%)   | 223 (0.4%)   |
| Tetanus                                       | 1,039 (1.8%)  | 230 (0.5%)   | 141 (0.5%)   |

## Ministry of Health: System and Structure

In 1975, a few years after Bangladesh's independence, the country adopted a dual system of structure and function within the Ministry of Health and Family Welfare (MOHFW), by setting up two directorates, the Directorate General of Health Services (DGHS) and the Directorate General of Family Planning (DGFP). The decision to set up a separate directorate for family planning (FP) was made because of Bangladesh's recognition of the need to address overpopulation. (See Cross-Cutting Contextual Factors section.) This decision had significant implications for the overall design and management of maternal, newborn, and child health care delivery at the local level and was identified by some KIs as a challenge in coordination of services.

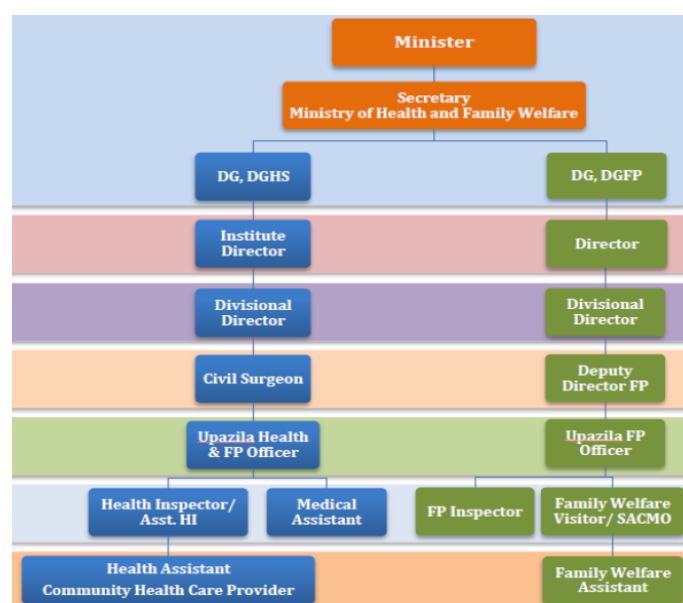


Figure 7. Structure of Bangladesh MOHFW DGHS and DGFP (Source: Health Systems of Bangladesh, 2019)



The DGHS, an executive authority of the MOHFW, was responsible for managing public health services and providing general health care. It was headed by a director general at the national level (Figure 10). At the national level also, directors of postgraduate health institutes and hospitals (including alternative medicine hospitals) reported to the director general.

At the division level (similar to a state or province), the DGHS had a divisional director for each of the eight divisions, who also functioned as the hospital director for the divisional hospitals.<sup>25</sup> At the district level, the civil surgeon provided oversight for general health delivery. The upazila health and FP officer coordinated overall health delivery activities at upazila/sub-district level, while at union level a medical assistant and health inspector, supported by an assistant health inspector, provided oversight. The health assistants (HAs) and community health care providers (CHCPs) at the ward/community level were supervised by the health inspector and assistant health inspector (see Community Health Program).

The DGFP was responsible for managing and providing FP and components of maternal health care. It was headed by a director general at the national level who supervised the director of the family planning institute. At the division level, the divisional director provided oversight for all DGFP activities while the deputy director of FP was responsible at the district level. The upazila FP officer (at the sub-district level) supervised union-level FP inspectors, as well as the family welfare visitor and sub-assistant community medical officer. The family welfare visitor and sub-assistant community medical officer supervised the FWA at the ward level. (See also Community Health Program section.)

Recognizing the challenges associated with its dual system of structure and function, KIs noted that the MOHFW merged the DGHS and DGFP in 1998 with health care providers within each directorate, required to perform both their original roles as well as those of health care providers, within the same level, of the other directorate. For example, family welfare assistants (FWAs) and HAs were required to perform the same role at community/ward level. However, this was unpopular with the health care providers, which led to the reversal of the merger by 2003.

## Bangladesh's Health System Structure and Capacity (Through 2015)

Bangladesh's health system became increasingly pluralistic during the case study period, between 2000-2015, with two main actors, the public sector/government and the private sector including NGOs, and care delivery in the community and through facilities.

### Public Sector

In Bangladesh, at the tertiary/divisional level, medical colleges and specialized hospitals provided specialized care. At the district level, general hospitals, district hospitals, and maternal and child welfare centers focused on essential obstetric care provided specialized care, although with relatively limited hospitalization services compared to tertiary/divisional levels (Figure 11). Upazila health complexes at the sub-district level provided first-level referral services including

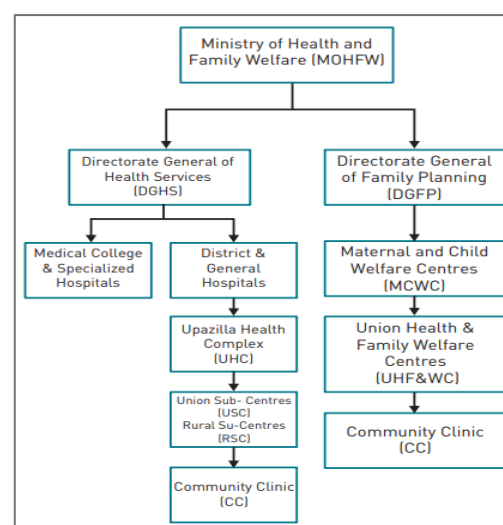


Figure 8. Bangladesh's Health Service Delivery Organizational Structure (Source: WHO, 2015)



diagnostic and surgical treatments, while union sub-centers, rural sub-centers, and family welfare centers at the union level provided preventive and primary curative services including FP, delivery, adolescent health care, and communicable disease control services.<sup>26</sup> (See SBA section for efforts to upgrade family welfare centers).

Community clinics were briefly in existence from 1998 to 2001 and then reestablished in 2009. At last count there were about 13,000 community clinics, averaging three to four clinics per village, each serving populations of 5,000-6,000. These community clinics offered basic services provided by community health workers (CHWs) from each department: FWAs, HA and, starting in 2009, services provided by CHCPs and community-based SBAs. The content of services provided at community clinics differed between 1998-2001 and post-2009 but always included health promotion (education and sensitization) and FP. Starting in 2009, Community-Based IMCI was also included (see Community Health Program section).

The geographic accessibility of services increased during the case study period, with vaccination and oral rehydration salts (ORS) available for more than 90% within 5km, even in rural areas, in 2014 compared to only about 13% in 2000. By 2014, more than 87% reported being within 1km of a public or private health facility or community clinic (data were unavailable for 2000).

### **Health System Readiness**

In 2000, Service Provision Assessment (SPA) data assessing the availability of curative child care services, child growth monitoring services, and child vaccination services in the public sector found that 95% of upazila-level facilities and 92% of union-level facilities offered child health services. Community clinics were not assessed as part of SPA 2000.<sup>27</sup> Health Facility Survey data from 2014 found widespread gaps in basic services which had worsened since the last facility survey (SPA) in 2000. For example, while a high percentage (72%) of district and upazila-level facilities were offering these services, they were offered in only 47% of union-level facilities. At the community level, only 54% of community clinics were found to offer these services. However, while availability was low in the public sector, it was even lower in local private primary health care (PHC) facilities. For example, 72% of district and upazila-level facilities provided all three basic child health services compared to only 9% of private facilities.<sup>28</sup>

This difference between public and private health centers was in contrast to findings about hospital readiness. A study reviewing facility readiness in Bangladesh between 2007-2015 showed no major differences in the readiness of either public or private hospitals to provide general health services. Public hospitals were found to have a Service Readiness Index (SRI)\* of 78% compared to private hospitals with SRI of 74%. On the other hand, public non-hospital health centers such as upazila health complexes were found to have a lower level of readiness (SRI of 42%) compared to private non-hospitals (63%).<sup>29</sup> (See Private Sector and Cross-Cutting and Remaining Challenges sections.)

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\* The Service Readiness Index is a standardized measure developed by WHO, USAID, and other partners to quantify the capacity of health facilities to provide general health services. It is an indicator of the availability of the elements required for providing services including basic amenities, standard precautions, basic equipment, medicines, and supplies.

## Private Sector: Formal For-Profit and Not-for-Profit

As discussed in the Economic Status and Development section, in the mid-1970s, Bangladesh began to move away from socialist policies, a move which encouraged the growth of the private sector. This included the introduction of a low-interest loan scheme by the Government of Bangladesh for the establishment of private health facilities – both for-profit and not-for-profit non-governmental organization (NGO) facilities. Other policies and initiatives were also introduced to encourage the expansion of the private health sector, including the government's decision to subsidize the cost of land and equipment for private health facilities in 2004-2005, and the reduction in customs duties on medical and hospital equipment. As part of the work to begin to strengthen regulation of the private sector, Bangladesh introduced the Medical Practice and Private Clinics and Laboratory Ordinance of 1982, which specified procedures for the establishment of private health facilities and for the recruitment of health care personnel. The DGHS was also responsible for providing oversight for the activities of the private health sector.

As a result of these efforts, the health sector became increasingly pluralistic (public and private) which was both of benefit but also a challenge to ensuring equitable, quality care for all. Before 2000 and during the study period, the formal private sector grew rapidly to fill the gaps in service delivery which the public sector was unable to fill initially in urban settings (35% of formal private facilities were in Dhaka in 2003)<sup>30</sup> and later on, nationally in rural and urban settings. For example, there was an increase in women delivering in the private sector from 3.2% in 2004 to 24.6% in 2014, compared to 6.1% in the public sector in 2004 and 12.8% in 2014.<sup>28</sup> KIs reported that, by 2019, 50% of deliveries were in the private sector, associated with a concerning rapid increase in Caesarean sections. According to research conducted in 2018 and interviews with the key informants (KIs), the regulation of the private health care sector had not been very effective for a number of reasons, including the centralization of regulatory activities limiting strong subnational oversight of private health facilities, and the unclear guidelines for routine inspection and monitoring of private health facilities which limited the validity of assessment processes.<sup>30</sup> As a result, the quality of care was largely unknown although efforts to rethink the policies and oversight had started as of 2018.<sup>31</sup>

## Human Resources for Health

In Bangladesh, like in many countries, care was provided by both formally trained and informal providers including village doctors and drug dispensers. The inclusion of a paid group of CHWs was an important component of the human resources (HRs) and is discussed in a separate section.

### Formal Sector: Physicians, Nurses and Midwives

Table 5. Distribution of Doctors and Nurses across the Divisions in Bangladesh – Public and Private Sector (2011)<sup>32</sup>

| Division                            | Region         | Doctors/1000       | Nurses/1000         |
|-------------------------------------|----------------|--------------------|---------------------|
| Barisal                             | North          | 0.17               | 0.09                |
| Chittagong                          | South          | 9,778 (20%)        | 4,504 (16%)         |
| <b>Dhaka (including Mymensingh)</b> | <b>Central</b> | <b>6,043 (13%)</b> | <b>2,721 (9.8%)</b> |
| Khulna                              | West           | 2,049 (4.3%)       | 1,673 (6%)          |
| Rajshahi (including Rangpur)        | North          | 2,322 (4.8%)       | 1,466 (5.3%)        |
| Sylhet                              | East           | 555 (0.6%)         | 223 (0.4%)          |



Throughout the study period Bangladesh's public and private health system had challenges with the number and distribution of HRs. The number of physicians and nurses / midwives remained well below the World Health Organization (WHO) target of 2.28 doctors, nurses, and midwives per 1,000 with an estimated 0.3 physicians and 0.1 nurses per 1,000 people, in 2011.<sup>33</sup> In addition, there was geographic inequity, with much of the country's higher skilled health personnel predominantly concentrated in urban areas such as Dhaka, although over 70% of the population lived in rural areas (Table 5). These gaps existed despite the presence of divisional medical colleges and nursing schools and the expansion of the private sector. One KI noted that positions remained unfilled not because of a lack of available health care providers but because of shortfalls in the national health budget. In addition, the presence of a civil service exam which took considerable time and effort to complete may have also served as an additional barrier.

### **Informal Sector**

A significant amount of care in Bangladesh, before and during the case study period, was provided by "village doctors" who offered a range of curative care services including antibiotics for respiratory infections. One of the challenges noted by KIs was the absence of standardized criteria for becoming a village doctor, which presented difficulties for efforts to systematically engage them as part of the health care delivery system. For example, for Community-Based Integrated Management Childhood Illness (CB-IMCI), a decision was made to provide village doctors training around recognizing danger signs for referral to facilities. Although their knowledge improved, their prescription practices did not, potentially due to the profit they made from selling medication (see CB-IMCI section). Research conducted in 2009 further highlighted this challenge but noted the continued importance of engaging village doctors if equity in care coverage was to be achieved, given their influence and reach within communities.<sup>34</sup> Other informal sources of health care delivery included traditional healers, traditional birth attendants (TBAs), and allopathic providers such as homeopaths for which training was either nonexistent, or at informal private institutions with large variability in competency, knowledge and practices according to KIs. (See Neonatal Interventions section for efforts to engage TBAs.)

### **Community Health Program**

Bangladesh's community health program was delivered by government salaried CHWs (CHWs) of a range of cadres as well as by NGO CHWs. Care provided by CHWs included health promotion, preventive services (vaccine education, FP), and limited curative (Oral Rehydration Therapy- ORT) or broader curative (CB-IMCI) care, through home visits or community clinics.

The government decided early that the CHW cadres should have official salaried positions in the government health care structure, with training and supervision. Initially, there were two cadres of government paid CHWs in Bangladesh, reflecting the two directorates under the MOHFW: HAs (DGHS) and FWAs (DGFP)<sup>35,36</sup>:

1. **Health Assistants:** HAs were introduced in 1995 as a mixed-gender cadre of CHWs employed, without input from the community, by the DGHS to provide health promotion services and community mobilization for immunization.<sup>36</sup> They also provided vitamin A supplementation and treatment of common diseases and illnesses in children such as diarrhea. After 2009, with the reintroduction of community clinics, female HAs began staying at the community clinic for three days in the week to support CHCPs and also began implementing indoor residual spraying (IRS) in 2013. HAs were trained for 21 days, supervised by health inspectors and assistant health inspectors and paid US\$103 per month as of 2013. In 2017 (after the case





study period ended) there were 19,279 HAs, although data on targets and ideal population ratios were unavailable for the team to review.<sup>36</sup>

2. **Family Welfare Assistants:** FWAs were introduced in 1976 as a female-only cadre of CHWs employed by the DGFP, without input from the community, to provide FP services (pills, condoms, and injectable birth control) at the household level and later, at community clinics. They also assessed pregnant women's nutrition and provided deworming, iron, and folic acid supplementation as needed. They promoted immunization, antenatal care (ANC), postnatal care (PNC), and educated mothers about ORS.<sup>36</sup> FWAs were trained for 21 days, supervised by FP inspectors and sub-assistant community medical officers, and paid US\$98 per month as of 2013. In 2017 (after the case study period ended) there were 23,500 FWAs although data on targets and ideal population ratios were unavailable for the team to review.<sup>36</sup>
3. **Community-Based Skilled Birth Attendants:** In 2003, a third cadre of CHWs – community-based SBAs – was introduced to address low levels of skilled birth attendance. Under the management of the DGFP, they provided clean deliveries within the community, at households and later also at community clinics, referred complicated cases to health facilities, and provided PNC. They were selected from existing FWAs and HAs and supervised by the FP inspector. As of 2013, they were paid either US\$98 or US\$103 per month, depending on the roles they held previously – as FWAs or HAs, respectively (see Neonatal Interventions section). In 2011, coverage of community-based SBAs was low (45.6%) with only 6,155 of the planned 13,500 recruited.<sup>36</sup> Ongoing challenges with supervision and over-burdening of the community-based SBAs, which resulted in low levels of deliveries and ANC sessions provided by this cadre of CHWs, are discussed in the Neonatal Interventions section.
4. **Community Health Care Providers:** In 2011, following the 2009 re-introduction of community clinics by a new government regime, a fourth cadre of CHWs, the CHCPs, was introduced to meet the increased demand for primary care services created by the introduction of community clinics.<sup>35</sup> CHCPs were selected and managed by the DGHS and provided ANC and PNC, treatment for childhood illnesses (CB-IMCI), FP, nutrition, and immunization services. Very few CHCPs were also trained to perform deliveries although data on reach were unavailable for the team to review. CHWs were trained for 12 weeks and supervised by health inspectors and assistant health inspectors. As of 2013, they were paid US\$110 per month. Research conducted in 2017, after the case study period ended, found high coverage (101%) of CHCPs with 13,622 of them recruited – more than the 13,500 required for there to be one per community clinic.

Over the years, Bangladesh also leveraged NGO CHWs, for example for the implementation of U5M reduction EBIs (see EBI section). They were largely Bangladesh Rural Advancement Committee (BRAC) CHWs; some cadres were not continued throughout the case study period.

1. **Oral Rehydration Workers:** Oral rehydration workers (ORWs) were a female-only cadre of CHWs introduced in 1979 for the implementation of the BRAC ORT program. They were trained for five days and paid based on performance such as the number of households visited. This cadre of CHWs was discontinued at the end of the National Oral Rehydration Project (NORP) in 1984.



2. **Shasthya Shebika:** This cadre of female-only CHWs was introduced in 1972 by BRAC. Their roles evolved between 1972 and 2000 and during the case study period but included providing basic health care services such as registering pregnancies, conducting normal delivery, providing FP commodities, referral for vaccination and essential newborn care, identifying patients with tuberculosis, and treating common illnesses such as fever, cold, anemia, peptic ulcer, diarrhea, amoebic dysentery, scabies, and pneumonia. They were trained for 15-20 days and provided a performance-based incentive of loans to establish revolving funds, which they used to make money by selling products at a marked-up price, for profit. Notably, Shasthya Shebikas were involved in implementing Bangladesh's ITN and IRS programs (see ITN section). In 2011, there were 91,000 Shasthya Shebikas, although data on targets and ideal population ratios were unavailable for the team to review.<sup>36</sup>
3. **Shasthya Kormi:** This mixed cadre of CHWs was introduced in 2005 by BRAC to supervise shasthya shebikas and conduct health education sessions within the community, ANC, PNC, assisting deliveries, providing essential newborn care including special care for low birth weight (LBW) babies, community-based management of acute malnutrition, management of diarrhea and ARIs, tuberculosis treatment, and immunization. They were trained for three to four weeks, and were provided a monthly salary of US\$50 in addition to performance-based incentives like the shasthya shebika. According to research conducted in 2018, after the study period ended, there were approximately 4,200 shasthya kormis (SKs). Data on targets and ideal population ratios were unavailable for the team to review.<sup>37</sup>
4. **Community Nutrition Promoter and Supervisors:** These were a cadre of female-only CHWs recruited by a consortium of NGOs to implement the Bangladesh Integrated Nutrition Program (BINP) and National Nutrition Program (NNP). They were trained for 21 days and paid US\$21 per month. This cadre of CHWs was discontinued in 2011 when the NNP was integrated into the third SWAp – the Health, Population and Nutrition Sector Development Plan (HPNSDP). (See Malnutrition Interventions section for more information.)

Table 6 summarizes the roles of the different CHW cadres in Bangladesh through different time periods: before 1998, 1998-2001 (initial introduction of community clinics), 2002-2008 (closure of community clinics), and 2009 and afterwards (re-opening of community clinics).

*Table 6. A Summary of Government and NGO Community Health Worker Roles in Bangladesh through Critical Time Periods*

| CHW Cadre         | Before 1998   | 1998-2001   | 2002-2008   | 2009 and afterwards   |
|-------------------|---|---|---|---|
| Health Assistants | Household visits: conducting birth registrations for vaccination, vitamin A supplementation, health promotion activities and treatment of basic illnesses e.g. diarrhea, and referrals.<br><br>Outreach: organizing and mobilizing for expanded program on immunization (EPI) sessions. | DGFP and DGHS merged so in addition to tasks conducted pre-1998, HAs begun providing FP services along with FWAs. | CB-IMCI i.e. health promotion and referral (see CB-IMCI section for details) in addition to activities performed before 1998. | Same as 2002-2008; female HAs begun staying in community clinic 3 days in a week to support CHCPs.<br><br>Also conducted IRS. |



| CHW Cadre                       | Before 1998  | 1998-2001   | 2002-2008   | 2009 and afterwards  |
|---------------------------------|--|---|---|--|
| Family Welfare Assistants       | Household visits: listing of pregnant women, provision of contraceptive commodities, FP counseling, pregnant women's nutrition assessment and deworming, iron and folic acid (IFA) supplementation, health promotion focused on antenatal and PNC, immunization, and importance of ORS use.                | FWAs begun providing same services as HAs did before 1998, in addition to carrying out their own (pre-1998) role. | CB-IMCI i.e. health promotion and referral (see CB-IMCI section for details) and pre-1998 activities. | Same as 2002-2008 and began staying at the community clinic 3 days in a week to support CHCPs.   |
| Community (SBAs)                | Not Applicable (NA)  | NA  | ANC, skilled birth attendance (SBA), PNC and referrals through home visits.                           | ANC, SBA, PNC and referrals at community clinics.  |
| Community Health Care Providers | NA   | NA  | NA  | Based in community clinics and provided CB-IMCI, FP, ANC, PNC, nutrition and immunization services.<br>Note: some CHCPs were trained to provide delivery services. |
| Oral Rehydration Workers        | ORT for diarrhea   | NA  | NA  | NA   |
| Shasthya Shebika                | Registering pregnancies, conducting normal deliveries, providing FP commodities, referral for vaccination and essential newborn care, identifying patients with tuberculosis and treating common illnesses such as fever, cold, anemia, peptic ulcer, diarrhea, amoebic dysentery, scabies, and pneumonia. | Same  | Same as activities conducted pre-1998 in addition to implementing ITN program                         | Same as activities conducted pre-1998 in addition to implementing ITN and IRS programs.  |
| Shasthya Kormi                  | Conducting health education sessions within the community, ANC, PNC, assisting deliveries, providing essential newborn care including special care for LBW babies, community-based management of acute malnutrition, management of diarrhea and ARIs,  | Same  | Same  | Same   |

| CHW Cadre                                   | Before 1998   | 1998-2001 | 2002-2008 | 2009 and afterwards |
|---|---|-----------|-----------|---------------------|
|   | tuberculosis treatment, and immunization.                                     |           |           |                     |
| Community Nutrition Promoter and Supervisor | Implemented BINP and NNP (see Malnutrition Interventions section for details) | Same      | Same      | Same                |

## Health Management Information System and Other National Survey Data

### Data Availability

Bangladesh had a history of data production through surveys and health management information systems (HMIS). Surveys include DHS and the Multiple Indicator Cluster Survey (MICS) in 1993.<sup>38</sup> SPA and Health Facility Survey were also conducted in 2000 and 2014, respectively.

### Data Use

Although Bangladesh ensured data availability and surveys were used for designing, planning, implementing, monitoring, and evaluating specific EBIs before and during the case study period, broader value for data use for decision-making increased during the case study period because of donor priorities (see Cross-Cutting Contextual Factors section). Bangladesh introduced an electronic Health Information System (e-HIS) to synthesize public facility-level data in 2014 just before the case study period ended and set up an HMIS unit at the DGHS in June 2014. However, research conducted in 2016 assessing availability of electronic maternal, newborn, and child health data at the national level, found very low availability in Bangladesh with a score of one (compared to an average of 8.65) out of 15 possible points and Bangladesh scoring the lowest out of all 22 countries assessed.<sup>39</sup> Nonetheless, according to KIs, Bangladesh's continued investment in capacity-building for its newly introduced e-HIS, particularly for the newly set-up HMIS unit at the DGHS, reflected a commitment to improving data availability and quality. While data on the completeness and quality of Bangladesh's e-HIS was mostly unavailable for the team to review, a comprehensive national data dashboard accessible to the public and a 2016 study of data on "newborn death before discharge" found high quality and completeness, suggesting progress.<sup>39,40</sup>

Bangladesh also had disease-specific surveillance systems which it leveraged during the case study period for implementation of a number of EBIs including the pediatric bacterial meningitis and pneumococcal disease sentinel surveillance system at the MOHFW which was leveraged for monitoring pneumococcal vaccine (PCV) introduction (see EBI section).

### Health Financing

Between 2000-2015, Bangladesh's total health expenditure per capita increased from US\$8 in 2000 to US\$32 in 2015 (Figure 12).<sup>41</sup>



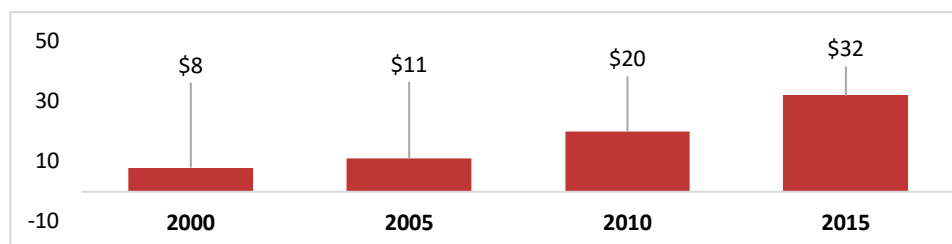


Figure 9. Bangladesh's Health Expenditure per Capita (US\$ million) (2000-2015) (Source: Knoema 2018)

## Government Funding for Health

Despite the increase in health expenditure, Bangladesh's actual all-cause government expenditure as a percentage of overall health expenditure remained low and decreased between 2000-2015, from 26% in 2000 to 21% in 2005, 20% in 2010, and 15% in 2015.<sup>42</sup> (See Cross-Cutting Contextual Factors section.) As noted, low levels of broader government funding remained a barrier to addressing the HRs for health challenge in Bangladesh.

## Donor Funding for Health

The proportion of all-cause development assistance for health, as a percentage of overall health expenditure, remained low and decreased between 2000-2015, from 14% in 2000 to 11% in 2005, 9% in 2010, and 8% in 2015.<sup>42</sup> KIs noted that with the introduction of the first SWAp in 1998, donor funding for health was mainly funneled through a broader health sector fund as opposed to funding for vertical programs (see Cross-Cutting Contextual Factors section).

## Out-Of-Pocket Expenditure for Health

In contrast to donor and government funding, the percentage of overall health expenditure which was covered by all-cause out-of-pocket (OOP) spending for health was high and continued to increase during the study period, from 58% in 2000 to 68% in 2010, and 74% in 2015.<sup>42</sup> Some of the high level of OOP spending reflected the challenges in setting up a health insurance system in Bangladesh. (See Cross-Cutting Contextual Factors section.) Bangladesh implemented some initiatives which were introduced to lower the OOP cost of health services including subsidization of outpatient visits, free provision of drugs on the essential drugs list, free hospitalizations for selected conditions, and provision of medical and surgical supplies. However, research conducted in 2015 found that it was still common for citizens to purchase items such as syringes, plaster, and intravenous fluids when they were unavailable at public health facilities.<sup>43</sup>

## Health Insurance

In Bangladesh, private organizations implemented community-based insurance programs. One such initiative was the Grameen Health Program implemented by the Grameen Bank in the 1990s. The Grameen Health Program provided a pre-paid health plan open to all households in communities around Dhaka to access curative, preventive, and promotional health services at specially built health centers called Grameen clinics. The program also provided referrals to government health facilities. By 2009, 48 Grameen clinics, including a pharmacy and laboratory as well as a satellite clinic for community health outreach and emergency services, had been established across Bangladesh. The clinics served a population of 50,000 people living 8 to 10 kilometers from the clinic.<sup>38</sup> Bangladesh had not implemented a national health insurance program by the end of the case study period.



In order to address this gap and high OOP expenses, in 2012 Bangladesh committed to achieving universal health coverage (UHC) by 2032, by exploring policy options to increase financial resources for health and expand coverage while improving service quality and availability and providing financial risk protection.<sup>44</sup> This commitment to UHC was reflected in the Health Care Financing Strategy (2012–2032) which emphasized pre-payment mechanisms for people in both formal and informal economic sectors. Taxes, social health insurance contributions, and community-based health insurance schemes were also recommended as part of the strategy.<sup>43</sup> The small-scale testing phase of the implementation of the health care financing strategy was planned for 2012–16, to focus on households below the poverty line, but implementation was delayed. KIs explained that this was due to changes of positions within the DGHS, changes of planned funding arrangements, delays in decisions regarding testing site selection, testing methodology, and overall program model.<sup>44</sup>

In 2017, after the case study period ended, research found that the testing phase was being implemented in three sub-districts in the form of a health financing scheme – Shasthyo Suroksha Karmasuchi – which provided an essential package of care for free, for basic services including vaccination, IMCI, and FP at government facilities. However, the research also identified broader challenges with achieving UHC including HR shortages, bureaucracy in the public financial management system, and the hard-to-reach geography of some areas. Further, there were specific issues around low acceptability of the scheme, with health workers reluctant to adopt the scheme’s treatment, referral, follow-up, or general service management protocols because these were different from what they were used to.<sup>45</sup> (See Cross-Cutting Contextual Factors.)

## Health Equity

Bangladesh was committed to equity, and a number of EBIs were initially implemented targeting areas most in need (see CB-IMCI for example). However, while the Composite Coverage Index used by Countdown 2030\* showed an overall increase in coverage of many of the key reproductive, maternal, newborn, and child health indicators, there was no major narrowing of the overall equity gap between 1993 and 2014 (Figure 13).<sup>46</sup> There was a narrowing of the equity gap with regards to vaccines, demand for FP satisfied with modern methods, and oral rehydration therapy between 1999–2011. Other areas showed persistent wide equity gaps, such as at least 4 visits of antenatal care (ANC4+) which in 2011 were 9% for the lowest quintile and 53% for the highest quintile, a gap of 44% (Figure 14). These coverage results were in contrast to the decline in U5M which benefited all wealth quintiles with a reduction in the equity gap (Figure 5). KIs suggested that this reduction in mortality inequity with more limited impact on coverage likely reflected the importance of pro-poor initiatives such as women’s empowerment and education as well as the wide coverage of important EBIs such as vaccination and strong focus on FP to reduce fertility rates (see Cross-Cutting Contextual Factors section).

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\* The Composite Coverage Index is widely used by the Countdown to 2030 initiative to track progress in coverage for reproductive, maternal, newborn, and child health, and represents a proxy for universal health coverage in this area and includes skilled birth attendant, early initiation of breastfeeding, family planning need satisfied etc. (Wehrmeister, Restrepo-Mendez et al. 2016)

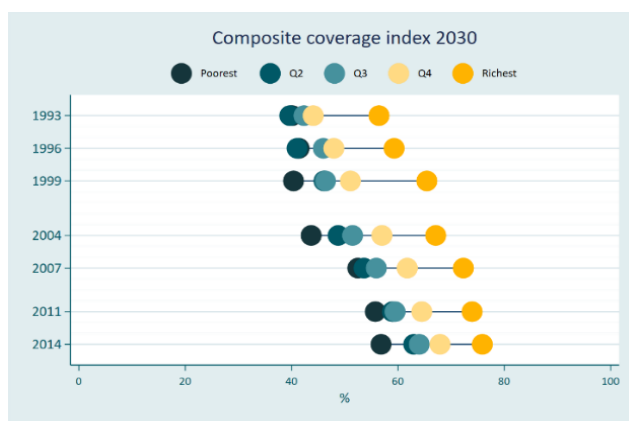


Figure 11. Composite Coverage Index in Bangladesh by Wealth and Year (Source: Victora et al, Countdown2030 Equity)

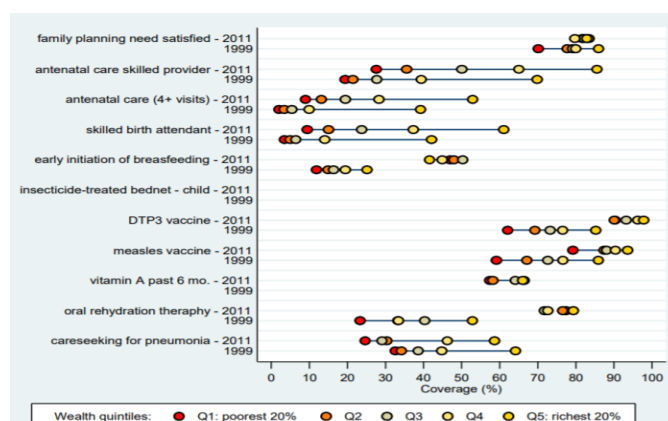


Figure 10. Bangladesh's Equity Profile: Coverage of Selected Under-5 Mortality Interventions (Source: Countdown2030 Equity Profile)

## Gender Equity

Bangladesh improved gender equity between 2000-2015. For example, the literacy rate for adult females increased from 40.8% in 2001 to 62.2% in 2015, slightly higher than the South Asia average of 61.2% and similar to adult male literacy rate of 68% in 2015. The proportion of females in the workforce increased from 26% in 2003 to 36% in 2016.<sup>47</sup> Despite these achievements, gender equity remained a challenge, with the country ranked 72 out of 144 in gender equity in the World Economic Forum's 2016 Global Gender Gap Report.<sup>48,49</sup> The Global Gender Gap Report assessed women's parity with men in economic opportunity, educational attainment, and political empowerment. (See the Cross-Cutting Contextual Factors section for details of initiatives introduced by Bangladesh to address gender inequity.)

### 3 METHODS FOR CASE STUDY

The methodology for this research was designed to generate new and actionable insights through applying implementation science methods to selected exemplar countries. This was done by identifying and evaluating the steps countries employed in deciding on the policies and EBIs to reduce U5M, their implementation strategies, and execution, as well as understanding the contextual factors which either obstructed or facilitated the implementation of these EBIs within these countries, between 2000-2016.

#### 3.1 Project Framework

Both the desk review and the primary research were informed by an implementation science framework designed specifically for this project. While it was often possible to identify policies and EBIs chosen by a country to reduce U5M, the key lessons in how these were chosen, adapted, implemented, and sustained were often missing from available published or gray literature. Because the same policies and interventions often produce different results in different countries, implementation science offered important tools for how to think more holistically about how and why countries were able to reduce U5M, and from where lessons in replication could be drawn. To guide the overall work, we developed a framework to understand the contribution of contextual factors and the different levels of actors involved: global, national, Ministry of Health (MOH), community, and individual. Our framework combined elements of existing frameworks: Aarons et al's Exploration, Preparation, Implementation, and Sustainment (EPIS);<sup>50</sup> Proctor et al's Implementation outcomes of Feasibility, Fidelity, Acceptability, Reach, and Effectiveness.<sup>51</sup> We also added a new step, Adaptation, to the EPIS framework. Further details can be found in Appendix A: Exemplars in Under-5 Mortality Project Methodology and Framework.

#### 3.2 Desk Review

In collaboration with UGHE and Gates Ventures, Evaluserve undertook an extensive review of available information and published data on the rates and progress of U5M in Bangladesh, including policies, strategies, EBIs available to potential exemplar countries, the uptake and implementation of these EBIs, and key global, national, MOH, community, and individual contextual factors. The literature review was done through MEDLINE (PubMed) and Google, using search terms such as “child mortality” or “under-5 mortality” and “Bangladesh.” Further searches included specific EBIs, CODs, or contextual factors as search terms (e.g. “insecticide-treated nets,” “malaria,” or “community health workers”).

The desk review was an iterative process, with ongoing additions occurring throughout the initial research and case study development processes as additional sources including published articles, reports, case studies, and policy and other country documents were identified. The desk review focused on the list of health systems delivered EBIs targeting amenable CODs (see Appendix). However, work was also done to explore important broad interventions that may have contributed to U5M reduction. These included education, poverty reduction, water and sanitation, and programs designed to improve nutritional status, and were reflected in the contextual factors section and in the synthesis to explore their contribution to the U5M and neonatal mortality reductions. Following this, the UGHE team supplemented the review to expand the capture of published literature and other documents relevant to the work.



### 3.3 Primary Research

In collaboration with our in-country partner, the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, we identified KIs reflecting a broad range of experience and viewpoints. KIs were chosen based on the topics identified in the desk review and through other analyses in close collaboration with the in-country partner, prioritizing KIs able to provide information on the Exploration, Preparation, Implementation, Adaptation, and Sustainment (EPIAS) stages during the period of study. KIs included current and former MOHFW employees responsible for high-level strategic direction of the ministry or specific disease or intervention areas; implementing partners; and other multilateral organizations or donor organizations who had managed partner-supported or partner-led activities. Some informants represented more than one area or role based on their experience over the 15 years and were interviewed for each of their multiple viewpoints. We prioritized individuals active in the study period but were able to also capture some experiences from before 2000 and after 2015.

Informed by the framework and review of relevant literature on contextual factors and implementation outcomes, we developed core interview guides for four main routes of inquiry.

1. Global and national level actors;
2. Ministry of Health and Family Welfare (MOHFW) actors;
3. Project managers and implementers for specific CODs or EBIs; and
4. Other partners

The interviews were designed to address the EBI implementation process, from exploration to preparation, implementation, adaptation, and sustainment. This included critical contextual factors at the relevant global, national, ministry, and local levels. The interviews also identified additional sources of data and information which could be added to the knowledge base and understanding already developed from the desk review. Interview guides were adapted from the core tools based on Bangladesh's context and translated to Bangla and interviews were conducted in Bangla or English depending on the linguistic comfort of the KIs.

All interviews were led by the project co-Principal Investigator (Lisa Hirschhorn) or UGHE Research Associate (Kelechi Udoh), with support from in-country lead (Dr. Fauzia Akhter Huda), Research Associate (Dr. Hassan Rushekh Mahmood), and Research Coordinator (Md. Omar Faruk) taking notes and operating recorders as needed. Following the close of the interviews, notes were combined and the tape recordings (if allowed) were used to clarify areas as needed. Recorded interviews were translated as needed, transcribed, and reviewed for quality and consistency by both icddr,b and UGHE teams.

### 3.4 Analysis and Synthesis

The UGHE team used a mixed methods explanatory approach, applying the framework to understand the progress, or lack thereof, for each cause of death (COD) and coverage of chosen EBIs, as well as facilitators and barriers at the local, national, and global levels. This approach was designed to understand what, how, and why the Government of Bangladesh was able to achieve success in decreasing U5M and what the challenges were. The analyses were also informed by work completed by other initiatives, including Countdown 2015, equity plots from the International Center for Equity in Health (Victora and team), and geospatial mapping from the Institute for Health Metrics and Evaluation (Simon Hays and team), among others.



KI interviews were coded by one of the researchers using the framework developed for the overall U5M Exemplar Project, to extract the EPIAS steps, implementation strategies, implementation outcomes, and contextual factors. One of the Principal Investigators reviewed the first six (one-third) coded transcripts, to assure the quality of the coding process, and a sample were co-coded with icddr,b team to ensure agreement. Disparities in codes and themes, and recommendations for adapting the coding process going forward, were then discussed with the researcher. Also, as emerging themes were identified, a priori codes for contextual factors and strategies were adapted and expanded.

### 3.5 Human Subjects Review

The work was approved by the Research Review Committee (RRC) and Ethical Review Committee (ERC) of icddr,b, Bangladesh. The ethics review committees of UGHE and Northwestern University also exempted the study. No quotes or specific viewpoints which were identifiable to the source were included without explicit permission. All recordings and interviews had names removed and were kept in password-protected computers and stored on a limited access Google Drive. All recordings were destroyed once the interview coding had been completed.

KIs were informed about the goals and structure of the project, and consent for participation and recording was obtained separately from the interview.

### 3.6 Key Informants

In total, 18 KIs were interviewed. Table 7 shows the number of KIs who spoke to contextual factors at the different levels – global, national (and MOH), and subnational (community and individual) – as well as the different CODs and neonatal periods of risk examined by this case study.

Table 7. Key Informants Interviewed

| Contextual Factors and Causes of Death |                                    | Number of KIs |
|--|------------------------------------|---------------|
| Contextual Factors                     | Global                             | 3             |
|  | National                           | 18            |
|  | Sub-National                       | 3             |
| Non-Neonatal Cause of Death            | LRIs                               | 8             |
|  | Diarrhea                           | 9             |
|  | Malaria                            | 5             |
|  | Measles                            | 7             |
|  | Malnutrition                       | 11            |
|  | HIV                                | 4             |
|  | Meningitis                         | 7             |
|  | Other vaccine preventable diseases | 8             |
|  | Vitamin A Deficiency               | 8             |
| Neonatal Periods of Risk               | Preconception                      | 6             |
|  | Antenatal                          | 8             |
|  | Intrapartum                        | 8             |
|  | Postnatal                          | 8             |





## 4 SPECIFIC CAUSES OF DEATH AND EVIDENCE-BASED INTERVENTIONS

Building from a global review of EBIs, we focused on EBIs which addressed specific and leading CODs for children under 5 (U5) in Bangladesh. See Appendix A for a complete list of U5M CODs and EBIs considered in this case study. Table 8 shows coverage of EBIs targeting common U5M CODs and prevalence of selected conditions between 2000-2016 from the DHS. EBIs which achieved coverage greater than 80% are highlighted in green and include vaccination EBIs for *Hemophilus influenzae b* (Hib) (as part of the Pentavalent vaccine) and measles as well as others such as ORT (either ORS or recommended home fluid- RHF). Other EBIs did not achieve as widespread coverage but did see increases, including ANC4+, facility-based delivery (FBD), and children taken to a health facility for ARI or diarrhea.

Table 8. Coverage of Selected EBIs in Bangladesh (Based on Available Nationally Representative Data) (1993-94 to 2014)9,52–58

| U5 Causes of Death           | Intervention  | 1993-1994 | 1996-1997 | 1999-2000 | 2004 | 2007 | 2011 | 2014 |
|------------------------------|---|-----------|-----------|-----------|------|------|------|------|
| Acute Respiratory Infections | Children with symptoms of ARI taken to health facility                          | 28%       | 36%       | 28%       | 23%  | 41%  | 40%  | 46%  |
|                              | Children with Symptoms of ARI who received antibiotics*                         |           |           |           |      |      | 73%  | 34%  |
|                              | Vaccination: Hib (as part of Pentavalent)                                       |           |           |           |      |      | 93%  | 91%  |
|                              | U5 with symptoms of ARI 2 weeks preceding survey                                |           | 13%       | 17%       | 19%  | 5%   | 6%   | 5%   |
| Diarrheal Diseases           | Oral Rehydration Therapy (Either ORS or RHF)                                    | 58%       | 62%       | 72%       | 75%  | 82%  | 78%  | 83%  |
|                              | Treatment of diarrhea with zinc supplements                                     |           |           |           |      | 23%  |      | 44%  |
|                              | Children with diarrhea taken to health facility                                 | 20%       | 26%       | 27%       | 18%  | 46%  | 28%  | 39%  |
|                              | U5 with diarrhea 2 weeks preceding survey                                       |           | 8%        | 6%        | 8%   | 10%  | 5%   | 6%   |
| Malaria**                    | Advice or treatment for fever sought from a health facility or provider         |           | 21%       | 25%       | 21%  | 25%  | 30%  | 35%  |
|                              | Treatment of children with fever by artemisinin-based combination therapy (ACT) |           |           |           |      |      | 1%   | 4%   |
|                              | U5 with fever – 2 weeks preceding survey  |           | 31%       | 37%       | 40%  | 38%  | 37%  | 37%  |
| Measles                      | Measles vaccination coverage  | 69%       | 70%       | 71%       | 76%  | 83%  | 88%  | 86%  |
| Malnutrition                 | Exclusive breastfeeding from 0-5 months   | 46%       | 45%       | 47%       |      | 50%  | 64%  | 55%  |
|                              | U5 receiving vitamin A supplements in the six months preceding survey           | 49%       | 67%       | 73%       | 82%  | 88%  | 60%  | 62%  |



|  |   |            |            |            |            |            |            |            |
|--|---|------------|------------|------------|------------|------------|------------|------------|
|  | U5 stunted  |            | 60%        | 51%        | 51%        | 43%        | 41%        | 36%        |
|  | U5 wasted   |            | 21%        | 12%        | 15%        | 17%        | 16%        | 14%        |
|  | U5 underweight  |            | 52%        | 42%        | 43%        | 41%        | 36%        | 33%        |
| <b>Other Vaccine Preventable Diseases</b>  | <b>Full vaccination coverage with 3 doses DPT, 3 doses polio, measles and BCG</b> | <b>59%</b> | <b>54%</b> | <b>60%</b> | <b>73%</b> | <b>82%</b> | <b>86%</b> | <b>84%</b> |
| Neonatal Causes of Death   | Total fertility rate (15-49)  | 3          | 3          | 3          | 3          | 3          | 2          | 2          |
|  | Teenagers who are pregnant with their first child                                 | 6%         | 5%         | 5%         | 5%         | 6%         | 6%         | 6%         |
|  | <b>Tetanus protection at birth</b>  |            |            |            |            | <b>88%</b> | <b>91%</b> |            |
|  | Antenatal care: 4+ visits   | 6%         | 7%         | 11%        | 17%        | 22%        | 26%        | 31%        |
|  | Delivery attended by skilled provider   | 9%         | 8%         | 12%        | 15%        | 21%        | 32%        | 42%        |
|  | Facility-based delivery   | 4%         | 5%         | 9%         | 12%        | 17%        | 29%        | 37%        |
|  | Delivery by Caesarean section   |            |            | 3%         | 5%         | 9%         | 17%        | 23%        |
|  | Newborn's 1st PNC in first two days after birth                                   |            |            |            |            |            | 39%        | 53%        |
|  | Doctor/nurse/midwife provided 1 <sup>st</sup> PNC                                 |            |            |            |            |            | 30%        | 32%        |
| <p>*The drop in % of children with symptoms of ARI who received antibiotics between 2011-2014 resulted from the difference in methodology used. The 2011 survey relied on just the mothers' report which likely resulted in an overestimation of the use of antibiotics, while in 2014, data collectors requested the name of the medicine or asked to see the pack for verification.</p> <p>** *Data not available for children with diagnosed malaria. Nationally representative data not available for proportion of children under 5 who slept under ITN night prior to the DHS survey and household ownership of ITN.</p> <p>Note: Nationally representative data not available for HIV counseling during ANC and HIV-testing during ANC or labor and results received.</p> |   |            |            |            |            |            |            |            |

## 4.1 Malaria, Diarrhea, and Pneumonia

According to estimates by IHME, these three diseases –pneumonia, diarrhea, and malaria – accounted for approximately 30% of all U5 deaths in 2000, with lower respiratory infections causing the greatest burden (23% of all deaths), followed by diarrhea (6.9%), and a much smaller fraction from malaria (0.001%).<sup>24</sup> There were a number of EBLs which targeted malaria, diarrhea, and pneumonia in children under 5 in Bangladesh and reflecting the national embrace of Integrated Management of Childhood Illness (IMCI), these are considered together. Across the three conditions, care-seeking by caregivers between 1999-2000 and 2014 remained low at 46% or less. For prevention-based interventions, there were some successes including uptake of preventive measures for malaria, such as ITNs, with the proportion of children under 5 sleeping under a long-lasting insecticidal net (LLIN) or other ITN in the malaria endemic areas targeted for interventions at 92% in the southeast and 87% in the northeast between 2008-2011. The introduction of PCV in 2015 was also a success for prevention of respiratory infections, with high coverage achieved and maintained: 97% by 2016 and 2017. In addition, rates of these conditions reported by caregivers in the two weeks preceding the DHS survey dropped for ARI (17% in 2000, 5% in 2007 and 2014), remaining largely the same for diarrhea (6% in 2000, peaking at 10% in 2007, and dropping back to 6% in 2014) and fever (37% in 2000, 38% in 2007, and 37% in 2014).<sup>52</sup>



### 4.1.1 Facility-Based Integrated Management of Childhood Illness (FB-IMCI)

Table 9. Key Facility-Based IMCI Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"><li>• National leadership and accountability</li><li>• Community engagement</li><li>• Stakeholder engagement</li><li>• Leveraging or strengthening existing system; includes integration<ul style="list-style-type: none"><li>◦ Care delivery</li><li>◦ Data systems strengthening</li></ul></li><li>• Development of protocols and guidelines including adaptation of global guidelines for use in local context</li><li>• Training (TOT)</li><li>• Leveraging partner support for implementation and expertise</li><li>• Leveraging donor support</li><li>• Phased scale-up</li><li>• Rapid scale-up</li><li>• Focus on equity</li><li>• Small-scale testing</li><li>• Data use for decision-making<ul style="list-style-type: none"><li>◦ Data use to understand disease burden</li><li>◦ Monitoring and evaluation</li></ul></li></ul> |

#### EXPLORATION

Bangladesh introduced the Control of Diarrhea Diseases (CDD) program in 1989 to consolidate diarrhea control activities nationwide. The CDD focused on strengthening all cadres of health workers' skills in diarrheal management at facility and community-levels of care (see Other Diarrhea Interventions section for details). By 1991, Bangladesh also began an ARI program based on WHO recommendations which developed and implemented national health worker guidelines for the diagnosis and management of ARI at facility and community levels of care. (See also Community-Based IMCI section.) According to KIs, the introduction of both the CDD and ARI programs reflected the burden of diarrhea and ARI in Bangladesh with the incidence of diarrhea in children at 40% in 1986, just before the introduction of CDD, and 14% of all U5 deaths in 1990, just after the CDD program began, attributable to diarrhea. Similarly, 21% of all U5 deaths in 1990 were attributable to lower respiratory infections, just before the ARI program was introduced.<sup>24,52</sup> ARI incidence data before 1990 were unavailable for the team to review.

In 1995, WHO and United Nations Children's Fund (UNICEF) developed the IMCI strategy to guide the prevention and treatment of the most common childhood illnesses including diarrhea, pneumonia, and malaria.<sup>59</sup> IMCI focuses on improving health providers' abilities to diagnose and treat the common illnesses in high child mortality countries (including ARI, diarrhea, and malaria) and improving family and community health behaviors through integrating health education.

Following WHO and UNICEF's recommendations and recognizing the need for an integrated approach, Bangladesh decided in 1995 to implement FB-IMCI. A KI explaining the rationale for Bangladesh's adoption of the



IMCI strategy said, “We can say the decision to start IMCI was because WHO brought the strategy but it’s not [just] WHO, [the] government thought, so, we have reduced the mortality with CDD and ARI, okay but you know, IMCI is a holistic approach, because the same patient may be suffering from diarrhea or pneumonia or both or malnutrition. So, [the] government thought we don’t need a vertical program, it should be the combination and so they took the IMCI.”

## **PREPARATION**

Preparations for implementing FB-IMCI began in 1998 and a national steering committee under the leadership of the deputy program manager of the CDD program was set up.<sup>60</sup> The steering committee also included the program managers of the CDD and ARI programs as well as national professional societies and groups including the Bangladesh Pediatric Association (BPA), Bangladesh Neonatal Forum (BNF), and donors and implementing partners such as WHO and UNICEF. A KI explained the importance of engaging stakeholders, especially the BPA and BNF, for ensuring acceptability and sustainability, saying, “For the IMCI, we said: yes, you the experts, you the pediatricians, you the professional bodies please help us. Meanwhile, along with them we continuously started sitting together... They are coming in contact with the parents and children so their participation is very important because unless the professional bodies are coming (together) to bring this program forward... without their help, you cannot sustain.”

To make sure Bangladesh’s IMCI program was appropriate for its context, it was designed to include the three main CODs for U5s: respiratory infections, diarrhea, and malnutrition (which jointly accounted for 39% of U5 deaths in Bangladesh in 1990), in addition to ear problems such as otitis media based on recommendations by BPA, and malaria because of malaria endemic areas (see Other Malaria Interventions section).<sup>24</sup> When a KI was asked why ear problems were included the IMCI program, they said: “...the interventions included depended upon the mortality but in our country many pediatricians told us that because many children have otitis media and many children even died... so, we took the ear problem as well.”

During the preparation stage, Bangladesh also leveraged WHO and existing program (CDD, ARI, malnutrition, and malaria) protocols and guidelines. These included integrating CDD and ARI into FB-IMCI and components of existing programs for malnutrition, such as growth monitoring, and malaria, such as testing and treatment. According to KIs, this was important because the existing programs’ protocols and guidelines had already been adapted to Bangladesh’s context. As one KI explained, “We had a committee...and included different expert people. So, for the nutrition part, for example, [although] there was generic [WHO recommendations] ...we also had some county context. So, we adopted the existing guides in nutrition like how much of the breastfeeding, how many times, when the complementary feeding should start and what to feed. So, that was all included in our IMCI protocol.”

Another example of an adaptation made to the generic IMCI strategy to ensure appropriateness was Bangladesh’s early focus on the neonatal period and decision to set the lower age limit for FB-IMCI at 24 hours as opposed to seven days as recommended by WHO and UNICEF.<sup>61</sup> A KI explained that “Initially, WHO said IMCI starts after seven days... it was originally WHO guideline but we did some changes because the [under 5] mortality rate was significantly contributed by neonatal mortality in this country, so, we wanted to give more coverage to neonatal care.”



Preparations also included the development of training materials, FB-IMCI case recording forms, and the establishment of an IMCI program unit within the DGHS at the MOHFW, reflecting Bangladesh's early focus on sustainability. The HMIS was also adapted to reflect the FB-IMCI program, including indicators such as "severity of pneumonia" based on WHO classification criteria. The HMIS did not include quality of FB-IMCI delivery indicators.

## IMPLEMENTATION

In 2001, with financial and technical support from WHO and UNICEF, and technical support from icddr,b, implementation of FB-IMCI began with small-scale testing as part of a multi-country evaluation of the IMCI strategy in five countries – Uganda, Brazil, Tanzania, Peru, and Bangladesh. The aim was to identify its feasibility and effectiveness before scaling up as well as contribute to the evidence base for IMCI globally.<sup>62</sup> The testing phase for FB-IMCI was implemented in 20 union sub-centers in Matlab (a sub-district in the Chittagong division) including 10 treatment and 10 control sub-centers. Matlab was selected as the site for the testing phase because of icddr,b, the in-country evaluation lead's, established presence in the sub-district. By 2002, the testing phase was expanded to include two other sub-districts in different divisions, to allow for comparison with Matlab. The two sub-districts selected were Dhamrai, a sub-district with high U5M in the Dhaka division, and Kahaloo, a hard-to-reach sub-district with high U5M in the Rajshahi division, for comparison to Dhaka.

Surveys were conducted at six-month intervals between 2002-2004 to assess the small-scale testing phase of FB-IMCI. These surveys found that 94% of health workers in facilities implementing the FB-IMCI strategy had received training on the FB-IMCI protocol and approximately two-thirds of these facilities had received supervisory visits.<sup>63</sup>

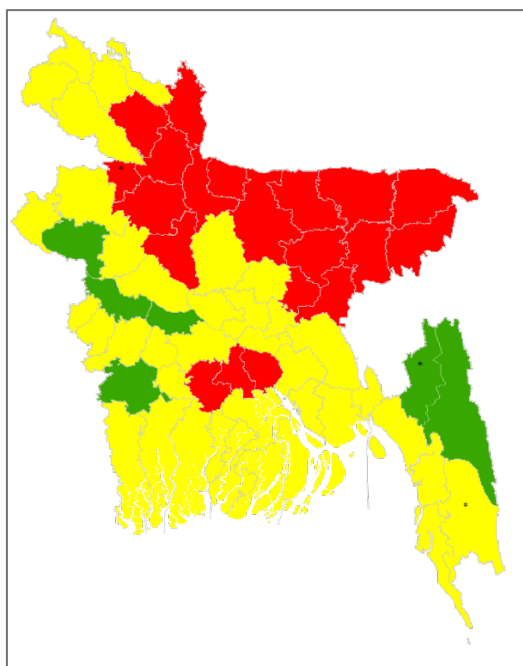


Figure 12. Map of Bangladesh Showing Pattern of Scale Up- From High U5M Districts (Red), Medium U5M Districts (Yellow), and Low U5M Districts (Green) (Arifeen, 2019)

The surveys also found an increase in quality of care and facility use in FB-IMCI-implementing facilities. On a scale of 0-100, facilities implementing FB-IMCI scored an average of 54 for correct treatment of childhood illnesses, including treatment of pneumonia with the recommended antibiotics, compared to an average score of 9 in the 10 control sub-centers. Use of FB-IMCI facilities also increased from 0.6 visits per child per year in 2002 to 1.9 visits per child per year, in 2004.

Bangladesh also conducted a cost-effectiveness study to identify the recurrent cost implications of adopting and scaling up IMCI, both FB-IMCI and CB-IMCI, and found that it could save the country approximately US\$7 million on costs of medicines.<sup>64</sup>

Based on the study results, the national steering committee developed a plan for a phased national scale-up of the FB-IMCI program beginning with districts with the highest U5M rates (shaded red in Figure 15 and with U5M ranging between 114-163 per 1,000 live births, according to the 2001 Bangladesh Maternal Mortality Survey)<sup>65</sup> followed by districts with medium U5M rates

(shaded yellow and with U5M ranging between 77-113 per 1,000 live births), and those with the lowest U5M rates (shaded green and with U5M ranging between 36-76 per 1,000 live births). According to KIs, a phased scale-up plan was important because financial resources were limited. By December 2004, as planned, FB-IMCI was scaled up to 48 new sub-districts (out of 490) prioritized because of their relatively higher U5M. In the same year, the IMCI program was included in the Health, Nutrition and Population Sector Program – Bangladesh’s second SWAp, again reflecting Bangladesh’s focus on sustainability.<sup>66</sup>

According to KIs, scale-up of FB-IMCI included WHO- and icddr,b-conducted cascade trainings starting with 11-day trainings for doctors at tertiary and national hospitals beginning with the Dhaka medical college, who then trained nurses at the tertiary level and doctors, nurses, sub-assistant community medical officers, and family welfare visitors at division, district, sub-district, and union levels. To ensure feasibility of reaching all targeted health facility personnel, FB-IMCI training centers were also established in divisional medical colleges. In describing the process of expansion, a KI explained, *“first we brought the professors and associate professors and other staff from the divisional medical colleges to [Dhaka] and they got the 11 days training on the IMCI protocol. After that, they came for five days TOT and then they went back and they started their training facility in their division – Rajshashi, Rangpur, Barisal, Chittagong, Mymensing [the divisions with medical colleges at the time]. This way, we scaled up the training centers.”* KIs also mentioned that supervision visits funded by UNICEF were a key component of the initial implementation of FB-IMCI in Bangladesh. *“Providers receive[d] training, [went] back to their facility and implemented there, and then within one month that facility would be visited to make sure that [they were] able to implement IMCI properly.”* These supervision visits were implemented, using checklists developed by WHO, by DGHS medical officers at district and sub-district levels as well as medical officers of the DGFP at sub-district level. These medical officers from both directorates were trained by master trainers at central level, including the deputy program manager and medical officers in the IMCI program unit and selected icddr,b staff. The master trainers were trained by WHO.

Facility readiness for providing FB-IMCI was evaluated using health facility survey data while DHS data was used to track incidence and care-seeking rates for illnesses covered by the FB-IMCI program. SPA 2000 data showed that 70% of health workers at the facilities were trained in ARI management and 71% and 88% of facilities had ORS for diarrhea and cotrimoxazole for pneumonia treatment. However, over time some of these indicators declined. In 2014, although approximately 80% of surveyed facilities had ORS and amoxicillin, facilities showed low overall IMCI readiness. Only half of facilities surveyed had IMCI guidelines or at least one health worker who had ever received in-service IMCI training.

Rates of diarrhea, ARI, and fever reported by caregivers in the two weeks preceding the DHS survey was 8%, 13%, and 31%, respectively, in 1996-97 just before FB-IMCI was introduced.<sup>52</sup> Although this rate dropped for ARI (17% in 2000, 5% in 2007 and 2014, unlikely due to PCV which was only introduced in 2015), diarrhea (6% in 2000, peaking at 10% in 2007, and dropping back to 6% in 2014) and fever (37% in 2000, 38% in 2007, and 37% in 2014) remained largely the same despite implementation of water, sanitation, and hygiene (WASH) and malaria prevention programs.<sup>52</sup>

Despite careful planning and implementation of FB-IMCI, care-seeking behavior for diarrhea, ARI, and fever remained generally low, with the percentage of children with diarrhea taken to a health facility at 26% in 1996-97 (just before the introduction of IMCI), 27% in 2000, and 39% in 2014. There was also minimal change for fever



(from health facilities or other provider, 21% in 1996-97, 25% in 2000, and 35% in 2014) and respiratory infections (from health facilities, 36% to 46% between 1996-97 and 2014).<sup>52</sup> The low rates of care-seeking at health facilities for diarrhea and respiratory infections might have been a result of the introduction of CB-IMCI and consequent care-seeking from CHWs as opposed to health facilities.

KIs noted that quality of care was not routinely assessed as part of ongoing implementation of FB-IMCI. They also mentioned that supervision visits became infrequent after the multi-country evaluation and initial implementation of FB-IMCI had been completed.

### **ADAPTATION DURING IMPLEMENTATION**

A number of adaptations were made, largely reflecting international recommendations and advances in available technology. At the beginning of the FB-IMCI program, global and country-led surveillance studies had begun to identify increasing resistance to Chloroquine. As a result, the recommended treatment for malaria in Bangladesh was changed to ACT in 2004, based on WHO's recommendations.<sup>67</sup>

However, KIs noted that although Bangladesh had officially adopted ACT as the standard of treatment, actual implementation was delayed by three years because of unavailability of funds. As one KI explained, *"at that time, cost and things were high, so we couldn't afford to do it. 2004 we put it in the paper, in the documents but...it was very expensive. In a real sense, it started much later."* By 2007, Global Fund began providing support to Bangladesh for the scale-up of malaria interventions and Bangladesh rolled out ACT for malaria treatment nationwide.<sup>68</sup> (See Other Malaria Interventions section.)

In 2006, based on WHO recommendations, national IMCI guidelines were revised to include zinc treatment for diarrhea.<sup>69</sup>

Prior to 2007, the FB-IMCI program employed facility-based microscopy for the diagnosis of malaria. In 2007, with Global Fund's support, Bangladesh decided to introduce rapid diagnostic tests (RDTs) for malaria diagnosis in malaria endemic areas – three years before WHO recommendations in 2010. A KI explained that this decision to adopt RDTs early was mainly based on the ease of RDT use, compared to microscopy: *"You know where you going to have a microscope, you have to have it clean. I won't say always in hospital but a house, room, with enough lighting... so, you can put the microscope there, otherwise keeping it just outside you cannot do it. But RDT is different."*

Preparations for introducing RDTs began with community engagement to create awareness as well as the development of training guidelines and RDT use protocols. With financial and technical support from Global Fund, RDTs were introduced in 2007 and facility-level health care workers were trained on the RDT use protocol. Bangladesh's implementation of RDTs reflected a balance of the need for local evidence with the strength of existing global evidence, where appropriate. For example, when a KI was asked why the RDTs were not piloted before full implementation, they said: *"I would say it was rolled out because the money from Global Fund came and it was well established globally that this is well accepted. So, it didn't have to be piloted."*





Initially, Plasmodium falciparum-specific RDT was used based on data that showed that 85% of malaria cases in Bangladesh resulted from Plasmodium falciparum. However, in 2014, Pan-RDT was introduced to ensure diagnosis of other cases of malaria including those caused by Plasmodium vivax which had been underdiagnosed with the use of Plasmodium falciparum-specific RDT.<sup>68</sup> Further, the RDT-use protocol included testing all fever cases and treating malaria-positive cases with ACT (test-to-treat), for free, in malaria endemic areas, initially. However, in 2015, Bangladesh adopted a pre-elimination strategy which involved active testing, diagnosis, treatment, and tracking of all malaria cases, in order to achieve a malaria-free Bangladesh by 2030. As a result, RDTs were rolled out nationwide with support from Global Fund. Nonetheless, according to KIs, to keep the cost low, only fever cases with no other possible causes were tested with RDTs: *“In [endemic areas] I would say we go for any fever case... But in the plain land [low endemic areas], you have to exclude other causes, you have to take the history, you have to know if somebody is coughing, know history of traveling, obviously in that case we won’t waste our RDTs.”* Between 2007-2015, over 2 million RDTs were conducted.

Following the introduction of RDTs in 2007 among children under 5 with fever, the proportion of children who took ACT increased from 1% in 2011 to 4% in 2014. This suggested an increase in malaria diagnosis and treatment as a result of RDT introduction, while still remaining low.

Other adaptations to FB-IMCI included the integration of IMCI strategy into the doctors’ undergraduate training curriculum in 2009 to increase sustainability. This work was led by a consultant at icddr,b with support from professional bodies such as the BPA and the Bangladesh Medical and Dental Council.<sup>70</sup> According to a KI, Bangladesh made this decision because *“whenever we brought the doctors for training for a period of 11 days, they were absent from their original place of work and this caused severe disruption of the continuity of the service to be given there. It was also a huge expenditure, so far as the traveling and accommodation. So, considering everything ...we decided to incorporate this program into our medical curriculum, so our future doctors will be oriented.”* As a result of this integration, in-service training for doctors on the IMCI strategy was reduced to eight days with plans as of 2017 to include the IMCI strategy in nurses’ and sub-assistant community medical officers’ undergraduate and pre-service training curricula.

Finally, at the start of FB-IMCI in Bangladesh, first-line pneumonia treatment was cotrimoxazole. However, that was changed to amoxicillin in 2014 based on WHO recommendations due to rising rates of resistance.

As of 2016, data from the IMCI program unit of the DGHS showed that national scale was very close but not achieved with FB-IMCI implemented in 483/490 sub-districts (98%) across 64 districts. However, KIs explained that the seven districts which appeared to be missed was because some sub-districts did not have an upazila health complex or union-level health facility, the lowest level of facility-based care.

Table 10. FB-IMCI implementation outcomes

| Implementation Outcomes | Implementation Strategy   | Evidence  |
|-------------------------|---|---|
| Appropriateness         | Data use to understand disease burden: setting the lower age limit for FB-IMCI at 24 hours as opposed to 7 days as recommended by WHO and | (+): Rates of diarrhea, ARI, and fever reported by caregivers in the 2 weeks preceding the DHS survey were 8%, 13%, and 31%, respectively, in 1996-97 just before FB-IMCI was introduced. <sup>52</sup> |



| Implementation Outcomes | Implementation Strategy  | Evidence   |
|-------------------------|--|--|
|                         | UNICEF and FB-IMCI focus on diarrhea, malnutrition, ARI.   | <p>(+): Bangladesh's IMCI was designed to include the 3 main CODs for U5s, respiratory infections, diarrhea, and malnutrition in 1990.</p> <p>(+): Ear problems were included as part of FB-IMCI. One KI explained, "pediatricians told us that because many children have otitis media and many children even died... we took the ear problem as well."</p> <p>(+): See neonatal interventions section for high neonatal mortality rates (NMRs) before the FB-IMCI was introduced.</p> <p>(+): A KI mentioned that FB-IMCI introduction reflected Bangladesh's need for an integrated approach to addressing health issues of U5s.</p>  |
| Acceptability           | <p>Stakeholder engagement: steering committee (ARI and CDD program, donors, partners, BPA, BNF)</p> <p>Adaptation of global guidelines for local context</p> <p>Community engagement</p>   | <p>(+/-): While still low, care-seeking behavior increased for diarrhea, ARI, and fever. The percentage of children with diarrhea taken to a health facility was 26% in 1996-97 (just prior to introduction of FB-IMCI), 27% in 2000, and 39% in 2014. Fever care-seeking from health facilities or other provider rose from 21% in 1996-97 to 25% in 2000 and 35% in 2014; and respiratory infections (from health facilities, 36% to 46% between 1996-97 and 2014).<sup>52</sup></p> <p>The low rates of care-seeking at health facilities (for diarrhea and respiratory infections) might result from the introduction of CB-IMCI and consequent care-seeking from CHWs. Data on care-seeking for malnutrition were unavailable for the team to review.</p> |
| Feasibility             | <p>National leadership and accountability: steering committee</p> <p>Leveraging existing systems: ARI, CDD, malaria, and malnutrition program protocols and guidelines</p> <p>Leveraging donor support: Global Fund, WHO and UNICEF</p> <p>Leveraging partner support: Global Fund, WHO, icddr,b and UNICEF for trainings and developing training guidelines</p> | <p>(+): FB-IMCI and rolled out and reached very high coverage.</p>   |

| Implementation Outcomes            | Implementation Strategy  | Evidence   |
|------------------------------------|--|--|
|                                    | <p>Phased scale-up</p> <p>Small-scale testing including selection of sub-districts for assessing feasibility</p> <p>Data use for decision-making e.g. establishing divisional training centers, decrease in duration of training for doctors to 8 days</p>   |  |
| Effectiveness and coverage (reach) | <p>Small-scale testing including selection of sub-districts for assessing effectiveness</p> <p>Data use for decision-making: initial introduction of Plasmodium falciparum-specific RDT</p> <p>Phased scale-up</p> <p>Rapid scale-up of RDTs</p> <p>Data use for adaptation: switch to ACT; first line pneumonia treatment switch from cotrimoxazole to amoxicillin; IMCI program renamed NNHP-IMCI reflecting a new focus on the first 24 hours of the neonatal period; national IMCI guidelines revised to include zinc treatment for diarrhea; introduction of Pan-RDT.</p> | <p>(+): ORT coverage increased from 75% in 2004 to 83% by 2014 (See ORT section).</p> <p>(+/-): Rates of diarrhea, ARI, and fever reported by caregivers in the 2 weeks preceding the DHS survey was 8%, 13% and 31%, respectively, in 1996/7 just before FB-IMCI was introduced<sup>1</sup>. Although this rate dropped for children with ARI (17% in 2000, 5% in 2007 and 2014), rates for diarrhea (6% in 2000, peaking at 10% in 2007 and dropping back to 6% in 2014) or fever (37% in 2000, 38% in 2007 and 37% in 2014) in the 2 weeks before DHS remained largely the same<sup>2</sup>.</p> <p>(+/-): By 2016, per IHME, the proportion of deaths attributable to diarrhea, malnutrition and lower respiratory infections had decreased 95%, 86% and 83% respectively from 1990 figures<sup>3</sup>. Given the small increase in accessing treatment for these conditions at facilities and relatively unchanged incidence of fever and diarrhea, these drops in U5 deaths likely reflected a small contribution from FB-IMCI, with other contributions likely from treatment through CB-IMCI as well as potentially increased health status of the U5 (ex. better nutrition) which reduced the risk of mortality when these conditions occurred.</p> <p>(+): As of 2016, almost complete national scale was achieved.</p> |

<sup>1</sup> STAT Compiler (Accessed 24th August, 2018)

<sup>2</sup> STAT Compiler (Accessed 24th August, 2018)

<sup>3</sup> IHME | GBD Results tool. <http://ghdx.healthdata.org/gbd-results-tool>. Accessed July 31, 2018.

| Implementation Outcomes | Implementation Strategy  | Evidence   |
|-------------------------|--|--|
|                         |  | <p>(+/-): Following the introduction of RDTs in 2007, among under-five children with fever, the proportion of children who took ACT increased from 1% in 2011 to 4% in 2014. This suggested a small increase in malaria diagnosis (and treatment) as a result of RDT introduction.</p> <p><i>See also Neonatal, Malnutrition and Other Malaria Interventions section.</i></p>  |
| Fidelity                | <p>Training (TOT)</p> <p>Supervision</p> <p>Monitoring and evaluation</p> <p>Development of protocols and guidelines</p>   | <p>(-): Although approximately 80% of surveyed facilities had ORS and amoxicillin for diarrhea and ARI treatments, respectively, in 2014, overall facilities showed low IMCI readiness in other areas. Only half of facilities (50%) surveyed had IMCI guidelines or at least 1 health worker who had ever received in-service IMCI training (Health facility survey).</p> <p>(-): Infrequent supervisions</p> <p>Data assessing the quality of FB-IMCI delivery was not found because HMIS did not include quality indicators and no observations were included in the 2014 health facility survey.</p> |
| Cost                    | Limited testing with RDTs in low endemic areas   | Not found  |
| Sustainability          | Integration into systems   | <p>(+): Establishing IMCI program unit at MOHFW</p> <p>(+): The IMCI program was included in the Health, Nutrition and Population Sector Program – Bangladesh's 2<sup>nd</sup> SWAp.</p> <p>(+): IMCI strategy Integrated into doctors' undergraduate training curriculum in 2009; plans to include IMCI strategy in nurses' and sub-assistant community medical officers' undergraduate and pre-service training curricula (as of 2017).</p> <p>(+): Components of IMCI (ex. presence of danger signs) was integrated into the HMIS.</p> <p>(+): Increase in budget for IMCI.</p>                       |
| Equity                  | Focus on equity: small-scale testing in hard-to-reach sub-districts and sub-districts with high U5M, prioritizing high U5M sub-districts. Free test and treatment with RDTs and ACTs focused initially on endemic areas. | <p>(-): Equity plots in Figures 15, 16, and 17 show persistent gaps in care-seeking rates for pneumonia, diarrhea, and fever among different wealth quintiles.</p> <p>See CB-IMCI section.</p>   |

## **SUSTAINMENT**

In 2015, UNICEF and WHO ended their financial support for FB-IMCI and the Government of Bangladesh increased its budget allocation for IMCI implementation, to account for the loss of donor funding and ensure sustainability of the program.

In 2017 after the case study period ended, the IMCI program was renamed the National Newborn Health Programme (NNHP)-IMCI reflecting a new focus on the first 24 hours of the neonatal period in the FB-IMCI component. According to a KI, this decision was made because *“we found out that more of the under 5 deaths was due to newborn, mostly in the first 24 hours of life...and although we were focusing on newborns, perhaps it was not adequate. We thought, what is our success story? One of the best success stories is the immunization program which is successful because it is a program. If EPI would not be there, it would be just a routine immunization system in the government and would not draw that attention of the policymakers and others. So we thought we should also make a kind of program like that.”* As part of this integration, Bangladesh added neonatal resuscitation to its original FB-IMCI program because, as a KI mentioned, *“most of the neonatal component, particularly addressing sick newborn, were in the original IMCI. Only thing that was left behind was the resuscitation, immediately after birth. All the parameters to identify sick newborns were there as part of IMCI... [but] much of the neonatal deaths is due to asphyxia, so proper resuscitation immediately after birth was needed.”* (See Neonatal Interventions section for details of the neonatal resuscitation EBI – HBB initiative – which began in 2010.)

### **4.1.2 Community-Based Integrated Management of Childhood Illness**

Table 11. Community-Based IMCI Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"><li>• National leadership and accountability</li><li>• Stakeholder engagement</li><li>• Community engagement</li><li>• Leveraging, strengthening and integration into existing systems<ul style="list-style-type: none"><li>◦ Data systems strengthening</li></ul></li><li>• Training (TOT)</li><li>• Leveraging partner support</li><li>• Leveraging donor support</li><li>• Phased scale-up</li><li>• Focus on equity</li><li>• Small-scale testing</li><li>• Data use for decision-making<ul style="list-style-type: none"><li>◦ Data use to understand disease burden</li><li>◦ Monitoring and evaluation</li><li>◦ Data use for adaptation</li></ul></li><li>• Community-based delivery<ul style="list-style-type: none"><li>◦ Fixed-site community-based delivery</li><li>◦ Door-to-door</li></ul></li></ul> |
| See FB-IMCI  |

## **EXPLORATION**

When Bangladesh decided to implement FB-IMCI, a CB-IMCI strategy was not yet developed by WHO and UNICEF. However, according to KIs, Bangladesh decided to implement the IMCI strategy at the community level because of a recognized need to integrate under 5 care at the community level in order to improve care-seeking behavior for children under 5, given that most care was being sought at the community level. As a result, Bangladesh decided to develop and assess a community-based IMCI program which was later adopted and adapted by WHO in 2004. As a KI explained, *“When the multi-country evaluation was started, community IMCI was totally missing at that time, WHO [did not have] such strategy... community IMCI strategy document was developed by Bangladesh which later contributed in developing the globally strategy.”*

## **PREPARATION**

Preparations for CB-IMCI began in 2002, a year after the FB-IMCI multi-country evaluation started. Similar to the FB-IMCI program, and under the leadership of the same national working group, FB-IMCI protocols were adapted for Bangladesh’s CB-IMCI program. These leveraged existing community program protocols and guidelines such as ARI and CDD. Similar to FB-IMCI, Bangladesh’s CB-IMCI program focused on high burden diseases for children under 5 – diarrhea, respiratory infections, and malnutrition, as well as ear problems and malaria in endemic regions. However, in contrast to the FB-IMCI program, the CB-IMCI program’s lower age limit was set at 1 month – excluding the neonatal period – because, according to KIs, neonatal conditions required higher levels of care which were not possible at community level.

Further preparations for implementing CB-IMCI included development of protocols for existing cadres of government CHWs: HAs and FWAs who were required to identify cases (such as malaria, pneumonia, and diarrhea cases), provide counseling (including on infant and young child feeding) and vitamin A supplements, carry out growth monitoring, and refer cases to facilities in addition to basic curative care such as ORT. According to KIs, the decision to engage HAs and FWAs was made to ensure acceptance of CB-IMCI, given that *“they already had a good structure for many years. They had close contacts already with the communities.”* (In 2011, CHCPs were introduced as a new cadre of CHWs and providers of broader CB-IMCI curative care such as antibiotic treatment for pneumonia at community clinics. See Community Health Program section in the Introduction.)

Preparations also included the development of training materials and guidelines (for example, counseling guidelines) and CB-IMCI case recording forms as well as community engagement targeted at religious leaders and community leaders to increase the probability of acceptability. Community engagement also targeted mothers to increase their awareness of the importance of care-seeking for childhood illnesses and the recognition of danger signs.

## **IMPLEMENTATION**

In 2003, Bangladesh also decided to determine the feasibility of introducing a CB-IMCI with the number of government CHWs in the country (estimated at 4,500 in 1998). The testing phase also focused on assessing the additional demands of the CB-IMCI strategy on CHW time as well as the cost implications of recruiting additional personnel, if needed, before scale-up.<sup>62,71</sup> The testing phase for CB-IMCI was implemented in the catchment areas



of the union-level health facilities selected for the FB-IMCI testing to ensure the facilities had the capacity and providers trained in IMCI to manage referred cases (see FB-IMCI section).

A study assessing the CB-IMCI testing phase found that an additional 2,700-4,000 CHWs were required for the successful roll out of CB-IMCI at a cost of US\$2.7 million to US\$4 million which, according to the authors, was affordable for Bangladesh's government (accounting for only 1.5% of the total annual health sector budget).<sup>71</sup>

A major output of the small-scale testing phase was the development of the WHO pocket book – a guideline for care for children under 5 at first level referral health facilities. According to a KI, this guideline was developed because *“it was observed that some children were coming with severe sickness at upazila health complex and there was no guideline to manage them [during the small-scale testing phase]. Then WHO pocket book was developed which acted as a guideline to manage sick children at referral facility. One of the targets of IMCI is to find out cases at community level. Initially, there was no such guideline by WHO for the referral facilities.”*

As a result of the initial testing, Bangladesh rolled out the CB-IMCI program in phases, beginning with 15 sub-districts, selected from districts with the highest U5M (shaded red in Figure 14) in 2005, through bi-weekly home visits. (The community clinic system experienced challenges due to a change in government and priorities and resultant closures of community clinics, which limited CB-IMCI to a home visit-only approach until 2009 – see Community Health Program section in the Introduction.) TOT of district and sub-district-level health workers on the CB-IMCI protocol was conducted and they trained CHWs over a period of five days. The program included supervision of the CHWs by health inspectors and assistant health inspectors, for HAs, and FP inspectors, for FWAs, representing the two arms of the MOH.

Bangladesh also engaged NGOs with experience implementing interventions in selected districts such as Save the Children to implement CB-IMCI in certain sub-districts. The strategy of engaging NGOs was to ensure feasibility and to achieve high coverage, given challenges with the capacity of government CHWs, as discussed. NGOs also initially focused on high U5M districts. Other implementing partners such as Plan International and Concern Worldwide implemented similar packages of care in other districts. Despite engaging the different NGOs, KIs noted that ensuring delivery of a standardized model of CB-IMCI across districts was important and the MOHFW supported the NGOs in training their CHWs.

Community clinics' readiness for providing CB-IMCI care was evaluated using health facility survey data while DHS data was used to track incidence and care-seeking rates for illnesses covered by the CB-IMCI program. According to health facility survey data from 2014, while approximately 89% of surveyed community clinics had ORS for diarrhea treatment and 82% had amoxicillin for ARI treatment, overall community clinics showed low IMCI readiness. Only half of facilities surveyed had IMCI guidelines or at least one CHW who had ever received in-service IMCI training.

### **ADAPTATION DURING IMPLEMENTATION**

The same year Bangladesh scaled up CB-IMCI the country began exploring the feasibility of engaging village doctors (informal health workers practicing allopathic medicine) to expand the HRs for implementing CB-IMCI, given their popularity as the first point of care for children under 5. As a result, in 2005, Bangladesh conducted



two-day trainings on the CB-IMCI protocol for 144 village doctors in Matlab and monitored their implementation of CB-IMCI within the community for two years. The study found that, overall, village doctors could adequately implement the CB-IMCI protocol as shown by their knowledge of the assessment and management of pneumonia, severe pneumonia, and diarrhea up to two years after training. For example, village doctors' knowledge of the correct management of severe pneumonia and diarrhea increased from 62% and 65% (at baseline), respectively, to 84% and 82% post-training and maintained high levels at the end of the project, two years later.<sup>72</sup> Despite these positive findings which provided basis for Bangladesh's engagement of village doctors, the absence of standardized criteria for becoming a village doctor and inability to ensure competency, as discussed, led to their engagement only in a role to provide counseling and identify cases for referral to facilities, as part of a harm reduction approach. KIs also noted that village doctors' prescription practices did not change after their engagement as part of CB-IMCI, potentially due to the profit they made from selling medication.

Another step was to add drowning to the CB-IMCI package of care based on evidence that drowning was a leading COD among children.<sup>32</sup> According to a KI, *"in community IMCI, we have taken the drowning. We have taken the drowning because we have a lot of children dying by drowning. So, we are trying to actually make mothers or caretakers aware of how to prevent drowning."*

Other key adaptations similar to FB-IMCI included the introduction of ACT as the standard for malaria treatment in 2004, revision of IMCI guidelines to include zinc treatment in 2006, and the introduction of RDTs in 2007. Another adaptation in 2009 was the moving of CB-IMCI into the community clinic system in 2009 because, as KIs noted, *"it was difficult to monitor home visits."* In 2014, Bangladesh also switched from cotrimoxazole to amoxicillin for pneumonia treatment.

Table 12. CB-IMCI implementation outcomes

| Implementation Outcomes | Implementation Strategy  | Evidence   |
|-------------------------|--|--|
| Appropriateness         | <p>Data use to understand disease burden: setting lower age limit for CB-IMCI at 1 month – excluding neonatal period; CB-IMCI focus on diarrhea, malnutrition, ear problems, ARI.</p> <p>CB-IMCI introduction reflected high community-based care seeking.</p> | <p>(+): Respiratory infections, diarrhea and malnutrition jointly accounted for 39% and 33% of U5 deaths in 1990 and 2000 respectively.</p> <p>(+): Ear problems were included as part of CB-IMCI based on burden of morbidity per KI (See FB-IMCI).</p> <p>(+): According to a KI, CB-IMCI introduction reflected need for integrated and community approach.</p> |
| Acceptability           | <p>Stakeholder engagement: steering committee (ARI and CDD program, donors, partners, BPA, BNF)</p> <p>Community engagement</p> <p>Leveraging existing systems: CHWs</p>   | <p>Data on care-seeking rates from CHWs only was unavailable for the team to review.</p> <p>See FB-IMCI.</p>   |
| Feasibility             | Data use for decision-making: Restricting  | (+): CB-IMCI implemented although  |

| Implementation Outcomes            | Implementation Strategy  | Evidence  |
|------------------------------------|--|---|
|                                    | <p>scope by setting the lower age limit for CB-IMCI at 1 month – excluding neonatal period as children younger than 1 month require more specialized care only available at facilities.</p> <p>National leadership and accountability: steering committee</p> <p>Leveraging existing systems: existing protocols and guidelines</p> <p>Leveraging donor support: WHO and UNICEF</p> <p>Leveraging partner support: Training: WHO and UNICEF for trainings and developing training guidelines. Implementation: Save the Children and other NGOs.</p> <p>Small-scale testing for assessing feasibility<br/>Phased scale-up</p> | <p>MOHFW data showed geographic coverage of only 51% by 2016 (although an underestimate as did not include NGO coverage per KI). By 2019, CB-IMCI was successfully implemented (KIs).</p>   |
| Effectiveness and coverage (reach) | <p>Fixed-site CBD: community clinics</p> <p>Door-to-door: home visits</p> <p>Data use for adaptation: pneumonia treatment switch from cotrimoxazole to amoxicillin; addition of drowning to CB-IMCI package; national IMCI guidelines revised to include zinc treatment for diarrhea; engagement with village doctors for CB-IMCI; switch to ACT</p> <p>Phased scale-up</p> <p>See FB-IMCI.</p>  | <p>(+): ORT coverage increased from 75% in 2004 to 83% by 2014 (See ORT section).</p> <p>(+): By 2016, the proportion of deaths attributable to diarrhea, malnutrition, and lower respiratory infections had decreased 95%, 86%, and 83% respectively from 1990 figures.<sup>24</sup> These drops reflected the effectiveness of CB-IMCI (given that incidence rates remained largely the same for diarrhea and fever for example) but may also be due to FB-IMCI.</p> <p>(+): MOHFW 2016 data showed national scale was not achieved – CB-IMCI was in about half of all sub-districts (249/490) not including NGO coverage. CB-IMCI was implemented nationwide by 2019 according to KIs.</p> <p>See Neonatal, Malnutrition and Other Malaria Interventions sections.</p> |
| Fidelity                           | Training (TOT)   | (+/-): According to health facility survey  |



| Implementation Outcomes | Implementation Strategy   | Evidence   |
|-------------------------|---|--|
|                         | <p>Supervision</p> <p>Monitoring and evaluation</p> <p>Protocol and guideline development</p> <p>Integration into systems: move from household to community clinics</p>   | <p>data from 2014, community clinics had high rates of stock (89% of surveyed community clinics had ORS for diarrhea treatment and 82% had amoxicillin for ARI treatment) but only half of facilities surveyed had CB IMCI guidelines or at least 1 health worker who had ever received in-service IMCI training.</p> <p>No data on quality of care delivery once implemented was found</p> <p>(-): Infrequent supervision</p>   |
| Sustainability          | Integration into systems  | <p>(+): By 2019, KIs noted that CB-IMCI was implemented nationwide although with about 50% of all sub-districts were covered by government with the remainder by local NGOs.</p> <p>(+): See FB-IMCI</p>   |
| Cost                    | Not found   | <p>(+/-): A 2016 study, after the case study period ended, compared the cost of implementing CB-IMCI in Bangladesh to Nigeria, Egypt, Cambodia, and Peru, finding Bangladesh's program was the second most expensive per child treated.<sup>73</sup> This may have been linked to the fact that CHWs in Bangladesh were salaried government workers.</p>   |
| Equity                  | <p>Focus on equity: small-scale testing in sub-district with high U5M and hard-to-reach area. Introduction of CB-IMCI reflected need to bring care to community level where U5s accessed it the most.</p> <p>Door-to-door</p> | <p>(-): Figures 16, 17, and 18 show persistent gaps in care-seeking rates for pneumonia, diarrhea, and fever among different wealth quintiles. For pneumonia, 1999 care-seeking rates were at 23% for the poorest quintile and 55% for the wealthiest quintile; after the intervention the gaps persisted with the poorest quintile at 25% in 2011 and 38% in 2014 and the wealthiest quintile at 59% in 2011 and 60% in 2014. Wealth-related disparities were seen for care-seeking for diarrhea and fever.</p> |

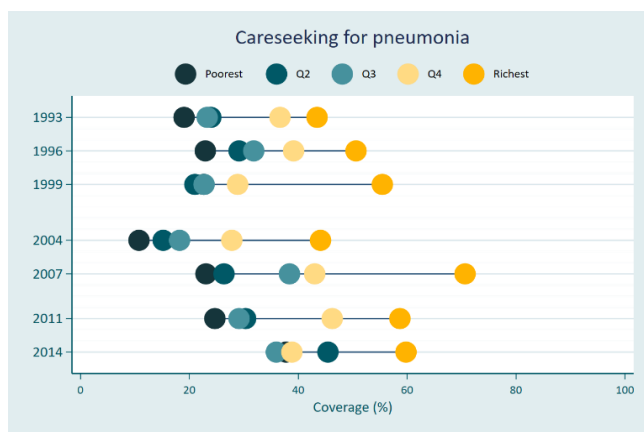


Figure 14. Coverage and Equity Outcome: Care-Seeking for Pneumonia Across the Different Wealth Quintiles in Bangladesh (1993-2014) (Source: Victora, et al 2018)

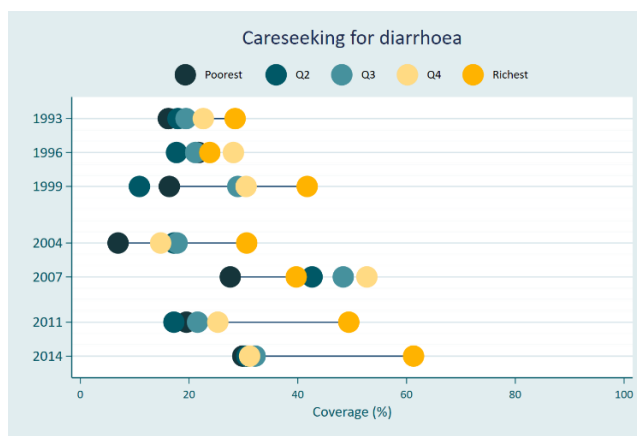


Figure 13. Coverage and Equity Outcome: Care-Seeking for Diarrhea Across the Different Wealth Quintiles in Bangladesh (1993-2014) (Source: Victora, et al 2018)

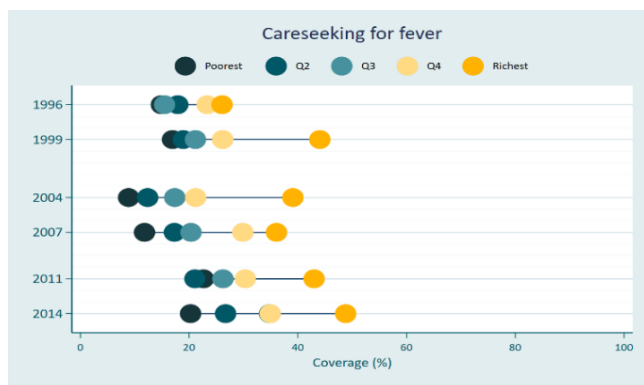


Figure 15. Coverage and Equity Outcome: Care-Seeking for Fever Across the Different Wealth Quintiles in Bangladesh (1996-2014) (Source: Victora, et al 2018)

## SUSTAINMENT

A study conducted in 2016, after the case study period ended, compared the cost of implementing CB-IMCI in Bangladesh to Nigeria, Egypt, Cambodia, and Peru. It found that Bangladesh's program was the second most expensive per child treated at US\$1.42.<sup>73</sup> This may reflect the fact that CHWs in Bangladesh were salaried government workers compared to countries like Nigeria, which may support sustainability (see Cross-Cutting Contextual Factors section). The study assessed the components of CB-IMCI delivery, including medicine costs like antibiotics and non-medicine costs like equipment and HRs.

In 2016, MOHFW data showed that CB-IMCI had been rolled out in only about half of all sub-districts (249/490). KIs explained that this did not include NGO coverage, and noted that CB-IMCI was implemented nationwide as of 2019. By 2019, KIs mentioned that supervision of CHWs as part of CB-IMCI was not occurring as planned.

## 4.1.3 Other Diarrhea Interventions

### 4.1.3.1 Oral Rehydration Therapy for Diarrhea

Table 13. ORT Key Implementation Strategies

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"><li>• Leveraging partner support</li><li>• Data use for decision-making<ul style="list-style-type: none"><li>◦ Monitoring and evaluation</li></ul></li><li>• Focus on equity</li><li>• Free distribution</li><li>• Leveraging and integration into systems</li><li>• Leveraging donor support</li><li>• Community engagement</li><li>• HR strengthening (recruitment and training)</li><li>• Incentivization (supply)</li><li>• Public-Private Partnership (PPP)</li><li>• Small-scale testing</li><li>• Multi-sector approach</li><li>• Use of mass media</li><li>• Community-based delivery<ul style="list-style-type: none"><li>◦ Fixed-site community-based delivery</li><li>◦ Door-to-door</li></ul></li></ul> |
| <i>See also FB-IMCI/CB-IMCI</i>   |

#### IMPLEMENTATION PRE-2000

ORT use for treating diarrhea in children was discovered in the late 1960s in Bangladesh, through research led by the Pakistan-Southeast Asia Treaty Organization's Cholera Research Laboratory (now icddr,b). In 1971, during the war of independence, the effectiveness of ORT for diarrhea treatment in Bangladesh was demonstrated when 96% of patients treated with ORS survived diarrheal episodes.<sup>74,75</sup> However, ORT use was limited to cases of outbreaks or clinical settings despite its proven effectiveness.

To address this, by 1979, BRAC with support from UNICEF began an ORT program with the view to improving access to ORS for the rural poor. BRAC adopted a door-to-door approach of teaching mothers to prepare homemade ORT (*labon gur*) using common salt and unrefined brown sugar to increase ORT use among mothers who did not have access to ORS packets, reflecting a focus on equity.<sup>76</sup> The program involved teaching one mother within each household to make ORT, and supervising her as she made it in a session lasting 20-30 minutes. BRAC's program was also accompanied with behavior change communication on prevention of diarrhea, recognizing the symptoms of dehydration, and ORT (including ORS) use to increase acceptability and improve care seeking. Specialized CHWs (ORWs) were recruited specifically by BRAC for the ORT program and their remuneration was performance-based – they were paid if the women in a sample of households they had visited could remember

how to prepare ORT. BRAC's program was implemented first in two villages, Horinogor and Anondopur in Sylhet division, and then scaled up nationwide except in icddr,b program areas in Matlab and the Chittagong hill tracts.

Initial monitoring of BRAC's program showed that although ORT knowledge was high, use remained low because men were not sufficiently engaged in the process, and sugar was often not available at homes. As a result, BRAC expanded their community education, reaching out to men at mosques and community meeting centers to educate them on ORT use and using mass media such as radio commercials, posters, and leaflets to let mothers know they could use different kinds of sugars (like molasses) in ORT preparation. At the end of BRAC's ORT program in 1990, approximately 13 million mothers across both rural and urban areas had been reached – an estimated 46-63% of women of reproductive age.<sup>69</sup>

Shortly after the introduction of BRAC's program, in 1981, Bangladesh began the NORP focusing on free distribution of ORS packets by MOHFW's HAs. NORP was implemented with support from WHO and UNICEF. NORP ended in 1984 and achieved limited coverage with only 100/509 (mainly urban) sub-districts reached by the program.<sup>69</sup>

By 1989, building on BRAC's ORT program and the NORP, Bangladesh introduced the CDD program to consolidate diarrhea control activities nationwide implemented by the MOHFW in collaboration with the Ministry of Primary and Mass Education, Ministry of Information, and local governments. A number of strategies were used to increase demand as well as improve access. Strategies included strengthening all cadres of health workers' skills in diarrheal management and targeting community-level influencers such as religious leaders and school teachers to promote the use of ORT. Each of the groups targeted by the program were provided specially designed packages along with orientation and training. For example, the health workers' package included a self-learning guide on diarrhea management with local terms and references and a flip book in story format to increase reader participation. School teachers were provided with sample skits, quizzes, and games to include in the curriculum, to increase awareness of ORT among children. Orientation activities were organized for religious leaders to emphasize their status in the society and the importance of their role in promoting ORT use. Posters with Koranic metaphor were put up at mosques and other places of worship to highlight the importance of ORT use also. Caregivers were provided with reference booklets on dehydration symptoms, ORT use, and symptoms requiring referral.

To increase access and adherence "ORT corners," separate areas where mothers could regularly feed their children ORT under the supervision of health workers, were also set up in upazila health complexes.

A study conducted in 1993, three years after the introduction of CDD, found that more than 70% of mothers were able to correctly make ORT and ORT was used for managing approximately 60% of diarrheal cases. The study also found that drug sellers and village doctors frequently recommended the use of ORT and 80% of rural pharmacies had ORS available. However, findings also showed that health workers were reluctant to prescribe ORT for treating diarrhea, which KIs explained might have resulted from a preference for intravenous therapy and the reluctance of mothers to use the ORT corners.

Phase one of CDD ended in 1996-97 and although positive results were recorded in the study above, there was minimal increase in the proportion of children with diarrhea who received ORS or RHF's nationwide, from 58% in



1992-93 to 62% in 1996-97 when the first phase of the CDD program ended, according to DHS data. This minimal increase in coverage reflected the limited focus of phase one of CDD in urban areas and informed the design of phase two as discussed below.

In addition to these programs, Bangladesh also engaged the Social Marketing Company, a private non-profit established by Population Sciences International and the Government of Bangladesh with funding from United States Agency for International Development (USAID), to manufacture and conduct mass media campaigns to popularize its own brand of ORS, throughout the 1980s and early 1990s. Sales of their brand increased from 42,880 packets in 1983 to 16 million in 1992.<sup>76</sup>

### **IMPLEMENTATION AND ADAPTATION POST-2000**

The second phase of the CDD program began in 1997, designed to further increase the ORT usage in the country from 62% in 1997 to 80% by 2005, with a particular focus on rural children, reflecting Bangladesh's strong focus on equity.<sup>77</sup> Phase two focused on reinforcing the messaging of phase one – the importance of ORT use for treating diarrhea – while employing community engagement and mass media strategies which had been shown to be successful in phase one as well, including radio and television (TV) commercials.

The CDD program ended in 2000 when it was integrated into FB-IMCI and later, CB-IMCI. The proportion of children with diarrhea treated with ORT increased from 62% in 1996-97 when the first phase of CDD ended to 75% in 2004 and 83% by 2014.<sup>52</sup>

*Table 14. ORT implementation outcomes*

| Implementation Outcomes    | Strategy   | Evidence   |
|----------------------------|--|--|
| Appropriateness            | Data use for decision-making   | (+): Introduction of 1 <sup>st</sup> ORT program (NORP) reflected research findings on ORT effectiveness: 96% of patients treated with ORT survived diarrheal episodes during war of independence. <sup>74,75</sup>  |
| Acceptability              | Community engagement: men, women, schoolteachers and religious leaders<br><br>Multi-sector engagement<br>Use of mass media<br>PPP                                    | (-): A 1993 study showed health workers were reluctant to prescribe ORT for treating diarrhea; KIs explained this might have resulted from a preference for intravenous therapy and reluctance of mothers to use the ORT corners.<br><br>(+/-): See effectiveness and coverage data below. |
| Feasibility                | Leveraging of partner and donor support: Pakistan-Southeast Asia Treaty Organization, UNICEF, and BRAC.<br><br>Leveraging existing systems: HAs. Small-scale testing | (+): BRAC and Social Marketing Company's ORT program, NORP, and CDD implemented with high coverage overall (though low at the beginning).  |
| Effectiveness and Coverage | Fixed-site and door-to-door CBD  | (-): NORP's coverage was limited with only 100/509 sub-districts having ORT corners. <sup>69</sup>   |

| Implementation Outcomes | Strategy  | Evidence  |
|-------------------------|---|---|
|                         | <p>Free distribution of ORS and training on making <i>labon gur</i>, BRAC moved away from ORT corners and used door-to-door strategy</p> <p>Community engagement: behavior change communication on prevention of diarrhea, recognizing the symptoms of dehydration, and ORT use.</p> <p>HR strengthening (recruitment)</p> <p>PPP</p> | <p>(-): Initial monitoring of BRAC's ORT program showed although ORT knowledge was high, use remained low as men were not sufficiently engaged in the process and sugar was often not available at homes.</p> <p>(+): At the end of BRAC's ORT programs approximately 12 million mothers had been reached (an estimated 46-63% of women of reproductive age).<sup>69</sup></p> <p>(+): A study conducted in 1993 found more than 70% of mothers were able to correctly make ORT and ORT was used for managing approximately 60% of diarrheal cases. Drug sellers and village doctors frequently recommended the use of ORT and a high proportion (80%) of rural pharmacies had ORS available.</p> <p>(+): Sales of Social Marketing Company's brand of ORS increased from only 42,880 packets in 1983 to 16 million in 1992.</p> <p>(+): Minimal increase in the proportion of children with diarrhea who received ORS or RHF from 58% in 1992-93 to 62% in 1996-97 when the 1<sup>st</sup> phase of CDD ended. By 2004, after the integration of ORT into IMCI, it had increased to 75%; by 2014, coverage was 83%.<sup>52</sup></p> |
| Fidelity                | <p>Incentivization (supply): performance-based remuneration</p> <p>Monitoring and evaluation</p> <p>HR strengthening: training health workers on diarrhea management</p>  | <p>(+): Consistently high availability of ORS at health facilities and/or community clinics. According to health facility survey data from 2014, approximately 89% of surveyed community clinics and over 80% of facilities had ORS.</p>  |
| Sustainability          | Integration into systems  | (+): ORT was integrated into CDD and IMCI.  |
| Equity                  | <p>Focus on equity: training on making <i>labon gur</i>, door-to-door delivery, focus on rural U5s for 2<sup>nd</sup> phase of CDD</p> <p>Free distribution of ORS</p>  | <p>(+): In 1999, shortly after the 2<sup>nd</sup> phase of the CDD program began, gaps still existed amongst wealth quintiles in the proportion of U5s treated with ORT with the lowest quintile at 33% compared to 53% among the highest quintile (Figure 19).<sup>21</sup> In 2004, after the integration of ORT into IMCI, the proportion of U5s in the lowest quintile treated with ORT had risen to 41%; among the highest wealth quintile coverage was 76%. The equity gap to narrow and by 2011 the proportion of U5s in the lowest quintile treated with ORT was 77% compared to 79% in the highest quintile. By 2014, 76% in</p>   |

| Implementation Outcomes | Strategy | Evidence   |
|-------------------------|----------|--|
|                         |          | <p>the lowest quintile and 67% in the highest were administered ORT during diarrheal episodes.</p> <p>(+): Similar narrowing of the equity gaps was seen with the proportion of U5s in rural areas receiving ORT during diarrheal episodes increasing from 33% in 1999 to 68% in 2007, and 65% in 2014 compared to 47% of urban U5s in 1999, 70% in 2007, and 69% in 2014.</p> <p>(-): NORP's limited coverage meant it was unable to reach most of the rural poor.<sup>69</sup></p> |

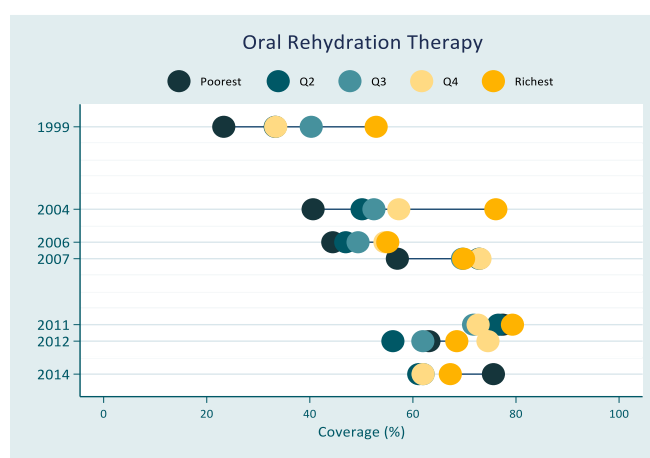


Figure 16. Coverage and Equity Outcome: ORT Use across Wealth Quintiles in Bangladesh (2007-2011) (Source: Victora, et al 2018)

### 4.1.3.2 Zinc Supplementation

Table 15. Zinc Supplementation Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"> <li>• Data use for decision-making <ul style="list-style-type: none"> <li>◦ Data use for adaptation</li> </ul> </li> <li>• Stakeholder engagement</li> <li>• Local evidence generation</li> <li>• Small-scale testing</li> <li>• Leveraging partner support (for implementation)</li> <li>• Leveraging donor support</li> <li>• PPP</li> <li>• Free distributions</li> <li>• National leadership and accountability</li> <li>• Integration into policy</li> <li>• Demand creation</li> <li>• Use of mass media</li> <li>• Training</li> </ul> |
| See FB-IMCI/CB-IMCI  |



## **EXPLORATION**

While ORS use had become very well established by the 1990s, concerns that the simultaneous promotion of zinc for diarrhea treatment would negatively impact ORS use continued to limit the introduction of a nationwide zinc program. Between 1998-2000, however, a study conducted in Bangladesh provided evidence that concurrent promotion of zinc would not result in reduction in ORS use.<sup>78</sup> Other studies conducted by icddr,b also provided evidence for the effectiveness of zinc in decreasing the severity and duration of diarrhea while reducing the likelihood of future recurrence and the need for hospitalization.<sup>69,79,80</sup> As a result, Bangladesh began considering the introduction of a national zinc program.

## **PREPARATION**

By 2003, three years before the WHO and UNICEF joint statement recommending treatment of acute diarrhea in children with zinc for 10-14 days in addition to ORT, icddr,b and Bangladesh's MOHFW began advocating for the integration of zinc treatment into child health practices and policies.

## **IMPLEMENTATION**

The Scaling Up Zinc for Young Children (SUZY) project began in 2003 with small-scale testing.<sup>69</sup> This phase aimed to improve awareness of zinc as an important childhood diarrhea treatment, convince caregivers to begin the use of zinc treatment, and establish zinc as part of standard household diarrhea management practices. It also focused on generating evidence for the acceptability of zinc and the feasibility of scale-up. Studies conducted during the small-scale testing phase showed that private facilities accounted for 90% of the visits for diarrhea, mothers were willing to pay approximately US\$0.45 per zinc blister pack, and that caregivers were most convinced when presented with the preventive benefits of zinc use. During the testing phase, Bangladesh also commissioned Acme Laboratories, a local pharmaceutical firm, to manufacture zinc tablets to replace existing zinc syrups which were more expensive.<sup>69</sup>

Drawing from the lessons of the testing phase, full-scale distribution of zinc blister packs started in 2006 with a focus on the private sector pharmacy-based distribution and the price set at US\$0.18 per pack to ensure it was affordable (and below the US\$0.45 mothers could afford to pay), reflecting a focus on equity. Zinc tablets were also made available at public health facilities for free with funding from the Bill & Melinda Gates Foundation. The MOHFW provided strong leadership for the SUZY project and in 2006 established two government-led committees which led the development of a policy that coordinated and provided oversight for the project as well as the revision of the national IMCI guidelines to include zinc treatment for diarrhea.<sup>69</sup>

Similar to the ORT demand-side strategies, Bangladesh implemented a number of engagement strategies tailored to specific groups, to ensure acceptability of the SUZY project. For example, leveraging icddr,b's status in Bangladesh as a trusted authority in health-related issues, icddr,b's logo was put on the blister packs to ensure acceptability by caregivers, and icddr,b collaborated with Dhansiri Media, a private advertising organization, to conduct national marketing campaigns using television and radio commercials, posters, billboards, branded buses, and rickshaws targeted at caregivers to promote the use of zinc. For private sector pharmacies, Acme Laboratories was commissioned to provide training given Acme's reputation as a trusted pharmaceutical organization. Reflecting their own professional reputation and leadership, BPA provided training to public health



care providers in all sub-districts including more than 6,000 CHWs, sub-assistant community medical officers, and midwives, on the importance of zinc use.

According to research conducted in 2012, the engagement efforts implemented by Bangladesh were successful in raising awareness: by 2006, more than 5 million zinc blister packs were sold across the country, higher than the expected demand of 3 million. By 2007, approximately 95% of Bangladeshi mothers of children under 5 in semi-urban and urban areas, and about 50% in rural areas, knew about baby zinc and its usefulness for treating diarrhea. However, actual use of full courses of zinc for diarrhea continued to lag behind, with only 10% of cases in rural areas and 25% in urban non-slum areas treated with zinc. An explanation was that the full 10-day treatment was not adequately emphasized to drug vendors who typically sold two- to three-day dosages, which resulted in treatment ineffectiveness and discouraged successive use.

### **ADAPTATION DURING IMPLEMENTATION**

In 2006, at the start of the SUZY project, zinc was designated as a prescription drug based on WHO recommendations, limiting its distribution to only pharmaceutical representatives. Sales were low because of the low profit margin for zinc and sales representatives were discouraged from promoting the product as a result. In 2008, the decision was made to change zinc to an over-the-counter medicine, opening up the sale of zinc to retail shops, and resulting as planned in increased sales and profits for sales representatives due to volume.

In the same year, 2008, the Social Marketing Company collaborated with Square Pharmaceuticals and began producing a brand of zinc with broad distribution to approximately 100,000 patent medicine vendors.

*Table 16. Zinc supplementation implementation outcomes*

| Implementation Outcomes | Strategy  | Evidence   |
|-------------------------|---|--|
| Appropriateness         | Data use for decision-making  | (+): Zinc program introduced based on local evidence that concurrent promotion of zinc would not result in reduction in ORS use; <sup>78</sup> other studies provided evidence for the effectiveness of zinc in decreasing the severity and duration of diarrhea and the need for hospitalization. <sup>69</sup> |
| Acceptability           | Stakeholder engagement: advocacy<br><br>Demand creation: branding zinc blister packs<br><br>Use of mass media and other population-specific demand generation approaches<br><br>Leveraging partner support: Bangladesh Pediatrics Association (BPA) and Dhansari media for engaging health workers and pharmacies | (-): Research conducted in 2012 found that health care providers remained reluctant to treat diarrheal cases with zinc because the benefits of zinc (compared to ORS) for diarrhea treatment were not as obvious to caregivers.<br><br>(+/-): See effectiveness and coverage data below.                         |



| Implementation Outcomes    | Strategy   | Evidence   |
|----------------------------|--|--|
| Feasibility                | <p>Small-scale testing</p> <p>PPP</p> <ul style="list-style-type: none"> <li>- Production (Acme Laboratories, Social Marketing Company, Square Pharmaceuticals)</li> <li>- Demand side (Dhansari Media)</li> </ul> <p>Leveraging donor support: The Bill &amp; Melinda Gates Foundation</p> <p>Leveraging partner support: icddr,b</p> | (+/-): Zinc program rolled out although achieved below 50% coverage.   |
| Effectiveness and Coverage | <p>Data use for decision-making: focus on private pharmacies for distribution</p> <p>Free distribution</p> <p>Data use for adaptation: switching from prescription to over-the-counter</p> <p>PPP: Social Marketing Company and Square Pharmaceuticals</p>   | <p>(+): Between 2006-2007, more than 5 million Baby Zinc blister packs were sold across the country, higher than expected demand of 3 million.</p> <p>(+/-): According to 2007 Bangladesh DHS, the proportion of children with diarrhea who received zinc supplements was 23%. This increased to 44% in 2014.<sup>52,56</sup></p>  |
| Fidelity                   | <p>National leadership and accountability</p> <p>Training health workers</p>   | (-): The full 10-day treatment was not adequately emphasized to drug vendors as part of SUZY so they typically sold 2- to 3-day dosages, resulting in treatment ineffectiveness and discouraged successive use.  |
| Sustainability             | <p>Integration into policy</p> <p>PPP (local production)</p> <p>National leadership and accountability</p>   | <p>(-): In 2006, Bangladesh commissioned local production of zinc tablets by Acme laboratories</p> <p>(+): Zinc included in IMCI guidelines</p> <p>(+): By 2012, approximately 9 manufacturers were manufacturing zinc in Bangladesh, increasing its availability.</p>   |
| Equity                     | <p>Free distribution of zinc tablets at public health facilities, price set at US\$0.18 per pack to ensure it was affordable</p>   | (+/-): In 2007, 6% of under-5s in the poorest wealth quintile (compared to 25% in the richest quintile) were treated with zinc and ORS during diarrheal episodes (Figure 20). <sup>81</sup> Similarly, 10% of rural U5s were treated with zinc and ORS compared to 21% in urban areas. By 2011, the proportion of U5s in the poorest quintile treated with zinc and ORS increased to 28% (compared to 38% in the richest quintile) with some closing of the equity gap. The same trend was seen for rural U5s (31%) and urban U5s (43%). |

## SUSTAINMENT

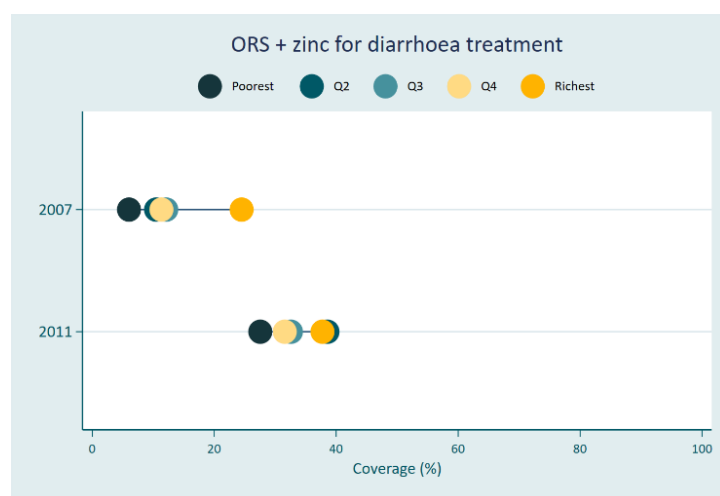


Figure 17. Coverage and Equity Outcome: ORS and Zinc for Diarrhea Treatment across Wealth Quintiles in Bangladesh (2007-2011) (Source: Victora, et al 2018)

By 2012, approximately nine manufacturers were manufacturing zinc in Bangladesh, increasing its availability and zinc was integrated into IMCI guidelines. However, research conducted in 2012 found that health care providers remained reluctant to treat diarrheal cases with zinc because the benefits of zinc, compared to ORS, for diarrhea treatment were not as obvious to caregivers.

According to Bangladesh DHS, in 2014 the proportion of children with diarrhea who received zinc supplements had increased, from 23% in 2007 to 44% though it remained below 50%.<sup>52,82</sup>

### 4.1.3.3 Rotavirus Vaccination

Table 17. Rotavirus Vaccination Key Implementation Strategies

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"> <li>• Data use for decision-making</li> <li>• Leveraging donor support</li> <li>• Leveraging partner support</li> <li>• Community engagement</li> <li>• Leveraging and strengthening existing systems <ul style="list-style-type: none"> <li>○ Cold chain strengthening</li> <li>○ Data systems strengthening</li> </ul> </li> </ul> |

## EXPLORATION

Globally, rotaviruses are responsible for more than one-third of deaths in children with diarrhea. In Bangladesh, multiple studies were conducted between 1990-2013 to determine the burden of disease of rotavirus. Research by icddr,b from 1993-2013 found that 44% of children under 5 admitted at Dhaka Hospital with diarrhea were infected with rotavirus and 37% of hospitalized children under age 2 at Matlab Hospital had rotavirus infection.<sup>83</sup>



As a result of these studies' findings, Bangladesh's Institute of Epidemiology, Disease Control and Research established sentinel surveillance sites in seven hospitals to monitor rotavirus infection. Between 2012 and 2015, 64% of children hospitalized with acute gastro-enteritis tested positive for rotavirus, with 8% of all admissions in children under 5 in these hospitals resulting from rotavirus infections.

These data as well as WHO's 2009 recommendations for the introduction of rotavirus vaccine globally provided the basis for Bangladesh's decision to introduce rotavirus vaccine.

## **PREPARATION**

With oversight from the interagency coordination committee which included civil society representatives such as BRAC and Rotary International, donors, MOHFW, and Ministry of Finance, preparations for introducing rotavirus vaccine began with an icddr,b study to assess the effectiveness of rotavirus vaccines. (See Other Vaccine Preventable Diseases section for other details of the interagency coordination committee.) These studies showed that Rotarix had similar effectiveness to Rotateq (39% versus 42.7%).<sup>83</sup> Given the comparable effectiveness of both vaccine types and increased cold chain capacity requirements of Rotateq (see below for cold chain capacity gaps), Bangladesh decided to introduce Rotarix.

In 2016, Bangladesh submitted a proposal for GAVI support for the planned introduction of rotavirus vaccine in 2018.

In 2017, further preparations for the introduction of rotavirus vaccine included an analysis of the impact and cost-effectiveness of the introduction of a two-dose rotavirus vaccine in Bangladesh using the Pan American Health Organization's TRIVAC model (version 2.0), compared to a no-vaccination scenario. This study found that rotavirus vaccination was highly cost-effective and expected to prevent 4,000 deaths, 3 million outpatient visits, and approximately 500,000 hospitalizations in the base scenario over the period of ten years.

Other preparations included development of guidelines, training manuals and reporting forms, and community engagement activities for the introduction of rotavirus vaccine. Cold chain capacity assessments were also carried out, finding that there was a need to equip national-, district- and sub-district-level cold stores with temperature monitoring systems and cold rooms as well as increase their storage capacity to accommodate the rotavirus vaccines. As a result, the Government of Bangladesh developed an improvement plan to accommodate the two-dose Rotarix vaccines which included the installation of eight national- and 48 district-level cold rooms and purchase of 400 refrigerators at the sub-district level.<sup>83</sup> These cold chain capacity improvements delayed the introduction of rotavirus vaccine by one year, to 2019, but were beneficial. According to a KI, the introduction of rotavirus in 2019 was feasible because *"the government has established increased [cold chain] spaces here at central level as well as also increased the spaces at district level."* However, KIs also noted that the scarcity of Rotarix meant there were not enough vaccines available for Bangladesh's population and the introduction of the vaccine was further delayed to 2020.

Implementation and sustainment were beyond the scope of this case study.



## 4.1.4 Other Pneumonia Interventions

### 4.1.4.1 Pneumococcal Vaccination

Table 18. *Pneumococcal Conjugate Vaccine Key Implementation Strategies*

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"><li>• Data use for decision-making<ul style="list-style-type: none"><li>○ Data use to understand disease burden</li><li>○ Surveillance</li><li>○ Monitoring and evaluation</li><li>○ Data use for adaptation</li></ul></li><li>• Leveraging partner support</li><li>• Leveraging donor support</li><li>• Community engagement</li><li>• Advocacy</li><li>• National leadership and accountability</li><li>• Leveraging, strengthening and integration into existing systems<ul style="list-style-type: none"><li>○ Cold chain strengthening</li><li>○ Data systems strengthening</li></ul></li><li>• Training (TOT)</li><li>• Focus on equity</li><li>• Increase in budget</li></ul> |

### EXPLORATION

Led by a champion at Dhaka Shishu Hospital in the early 1990s, Bangladesh began research into drug resistance of *Streptococcus pneumoniae* and disease burden of pneumococcal infection, recognizing the burden of disease even before vaccination was available.<sup>84,85</sup>

In 2000, GAVI began supporting the introduction of PCV into the immunization programs of developing countries and Bangladesh, led by the champion, began advocating for funds for the introduction of PCV. According to the champion, *“that was the beginning when PCV came... I gradually got involved with International Vaccine Access Center (IVAC) group, then IVAC was not there, it was really Pneumococcal vaccines Accelerated Development and Introduction Plan (PneumoADIP\*... the foundation of IVAC. So, I started working with them because nobody was really investing in the vaccine for this part of the world. There was no money because GAVI was just coming in those days and pneumococcal vaccine was money.”* To add credibility to the champion’s advocacy efforts, the KI published a paper on Pneumococcal meningitis disability, stating *“the most important and appealing thing was*

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\* PneumoADIP was a team based at the Johns Hopkins Bloomberg School of Public Health and supported by a GAVI grant to accelerate the uptake of Pneumococcal vaccines through partnerships with countries, academia, donors, international organizations, and industry. PneumoADIP coordinates its activities with WHO.

*how I presented disability. The first time I presented disability – yes, we know this number of children are disabled, but I just want to say – possibly you from the developed part of the world, you do not understand disability much... a pneumococcal meningitis case in Bangladesh and other developing countries, they are not only disabled, they are non-functional. Then I showed the pictures that when you go to US and you are disabled, you have a wheelchair, beautiful, you press it, you move. And when you are on the train, you are coming down, there is a ramp to come down, we don't have it [in Bangladesh]. And that is why my children, these disabled children – they are not disabled only, they are non-functional. And that is making her/his parents also non-functional.”* These advocacy efforts were targeted at the governments of potential donor countries and were done in collaboration with PneumoADIP.

In addition to advocacy efforts targeted at potential donor countries, the PneumoADIP team and the champion began exploring advanced market commitment strategies targeting countries with high burden of pneumococcal infection, such as Nigeria. In explaining the advance market commitment mechanism, the champion said, *“the idea was how the money will come, which was why the vaccine was so expensive and delayed to come from the developed countries to countries like Nigeria and Bangladesh. So we wanted to see, who else needs this? The policymakers... all of them needed to come together... with the industries to say to them okay, I know you sell the vaccine to developed countries and in Europe, what is the birth cohort? Several thousand, or maybe hundred thousand. And if you come to Bangladesh, it's 3 million. So, you are selling a hundred thousand doses there, and if you are coming to Bangladesh, you will be selling 3 million doses here... If you give this price, then we'll buy this number of doses.”*

By 2006, WHO recommended the introduction of PCV<sup>86</sup> and in 2010 Bangladesh's interagency coordination committee recommended the introduction of PCV vaccine to reduce child mortality. A proposal for support was approved by GAVI in 2012.

## **PREPARATION**

Between 2006 and 2013 Bangladesh conducted a study to determine the appropriateness of existing PCV types for Bangladesh's serotype prevalence. This study focused on children under 5 with suspected invasive pneumococcal disease who were identified through active surveillance at four hospitals. The findings of this study showed that PCV-10 and PCV-13 serotypes accounted for 46% and 50% of cases, respectively.<sup>87</sup> However, similar to rotavirus vaccine, given the comparable effectiveness of both vaccine types and increased cold chain capacity requirements of PCV-13 (see below for cold chain capacity gaps), Bangladesh decided to introduce PCV-10.

In preparation for introducing PCV Bangladesh began leveraging Global Pneumonia Day (November 12<sup>th</sup>) to conduct community engagement and awareness-creation activities around PCV introduction, with financial support from UNICEF, WHO, and the World Bank, and with implementing support from both BRAC and Plan International. According to a KI, Bangladesh was *“very active... We converted that pneumonia day, IVAC came here, CDC came here, British parliament members came here for the pneumonia day... we converted it into pneumococcal day. And stakeholders were involved because they were participating with us in the sessions, rallies everywhere, we were having the talk shows on the TV, every year.”* Speaking to the effectiveness of the community engagement activities and their impact on acceptability, a KI said, *“I think the pneumonia day made a way for the*





*country, because we were going through the different roads, with different songs, and then they were moving with this microphone, with the loudspeaker, all over the city.”*

Other preparations included cold chain assessments at national-, district- and sub-district-levels in 2010, with support from UNICEF and WHO. These assessments informed cold chain strengthening efforts in 2013 to receive PCV-10 which presented in two-dose vials and required less cold chain capacity compared to PCV-13. However, according to a KI, although these cold-chain-strengthening efforts were concluded on time – within a year – the manufacturer was unable to supply enough vaccines for the country’s large birth cohort of approximately 3.1 million, delaying the introduction of PCV by one more year.

With support from GAVI, training materials and training plans were also developed, including for a national-level TOT for health workers. The e-HIS system and vaccination cards were updated to include PCV as well.

## **IMPLEMENTATION**

In 2015, Bangladesh introduced PCV into its routine immunization program,<sup>88</sup> becoming the second country in South Asia after Pakistan to introduce PCV into its national immunization program.<sup>89</sup> The first dose of PCV-10 was given at the age of six weeks, along with the pentavalent vaccine, while the second and third doses were given at 10 and 18 weeks of age.<sup>90</sup> GAVI required Bangladesh to co-finance 20% of the cost of PCV.

Bangladesh rolled out PCV nationwide without any small-scale testing. In speaking to this decision to roll out nationwide, a KI explained that Bangladesh has a history of acceptability of vaccines and described the country as a *“pro-vaccine nation...because the way our EPI program runs, it’s almost a volunteer [system]. They [health workers] really want to do this. If you are not going to take vaccine this session, they will go to your house again and say ‘Oh, you did not come, next day we’ll be going to that house, come there’. And all these EPI programs are happening in someone’s courtyard, waiting room, or living room. They put a yellow banner and have the immunization session.”* The KI added that *“if you come to a national immunization day in this country, you will see a long queue. To get the vaccine, mothers are coming and waiting for hours on the queue to get the vaccine. There is hardly any country like this. Bangladesh has got magic, it’s a kind of magic, in fact honestly... our EPI is unbelievable.”*

Initial and ongoing implementation of the PCV program continued community engagement activities to constantly generate awareness and keep vaccination coverage high with support from BRAC and Plan International, which also supported tracking no-show or missed cases. As part of the implementation of the PCV program, Bangladesh also leveraged existing pediatric bacterial meningitis and pneumococcal disease sentinel surveillance systems at the MOHFW to monitor adverse events following immunization.

Seven months after the introduction of PCV, in December 2015, an evaluation of its implementation was conducted and found that high staff turnover resulted in inadequately trained staff administering the PCV, with no formal supervision plan or documentation of supervisory visits for follow-up. Supervisors were not regularly available to visit all sites because there were not enough supervisors and they did not have sufficient access to transport. These challenges were mainly found in Dhaka City Corporation where NGOs implemented the vaccination program, reflecting an ongoing challenge of NGO supervision gaps. In response to these results,

follow-up trainings for vaccinators were organized, there was an increase in the number of supervisors, and a supervision plan to ensure documentation of supervisory visits and adequate follow-up was developed. Transport was also made available for supervisory visits.

According to WHO, PCV coverage in 2015 was 48% because of the timing of data collection relative to the introduction date of PCV. However, coverage increased to 97% in 2016 and 2017.<sup>91</sup>

Impact on mortality and disease was difficult to determine given the most recent data were from 2016, reflecting only 18 months of coverage. Still, the death rate among children under the age of 5 due to meningitis decreased from 8.9 per 1,000 live births in 2000 to 4.5 per 1,000 live births in 2016. In 2000, 424/100,000 U5 deaths were attributable to lower respiratory infections, and by 2016, this decreased to 117/100,000. While PCV likely contributed to these reductions in death rate given the accelerated reduction between 2005 to 2016 (62% drop for lower respiratory illnesses, 63% drop for meningitis) compared to 1990 to 2005 (54% drop for lower respiratory illnesses and 90% increase for meningitis), this was minimal given its introduction in 2015, very late in the case study period.

### **ADAPTATION DURING IMPLEMENTATION**

In 2016, the initial immunization schedule of PCV (at six, 10, and 14 weeks) was changed to six, 10, and 18 weeks to coincide with the third dose of IPV because, according to KIs, routine monitoring data showed that children were missing the last dose as mothers were unable to take them to facilities for an extra vaccination visit.

*Table 19. PCV implementation outcomes*

| Implementation Outcomes | Implementation Strategy   | Evidence   |
|-------------------------|---|--|
| Appropriateness         | Data use to understand disease  | (+): PCV introduction reflected high pneumococcal disease burden.<br><br>(-): A 2006-2013 study found that PCV-10 and PCV-13 serotypes accounted for 46% and 50% of cases, respectively. <sup>87</sup>   |
| Acceptability           | Community engagement  | (+): A KI in speaking to the acceptability of PCV described Bangladesh as a “pro-vaccine nation,” adding that “if you come to a national immunization day in this country, you will see a long queue. To get the vaccine, mothers are coming and waiting for hours on the queue to get the vaccine.” |
| Feasibility             | Leveraging partner support: GAVI, UNICEF, WHO, BRAC, Plan International, PneumoADIP<br><br>Leveraging donor support: GAVI<br><br>Leveraging existing systems: | (-): PCV introduction delayed by a year from proposed introduction date<br><br>(+): PCV introduction in 2015   |

|                            |  |  |
|----------------------------|--|--|
|                            | <ul style="list-style-type: none"> <li>- Pediatric bacterial meningitis and pneumococcal disease sentinel surveillance systems at the MOHFW</li> <li>- Pneumonia day converted to pneumococcal day</li> </ul> <p>Advocacy targeted at potential donor countries</p> <p>Data use for decision-making: given the comparable effectiveness of both vaccine types and increased cold chain capacity requirements of PCV-13, Bangladesh decided to introduce PCV-10</p> <p>System strengthening: cold chain strengthening</p> <p>National leadership and accountability</p> |  |
| Effectiveness and coverage | <p>Data use for adaptation: initial immunization schedule of PCV at 6, 10, and 14 weeks was changed to 6, 10, and 18 weeks to coincide with the 3<sup>rd</sup> dose of IPV</p> <p>Data systems strengthening: The e-HIS system and vaccination cards updated to include PCV Leveraging existing systems e.g. BRAC for tracking no-shows and missed cases</p>   | <p>(+): Coverage of PCV at 97% in 2016 and 2017 within 2 years of introduction.<sup>91</sup></p> <p>(+): Death rate among children under the age of five due to meningitis decreased from 8.9 per 1,000 live births in 2000 to 4.5 per 1,000 live births in 2016. In 2000, 424/100,000 U5 deaths were attributable to respiratory infections; by 2016, this decreased to 117/100,000 for respiratory infections. PCV contributed minimally to these reductions given its introduction very late in the case study period. Data on ARI incidence after 2015 (when PCV was introduced) was unavailable for the team to review.</p> |
| Fidelity                   | <p>HR strengthening (TOT)</p> <p>Surveillance</p> <p>Monitoring &amp; Evaluation (M&amp;E)</p>   | <p>(-): High staff turnover resulted in inadequately trained staff administering the PCV, no formal supervision plan or documentation of supervisory visits for follow-up because supervisors were not regularly available to visit all sites.</p>   |
| Sustainability             | <p>Increase in budget</p> <p>Integration of PCV into e-HIS, adaptation of vaccination cards and data reporting forms</p>   | <p>(+): Government contribution to the co-funding of PCV vaccine began increasing, with a corresponding increase in the budget for vaccines as part of the 5<sup>th</sup> SWAp [Health, Population and Nutrition Sector Development Programme (2017-2021)].</p> <p>(-): Bangladesh's expected graduation to a middle-income country led to concerns at its ability to afford its proportion of the cost of vaccines as part of the co-funding arrangement with GAVI.</p>   |

|        |   |   |
|--------|---|---|
|        |   | (+): See PCV coverage   |
| Equity | Focus on equity: community-based vaccination sessions | Data on equity of PCV coverage were unavailable for the team to review although given high coverage, inequity was unlikely. |

## SUSTAINMENT

According to KIs, Bangladesh continued to monitor PCV's effectiveness at reducing infection rates of pneumococcal serotypes prevalent in the country, although the findings of these studies were unavailable for the team to review as they were not published.<sup>90</sup> Bangladesh's contribution to the co-funding of PCV vaccine began increasing in 2017 (from 20% to 23%) with a corresponding increase in the budget for vaccines as part of the fifth SWAp, the HPNSDP 2017-2021.

KIs also mentioned that with the expected increases in gross national income and the country's graduation to a middle-income country, Bangladesh's contribution to the co-funding of PCV was expected to increase with implications for sustainability. By 2017, PCV coverage was 97%.

### 4.1.4.2 Haemophilus Influenzae B Vaccination

See Section 4.2 Other Vaccine-Preventable Diseases.

## 4.1.5 Other Malaria Interventions

In the early 1960s, Bangladesh established the Malaria Eradication Programme to implement all malaria programming within the country. By 1977, one year before the declaration of Alma Ata and reflecting

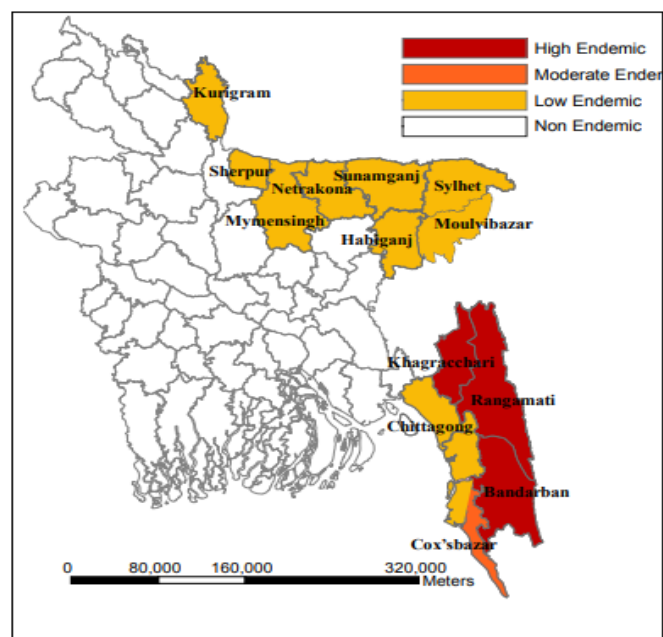


Figure 18. Map of Bangladesh showing regional Endemicity (2013) (Source: Ministry of Health and Family Welfare, Bangladesh. Malaria National Strategic Plan 2015–2020)

Bangladesh's very early focus on PHC, the Malaria Eradication Programme was integrated into the newly created PHC program (Integrated Thana Health Complex Scheme) and renamed the Malaria Control Programme. However, according to KIs, low malaria incidence in the 1980s and consequent deprioritization of malaria programming,<sup>92</sup> resulted in reduction in malaria funding, especially for the procurement of vector control commodities such as dichlorodiphenyltrichloroethane (DDT) for IRS, which had been the mainstay of the program (see IRS section). As a result, by the early 1990s, the malaria program was implementing an outdated strategy. This, combined with high staff turnover, was reflected in the tripling of the malaria incidence rate from 6/1,000 people in 1990 to 19/1,000 in 1994.<sup>93</sup>

Around the same time, noticing these gaps in malaria programming and the resulting rise in malaria

incidence, champions within the MOHFW began advocating for a new malaria strategy. By 1994, Bangladesh adopted the World Declaration of Malaria Control, and the malaria program was renamed the Revised Malaria Control Strategies Programme. The renamed program had a renewed focus on preventing and reducing malaria morbidity and mortality and its associated socioeconomic losses through prevention, early diagnosis, and prompt treatment.<sup>94</sup>

Over the years, leveraging various initiatives and availability of donor funding – especially the Roll Back Malaria Initiative in 1998 and Global Fund’s financial grants in 2006 (with implementation starting in 2007) and 2009 – Bangladesh implemented a number of EBIs. These EBIs included IRS and ITNs which are discussed below, as well as RDTs and ACT discussed in the FB-IMCI and CB-IMCI sections. The main focus of Bangladesh’s malaria EBIs was to reduce the incidence of malaria nationwide, focusing on the 13 malaria endemic districts of Sherpur, Mymensingh, Netrokona, Kurigram, Sylhet, Hobigonj, Sunamgonj, Moulvibazar, Khagrachari, Chittagong, Cox’s Bazaar, Rangamati, and Bandarban, to the east and northeast (Figure 21).<sup>92</sup> Annually, approximately 98% of the total malaria cases in Bangladesh were reported in these 13 districts, with four of these districts (three highly endemic, Bandarban, Khagrachari, Rangamati, and one moderately endemic, Cox’s Bazar) accounting for 92% of the cases and 80% of the deaths.<sup>68,92</sup>

*Table 20. Other Malaria Interventions Key Implementation Strategies*

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"> <li>• Data use for decision-making</li> <li>• Micro-planning</li> <li>• Data use for prioritization</li> <li>• Leveraging donor support</li> <li>• National leadership and accountability</li> <li>• Leveraging partner support (for implementation)</li> <li>• Leveraging and integration into systems</li> <li>• Community engagement</li> <li>• Focus on equity</li> <li>• Free delivery (distribution)</li> <li>• Ensuring budget</li> <li>• Data use for hot-spot approach</li> <li>• Community-based delivery</li> <li>• Fixed-site community-based delivery</li> </ul> |

#### 4.1.5.1 Insecticide Treated Nets

##### EXPLORATION

According to KIs, a country-led ITN program was not feasible throughout the 1980s and 1990s because of unavailability of funding and increasing turnover of malaria program staff. Between 1998 and 2004, as part of the Roll Back Malaria Initiative and with technical support from WHO, BRAC did manage to implement an ITNs project in Bandarban, Khagrachari, and Rangamati, three high-endemic districts.<sup>92</sup>

However, by 2002, Bangladesh's Country Coordinating Mechanism – a coordinating committee mandated by Global Fund with NGO, civil society, and MOHFW members that was responsible for overseeing the implementation of malaria, HIV/AIDS, and tuberculosis interventions – was set up. As a result, discussions began around the need to improve malaria control efforts through expanding the malaria program and implementing an ITNs program as recommended by WHO.

## **PREPARATION**

Under the leadership of the Country Coordinating Mechanism, preparations for implementing the ITNs program began in 2005 with the development of a proposal for a Global Fund grant, to expand the malaria program including providing LLINs to all households in the three districts with the highest malaria burden (Bandarban, Khagrachari, and Rangamati) and 80% of households in the other 10 malaria-endemic districts. The proposal was approved in 2006.

Community engagement activities targeted at community leaders and women to create awareness of malaria symptoms and the importance of LLIN use were also carried out. Speaking of the importance of community engagement as employed by the ITNs program, and adapting the engagement messaging to specific contexts for ensuring acceptability, a KI said: *"First, the leaders were engaged, because leaders have to be convinced first. They are the ones local community people will trust. So we convinced them on what we were going to do and subsequently we focused on the community people. We also did lots of dramas, even in the local language, especially for the tribes in the hilly areas who have different languages."*

Training guidelines and net distribution protocols were developed reflecting WHO recommendations of distributing nets every three years (based on evidence showing that three to five years was the lifespan of LLINs) and distributing a minimum of one net per two individuals within each household.

Consistent with Bangladesh's history of leveraging partner support and capacity for implementation, a consortium of 21 NGOs with prior experience in the malaria-endemic districts, including BRAC, was also set up to lead the implementation of the LLIN program, with oversight from the Revised Malaria Control Strategies Programme.

## **IMPLEMENTATION**

**Bangladesh began implementing an LLIN program in 2007.** BRAC's shasthya shebikas and the other NGOs' CHWs were trained by WHO on community engagement techniques and the importance of LLIN use. **The nets were distributed for free through outreach activities conducted every three years at community spaces including schools.**

In preparation for these outreach sessions every three years, KIs mentioned that community engagement activities targeted at caregivers (especially mothers) and community leaders were conducted to generate awareness for the use of LLINs. Other preparations included micro-planning by sub-district-, district-, and central-level NGO supervisors with oversight from the Revised Malaria Control Strategies Programme to determine the number of eligible households within each district and sub-district, nets required per household based on the number of household occupants, and the cost of the distribution exercise.



Overall, the LLIN program was successful during the study period, achieving a high coverage with a narrowing in geographic equity gaps. A study conducted between 2008–2011 found that the proportion of households with at least one LLIN in the northeast increased from 22% in 2008 (one year after the program began) to 62% in 2011 while in the southeast, this proportion increased from 60% in 2008 to 67% in 2011. The same study found that the proportion of children under 5 sleeping under an LLIN or other ITN was stable at 92% between 2008-2011 in the southeast and 87% in the northeast; during the same time period, the proportion of pregnant women sleeping under an LLIN or other ITN increased from 84% to 91% in the southeast, and from 77% to 83% in the northeast.<sup>95</sup>

Research conducted between 2008-2012 also found a reduction in malaria incidence and prevalence associated with ITNs, including LLIN use. In 2012, the research found that there was one ITN, including LLINs, for every 2.6 individuals in the high-endemic districts, only falling slightly short of the target of two individuals per net. The study also found that districts with more than one ITN per two people had a decrease in prevalence of 25% for severe malaria, 21% for all malaria, and 76% for malaria-associated mortality among all age groups, compared to baseline data.

Overall, malaria incidence decreased from 6.2 cases per 1,000 in 2008 one year after the program began, to 2.1 cases per 1,000 in 2012, across Bangladesh. Prevalence of severe malaria decreased by 79%, prevalence of all malaria decreased by 65%, and malaria-associated mortality decreased by 91%.<sup>96</sup> These decreases may be due to the ITNs program but may also be the result of other malaria program efforts including IRS and treatment with ACT.

According to IHME estimates, U5M attributable to malaria declined by 69% from 0.02 deaths per 100,000 live births in 1990 and 2000 to 0.01 deaths per 100,000 live births in 2005 and 0.008 per 100,000 in 2016.<sup>24</sup> DHS data on ITNs was unavailable for the team to review.

*Table 21. ITN implementation outcomes*

| Implementation Outcomes | Implementation Strategy  | Evidence   |
|-------------------------|--|--|
| Appropriateness         | Data use for decision-making (prioritization): BRAC and Government of Bangladesh rolled out ITNs program in high-endemic districts   | (+): The 13 districts where both BRAC and Government of Bangladesh rolled out ITNs program were malaria-endemic areas. <sup>92</sup>       |
| Acceptability           | Community engagement: community leaders and women  | (+): See effectiveness and coverage data.  |
| Feasibility             | Leveraging donor support: Global Fund<br>Leveraging partner support as part of Country Coordinating Mechanism, implementing NGOs<br>Leveraging existing systems: government CHWs<br><br>National leadership and accountability | (+): Program rolled out and achieved high coverage in 2011 in both the southeast and northeast. See effectiveness and coverage data below. |



| Implementation Outcomes    | Implementation Strategy   | Evidence  |
|----------------------------|---|---|
|                            | Micro-planning to target ITN distribution   |   |
| Effectiveness and coverage | Leveraging partner support: WHO recommendations for distribution protocols<br><br>Free distribution<br><br>Micro-planning<br><br>Fixed-site CBD | (+): A 2008–2011 study found the proportion of households with at least one LLIN in the northeast increased from 22% in 2008 to 62% in 2011. In the southeast, this proportion increased from 60% in 2008 to 67% in 2011. The proportion of U5s sleeping under an LLIN or other ITN was stable at 92% in the southeast and 87% in the northeast; the proportion of pregnant women sleeping under an LLIN or other ITN increased from 84% to 91% between 2008 and 2011 in the southeast, and from 77% to 83% in the northeast. <sup>95</sup><br><br>(+): U5M attributable to malaria decreased from 0.02 deaths per 100,000 live births in 2000 to 0.01 deaths per 100,000 live births in 2005 and 0.008/100,000 in 2016. <sup>24</sup> This drop in U5M attributable to malaria may not be solely accounted for by ITNs but may be due to other EBIs as well. |
| Fidelity                   | Trainings   | Not found.  |
| Sustainability             | Ensuring budget   | (+): Implementation of ITNs program included government workers by 2011, reflecting increasing government ownership of the program.   |
| Equity                     | Focus on equity: implementation in 13 endemic areas<br><br>Free distribution of nets  | (+): See effectiveness and coverage data above which shows a narrowing of geographic equity gaps between 2008 to 2011 in the proportion of households with >1 LLIN.   |

#### **ADAPTATION DURING IMPLEMENTATION AND SUSTAINMENT**

By 2011, according to one KI, with increases in staff numbers within the malaria program of the Government of Bangladesh, government CHWs (HAs) began to implement the ITNs program in collaboration with the NGOs. This reflected a shift towards more government ownership of the program. As one KI explained, “*we arranged at the national level regarding the distribution plan and decided that there should be a banner made to say that [ITNs distribution] was jointly done, because there was an impression that these nets were given by NGOs. While we were paying the price, they were claiming the credit just for distribution. So we began to do them jointly.*”

#### **4.1.5.2. Intermittent Preventive Treatment for High Risk Groups**

Based on WHO guidelines, intermittent preventive treatment (IPT) for both pregnant women and children as seasonal malaria chemoprevention was recommended only for high and moderate malaria endemic countries. As a result, this EBI was not implemented in Bangladesh, a low endemic country.<sup>97,98</sup>



### 4.1.5.3 Indoor Residual Spraying

#### IMPLEMENTATION PRE-2000

Between 1960 and 1977, Bangladesh's malaria program implemented IRS as a key component of its vector control strategy, using WHO-supplied DDT, in the endemic districts. Between 1977 and 1993, according to KIs, DDT use for IRS began to decline because of unavailability of funding for the malaria program; Bangladesh relied on donor-supplied DDT during this time period. By 1994, with the introduction of the Revised Malaria Control Strategies Program, Bangladesh began to move away from DDT use based on growing global evidence that DDT was harmful to the environment. By 1998 DDT was banned in Bangladesh.<sup>99</sup>

#### IMPLEMENTATION POST-2000

In 2006, WHO released a position statement to recommend the scale-up of IRS as a means to achieving the malaria-related MDGs by 2015.<sup>100</sup> However, Bangladesh did not reintroduce the program because DDT was banned.

By 2013, Bangladesh reintroduced IRS, using pyrethroids, implemented by BRAC's shasthya shebikas and government CHWs. This time, according to KIs, Bangladesh rolled out a hotspot spraying approach in which areas with the highest malaria incidence were targeted rather than the blanket spraying approach of all endemic districts used pre-1998, in order to ensure feasibility. According to KIs, the adoption of a hotspot approach was informed by research which found that vector-control interventions like IRS, although ordinarily expensive, were more feasible and cost-effective when directed at hotspots.<sup>101</sup> As part of the hotspot approach the surveillance unit of the malaria program reviewed annual malaria incidence data from the HMIS and determined the hotspot status of sub-district areas.

Bangladesh's IRS program continued to experience challenges in implementation, including adopting a suitable insecticide and procuring machines. A KI explained, *"in principle, the same insecticide shouldn't be used for LLIN and IRS. But we couldn't actually select the alternate insecticide. So for the time being we are using pyrethroid for both LLIN and IRS, but we have to select which insecticide to use for IRS. Also, I would say IRS is not still in the full swing but gradually we are increasing our capacity like machine."*

Table 22. IRS implementation outcomes

| Implementation Outcomes | Implementation Strategies  | Evidence   |
|-------------------------|--|--|
| Appropriateness         | Data use to determine hotspots and approach  | (+): IRS introduction in endemic areas and hotspots reflected high malaria incidence |
| Feasibility             | Data use to limit coverage to endemic areas and then hot-spot approach<br>Leveraging donor support<br>Leveraging partner support for implementation: shasthya shebikas | (+): IRS implemented in targeted endemic areas and then hotspots                     |

| Implementation Outcomes    | Implementation Strategies                                | Evidence   |
|----------------------------|--|--|
|                            | Leveraging existing systems: government CHWs             |  |
| Effectiveness and coverage | Hot-spot approach  | (+): U5M attributable to malaria dropped. See ITNs section.<br><br>Data on IRS coverage were unavailable for the team to review. |
| Equity                     | Focus on equity: targeted interventions in endemic areas | Data on equity of coverage of IRS were unavailable for the team to review.   |

## 4.2 Other Vaccine-Preventable Diseases

Table 23. Other vaccine-preventable diseases key implementation strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"> <li>• Stakeholder engagement</li> <li>• Multi-sector approach</li> <li>• Leveraging, strengthening and integration into existing systems <ul style="list-style-type: none"> <li>◦ Data systems strengthening</li> <li>◦ Cold chain strengthening</li> </ul> </li> <li>• Data use for decision-making <ul style="list-style-type: none"> <li>◦ Monitoring and evaluation</li> <li>◦ Micro-planning</li> <li>◦ Surveillance</li> </ul> </li> <li>• Community-based delivery</li> <li>• Outreach (for service delivery)</li> <li>• Decentralization of service delivery</li> <li>• Community engagement</li> <li>• Leveraging donor support</li> <li>• Leveraging partner support (service delivery)</li> <li>• Phased scale-up</li> <li>• Training (TOT)</li> <li>• Supervision</li> <li>• Ensuring government budget/funding including increase in budget</li> <li>• Differentiated strategy in urban versus rural</li> <li>• Focus on equity</li> </ul> |

Bangladesh launched its Expanded Programme on Immunization (EPI) in 1979, delivering six vaccinations: diphtheria, pertussis, tetanus (DPT), Bacillus Calmette–Guérin (BCG), polio and measles vaccines. The EPI was delivered through national-, divisional-, and district-level hospitals only. Between 1979-1984, coverage remained

low – at less than 2% in 1984 – and as a result, by 1985, Bangladesh committed to achieving universal child immunization by 1990, as recommended by WHO.<sup>82</sup>

Bangladesh’s strategy to achieving universal child immunization included setting up the interagency coordinating committee in 1985, with members including civil society representatives such as BRAC (national) and Rotary International (international), donors, MOHFW, and the Ministry of Finance, to provide oversight for all activities of the EPI within the country. (See also PCV, Rotavirus Vaccination, and Hib Vaccination sections.) Outreach sessions for vaccine service delivery were also introduced, with eight outreach centers set up in each ward (with an approximate catchment population of 1,000) to conduct vaccination sessions once each month. The outreach sessions targeted children below age 1 year and women of childbearing age. (See Neonatal Interventions section for details of vaccinations for women of childbearing age.) Further, vaccination services were introduced to sub-district and union-level facilities.

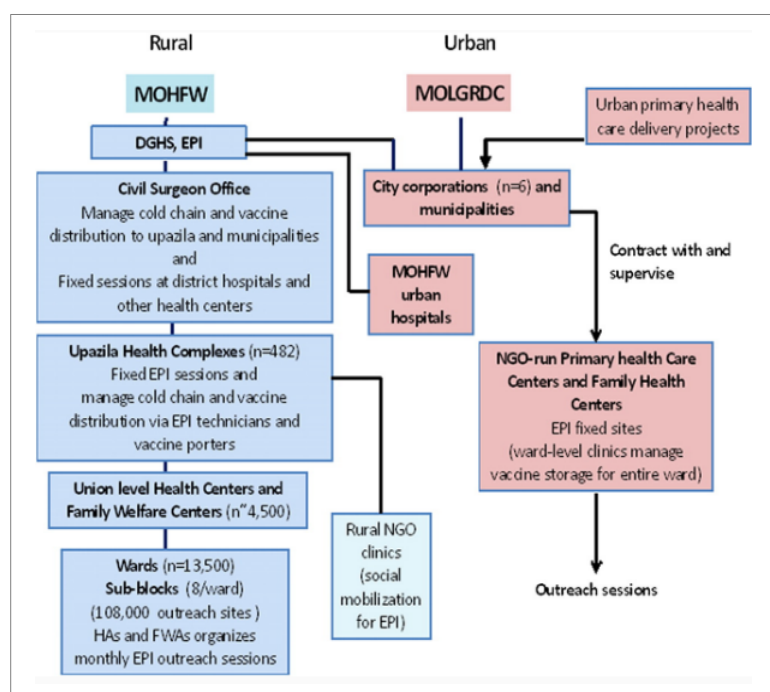


Figure 19. Structure of Bangladesh’s EPI Program (2011) (Source: Koehlmoos et al. 2011)

In order to ensure feasibility of this new decentralized approach, the Government of Bangladesh designated oversight of the EPI program in urban areas to the Ministry of Local Government, Rural Development and Co-operatives (MOLGRDC), city corporations, and municipal authorities which subcontracted vaccine service delivery including outreach sessions to NGOs such as BRAC’s SK implemented vaccinations in urban areas (Figure 22).

In rural areas, the civil surgeon’s office at the district level maintained oversight for all subnational vaccination services and NGOs were only engaged to support social mobilization and community engagement activities.<sup>102</sup> (See Introduction for structure of Bangladesh’s health system.)

As a result of these efforts, by 1993-94, vaccination coverage, especially BCG at 85%, had improved, although gaps remained, with DHS data showing that just 59% of children aged 12-23 months had received all eight basic immunizations doses (BCG, three doses of DPT, measles, and three doses of polio).<sup>52</sup>

In 2000, at the beginning of the study period, Bangladesh’s immunization program provided six vaccinations for children: polio vaccine, DPT vaccine, BCG, and measles vaccine. Between 2000 to 2015, Bangladesh introduced four new vaccines to its national immunization program, including hepatitis B vaccine Hib (as part of pentavalent vaccine), rubella vaccine, and PCV. These vaccines were introduced in response to WHO and GAVI recommendations and available support as well as reflecting available national data on disease burden. Between 2000-2015, the proportion of children aged 12-23 months who had received all eight basic immunization doses

increased from 60% in 2000 to 73% in 2004, 82% in 2007, and 84% in 2014, although inequity gaps persisted with 50% and 75% of children in the poorest and wealthiest quintiles, respectively, in 1999-2000, receiving all eight vaccines compared to 69% and 92%, in 2014.<sup>52,23</sup>

#### **4.2.1 Haemophilus Influenzae Type B (Hib) Vaccination**

##### **EXPLORATION**

Through much of the late 1980s and 90s, half of all high-income countries had introduced Hib vaccine into their immunization programs. However, the high cost of the vaccine, despite understanding of Hib disease burden, limited expansion into LMICs such as Bangladesh. For example, as early as 1987-1994, Bangladesh conducted a laboratory-based study of diagnosed bacterial meningitis at the Dhaka Shishu Hospital and found that 47% of cases were caused by Haemophilus influenza with 98% of these cases caused by type b strains (Hib). The study provided evidence for the increase of Haemophilus influenzae meningitis in Bangladesh and strongly recommended the introduction of Hib vaccination.<sup>103</sup>

In 2000, when GAVI was established, it immediately began a program to increase Hib use globally through its New Underused Vaccine Support program. This was followed by a global four-year GAVI grant of US\$37 million in 2005, to improve Hib uptake, and WHO's recommendations for all countries to include Hib in their immunization programs.<sup>104</sup> According to KIs, the availability of GAVI funding motivated Bangladesh's decision to begin considering the introduction of the Hib vaccine.

In June 2006, Bangladesh held a consultative workshop led by the interagency coordination committee, to review Hib disease burden and prevention, as well as determine technical, programmatic, and costing implications of Hib vaccine introduction. The World Bank, WHO, and UNICEF were also participants at the consultative workshop. At the end of the workshop, Bangladesh made the decision to introduce Hib, as part of the Pentavalent vaccine which also included DPT and Hepatitis b vaccines, based on the high disease burden in the country and evidence from other countries showing high effectiveness of the vaccine: between 90-99% of children developed antibodies after three doses of Hib vaccine.<sup>83</sup>

##### **PREPARATION**

In 2007, led by the interagency coordinating committee, preparations for the introduction of Hib vaccine began with a cold chain equipment assessment which found that the storage capacity of cold chain systems nationwide was sufficient for Hib vaccine introduction as a result of cold chain strengthening activities conducted for the measles campaign in 2005 and 2006. (See also Measles section.) Micro-planning to determine vaccine needs for each district was also done. Data collection and reporting forms and vaccination cards were updated to include Hib vaccine as part of Pentavalent vaccine, materials including posters and leaflets for community engagement were developed and printed, and radio and television commercials were used to generate awareness of the introduction of the vaccine. Further, the e-HIS system was updated to include pentavalent vaccine including Hib.

##### **IMPLEMENTATION**



Introduction of Hib vaccine as part of pentavalent vaccine was originally planned for 2008, however, this was postponed because of a delay in receipt of the vaccine introduction grant from GAVI which hindered the development and printing of training and communication materials. Also, the country still had Hepatitis b vaccines in stock which would have gone to waste with the introduction of pentavalent vaccine which was the strategy for Hib introduction. As a result, the vaccine was rolled out in phases beginning in Khulna district in January 2009 and nationwide by July 2009. This phased introduction strategy was important to ensure training of all vaccination service delivery personnel before nationwide rollout.

A national-level TOT of vaccination service delivery personnel was conducted and the national-level personnel cascaded the training to district, sub-district (upazila), and union-level personnel.

The introduction and continuous implementation of Hib vaccination as part of pentavalent was co-financed by GAVI with Bangladesh responsible for 20% of the cost.

A post-Introduction evaluation in March 2012 showed disparities in quality of implementation between rural and urban areas. In rural areas which were managed by the MOHFW, strong stakeholder and community engagement led to high levels of Hib (pentavalent vaccine) acceptance among service providers and communities. The study also found that cold chain and logistics for pentavalent vaccine were well planned and managed during the roll-out and ongoing implementation of Hib vaccination. Quality was also seen with correct injection techniques, use of auto-disable syringes, and proper filling of safety boxes observed among service providers in rural areas – although the evaluation found that disposal of safety boxes was not correctly done in some health facilities. Finally, in rural areas, the evaluation found that there were CHW and supervisor vacancies, mainly due to frequent turnover of mid-level managers, which led to inadequate supervision of vaccination service delivery.<sup>105</sup>

In urban areas on the other hand, parents were found to be unaware of the dates and locations of immunization sessions because of poor community engagement. Similar to findings in rural areas, shortage of vaccination service supervisors and vaccinators were found despite the strategy of using in-country NGO staff. The underlying cause was also high staff turnover, particularly in Dhaka City Corporation, and the vacancies resulted in sub-optimal service delivery and supervision.

Table 24. Hib vaccine implementation outcomes

| Implementation Outcomes | Implementation Strategy   | Evidence  |
|-------------------------|---|---|
| Appropriateness         | Data use to understand disease burden<br>Data use for decision-making: global data  | (+): Decision to introduce Hib was based on the high disease burden in the country and evidence of effectiveness from other countries. <sup>83</sup>  |
| Acceptability           | Stakeholder engagement: civil society representatives e.g. BRAC and Rotary International, donors, Ministry of Finance, as part of interagency coordinating committee, consultative workshop during exploration. | (+): In rural areas, strong stakeholder and community engagement led to high levels of Hib acceptance among service providers and communities.<br><br>(-): In urban areas, poor community engagement resulted in lower knowledge among parents. |

| Implementation Outcomes    | Implementation Strategy   | Evidence   |
|----------------------------|---|--|
|                            | Community engagement: posters, radio, television  |  |
| Feasibility                | <p>Leveraging donor support: GAVI (co-funding)</p> <p>Micro-planning</p> <p>Leveraging existing systems: cold chain strengthening efforts for measles campaign, CHWs, transfer of responsibility for urban vaccine service delivery to in-country NGOs and oversight and storage to MOLGRDC and community clinics respectively.</p> <p>Data systems strengthening: integration of Hib into e-HIS, adaptation of vaccination cards and data reporting forms</p> <p>Phased scale-up</p> | <p>(-): 1-year delay due to delay in receipt of the vaccine introduction grant from GAVI, delaying development and printing of training and communication materials.</p> <p>(+): Hib was rolled out in Khulna district in January 2009 and nationwide by July 2009.</p> <p>(+): In rural areas, cold chain and logistics for Hib vaccine were well planned and managed during the roll-out and ongoing implementation.</p> |
| Effectiveness and coverage | <p>Micro-planning</p> <p>Phased scale-up</p> <p>Leveraging existing systems including NGOs</p> <p>Decentralization of authority and responsibility</p> <p>Differentiated strategy in urban versus rural</p>   | <p>(+): Hib3 immunization coverage among 1-year-olds remained relatively stable: 93% in 2007 and 2011, 91% in 2014.<sup>55,82</sup></p> <p>(+): IHME estimates showed deaths per 100,000 children under 5 from meningitis decreased from 12/100,000 in 2005, to 4.5/100,000 in 2016. The proportional contribution to U5M did not change (0.8% to 0.7%) and could have been due to PCV.<sup>24</sup></p>                   |
| Fidelity                   | <p>Training (TOT)</p> <p>Supervision</p>  | <p>(+/-): In rural areas, correct injection techniques, use of auto-disable syringes, and proper filling of safety boxes were observed among service providers in rural areas although the disposal of safety boxes was not correctly done in some health facilities.</p> <p>(-): Inadequate supervision in urban and rural areas due to staff turnover and vacancies.</p>   |
| Sustainability             | <p>Increase in budget</p> <p>Integration into e-HIS and vaccination cards and overall government policy</p>   | <p>(+): The budget for vaccines as part of the 5th SWAp was increased.</p> <p>(+): Vaccine coverage rates for pentavalent vaccine remained high</p>  |
| Equity                     |   | (+/-): Although Figure 23 shows overall high coverage for all wealth quintiles in 2014, some disparities were seen   |

| Implementation Outcomes | Implementation Strategy | Evidence  |
|-------------------------|-------------------------|---|
|                         |                         | with 81% coverage among the poorest quintile compared to 97% among the wealthiest. <sup>106</sup> |

## SUSTAINMENT

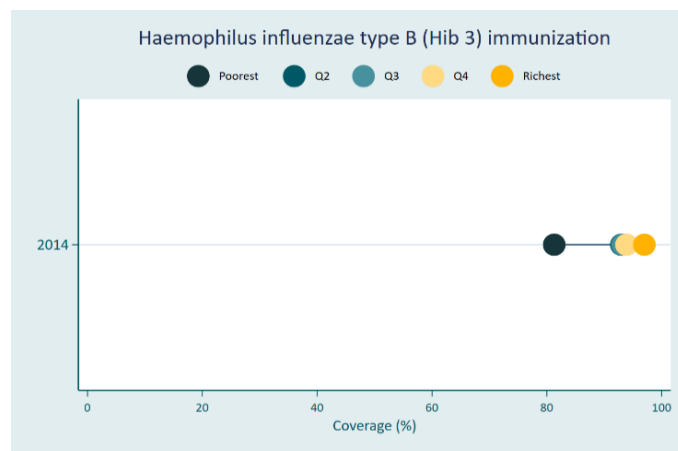


Figure 20. Equity and Coverage Outcome: Hib3 Vaccine in Bangladesh across Wealth Quintiles (2014) (Source: Victora, et al 2018)

The budget for vaccines as part of the fifth SWAp, the HPNSDP 2017-2021, was increased. Vaccine coverage rates for pentavalent vaccine remained high.

## 4.2.2 Measles Vaccination

### IMPLEMENTATION PRE-2000

Measles vaccine was introduced in 1979, as part of Bangladesh's EPI. Between 1979-2015, one dose of the measles vaccine (MCV1) was administered at nine months of age, through facility-based vaccination sessions and outreach, described in the overall vaccine section introduction. Coverage of measles vaccine was moderately high in 1993-94 at 69%, though it remained relatively unchanged by 1999-2000 at 71%,<sup>102</sup> well below the level needed to stop transmission.

### IMPLEMENTATION AND ADAPTATION POST-2000

According to KIs, throughout the 1990s Bangladesh continued to experience measles outbreaks, reflecting the coverage of measles vaccination for only about two-thirds of the population. As a result, by 2003, Bangladesh set up a measles surveillance system to investigate these outbreaks. The measles surveillance system was established to leverage the existing acute flaccid paralysis surveillance system for polio detection including its surveillance medical officers.

By 2004, Bangladesh introduced a Measles Control Action Plan (MCAP, 2004-2010) in response to an outbreak (Figure 23), based on WHO and UNICEF recommendations, with the view to further improving coverage from 76% in 2004 to 90% by 2010. The 90% goal reflected global evidence that 90-95% coverage was needed to ensure sufficient herd immunity given that the efficacy of the MCV1 was only 85%. As a result, Bangladesh decided to introduce catch-up supplementary immunization activities (SIAs) to provide children who had missed their



recommended single dose with a second opportunity to receive the measles vaccine.<sup>102</sup> The first measles SIA was planned for 2005-06.

Preparations for the implementation of the measles SIA included cold chain assessment and strengthening with support from UNICEF, to ensure sufficient capacity for the extra measles vaccines to be procured. Prior to roll-out, health workers were trained for two days by national-level personnel. Community and stakeholder engagement activities targeting teachers, professional bodies, the media, and communities were conducted as well, to ensure awareness and acceptance of the SIA. HAs and FWAs led the community engagement activities.

As planned, Bangladesh conducted a measles SIA in 2005-06 to vaccinate more than 35 million children aged 9 months to 10 years. The decision to set the upper age limit at 10 years was based on data showing that 89% of all serologically confirmed cases of measles between 2004-05 in Bangladesh were among children under age 10. The SIA achieved very high coverage (101%) with 36 million children receiving the measles vaccine; 1.5 million children were immunized during the first phase (2005) and 34.2 million during the second phase (2006).<sup>107</sup>

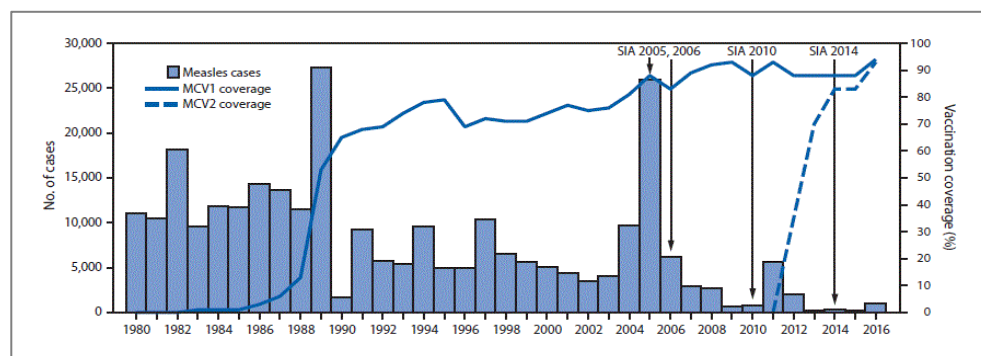


Figure 21. Measles cases, vaccination coverage and supplementary immunization activities (1980-2016) (Source: CDC, 2017)

Following the implementation of the measles SIA, the number of measles cases dropped, from 25,934 in 2005 (during an outbreak) to 6,192 in 2006, and 718 in 2009 (Figure 24).<sup>107</sup>

In 2009, Bangladesh's measles surveillance system was adapted from an outbreak-based approach to a case-based surveillance with laboratory confirmation, to further improve its effectiveness. An assessment of this laboratory confirmation approach was unavailable for the team to review.

The success of the 2005-06 SIA in reaching the targeted populations and decline in measles cases motivated Bangladesh's decision to conduct another SIA in 2010. Preparations for the 2010 measles SIA were the same as for 2005-06 including trainings, community and stakeholder engagements, and cold chain assessments, though cold-chain strengthening was not required due to sufficient cold chain capacity. However, in 2010 Bangladesh focused on children aged 9 months to 5 years to ensure children who were born between 2006-2010 received the vaccination. The 2010 SIA achieved very high coverage (100%) with 18.1 million children vaccinated, although an evaluation conducted in 2011 found that in some rural areas, the numbers of refrigerators and cold boxes were inadequate.<sup>83,102</sup>

Despite this work, in 2010 and 2011, Bangladesh's surveillance data began to identify an increase in measles incidence from 5.3/1,000,000 people in 2010 to 37.4/1,000,000 in 2011, with 86% of laboratory confirmed cases among children under age 15. Similarly, rubella cases were also found to be high, with an incidence of

87/1,000,000 people in 2010 and 37/1,000,000 in 2011, with a majority of the laboratory-confirmed rubella cases (84% in 2010 and 77% in 2011) in children under age 15. As a result, Bangladesh began considering introducing a second dose of measles vaccine with a dose of rubella vaccine (measles-rubella) into its routine immunization system.<sup>83</sup>

With the support of UNICEF, cold chain assessments conducted at national, district, and sub-district levels found sufficient capacity at the subnational level but cold chain capacity was expanded to accommodate the introduction of the measles-rubella vaccine at the central level. With GAVI support, training materials were developed, required documentation and information systems including record-keeping, reporting forms, vaccination cards, and e-HIS were updated, and facility-level personnel and CHWs were trained.

In 2012, with co-funding support from GAVI (lasting through 2017), Bangladesh introduced the measles-rubella vaccine to be administered as the second measles vaccine to children aged 15-18 months. In order to reach children up to the age of 15, adolescent girls attending tetanus vaccination were also administered the measles-rubella vaccine (see Section 4.6 Neonatal Interventions).

In 2014, another nationwide SIA was conducted using the measles-rubella vaccine. It targeted 53 million children aged nine months to 15 years and achieved 100% coverage.

According to DHS data, nationwide measles vaccination coverage had increased to 86% in 2014, although still remaining below the 90% target set by the Government of Bangladesh for 2010. According to IHME estimates, deaths per 100,000 children under 5 due to measles decreased from 119/100,000 in 1990 to 41/100,000 in 2000, 18/100,000 in 2005 just after the first SIA, and 0.6/100,000 in 2016 after the case study period ended.<sup>24</sup>

*Table 25. Measles vaccination implementation outcomes*

| Implementation Outcomes | Implementation Strategy  | Evidence  |
|-------------------------|--|---|
| Appropriateness         | Data use to understand disease burden<br><br>Data use for decision-making: Under-15s (U15s) were targeted for measles-rubella vaccine based on incidence data  | (+): SIAs introduced in response to increase in cases.<br><br>(+): Bangladesh introduced 2 <sup>nd</sup> dose of measles vaccine which was measles-rubella vaccine based on data showing high incidence of measles and rubella.                                       |
| Acceptability           | Community engagement: teachers, professional bodies<br>Stakeholder engagement  | (+): See effectiveness and coverage data.   |
| Feasibility             | Leveraging existing systems: including CHWs, the existing acute flaccid paralysis surveillance system for polio detection to include measles<br>Cold chain strengthening<br><br>Leveraging donor support: UNICEF, GAVI | (-): A 2011 evaluation found that for the 2010 SIA, in some rural areas, the numbers of refrigerators and cold boxes were inadequate.<br><br>(+): 2005, 2010, and 2014 SIAs achieved very high coverage of 100% or above – see effectiveness and coverage data below. |

|                            |   |  |
|----------------------------|---|--|
|                            | Leveraging partner support: UNICEF<br>Data systems strengthening: adaptation of e-HIS, vaccination cards and data reporting forms   |  |
| Effectiveness and coverage | <p>Surveillance<br/>SIA<br/>Data use for decision-making: SIAs were designed to address identified gaps based on surveillance data.</p> <p>Adaptation based on data: adaptation of surveillance approach, for effectiveness, 2<sup>nd</sup> dose and use of measles-rubella vaccine.</p> <p>Leveraging existing vaccination systems: incorporating 2<sup>nd</sup> vaccine into tetanus vaccination efforts to vaccinate girls under age 15.</p> | <p>(+): Coverage of measles vaccine was high: 69% in 1993-94 and 71% by 1999-2000.<sup>52</sup></p> <p>(+): The 2005-2006 SIA achieved very high coverage (101%): 36 million children received the measles vaccine. 1.5 million children were immunized during the first phase (2005) and 34.2 million during the second phase (2006).<sup>107</sup></p> <p>(+): Following the implementation of the 2005-2006 measles SIA, the number of measles cases dropped from 25,934 in 2005 (during an outbreak) to 6,192 in 2006 and 718 in 2009.</p> <p>(+): The 2010 SIA achieved very high coverage (100%) with 18.1 million children vaccinated.</p> <p>(+): The 2014 SIA achieved 100% coverage with 53 million children vaccinated.</p> <p>(+/-): According to DHS data, nationwide measles vaccination coverage was high at 86% in 2014, though below the 90% target set by the Government of Bangladesh for 2010.</p> <p>(+): A 2017 report showed between 2000–2016, confirmed measles incidence decreased from 34.2 to 6.1 per million people, a decrease of 82%.<sup>107</sup></p> <p>(+): U5M attributable to measles decreased.<sup>24</sup></p> |
| Fidelity                   | Training (TOT)  | Not found  |
| Sustainability             | <p>Ensuring government budget/funding</p> <p>Integration into e-HIS and update of vaccination cards</p>   | <p>(+): In 2017, after the case study period ended, GAVI co-funding for measles-rubella vaccine stopped; Bangladesh government began procuring the vaccine.</p>  |
| Equity                     | Focus on equity: reaching girls U15 through tetanus immunization sessions   | <p>(+/-): Although measles vaccination coverage increased across wealth quintiles between 1993-2014 (Figure 25), similar gaps in coverage between the poorest and wealthiest quintiles persisted between 1993-94 and 2014.</p>   |

## SUSTAINMENT

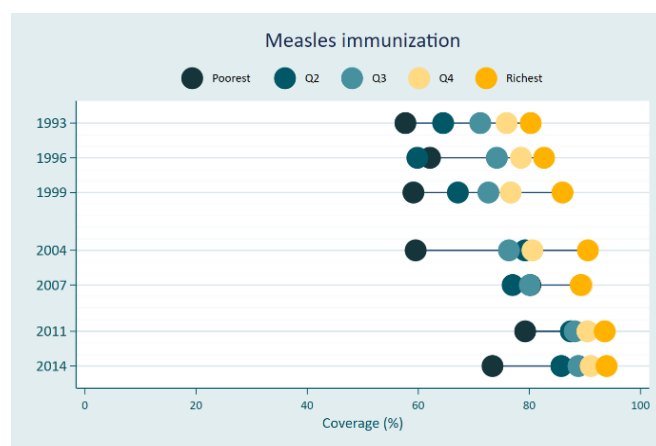


Figure 22. Equity and Coverage Outcome: Measles Vaccination in Bangladesh Across All Wealth Quintiles (1993-2014) (Source: Victora, et al 2018)

In 2017, after the case study period ended, GAVI co-funding for measles-rubella vaccine stopped and the Government of Bangladesh began procuring the vaccine. Also, according to a report published in 2017, between 2000–2016, confirmed measles incidence decreased from 34.2 to 6.1 per million people, a decrease of 82%.<sup>107</sup>

By 2019, KIs mentioned that measles outbreaks continued to occur due to a coverage rate below 95%.

## 4.3 HIV

Table 26. HIV Program Key Implementation Strategies

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"> <li>• Multi-sectoral approach</li> <li>• Stakeholder engagement</li> <li>• National leadership and accountability</li> <li>• Integration into policy</li> <li>• Adaptation of global guidelines for local context</li> <li>• Data use for decision-making</li> <li>• Data use for prioritization</li> <li>• Monitoring and evaluation</li> <li>• Leveraging donor support</li> <li>• Leveraging partner support</li> <li>• Small-scale testing</li> <li>• Training</li> <li>• Focus on equity</li> </ul> |

### **4.3.1 Antiretroviral for Prevention of Mother to Child Transmission and Treatment for Infants, Children**

#### **EXPLORATION**

In 1985, four years before the first case of HIV was identified in Bangladesh, the country initiated an early response by setting up the multi-sectoral National AIDS Committee headed by the president and with members from NGOs, MOHFW, and other ministries such as the Ministries of Education; Youth and Sports; Finance; Information; Home Affairs; Law; Justice and Parliamentary Affairs; Women's Affairs; Religious Affairs; and local government, to provide oversight and implement all HIV/AIDS programming activities in the country. Throughout the late 1980s and early 1990s, the main focus of the National AIDS Committee was awareness-raising and prevention campaigns targeted at at-risk populations, including female sex workers, injecting drug users, men who have sex with men, and transgendered people (*hijra*).

By 1996, recognizing the increasing number of HIV cases – from two in 1990 to 46 in 1996 – Bangladesh outlined a national HIV policy which was also reflected in the first National HIV/AIDS Strategic Plan (1997–2002).<sup>108</sup> Although the strategic plan noted that PMTCT efforts had been lacking in Bangladesh's previous HIV/AIDS control approach, HIV screening as part of ANC, a key component of PMTCT, was not included in the plan because it was not cost-effective and HIV testing would not be epidemiologically sensitive, given the overall low prevalence of HIV (less than 1%). The strategic plan however recommended the development of a voluntary counseling and testing protocol to continue to target at-risk populations such as female sex workers as a means to preventing MTCT by preventing primary HIV transmission. The National Strategic Plan (1997-2002) included counseling on breastfeeding and delivery options for HIV-positive pregnant women, but did not include any guidelines on ARV treatment for pediatrics or ARV treatment for pregnant women, further reflecting Bangladesh's low prioritization of PMTCT and pediatric-specific interventions, given the low HIV prevalence within the country.

In 1998, in coordination with the National AIDS Committee, Bangladesh set up the National AIDS/Sexually Transmitted Diseases (STD) Programme at the MOHFW to take over implementation of all HIV/AIDS programming within the country, reflecting a focus on systems and sustainability. The Second National HIV/AIDS Strategic Plan (2004-2010) was also developed.

#### **PREPARATION**

##### ***PMTCT***

In 2006, Bangladesh introduced its first comprehensive guideline for PMTCT, based on WHO recommendations.<sup>109</sup> These guidelines included ensuring safer delivery practices for HIV-positive pregnant women; infant feeding options, support, and counseling; and ARV therapy/prophylaxis for PMTCT.<sup>110</sup> For ARV therapy for PMTCT, Bangladesh decided to introduce option B, triple ARV prophylaxis starting at 14 weeks of gestation and continued till delivery or one week after the exposure of the infant to breast milk had ended. The recommended medicines for option B included:

- Zidovudine (AZT) + Lamivudine (3TC) + Lopinavir/Ritonavir (LPV/r) or
- AZT + 3TC + Abacavir (ABC) or
- AZT + 3TC + Efavirenz (EPV) or
- Tenofovir (TDF) + 3TC + EPV



Bangladesh did not adopt Nevirapine as an option for its ARV therapy for PMTCT because of Nevirapine's hepatotoxicity in women with Cluster of Differentiation 4 (CD4) counts of less than 350/mm.<sup>3,109</sup> For the newborn, Bangladesh adopted daily Nevirapine or twice daily AZT from birth until age four to six weeks, irrespective of breastfeeding.

### ***Pediatric ARV Treatment***

In 2006, Bangladesh also developed guidelines for pediatric ARV treatment. Reflecting WHO guidelines, Bangladesh guidelines recommended beginning treatment of all HIV-positive children aged 0-24 months, irrespective of CD4 count or clinical stage of HIV infection, with CD4 count-based initiation standards for older children.

## **IMPLEMENTATION**

### ***PMTCT***

In January 2007, small-scale testing of the PMTCT program was initiated with technical and financial support from UNICEF, and icddr,b as its implementation partner. The PMTCT program was rolled out in one national university hospital in Dhaka, which was selected because Dhaka had the highest HIV prevalence at the time. Nurses, midwives, social workers, and counselors were trained on the PMTCT guidelines by icddr,b and UNICEF.

In 2007, only 33% of pregnant women living with HIV received ARV treatment as part of PMTCT, dropping to 14% in 2010.<sup>110</sup> Although early infant diagnosis increased from 2% in 2010 to 10% in 2015, it remained low. These low coverage rates may have reflected the limited scale of the PMTCT program.

### ***Pediatric ARV Treatment***

The small-scale testing of the PMTCT program also incorporated a pediatric ARV treatment component.

## **ADAPTATION DURING IMPLEMENTATION**

In 2011, as part of the third National HIV/AIDS Strategic Plan (2011-2015), the PMTCT program and pediatric ARV treatment component was scaled up to two additional national level hospitals in Chittagong and Sylhet.

According to DHS 2014 data, the proportion of women who had ever been married who had knowledge of MTCT of HIV during pregnancy was 56% while 44% knew about the risk of transmission during delivery and 55% knew about the risk of MTCT during breastfeeding. Compared to DHS 2011 data, knowledge of MTCT of HIV during pregnancy and delivery had decreased slightly (from 59% and 48% respectively) with no change in breastfeeding knowledge.

According to IHME estimates, while U5 deaths attributable to HIV/AIDS has increased between 2000-2016, it remains very low at 0.08 per 100,000 children under 5 (0.01% of all deaths) in 2016, from 0.04/100,000 (0.003%) in 2005, and 0.009/100,000 (0.0005%) in 2000.<sup>24</sup>



Table 27. ARV for PMTCT implementation outcomes

| Implementation Outcomes    | Implementation Strategies  | Evidence   |
|----------------------------|--|--|
| Appropriateness            | Data use:<br>on prevalence and increased knowledge and availability of effective PMTCT and treatment     | (+): PMTCT and pediatric ARV treatment introduction reflected rising HIV prevalence and global standards and evidence of effectiveness<br><br>(+): Voluntary counseling and testing for at-risk populations as opposed to a comprehensive PMTCT program because of low prevalence  |
| Acceptability              | Multi-sectoral approach<br><br>Stakeholder engagement  | (Undetermined): Although low coverage data suggested low acceptability, this may have been due to the limited scale of both PMTCT and pediatric ARV efforts.   |
| Feasibility                | Leveraging donor support: UNICEF<br><br>Leveraging partner support: icddr,b for implementation, training | (-): In 2017, PMTCT was rolled out in only 3 national university hospitals.<br><br>(-): Data from 2017, after the case study period ended, showed 31% of HIV infected children aged 0-14 years were receiving treatment, <sup>111</sup> an increase from 2010 data (12%), it still remained low.   |
| Effectiveness and coverage | Small-scale testing and selection of a high prevalence area (Dhaka) for testing effectiveness            | (+/-): In 2007, only 33% of pregnant women living with HIV received ARV treatment as part of PMTCT and this proportion dropped to 14% in 2010 and 17% in 2017. <sup>110,111</sup><br><br>(+/-): New cases of children (aged 0-14) with HIV remained at <100 between 2007-2015 although the proportion of children aged 0-14 diagnosed late (with CD4 <350 mm <sup>3</sup> ) was over 95% in 2017. <sup>111</sup><br><br>(-): Although early infant diagnosis increased, it remained low from 2% in 2010 to 10% in 2015. <sup>111</sup><br><br>(-): Data from 2017 (after the case study period ended) showed that only 31% of HIV infected children aged 0-14 years were receiving treatment. <sup>111</sup> Although this was an increase from 2010 data (12%), it still remained low.<br><br>(+/-): While U5 deaths attributable to HIV/AIDS has increased between 2000-2016, it remains very low at 0.08 per 100,000 children under 5 (0.01% of all deaths) in 2016 unchanged from 2000 (0.009/100,000 or 0.0005%). <sup>24</sup> |
| Fidelity                   | Training<br><br>Monitoring and evaluation<br>National leadership and                                     | (-): Although Bangladesh has a national policy guiding viral load testing and monitoring antiretroviral therapy in HIV-positive patients (including in pregnancy and pediatric cases), they were not adhered to. <sup>111</sup>  |

| Implementation Outcomes | Implementation Strategies   | Evidence  |
|-------------------------|---|---|
|                         | accountability: National AIDS Committee and National AIDS/STD Programme                                 |   |
| Sustainability          | Integration into policy   | <p>(+): National HIV policy developed in 1997</p> <p>(+): National Strategic Plans developed in 1997, 2004, 2011</p> <p>(+): National AIDS/STD Programme in MOHFW, set up in 1998.</p> <p>(+): Bangladesh continued to increase the funding allocated to HIV programming efforts.<sup>112</sup></p> <p>(-): In 2017, PMTCT was rolled out in only 3 national university hospitals. The PMTCT program also continued to be supported by donor funding (UNICEF) with implications for sustainability.</p> |
| Equity                  | Focus on equity: focus on higher prevalence areas and vulnerable populations (where need was greatest). | Not found.  |

## **SUSTAINMENT**

Bangladesh continued to increase the funding allocated to HIV programming efforts, including PMTCT and pediatric treatment with ARV. For example, for the third health sector program, the Health, Population and Nutrition Sector Development Program (HPNSDP, 2011-2016), the operational plan for the National AIDS/STD Programme was allocated US\$24.4 million while for the fourth health sector program, the HNPSSP, 2017-2022, approximately US\$47 million was allocated.<sup>112</sup> The PMTCT program also continued to be supported by donor funding (UNICEF) with implications for sustainability.

After the case study period ended, HIV programming efforts were still focused on vulnerable populations representing highest need and traditionally underserved populations including commercial sex workers. In 2017, United Nations Population Fund (UNFPA), UNICEF, and Joint United Nations Programme on HIV and AIDS (UNAIDS) were planning to implement a PMTCT program among brothel sex workers, in collaboration with the Government of Bangladesh.

Further, research conducted in 2017, found that Bangladesh had a national policy guiding viral load testing and monitoring antiretroviral therapy in HIV-positive patients including in pregnancy and pediatric cases. However, they were not adhered to, posing a potential threat to longer term effectiveness.<sup>112</sup>





## 4.4 Malnutrition

Children under the age of 5 are classified as malnourished on the basis of three anthropometric indices: stunting (height-for-age), wasting (weight-for-height), and underweight (weight-for-age). Malnutrition was the focus of U5M reduction activities before 2000 and continued during and after the study period. Overall, stunting, wasting, and underweight prevalence decreased between 1996-97 and 2014 but remained at high levels. Stunting decreased from 60% in 1996-97 to 43% in 2007 and 36% in 2014 (Table 6) while wasting was at 21% in 1996-97, dropping to 17% in 2007 and 14% in 2014. Similarly, prevalence of underweight children dropped from 52% in 1996-97 to 41% in 2007 and 33% in 2014.

Much of Bangladesh's nutrition efforts focused on addressing malnutrition broadly, mainly through the BINP (1995-2002) which was scaled up and renamed the NNP (2002-2011). These programs are discussed below.

Table 28. Broader Nutrition Interventions Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"><li>• Leveraging partner support</li><li>• Focus on equity</li><li>• Leveraging donor support</li><li>• Supervision</li><li>• Community engagement</li><li>• HR strengthening (recruitment, training)</li><li>• Incentivization (supply)</li><li>• Community-based delivery</li><li>• Fixed-site community-based delivery</li><li>• Outreach</li><li>• Leveraging and strengthening existing systems</li><li>• Data systems strengthening</li><li>• Data use for decision-making</li><li>• Data use for adaptation</li><li>• Monitoring and evaluation</li><li>• Data use to understand disease burden</li></ul> |

### 4.4.1 Malnutrition Interventions

#### IMPLEMENTATION PRE-2000

In 1995, responding to high levels of malnutrition among children and women of childbearing age, the BINP was introduced as the first large-scale nutrition program.<sup>113</sup> Prior to 1995, malnutrition programs were small-scale, donor-funded initiatives which were not designed to reach national scale – such as BRAC's supplementary feeding program. BINP was designed by the Government of Bangladesh in collaboration with icddr,b and was implemented in 12% (61/490) of all sub-districts. The sub-districts were selected to ensure a spread across all the divisions of Bangladesh, though it covered only 16% of the rural population.<sup>114</sup> The program was funded by the Government of Bangladesh with credit from the World Bank International Development Assistance Programme. UNICEF also provided financial support.

Reflecting the implementation strategy used in other EBIs to ensure feasibility, the Government of Bangladesh assigned the implementation of BINP to different NGOs with BRAC leading implementation in 33 sub-districts and other NGOs like Proshika and Thengamara Mohila Sabuj Sangha assigned 26 other sub-districts. In addition, to ensure acceptability, only females were recruited as CHWs – Community Nutrition Promoters – and supervisors – Community Nutrition Organizers – from within implementation communities. Their recruitment was done by NGOs and in collaboration with community leaders. They were trained for 21 days by BINP central-level staff and were paid 1500 Bangladeshi Taka (US\$19) per month to implement the BINP.<sup>36</sup>

BINP was implemented through national- and community-level activities. National-level activities focused on advocacy, policy advice and development of information, education, and communication materials on nutrition-related topics. However, much of BINP's focus was on community-level activities to improve the capacity of communities, households, and individuals to understand and take action on nutritional issues. At the community-level, monthly growth monitoring and promotion for children under age 2 and pregnant and lactating women, nutrition education, and supplementary feeding of malnourished children under age 2 and pregnant and lactating women, as well as promotion of home gardening, were carried out through special community nutrition clinics open six days a week and through outreach activities staffed by the Community Nutrition Promoters and Supervisors.

A BINP project office staffed by personnel seconded from the MOHFW (but separate from the MOHFW), was set up to provide oversight for the program at central level although day-to-day monitoring and supervision of the program were the responsibility of the implementing NGOs. This decision to establish a separate office was taken because, according to a KI, *"in Bangladesh, there were a lot of vertical programs at that point in time... I think over 100 vertical programs in the Ministry of Health. The vertical programs were implemented partly because of the success of the immunization program in Bangladesh which was also implemented as a vertical program... and it had some success stories, so everybody wanted to replicate that."*

An evaluation of BINP implementation showed that, overall, it was successful. For example, at the national level, a key accomplishment was the development of the first nutrition policy document – the National Plan of Action for Nutrition – in 1997, which set out Bangladesh's focus on improving nutritional status and reducing malnutrition.<sup>115</sup> At the community level, the evaluation showed a high level of participation in growth-monitoring sessions (75%–95%) and nutrition education sessions (66%) in sub-districts where BINP was implemented. However, the data on coverage and targeting of supplementary feeding for children showed low coverage, with only 21% of eligible children receiving supplementary feeding. In program areas, severe malnutrition dropped from 13% to 0.9% while moderate malnutrition dropped from 32% to 16% between 1995 and 2002, when BINP ended.

Although evaluation findings were mainly positive, they also showed that government oversight and coordination of the program was sub-optimal because the BINP central level staff did not have the requisite management skills. According to KIs, another reason for the sub-optimal oversight was the placement of the BINP office outside the MOHFW, as a vertical program, which negatively affected the MOHFW's ownership of the program as a KI explained. *"This [BINP] was a vertical program and [because the BINP office was separate from the MOHFW] there was kind of attention in the health ministry like who owns this program in the long run? So, they [BINP] were*



*properly not quite linked with the health ministry.”* Evaluation findings also showed that the home gardening promotion component of the program was not successful because of lack of multi-sectoral coordination in its implementation, as a KI explained. *“When we talk about multi-sectoral implementation, [BINP] was vertically implemented as a project of the government so there was very poor linkage with other departments of the government. The home gardening didn’t have that linkage. Though in papers they were supposed to work in collaboration with the agricultural department of the government but that linkage was not there.”* The evaluation also found challenges with the government’s oversight of monitoring and evaluation of community-level activities. Although NGOs were responsible for monitoring and supervising at the community level, at the central level, a management information system (MIS) was to be set up to collate all data and use them for decision-making. By 2002, when BINP ended, this MIS had not been developed.

Further, findings showed that BINP implementation sub-districts were assigned randomly to NGOs without any clustering, which limited communication and coordination between implementing teams of the same NGO, working in different sub-districts.

### IMPLEMENTATION POST-2000

By 2002, drawing from the lessons of the BINP, the program was renamed the NNP and scaled up to a further 79 sub-districts before a national level launch. While the NNP adopted the same approach as the BINP including supplementary feeding, nutrition, and education at the community level, there was an increased emphasis on coordination between the NGOs at the community level and the government at the central level. NNP also ensured adequate monitoring, evaluation, and supervision oversight from the central level for activities carried out at the community level, by setting up the MIS for data collection and decision-making.<sup>114</sup>

Other adaptations to the NNP included the subcontracting of CHW training to BRAC and government institutions (National Institute of Population Research and Training and the Institute of Public Health Nutrition) to ensure feasibility of training, given the increase in implementation sub-districts and number of CHWs to be trained. Learning from BINP, NNP implementation sub-districts were assigned to different NGOs in clusters to ensure coordination among NGO teams working in the different sub-districts.

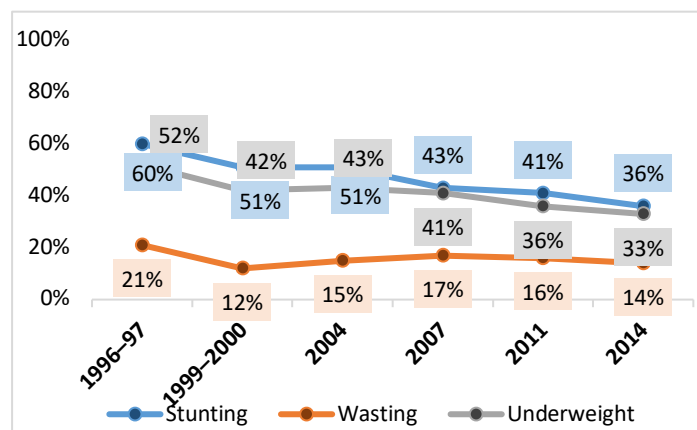


Figure 23. Prevalence of stunting, wasting, and underweight (% under 5) (STAT Compiler)

By 2006, the NNP ended with the full integration of all vertical program into the second SWAp – the HNPS.

Overall, the prevalence of stunting, wasting, and underweight among children dropped during the implementation of the NNP. For example, stunting decreased from 51% in 2004, just after NNP began, to 41% in 2011 when the NNP ended, with drops in underweight (43% in 2004 and 36% in 2011), but slight increase in wasting (from 12% in 2004 to 16% in 2011).

In 2010, following a joint statement by the WHO, the World Food Programme, the United Nations System Standing Committee on Nutrition, and UNICEF calling for Community-based Management of severe acute malnutrition (CMAM) and the use of ready-to-use therapeutic food (RUTF) to combat severe acute malnutrition among children, Bangladesh collaborated with Save the Children to implement a study in Bhola district (Barisal division) to identify the cost-effectiveness of the approach. Bhola district was selected because it had the highest prevalence of acute malnutrition among children at that time.<sup>116,117</sup> The study found that CMAM implementation by CHWs was more cost-effective than facility-based care and was feasible at US\$26 per disability-adjusted life year averted in comparison to US\$1,344 for facility-based care. The study also found that the cost incurred by households to treat children with severe acute malnutrition using CMAM was one-sixth of facility-based treatment.

As a result of these findings, in 2011, national guidelines for CMAM were introduced to allow CHWs treat severe acute malnutrition outside of facilities.<sup>118</sup> The aim was to integrate CMAM into the CB-IMCI program, in addition to counseling for infant and young child feeding already being carried out. However, by 2018, after the case study period ended, CMAM treatment and RUTF use had not been rolled out at the community level. RUTF was being distributed to Rohingya refugee children in Cox's Bazar district (Chittagong division) by Save the Children with support from UNICEF.

Rates of malnutrition remained high (with stunting, wasting, and underweight at 36%, 14%, and 33% respectively in 2014). KIs reported that this was because *“the dietary diversity of the children has not been improved in Bangladesh and at the same time the quality of diet. The diet is mainly carbohydrate [and] density of micronutrients is poor...the macronutrient contents of those diets are also poor.”* Research conducted in 2018 also attributed these high rates to ongoing challenges with food insecurity in Bangladesh, where 35% of the population were food insecure.<sup>119</sup> (See also Section 4.6.3.2 Kangaroo Mother Care.)

Table 29. Broader nutrition interventions implementation outcomes

| Implementation outcomes | Implementation strategy  | Evidence  |
|-------------------------|--|---|
| Appropriateness         | Data use to understand disease burden  | (+): IHME estimates showed malnutrition accounted for 3.7% of US deaths in 1990 with 119/100,000 US deaths attributable to malnutrition. <sup>24</sup><br><br>(+): BINP introduction reflected malnutrition burden in Bangladesh. <sup>113</sup> In 1996-97, stunting prevalence among children was 60% while wasting was 21% and underweight was 52%. Earlier prevalence data were unavailable for the team to review. |
| Acceptability           | HR strengthening (recruitment): recruitment of female Community Nutrition Promoters and Organizers<br><br>Community engagement: selecting CHWs from implementation communities and in collaboration with community leaders | Not found.  |
| Feasibility             | Leveraging partner support: for design,  | (+): NNP implemented and reached national scale   |



| Implementation outcomes            | Implementation strategy   | Evidence  |
|------------------------------------|---|---|
|                                    | <p>implementation, supervision</p> <p>Leveraging donor support: World Bank-International Development Assistance Programme, UNICEF</p> <p>Data use for adaptation: clustering of sub-districts per NGO, for NNP based on BINP challenges</p> | <p>(-): CMAM implementation as a component of CB-IMCI not yet accomplished as of 2018, after the case study period ended.</p>   |
| Effectiveness and coverage (Reach) | <p>Fixed-site CBD: community nutrition clinics</p> <p>Outreach</p>  | <p>(+): Evaluation showed a high level of participation in growth-monitoring sessions (75%–95%) and nutrition education sessions (66%) in sub-districts where BINP was implemented.</p> <p>(-): The data on coverage and targeting of supplementary feeding for children showed low coverage with only 21% of eligible children receiving supplementary feeding.</p> <p>(+): In BINP program areas, severe malnutrition dropped from 13% to 0.9 while moderate malnutrition dropped from 32% to 16%, between 1995-2002 when BINP ended.</p> <p>(+/-): Prevalence of stunting, wasting, and underweight among children dropped during the implementation of the NNP though overall, remained high.</p> <p>(+): By 2005 (shortly after BINP ended and NNP began), U5 deaths attributable to malnutrition had dropped to 47/100,000 from 119/100,000 in 1990. By 2016, it had dropped to 17/100,000.<sup>24</sup></p> <p>(+): NNP reached national scale</p> |
| Fidelity                           | <p>Training</p> <p>Monitoring and evaluation</p> <p>Supervision</p> <p>Data systems strengthening: MIS set up for NNP implementation</p>  | <p>(-): Government oversight and coordination of the BINP was sub-optimal.</p> <p>(-): M&amp;E oversight from central level limited because MIS was not developed for BINP.</p>   |
| Sustainability                     | <p>Integration into policy</p>  | <p>(+): Development of National Plan of Action for Nutrition, in 1997</p> <p>(+): Development of national guidelines for CMAM in 2011.</p> <p>(+): Integration of nutrition program into SWAp</p>   |
| Equity                             | <p>Focus on equity: selection of BINP districts to ensure spread</p>  | <p>(-): Figures 27, 28, and 29 show persistent gaps among the wealthiest and poorest quintiles in U5 stunting and underweight prevalence. In 1996, stunting prevalence</p>  |

| Implementation outcomes | Implementation strategy | Evidence  |
|-------------------------|-------------------------|---|
|                         |                         | among the poorest quintile was 65% and 40% for the wealthiest quintile. In 2014, although overall prevalence of stunting had dropped, equity gaps remained with 49% of the poorest still stunted compared to only 19% of the wealthiest. A similar pattern was seen for underweight data with 60% and 33% of the poorest and wealthiest quintiles, respectively, underweight in 1996. By 2014, the prevalence among both groups had dropped to 45% for the poorest quintile and 17% for the wealthiest but equity gaps still persisted. |

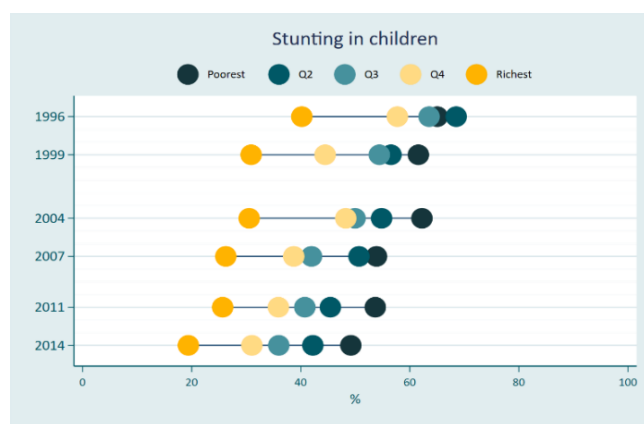


Figure 25. Equity and Coverage Outcome: Percentage of Stunted Children in Bangladesh across all Wealth Quintiles (Source: Victora, et al 2018)

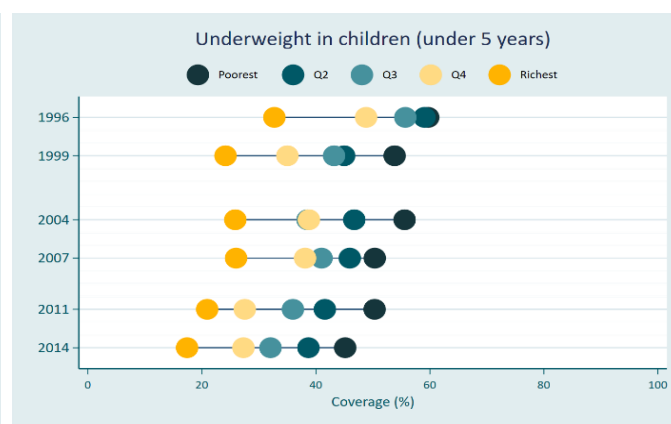


Figure 24. Equity and Coverage Outcome: Percentage of Underweight Children in Bangladesh across all Wealth Quintiles (Source: Victora, et al 2018)

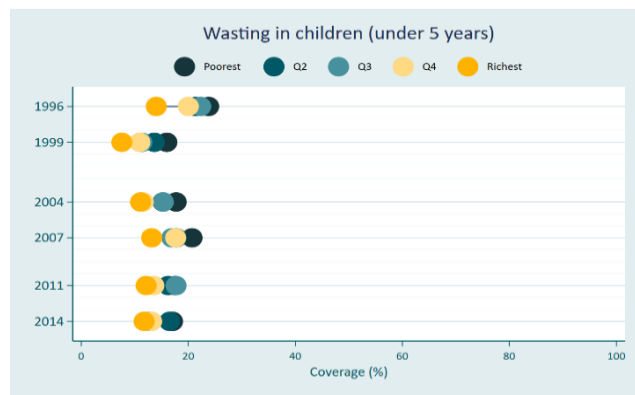


Figure 26. Equity and Coverage Outcome: Percentage of Wasted Children in Bangladesh across all Wealth Quintiles (Source: Victora, et al 2018)

## 4.5 Vitamin A

Table 30. Vitamin A Supplementation Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"><li>• Data use for decision-making<ul style="list-style-type: none"><li>○ Data use to understand disease burden</li><li>○ Data use for adaptation</li></ul></li><li>• Leveraging donor support</li><li>• Leveraging existing systems</li><li>• Leveraging partner support</li><li>• Focus on equity</li><li>• Integration into systems</li><li>• Community-based delivery<ul style="list-style-type: none"><li>○ Fixed-site community-based delivery</li><li>○ Door to door</li><li>○ Outreach</li></ul></li></ul> |

### IMPLEMENTATION PRE-2000

Vitamin A deficiency is an underlying determinant of child mortality, increasing risk of morbidity and mortality from common CODs, including respiratory issues, measles, and diarrheal diseases.<sup>120</sup> Several studies carried out in different countries also demonstrated that vitamin A supplementation (bi-annual dosing with high-dose capsules) significantly reduced mortality among children 6-59 months of age. WHO and UNICEF recommended setting up programs to supplement vitamin A in all countries with infant and child mortality rates higher than 70 per 1,000 live births, which included Bangladesh.<sup>121</sup>

In 1973, the Government of Bangladesh began conducting a national, twice annual high-dose vitamin A capsule distribution program for free for all children aged 0-71 months to address the concern of chronic deficiency of vitamin A, through the National Blindness Prevention Programme (NBPP) implemented by the Institute of Public Health Nutrition with financial support from UNICEF.<sup>122</sup> Distribution of vitamin A capsules was conducted through door-to-door home visits by HAs in the rural areas and BRAC's CHWs (shasthya shebika) in urban areas. However, according to research published in 1998, coverage remained low, especially in rural areas where only 35% of children had received vitamin A capsules by 1989.<sup>122</sup>

In order to address low coverage rates, by the mid-1990s, Bangladesh integrated vitamin A supplementation into its facility-based immunization program, changing the dosing for children aged 0-11 months to coincide with the vaccination schedule. Children aged 12-71 months continued to be targeted through home visits and with biannual dosing. To further improve coverage, by 1995 Bangladesh also integrated vitamin A supplementation into its National Immunization Days (polio vaccination outreach sessions) with increases in Vitamin A coverage among children from 49% in 1993-94 to 67% in 1996-97. Drawing from the successes of the National Immunization Day-associated distribution approach at improving coverage, Bangladesh introduced Vitamin A weeks in 1995 as well, to distribute vitamin A capsules at specially set-up outreach centers, twice a year.



## IMPLEMENTATION POST-2000

In 2001, National Immunization Days were discontinued following the eradication of polio (see Other Vaccine Preventable Diseases section for details), although vitamin A supplementation only continued at facility-level as part of facility-based immunization, and through home visits and vitamin A weeks (as part of the NBPP). In March 2006, after the resurgence of polio, National Immunization Days including vitamin A supplementation were reintroduced with support from WHO, the US Centers for Disease Control and Prevention (CDC), UNICEF, and Rotary International.<sup>123</sup>

In 2003, vitamin A supplementation was included as part of CB-IMCI. In 2011 and 2014, respectively, facility-level vitamin A supplementation as part of vaccination and National Immunization Days were discontinued and vitamin A supplementation was limited to vitamin A weeks only.<sup>9</sup>

The percentage of children under the age of 5 who received vitamin A capsules/supplementation was at 60% in 2011 and 62% in 2014.<sup>9,55</sup> Although KIs explained that this stagnating coverage was as a result of the timing of DHS data collection which focused on six months prior to the survey hence not taking into account vitamin A supplementation from vitamin A weeks which occurred over six months prior to the survey.

Table 31. Vitamin A supplementation implementation outcomes

| Implementation Outcomes    | Implementation Strategy  | Evidence  |
|----------------------------|--|---|
| Appropriateness            | Data use to understand disease burden  | (+): NBPP introduction reflected burden of vitamin A deficiency   |
| Feasibility                | Leveraging existing systems: HAs<br>Leveraging partner support: BRAC's CHWs<br>Leveraging donor support: UNICEF  | (+): Vitamin A supplementation implemented although coverage remained at only about two-thirds which KIs explained was as a result of the timing of DHS data collection.  |
| Effectiveness and Coverage | Fixed-site CBD<br>Door-to-door<br>Outreach<br>Data-use for adaptation: integration of vitamin A supplementation to National Immunization Days, facility-based immunization and introduction of Vitamin A weeks | (+): Overall, Vitamin A coverage increased from the early 1990s but remained at only about two-thirds coverage, 60% in 2011 and 62% in 2014. KIs explained this was as a result of the timing of DHS data collection. |
| Sustainability             | Integration into systems: integration into CB-IMCI   | (+): Fairly high coverage was achieved though KIs explained coverage data did not represent true picture as was the result of the timing of DHS data collection   |
| Equity                     | Focus on equity: free distribution   | Not found   |



## 4.6 Neonatal Interventions

Between 2000-2015, the reduction in neonatal mortality was less dramatic than overall U5M with a decline of 51%, from 43 per 1,000 live births in 2000 to 21 per 1,000 live births in 2015, according to IHME estimates (Figure 30).<sup>124</sup> Bangladesh's DHS showed slightly slower decline between 2000 to 2014 (when the last DHS was conducted during the case study period), with neonatal mortality dropping from 42 per 1,000 live births to 28 per 1,000 live births, a decline of 33%.

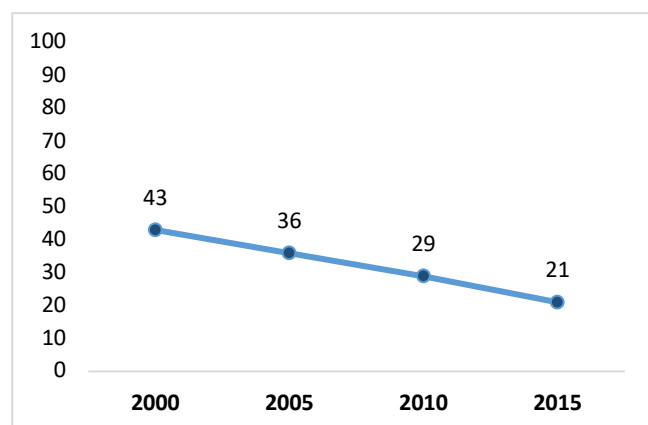


Figure 29. Neonatal Mortality Rate in Bangladesh (2000-2015) (Source: IHME 2018)

Similar to overall U5M reduction, the decline in neonatal mortality occurred across wealth quintiles but with faster declines in the wealthiest, with a small narrowing of the equity gap (22%). Among the poorest quintile, neonatal mortality declined between 1993 and 2014 from 69 to 41/1,000 live births (41%) while in the wealthiest quintile, neonatal mortality fell from 42 to 20/1000 in the same time period (52%) (Figure 31). Neonatal mortality also dropped across all regions, although similar to overall U5M reduction, the northwest, northeast, and southeast lagged behind the rest of the country (Figure 32).<sup>21,22</sup> (See Cross-Cutting Contextual Factors and Remaining Challenges sections.)

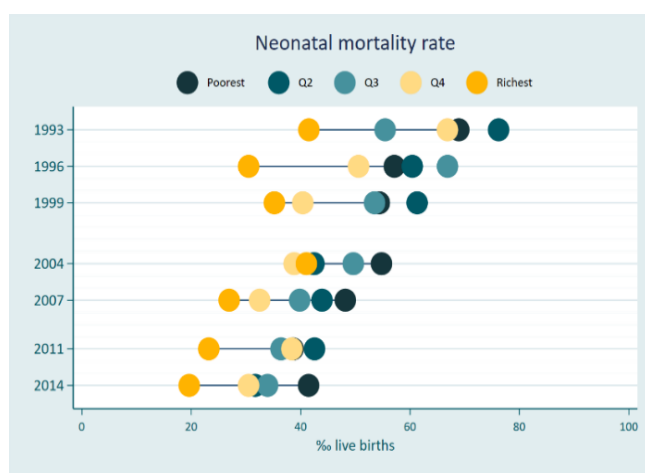


Figure 28. Equity Analysis of Neonatal Mortality Rate in Bangladesh (1993-2014) (Source: Victora, et al 2018)

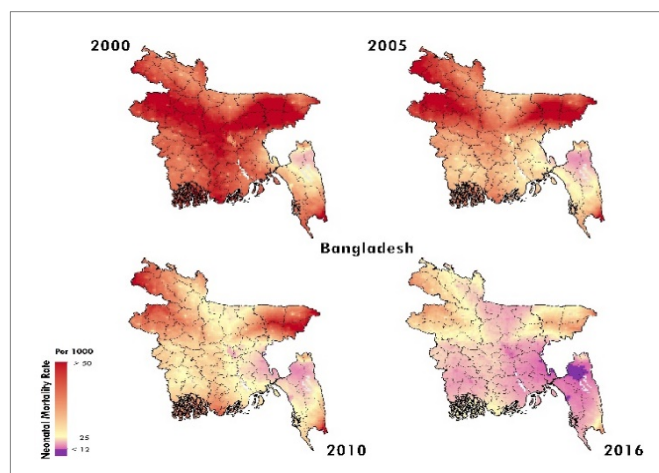


Figure 27. Map of Bangladesh Showing the Trend of Under-5 Mortality across the Different Regions (2000-2016) (Source: IHME 2018)

## 4.6.1 Improving Antenatal Care Services, Access, and Uptake

### 4.6.1.1 Improving Access to Antenatal Care

Table 32. Improving Access to ANC Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"><li>• Leveraging and integration into systems</li><li>• Leveraging partner support (including for implementation)</li><li>• Adapting global guidelines for local context</li><li>• Engagement of country professional societies in development and training</li><li>• Development of protocols</li><li>• Training (TOT)</li><li>• Small-scale testing</li><li>• Leveraging donor support</li><li>• Supervision</li><li>• National leadership and accountability</li><li>• Phased scale-up</li><li>• Stakeholder engagement</li><li>• Community engagement</li><li>• Focus on equity</li><li>• Community-based delivery<ul style="list-style-type: none"><li>○ Door-to-door</li></ul></li><li>• Data use for decision-making<ul style="list-style-type: none"><li>○ Data use for adaptation</li></ul></li></ul> |

### EXPLORATION

ANC delivered by a medically trained provider is recommended for monitoring the state of a pregnancy and predicting associated complications that can lead to adverse outcomes for the mother and/or the child. Throughout the 1990s, ANC attendance remained very low with only 35% of women attending at least one ANC session in 1999-2000.<sup>58</sup> Similarly, attendance of at least four ANC sessions – the WHO recommendation – was very low, with only 11% of women attending at least four ANC sessions in 1999-2000. According to KIs, these low ANC attendance rates were the result of longstanding cultural preferences for community-based, oftentimes unskilled, pregnancy and delivery care.

#### *Introduction of New Community Health Worker Cadre*

As a result of low ANC attendance and low SBA rates, in 2001, Bangladesh introduced a new cadre of CHWs: community-based SBAs. These health care workers were trained to provide ANC and perform normal deliveries at home, refer complicated cases to facilities, and provide postpartum care. (See Community Health Program, SBA, and Improving Postpartum Care sections.)

### ***Saving Newborn Lives Initiative and Project for Advancing the Health of Newborns and Mothers (ProjAHNMo I), ACCESS, and Mamoni***

The Saving Newborn Lives (SNL) initiative was launched in 2000 by Save the Children with funding from the Bill & Melinda Gates Foundation to promote neonatal research and help countries including Bangladesh implement high-impact neonatal interventions at scale.<sup>125</sup> The SNL initiative aimed to improve essential neonatal health and care at facility and community levels through capacity building, including training and provision of equipment, for ANC delivery, skilled birth attendance, and PNC delivery.

## **PREPARATION**

### ***Introduction of New Community Health Worker Cadre***

Preparations for introducing the community-based SBAs began in 2002 with a needs assessment conducted by the MOHFW in collaboration with WHO, UNFPA, and the Obstetrics and Gynecological Society of Bangladesh (OGSB), to determine the perceived need at the community level for SBAs, as well as for ANC and postpartum care delivery.

Preparations also included development of a training curriculum and protocols, translated to Bangla, for the attendants, in collaboration with the Bangladesh Nursing Council, the OGSB, UNFPA, and WHO. The training curriculum was based on the essential midwifery skills outlined by the Safe Motherhood Initiative – a global initiative started in 1987 by the World Bank, WHO, International Planned Parenthood Federation, the Population Council, the UNFPA, the United Nations Development Program (UNDP), and the UNICEF to reduce maternal mortality by 50% by 2000.

According to KIs, Bangladesh recruited only female community-based SBAs from existing cadres of government CHWs, FWAs, and HAs – as opposed to NGO CHWs – to ensure accountability and acceptability. As one KI explained, *“during that time, the discussion was who will be the community-based skilled birth attendant? So, the decision made was that the person should be a government person so that the accountability would be there. If there is no accountability, there will be no work. So we identified two persons who are very close to the home people, like family welfare assistant from DGFP, and female health assistants from DGHS. In our country, health assistants are male and female but [for the community-based skilled birth attendant role] they don’t like that male one for the sake of our culture.”*

### ***Saving Newborn Lives Initiative and Project for Advancing the Health of Newborns and Mothers (ProjAHNMo I), ACCESS, and Mamoni***

Preparations for introducing the SNL initiative included a participatory design workshop attended by MOHFW personnel, partners such as Save the Children, and research institutions such as icddr,b to design and adapt the program to Bangladesh’s context. A national-level technical review committee was also set up to oversee the program.



## **IMPLEMENTATION**

### ***Introduction of New Community Health Worker Cadre***

In 2003, the selected CHWs were provided six months of training: four weeks of classroom-based training followed by a 13-week clinical training at district-level health facilities, and an additional community-based practicum.<sup>126</sup> The trainings employed a TOT approach in which district-level midwives selected through an application and interview process were trained for two weeks at the Maternal and Child Health Training Institute (MCHTI), Azimpur, Dhaka, and at the Institute of Child and Maternal Health (ICMH), Matuail, Dhaka, both division-level midwifery training institutes.<sup>127</sup> These trainers then cascaded the training to the selected community-based SBAs at the district level. The attendants were also equipped with a kit containing essential items such as a blood pressure monitor, which were used for carrying out their role.

**Small-scale testing of the community-based SBA program** began in 2003 in six districts with technical and financial support from WHO and UNFPA as well as technical support from the OGSB. This was followed by supportive supervision provided by the trainers, with one supervisor attached to three to six attendants. According to a KI, the six districts, were selected to represent the “average” district within **each of the six existing divisions and assess the feasibility of national scale-up.**<sup>127</sup>

In 2004, in implementation districts, 52% of ANC sessions were performed by the community-based SBAs, suggesting a fairly high level of acceptability. The assessment also found that 91% of women who used their services were either “fully” or “fairly” satisfied.<sup>127</sup> Further, the community-based SBAs’ retention of selected skills including blood pressure measurement and ANC physical examination was also high, with an average score of 75 out of a possible 100.<sup>128</sup>

Drawing from the lessons of the testing phase, in 2004 Bangladesh decided to scale up the community-based SBA program using a phased approach, adding an average of 10 districts per year, with support from WHO and UNFPA.

### ***Saving Newborn Lives Initiative and Project for Advancing the Health of Newborns and Mothers (ProjAHNMo I), ACCESS, and Mamoni***

In collaboration with the MOHFW, icddr,b, and Johns Hopkins University, Save the Children began the implementation of the SNL initiative in 2001 with a focus on generating evidence to inform scale-up. The small-scale testing phase was implemented in three rural sub-districts, Beanibazar, Zakiganj, and Kanaighat, in Sylhet district. These were selected because of their relatively higher neonatal, infant, and maternal mortality and home delivery rates, as well as adequate population size to satisfy sample requirements. The testing phase was called Project for Advancing the Health of Newborns and Mothers (ProjAHNMo I).

At the community level, the main focus of the intervention, ProjAHNMo I identified women within communities to be trained as project CHWs. They were provided trainings and supportive supervision by program supervisors who were also recruited for the project. The CHWs identified pregnant women within the community, and visited them twice during pregnancy, at 12-16 weeks and at 32-36 weeks, at delivery, and within 24 hours of delivery, and then three times after delivery (day one, day three, and day seven). During visits, the CHWs were required to encourage women to attend ANC sessions. (See SBA and Improving Postpartum Care sections.)



Another key component of the community-level intervention was household-level health education and counseling, which targeted not just pregnant women but also senior female family members and married women of reproductive age within households, as well as adult males, to provide them information on the importance of ANC use. Community mobilizers from Shimantik, an NGO partner, were contracted to implement the health education and counseling component, which were held at households or at communal locations within the community such as mosques and shops. The community mobilizers were supervised through observation of education and counseling sessions and provision of feedback.

KIs noted that stakeholder engagement was a major component of the initial and ongoing implementation of the SNL initiative and contributed to the acceptability of the program. *"I still remember that in 2001, '02, '03, that period, Saving Newborn Lives used to organize [meetings] in restaurants in Dhaka, I don't remember the frequency, maybe quarterly...where they started inviting all the stakeholders and present different stories around newborn programming and issues. This newborn club [which later became institutionalized as the National Technical Working Committee for Newborn Health] had a good effect because the professional bodies in Bangladesh at that time, was mostly the clinicians and they had a clinical orientation...They didn't really understand community-based preventive perspective of newborn... health. So, those forums helped to bring people, the brains and the efforts together and learn lessons. At the same time the professional bodies became closer to the public health professionals, to the government program managers."*

By 2006 ProjAHNMo I ended. Although data on its effect on ANC coverage were not available for the team to review, results showed that overall the community-based package reduced the NMR by 34%.<sup>129</sup> (See SBA and Improving Postpartum Visits sections.) The positive findings of ProjAHNMo I provided a basis for the introduction of ACCESS (2007-2009), a USAID-funded project which was implemented in seven sub-districts in Sylhet selected because of their high maternal and NMRs. Mamoni (2009-2013), which was also a USAID-funded project, further expanded the scope of ACCESS to an additional district, Habiganj. Both projects focused on improving ANC access in addition to other objectives such as improving skilled birth attendance and access to PNC. (See SBA and Improving Postpartum Care sections.) Assessment of both projects showed that in ACCESS sub-districts, ANC4+ coverage remained low, at 15%, and ANC4+ coverage in both Mamoni districts, Sylhet and Habiganj, remained low at 8.2% and 8.7%, respectively.<sup>127,129</sup>

## **ADAPTATION DURING IMPLEMENTATION**

### ***Introduction of New Community Health Worker Cadre***

According to KIs, one of the key challenges of the community-based SBA program was the inadequacy of supervision provided to the attendants because there were not enough supervisors (midwives) available and trained to oversee the growing number of attendants as the program scaled up. As a result, in 2008, Bangladesh decided to begin training family welfare visitors as attendants' supervisors. They were selected because there were higher numbers compared to midwives and they were union-level staff, and therefore closer to the community. Family welfare visitors also received pre-service training in PHC, maternal health, pregnancy, delivery, and midwifery. According to research conducted in 2009, 50 family welfare visitors were trained in 2008

with plans to scale up this training to all family welfare visitors in all districts, but that did not occur.<sup>127</sup> Data on reasons for the inability to scale up the training were unavailable for the team to review.

In 2009, community-based SBAs were integrated into the community clinics but as of 2011, coverage of community-based SBAs was low (45.6%) with only 6,155 of the planned 13,500 recruited.<sup>36</sup> A KI explained that this low coverage meant that the community-based SBAs often traveled long distances in order to cover their catchment areas, which limited the performance of their roles. This explanation was corroborated by DHS data from 2011 and 2014 which showed that less than 0.5% of ANC sessions were provided by community-based SBAs.

In 2009 Bangladesh introduced another cadre of CHWs, CHCPs, to further expand antenatal and PNC delivery at the community level and provide CB-IMCI with the re-introduction of community clinics (see Community Health Program and CB-IMCI sections). They were selected from within the communities and were provided 12 weeks of basic training (six weeks each of theoretical and practical training). The aim to have one per community clinic was almost achieved with 12,991 of 13,500 of the planned CHCPs (approximately 96%) recruited by 2011.<sup>36</sup> Despite this success, according to DHS 2014 data, only 1.3% of ANC sessions were provided by CHCPs.

In 2004, shortly after the introduction of the community-based SBAs' cadre, at least one visit of antenatal care (ANC1+) coverage was at 51%, increasing slightly to 55% in 2011. Five years after the introduction of the CHCPs, in 2014, ANC1+ attendance was at 64%.<sup>9,57</sup> ANC4+ attendance rates remained low at 17% in 2004 and 26% in 2011, shortly after the introduction of the CHCPs, with a modest increase to 31% in 2014.

The overall increase in ANC attendance may not be attributable to the introduction of the new CHW cadres, given the low proportion of ANC sessions they provided compared to the increase in ANC sessions (from 49% in 2004 to 64% in 2014) provided by doctors, nurses, midwives, family welfare visitors, and sub-assistant community medical officers. This increase in ANC sessions attended by traditional providers may be related to the growing role of the private sector in the delivery of maternal and child health services (as discussed in the Introduction), with the proportion of ANC sessions attended at public facilities dropping from 44% in 2007 to 36% in 2014.<sup>9,56</sup>

One KI also reflected that, for community-based SBAs, the low proportion of ANC sessions provided by them may have been related to their already high workload, given that they were selected from existing cadres and so had these new responsibilities added on. *"The thing I can tell you, this community skilled birth attendant thing, after the scaling up, when the BDHS report came, we were frustrated a bit because before scaling up, evaluation showed all the things were good, but after scaling up in many districts, the report showed that they were not contributing much at the field because they are busy with other works. They are family welfare assistants, health assistants, and community-based skilled birth assistants, so they have to do all their work as well as deliver. Suppose a labor started at night, then she has to attend in the morning session for her work too. Those are some problems."*

Health facility survey data from 2014 showed low readiness for providing ANC among health facilities and community clinics. Only about half (53% and 48%, respectively) of health facilities and community clinics offering ANC had guidelines for ANC. Also, only 31% of health facilities and 19% of community clinics offering ANC had staff trained in ANC in the two years preceding the survey. Earlier data were unavailable for the team to review.



Table 33. Improving Access to ANC Implementation Outcomes

| Implementation Outcome     | Implementation Strategy  | Evidence   |
|----------------------------|--|--|
| Appropriateness            | Data use for decision-making<br><br>Adaptation of international guidelines for local context: adaptation of Safe Motherhood Initiative's recommendations, adaptation of SNL initiative to local context  | (+): Introduction of a community-based approach to improve ANC attendance  |
| Acceptability              | Leveraging existing social norms: Female-only community-based SBAs were chosen<br><br>Community engagement<br><br>National leadership and accountability   | (Undetermined): Low coverage suggested low acceptability but may also be due to challenges.  |
| Feasibility                | Leveraging existing CHWs: HAs and FWAs for the community-based SBAs, midwives for the TOT<br><br>Leveraging partner support for the needs assessment, small-scale testing and development of training curriculum for attendants, participatory workshop for SNL initiative, and implementation<br><br>Leveraging donor support: WHO, UNFPA, USAID<br><br>Small-scale testing and selection of districts to assess feasibility<br><br>Phased scale-up | (+): In 2011, 96% of the planned CHCPs had been recruited. <sup>36</sup><br><br>(-): In 2011, coverage of community-based SBAs was low (45.6%) with only 6,155 of the planned 13,500 recruited which affected the performance of their roles.                        |
| Effectiveness and Coverage | CBD (community clinics and door-to-door)<br><br>Phased scale-up  | (+): In 2004, shortly after the introduction of the community-based SBA cadre, ANC1+ coverage was at 51%. It increased to 64% by 2014.<br><br>(-): Assessment of ACCESS showed that in project sub-districts, ANC4+ coverage remained low at 15%. <sup>129,130</sup> |

| Implementation Outcome | Implementation Strategy  | Evidence  |
|------------------------|--|---|
|                        |  | <p>(-): ANC4+ attendance rates remained low although increased from 17% in 2004 to 26% in 2011 and 31% in 2014.</p> <p>(-): Overall, the proportion of ANC sessions performed by CHWs remained very low.</p>  |
| Fidelity               | <p>Supervision</p> <p>Protocol development and translation to Bangla</p> <p>Training (TOT)</p> <p>Data use for adaptation: decision to train family welfare visitors to supervise community-based SBAs</p> | <p>(-): Inadequate supervision of attendants because too few midwives were trained, only 50 family welfare visitors trained by 2008 and challenges with scaling up the supervision training.</p> <p>(-): Health facility survey data from 2014 showed low readiness for providing ANC among health facilities and community clinics including guidelines and recently trained staff.</p> <p>(-): In 2014, many facilities did not have guidelines or trained providers</p>  |
| Sustainability         | Integration into systems   | (+/-): Integration of community-based SBAs into community clinics – though overburdening the attendants had negative implications for sustainability  |
| Equity                 | <p>CBD (community clinics and door-to-door)</p> <p>Small-scale testing and selection of districts based on high neonatal, infant and maternal mortality rates and home delivery rates</p>                  | <p>(-): No change was seen in the large gap in equity with persistently low coverage particularly among the poorest. In 1993-94, Only 13% of women in the poorest quintile attended at least 1 ANC sessions compared to 59% of the wealthiest quintile. In 2004 (shortly after the introduction of the community-based SBAs' program), wealth-based disparities persisted with 27% of women in the poorest quintile and 84% in the poorest and wealthiest quintile attending. In 2014, 36% and 90% in the poorest and wealthiest quintile attended at least 1 ANC session, respectively.<sup>106</sup></p> <p>(-): Similar results were seen for ANC4+. In 1993-94, the gaps in ANC4+ attendance among women of different wealth quintiles was wide with 0.4% of women in the poorest quintile attending 4+ ANC sessions compared to 26% of the wealthiest quintile. In 2014, 15% and 55% in the poorest and wealthiest quintile attended ANC4+ sessions, respectively.<sup>106</sup></p> |



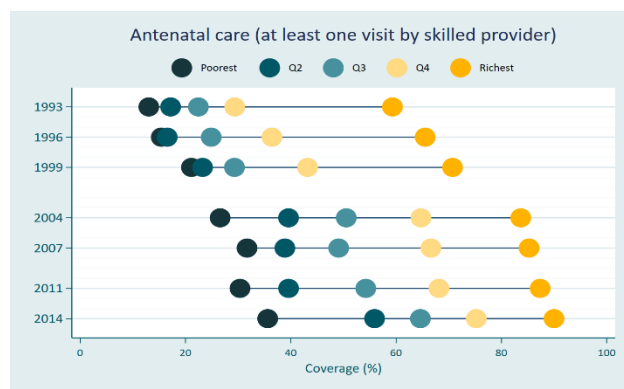


Figure 30. Equity and Coverage Outcome: ANC (at least one visit) in Bangladesh (1993-2014) (Source: Victora, et al 2018)

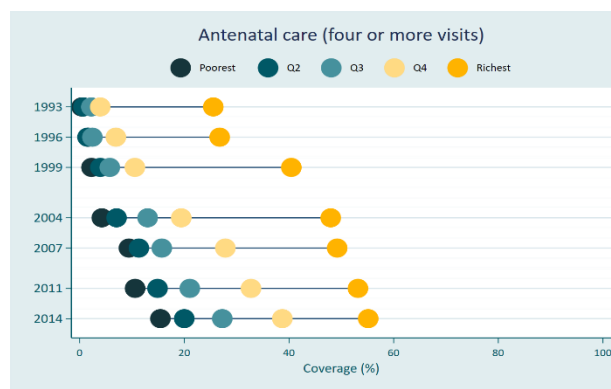


Figure 31. Equity and Coverage Outcome: ANC4+ in Bangladesh (1993-2014) (Source: Victora, et al 2018)

## SUSTAINMENT

In 2016, after the study period ended, WHO recommended a minimum of eight ANC sessions to reduce perinatal mortality. According to a KI, though, that recommendation had not been adopted as of 2018 because Bangladesh had not achieved high coverage rates for ANC4+ attendance.<sup>131</sup> As a KI explained, “recently WHO published a new ANC recommendation guideline...one recommendation is that WHO is now saying that 8+ ANC is important for positive pregnancy outcome. But our government and Obstetrics and Gynecology Society of Bangladesh is saying that as we are not reaching four yet, we should not take that [recommendation] right now. We will write that it is better, but it should not be a national program.”

### 4.6.1.2 Maternal Tetanus Vaccination

Table 34. Maternal Tetanus Vaccination Key Implementation Strategies

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"> <li>Community-based delivery and facility-based delivery <ul style="list-style-type: none"> <li>Outreach (for service delivery)</li> </ul> </li> <li>Leveraging donor support</li> <li>Leveraging partner support</li> <li>Decentralization of service delivery</li> <li>Leveraging and integration into existing systems</li> <li>Data use for decision-making</li> </ul> |

## IMPLEMENTATION PRE-2000

As noted in the Other Vaccine Preventable Diseases section, Bangladesh’s EPI began in 1979 and was delivered through national-, divisional-, and district-level hospitals. Between 1979-1985, pregnant women were administered two doses of the tetanus toxoid vaccine as part of ANC sessions at these facilities. By 1985, vaccine expansion efforts including offering from an expanded number of facilities at lower (sub-district and union) levels and community-based outreach sessions were introduced to improve coverage, with eight outreach centers set

up in each ward to conduct vaccination sessions once in a month. The outreach sessions included tetanus toxoid vaccine for pregnant women. (See Other Vaccine Preventable Diseases section.)

By 1993, Bangladesh expanded the target group for tetanus toxoid vaccination to women of reproductive age (ages 15-45 years, and later, 15-49 years) while still administering the vaccine as part of ANC. This, according to a KI, was because *“in our country, in context of Bangladesh, our marriage age for female is 18 years. So, if we target them before 18 years [marriage age], no need to give the tetanus toxoid vaccination after marriage or during pregnancy if they completed... if they miss the tetanus toxoid vaccine during the childbearing age, then during time of pregnancy, they are offered.”*

In 1999, the Maternal and Neonatal Tetanus Elimination initiative was launched by UNICEF, WHO, and UNFPA to reduce cases of neonatal tetanus to less than one case per 1,000 live births in all districts within countries that had not achieved the standard for elimination, including Bangladesh. As a result, that same year the MOHFW began SIAs in high-risk areas, with technical and financial support from WHO and UNICEF, to speed up the achievement of the global elimination goal.

Preparations for the SIAs included assessment of district-level tetanus toxoid vaccination data to identify districts with the lowest coverage and highest risk of neonatal tetanus. This assessment was conducted by the MOHFW with support from WHO, UNICEF, and Bangladesh’s Institute of Epidemiology, Disease Control and Research. Data on coverage of the 1999 SIAs were not available for the team to review.

### **IMPLEMENTATION POST-2000**

During the case study period, Bangladesh continued to implement both facility-based tetanus toxoid vaccination sessions for pregnant women attending ANC sessions, as well as monthly outreach to ensure high coverage of tetanus toxoid vaccine for all women of reproductive age. Bangladesh also implemented another supplementary immunization activity in 2005 in high-risk districts. Data on coverage of the 2005 SIAs were not available for the team to review.

As a result of these efforts, in 2008 Bangladesh achieved Maternal and Neonatal Tetanus Elimination status with fewer than 1/1,000 live births per district year.<sup>132</sup> Bangladesh also maintained a high rate of tetanus protection at birth: 88% in 2007 and 91% in 2011. However, in 1999-2000, only two-thirds of women had received at least two doses of tetanus toxoid vaccine and this dropped steadily to 47% in 2011.

According to IHME estimates, U5M attributable to tetanus represented a success, reduced by 99% between 1990 and 2016 from 165/100,000 children under 5 in 1990 to 20/100,000 in 2000, and 2.4/100,000 in 2016.<sup>24</sup> The rate of deaths caused by tetanus per 100,000 newborn population also dropped by 98% from 8,563/100,000 neonates in 1990 to 1,039/100,000 in 2000, and 141/100,000 in 2016.



Table 35. Maternal Tetanus Vaccination Implementation Outcomes

| Implementation Outcomes    | Implementation Strategy  | Evidence   |
|----------------------------|--|--|
| Feasibility                | <p>Leveraging donor support: WHO, UNICEF</p> <p>Leveraging partner support: WHO, UNICEF, for example for supplementary immunization activity planning</p> <p>Leveraging existing systems: existing vaccination activities</p>  | <p>(+): SIAs implemented including facility and community</p> <p>See also effectiveness and coverage below.</p>  |
| Effectiveness and coverage | <p>SIAs and outreaches</p> <p>Decentralization of service delivery</p> <p>Data use for decision-making: SIAs were introduced in high-risk districts</p> <p>Leveraging existing systems: vaccination outreach</p> <p>Data use for decision-making: decision to cover all women and girls of childbearing age or younger</p> | <p>(+): In 2008, Bangladesh achieved Maternal and Neonatal Tetanus Elimination status with less than 1/1,000 live births per district year.<sup>132</sup></p> <p>(+): Bangladesh maintained a high rate of tetanus protection at birth at 88% in 2007 and 91% in 2011 (earlier data were unavailable for the team to review).</p> <p>(-): The proportion of women who had received at least 2 doses of tetanus toxoid vaccine was moderately high in 1999-2000 and 2004 at 64% but dropped steadily to 60% in 2007 to 47% in 2011.</p> <p>(+): U5M attributable to tetanus reduced by 99% between 1990-2016 and rate of deaths caused by tetanus per 100,000 newborn population also dropped by 98% from 8,563/100,000 neonates.</p> |
| Sustainability             | Integration into systems   | (-): Drop in coverage  |
| Equity                     | Data use for decision-making: SIAs were introduced in high-risk districts  | Not found.   |

#### 4.6.1.3 Iron and Folic Acid Supplementation

Table 36. Iron and Folic Acid Supplementation Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"> <li>Guideline development</li> <li>Leveraging existing systems</li> <li>Community-based delivery (community clinic and door-to-door)</li> </ul> |



## **IMPLEMENTATION PRE-2000**

Based on WHO recommendations, Bangladesh provided 60 mg of IFA supplements through facility-based ANC sessions to pregnant women to reduce anemia and iron deficiency. This was reflected in ANC guidelines.

## **IMPLEMENTATION AND ADAPTATION POST-2000**

In 2003, Bangladesh began providing iron supplementation to pregnant women through community-based ANC sessions with the introduction of community-based SBAs and in 2011, as planned, CHCPs also began providing iron supplements to pregnant women at community clinics.

The percentage of mothers who received IFA supplements during their last pregnancy increased from 36% in 2000 to 50% in 2004 and 55% in 2007, but was still far from universal coverage and reflected ANC rates more broadly.<sup>52,113</sup> According to KIs, these predominantly low coverage rates persisted *“because, ANC4+ is still very low and for one ANC, you will get one month or two months’ worth of iron capsule. Another thing, in the field we are giving the iron tablet, not the ferric form, ferrous form. Sometimes it may cause constipation and other things. So sometimes due to the complications they do not come to the care providers but they just quit.”* In 2011, the proportion of pregnant women with anemia was 47%.<sup>55</sup>

Consistent with the KIs’ input and the low coverage of ANC, despite the low coverage for these supplements, health facility survey data from 2014 showed very high readiness for providing iron supplementation with 96% of health facilities and 95% of community clinics that offered ANC having iron or folic acid tablets.

Reflecting low iron coverage as well as likely other nutritional and comorbid causes, in 2011 the proportion of pregnant women with anemia was 47%, with higher rates (54%) among the poorest wealth quintile compared to 36% in the wealthiest quintile.<sup>55</sup> Earlier data were unavailable for the team to review.

*Table 37. Iron and Folic Acid Supplementation Implementation Outcomes*

| Implementation Outcome     | Implementation Strategy                      | Evidence   |
|----------------------------|--|--|
| Acceptability              | Not found.                                   | (-): Low acceptability due to complications of IFA supplements   |
| Feasibility                | Leveraging existing systems: on ANC sessions | (-): Low feasibility because of low ANC4+ levels   |
| Effectiveness and Coverage | Leveraging existing systems: on ANC sessions | (+): The proportion of pregnant women who received iron supplements during ANC sessions was 50% in 2004 and increased to 55% in 2007. Earlier and later data were unavailable for the team to review.<br><br>(-): In 2011, the proportion of pregnant women with anemia was 47%. <sup>55</sup> Earlier data were unavailable for the team to review. |
| Fidelity                   | Guideline development                        | (+): Health facility survey data from 2014 showed very high rates of availability of iron or folic acid tablets.   |

|        |  |   |
|--------|--|---|
| Equity | CBD: community clinic and door-to-door | Equity data on iron supplementation during pregnancy were unavailable for the team to review but wealth-related disparities in anemia were found. |
|--------|--|---|

## 4.6.2 Improving Child Birth Delivery Services, Access, and Uptake

### 4.6.2.1 Skilled Birth Attendant and Facility-Based Delivery

Table 38. Skilled Birth Attendant Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"> <li>• Community engagement</li> <li>• Leveraging and integration into systems</li> <li>• Community-based delivery (community clinics and door-to-door)</li> <li>• Training</li> <li>• Supervision</li> <li>• Small-scale testing</li> <li>• Data use for decision-making <ul style="list-style-type: none"> <li>◦ Data use for adaptation</li> </ul> </li> <li>• HR Strengthening: recruitment</li> <li>• Protocol development</li> <li>• National leadership and accountability</li> </ul> |
| <i>See also Improving Access to ANC section</i>  |

## EXPLORATION

Similar to ANC, skilled birth attendance was low throughout the 1990s with only 8% of deliveries assisted by a skilled provider in 1996-97 and 12% in 1999-2000, and with only a few of these at facilities: home-based delivery was 92% in 1999-2000.<sup>52</sup>

### Introduction of New Community Health Worker Cadre

As discussed, as a result of low ANC and skilled birth attendance rates, Bangladesh began considering a community-based SBA program to provide ANC, perform normal deliveries at home, and provide PNC. According to a KI, “we discussed at that time – home delivery was high, and people were not coming to health facility for delivery...so what to do? That’s the time this community-based skilled birth attendant training program came out, the strategy was that, as people are delivering at home, so there should be a skilled person.”

### Saving Newborn Lives Initiative and Project for Advancing the Health of Newborns and Mothers (ProjAHNMo I), ACCESS and Mamoni

The Saving Newborn Lives (SNL) initiative was launched by Save the Children with funding from the Bill & Melinda Gates Foundation in 2000 to promote neonatal research and help countries including Bangladesh implement high-impact neonatal interventions at scale. (See Improving Access to ANC.)



## **PREPARATION**

Preparations for introducing community-based SBAs included a needs assessment by MOHFW in collaboration with partners, development of a training curriculum and protocol, and the decision to recruit only female birth attendants. Preparations for introducing the SNL initiative involved a participatory workshop which included partners and setting up a national technical review committee. (See Improving Access to ANC section.)

## **IMPLEMENTATION**

### ***Introduction of New Community Health Worker Cadre***

A small-scale testing phase was implemented for the roll-out of the community-based SBA program, as noted in the Improving Access to ANC section. The assessment found that the trained community-based SBAs were attending only 29% of home deliveries although 60% of women surveyed who reported that they wanted another child said they would prefer to have their next deliveries performed by a community-based SBA. This reflected fairly high level of acceptability but not coverage.

One key challenge of the community-based SBA program was the inadequacy of supervision provided. In explaining this major challenge, a KI described it as *“the problem with training-only interventions.”* Another KI said, *“the monitoring system for community-based skilled birth attendants is not in place... that’s the main thing. That’s why they are not performing up to that mark. If you see the curriculum, it is so good, so structured curriculum. When they are in the district hospital for training, they are much better. Sometimes we say that, ‘oh, young doctors are not as good as them.’ They do the partograph very carefully and very correctly. But after that, if you don’t have that supportive supervision, monitoring, mentoring...it is needed. I’ve seen some of the community-based skilled birth attendants perform better normal delivery than the family welfare visitors and even some doctors. Because it is the competency-based training.”*

### ***Saving Newborn Lives Initiative and Project for Advancing the Health of Newborns and Mothers (ProjAHNMo I), ACCESS, and Mamoni***

In addition to the interventions discussed in the Improving Access to ANC section, as part of the ProjAHNMo I project CHWs supported women to select a trained TBA to assist with delivery if facility delivery was not possible and referred cases requiring facility-based care based on identification of danger signs to the sub-district-, district-, or tertiary-level health facilities. CHWs worked with women to set up emergency transportation in preparation for delivery and to save money to pay for delivery costs. CHWs and community mobilizers also promoted the use of clean delivery kits containing one clean plastic sheet, a sterile blade, a piece of thread, soap, and gauze, for women delivering at home. CHWs distributed these kits to pregnant women and women were able to purchase them during ANC visits.

At the facility level (sub-district and union-level), ProjAHNMo I focused on improving the capacity of doctors, nurses, midwives, and family welfare visitors through trainings, supportive supervision, and supply of drugs and equipment. This was to provide skilled birth attendance, early recognition of and care-delivery for pregnant women, and identification of obstetric danger signs. Further, essential newborn care would be provided including clean cord cutting, drying, and wrapping, and immediate breastfeeding (see Clean Cord Care section).



As discussed, the positive findings of ProjAHNMo I provided a basis for the introduction of ACCESS (2007-2009) which, in addition to the interventions of ProjAHNMo I such as distributing clean delivery kits, also trained TBAs on identification of danger signs and providing timely and appropriate referrals to facilities and engaging community leaders in the organization of emergency transportation for pregnant women. Assessment of ACCESS showed that in project sub-districts, skilled birth attendance remained low at 15%.<sup>129</sup> Mamoni (2009-2013) focused on scaling up the interventions implemented by ACCESS in an additional district, Habiganj, with an increased focus on sustainability and improving FBD demonstrated through the strengthening of family welfare centers' at union-level facilities, abilities to provide 24-hour delivery services by providing essential equipment, medicines, and supplies, and hiring nurses and family welfare visitors. Mamoni also focused on strengthening referral systems to district hospitals. Assessment of Mamoni showed limited impact with only 38% of deliveries performed by community-based SBAs in project districts (Sylhet and Habiganj) during the period of project implementation and overall skilled birth attendance remained low, at 25.8% in Sylhet and 19.4% in Habiganj.<sup>130</sup>

## **ADAPTATION DURING IMPLEMENTATION**

### ***Introduction of New Community Health Worker Cadre***

In 2007, to reinforce the attendants' skills, a three-month course on management of bleeding in pregnancy, childbirth and postpartum, and dealing with other complications and medical factors contributing to complications was introduced for attendants who had spent at least nine months on the job. However, the reach of the training was extremely low with only 3% (205 of 6,155) of community-based SBAs trained by 2011.<sup>127</sup> Data on reasons for the low coverage of this training were unavailable for the team to review.

Skilled birth attendance increased following introduction of the community-based SBAs cadre, from 12% in 1999-2000 shortly before the introduction, to 28% in 2011 and 42% in 2014. However, between 2004-2014, fewer than 0.4% of all births were carried out by community-based SBAs.<sup>9,52</sup> KIs noted that a major challenge of the community-based SBA program was that communities mainly identified the community-based SBAs as HAs and FWAs or did not trust them as skilled providers of delivery services. As a result, community members did not go to them with issues relating to their role as community-based SBAs, which impacted coverage.

According to DHS data, FBD increased from 9.3% in 2004 to 37.4%, though this was largely due to increased private sector deliveries (in 2014 66% of FBDs were at NGOs or private facilities) as opposed to government facilities such as the upgraded family welfare centers. This increase in private sector delivery rates reflected the challenges with absenteeism of FBD care providers, quality of care, and distrust of public sector health facilities discussed in the Introduction and Cross-Cutting Contextual Factors section.

Further, despite work to integrate community-based SBAs into the community clinic system and expand delivery capacity of family welfare centers, according to 2014 Health Facility Survey data, community clinics showed low readiness for delivery: only 27.4% of community clinics had basic emergency obstetric care (EmOC) or comprehensive EmOC guidelines, and less than half (45.3%) had a delivery pack including a cord clamp, scissors/blade to cut cord, episiotomy scissors, suture material with needle, and needle holder. In upgraded family welfare centers, similar low readiness was found: only 20% had basic EmOC or comprehensive EmOC guidelines and 47% had a delivery pack. Only 17% of community clinics and family welfare centers reported having an injectable uterotonic (oxytocin).



Table 39. Skilled Birth Attendant Implementation Outcomes

| Implementation Outcome     | Implementation Strategy  | Evidence   |
|----------------------------|--|--|
| Appropriateness            | Data use for decision-making   | (+): Introduction of community-based SBAs reflected low skilled birth attendance rates.  |
| Acceptability              | Community engagement in organization of transportation for women<br><br>HR strengthening: Recruiting female attendants   | (-): Low acceptability due to lack of trust in community-based SBAs for delivery   |
| Feasibility                | Leveraging existing systems: TBAs and ANC sessions for distribution of clean delivery kits<br><br>Leveraging partner support: needs assessment, participatory workshop<br><br>National leadership and accountability | (+/-): Community-based SBAs recruited and trained although achieved only low coverage (<50%)<br><br>(-): Training coverage for higher level skills only at 3%  |
| Effectiveness and Coverage | CBD (community clinics and door-to-door)<br><br>Leveraging existing systems: TBAs and ANC sessions for distribution of clean delivery kits   | (-): Assessment of ACCESS showed that in project sub-districts, skilled birth attendance remained low at 15%. <sup>129</sup><br><br>(-): Assessment of Mamoni showed only 38% of deliveries were performed by community-based SBAs in project districts during the period of project implementation. Overall skilled birth attendance in Sylhet and Habiganj remained low at 25.8% and 19.4%, respectively. <sup>130</sup><br><br>(-): In 2011, coverage of community-based SBAs was low (45.6%) with 6,155 recruited of the planned 13,500.<br><br>(-): Overall, skilled birth attendance remained low at 42% in 2014. Very few of deliveries (<0.4% of all births) were carried out by community-based SBAs. <sup>9,52</sup><br><br>(+/-): Increase in FBD, though largely due to increase in private sector delivery rates. |
| Fidelity                   | Training curriculum and protocol development<br><br>Training of both traditional and community-based SBAs<br><br>Supportive supervision  | (-): Inadequate supervision: too few midwives were trained and only 50 family welfare visitors trained by 2008 and challenges with scaling up the supervision training. KIs reported poor quality<br><br>(-): According to 2014 Health Facility survey data, community clinics and upgraded family welfare centers showed low readiness for delivery.  |



| Implementation Outcome | Implementation Strategy   | Evidence  |
|------------------------|---|---|
|                        | Data use for adaptation: decision to train family welfare visitors to supervise community-based SBAs<br><br>HR Strengthening: recruitment |   |
| Sustainability         | Integration into systems  | (+): Integration of community-based SBAs into community clinics   |
| Equity                 | CBD (community clinics and door-to-door)  | <p>(-): 2007 DHS data reported wealth-related differences in skilled birth attendance: 5% of the lowest wealth quintile had deliveries attended by a skilled attendant compared to 51% of the wealthiest quintile.<sup>9</sup> These disparities increased slightly despite increases in skilled birth attendance for the different wealth quintiles. By 2014, only 18% of the lowest wealth quintile had deliveries attended by a skilled attendant compared to 74% of the wealthiest quintile.</p> <p>(-): Figure 35 shows widening wealth-based equity gaps with 0.4% of the poorest quintile in 1993 delivering at health facilities compared to 16% in the wealthiest quintile. In 2014, the gap grew: 14.9% in the poorest and 70.9% in the wealthiest quintiles delivered at facilities. This was likely a result of increases in private facility deliveries by those in wealthier quintiles.</p> |

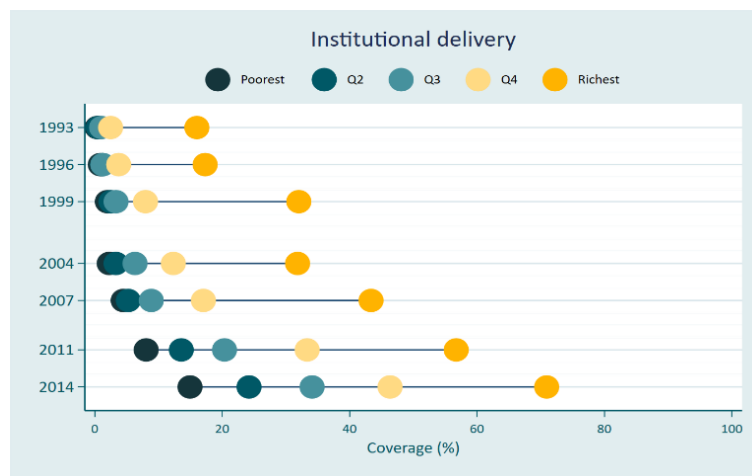


Figure 32. Equity and Coverage Outcome: Institutional (Facility-Based) Delivery in Bangladesh (1993-2014) (Source: Victora, et al 2018)

## 4.6.3 Improving Postpartum Care

### 4.6.3.1 Neonatal Resuscitation

Table 40. Neonatal Resuscitation Key Implementation Strategies

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"><li>• Data use for decision-making</li><li>• Stakeholder engagement: advocacy</li><li>• Adaptation of international guidelines for local context</li><li>• Small-scale testing</li><li>• Protocol and guideline development</li><li>• Integration into systems</li><li>• Training (TOT)</li><li>• Phased scale-up</li><li>• Leveraging donor support</li><li>• Leveraging partner support</li></ul> |

#### **EXPLORATION**

According to KIs, historically, newborn care including neonatal resuscitation was considered sophisticated, costly, and difficult to implement at lower levels of care (sub-district and community levels). As a result, it was inaccessible to most of the population. However, by 2010, in recognition that asphyxia was the leading cause of neonatal death, Bangladesh adopted the HBB initiative, an initiative by the American Academy of Pediatrics (AAP) in collaboration with the SNL initiative, and global partners including WHO, USAID, the National Institute of Child Health and Development (NICHD), and other global health stakeholders, to provide basic training on neonatal resuscitation in resource limited settings.<sup>133</sup> The HBB initiative aimed to improve the capacity of both facility-level and community-level SBAs in neonatal resuscitation.

#### **PREPARATION**

Led by a champion at Bangabandhu Sheikh Mujib Medical University (BSMMU), advocacy was done to gain buy-in from the government on the HBB initiative. Preparations included the adaptation of generic HBB materials for Bangladesh's context. The HBB materials included an HBB flip chart, action plan, and learner's book, which were translated into the Bangla language. During preparations, these HBB materials were field-tested in an upazila health complex near Dhaka to ensure they were suitably adapted to Bangladesh's context. Reflecting a focus on sustainability, Bangladesh adapted the standard MOHFW neonatal resuscitation protocols for the tertiary level (advanced management of asphyxia following the Golden Minute®) to reflect the HBB initiative, and developed training guides for these protocols.

#### **IMPLEMENTATION**

Bangladesh began implementing the HBB initiative with a small-scale testing phase in six districts: Habiganj, Noakhali, Lakshmipur, Jhalokathi, Bhola, and Pirozpur. A wide range of cadres including community-based SBAs, doctors, nurses, midwives, and family welfare visitors were trained for two days on the new initiative.<sup>134</sup> The



training employed a TOT approach.<sup>135</sup> Assessment of the small-scale testing phase showed that participants' scores on neonatal resuscitation knowledge tests increased from 85% before training to 99% after the HBB training. The average number of correct bag-and-mask skills demonstrated by participants during simulated resuscitation increased from 1.7 (out of seven) before training to 6.7 during the post-training assessment. These findings provided evidence that providers' knowledge and skills, in simulations, regarding management of birth asphyxia were unacceptably low, and that the HBB training could effectively improve them.<sup>135</sup>

As a result of these initial findings and identified need, by 2011 Bangladesh began scaling up HBB nationally in phases, with financial support from USAID (through Save the Children) and UNICEF. These organizations committed to providing funds for equipment for 40/64 and 24/64 districts, respectively. The MOHFW paid the taxes for all off-shore procurement of the HBB equipment. A range of in-country experts and international partners provided technical support, including the USAID-funded Maternal and Child Health Integrated Program (MCHIP), Save the Children, BSMMU (which led trainings), the BPA, BNF, and UNICEF.

The scale-up process involved introduction of the HBB initiative to six districts – one in each division – per phase, so that divisional health managers could efficiently supervise trainings at the district and sub-district levels. Further reflecting a focus on sustainability, the MOHFW integrated the HBB initiative into the HPNSDP'S (2011–2016) Maternal, Newborn, Child and Adolescent Health (**MNC&AH**) Operational Plan.

Additionally, as part of efforts to upgrade family welfare centers discussed in the SBA section, newborn care corners were introduced to labor rooms to provide a hygienic location where immediate care to the neonate including resuscitation, early breastfeeding, and warmth provision could be carried out.

However, according to Health Facility Survey data from 2014, facilities' readiness for providing neonatal resuscitation remained low, particularly at lower-level facilities. Although 79.5% of district- and sub-district-level facilities had a neonatal bag and mask, only 34.7% of union-level facilities and 22% of community clinics had these resuscitation materials. In addition, only 25% of health facilities and 8% in community clinics which provided normal delivery had at least one staff member trained on neonatal resuscitation in the 24 months preceding the survey.

*Table 41. Neonatal Resuscitation Implementation Outcomes*

| Implementation Outcomes | Implementation Strategy  | Evidence   |
|-------------------------|--|--|
| Appropriateness         | Data use for decision-making   | (+): Deaths from neonatal encephalopathy due to birth asphyxia accounted for the highest cause of neonatal deaths in 2005 (26% of all neonatal deaths) and introduction of the HBB initiative reflected the burden of disease of birth asphyxia. |
| Acceptability           | Stakeholder engagement: advocacy<br>Adaptation of international guidelines for local context | (+): Research conducted in 2014 reported high levels of acceptability of the HBB initiative  |

| Implementation Outcomes            | Implementation Strategy  | Evidence   |
|------------------------------------|--|--|
|                                    | including translation to Bangla<br><br>Data use for decision-making<br>(testing adapted HBB materials)   |  |
| Feasibility                        | Phased scale-up<br><br>Leveraging donor support: USAID and UNICEF<br><br>Leveraging partner support: MCHIP, Save the Children, BSMMU, BPA, BNF, UNICEF | (+): HBB introduced and scaled nationwide  |
| Effectiveness and Coverage (Reach) | Small-scale testing: comprehensive newborn care package to assess effectiveness<br>Phased scale-up   | (+): Deaths from neonatal encephalopathy due to birth asphyxia decreased to 8,645/100,000 neonatal deaths by 2015 although the relative proportion of deaths increased to 31%.<br><br>(+): The HBB initiative reached national scale in 2014.  |
| Fidelity                           | Protocol and guideline development<br><br>Training (TOT)   | (-): Facilities' readiness for providing neonatal resuscitation remained low. Although 79.5% of district and sub-district level facilities had a neonatal bag and mask, only 34.7% of union level facilities and 22% of community clinics had these resuscitation materials.<br><br>(-): 25% of staff in health facilities and 8% in community clinics providing normal delivery had at least 1 staff trained on neonatal resuscitation in the 24 months preceding the survey.<br><br>(-): In 2014, poor skill retention and practice by SBAs. |
| Sustainability                     | Integration into systems   | (+): Bangladesh adapted standard MOHFW neonatal resuscitation protocols for tertiary level (advanced management of asphyxia following the Golden Minute®) to reflect the HBB initiative.<br><br>(+): MOHFW integrated HBB into the HPNSDP'S (2011–2016) <b>MNC&amp;AH</b> Operational Plan.<br><br>(+): HBB training was included as part of FB-IMCI<br><br>(+): The comprehensive newborn care package was integrated into the 4 <sup>th</sup> SWAp, Health Nutrition and Population Sector Program (HPNSP).                                  |

## **SUSTAINMENT**

With a focus on crystallizing all the lessons learned, in 2013 Bangladesh collaborated with Save the Children and Mamoni: Health Systems Strengthening to develop a comprehensive newborn health government program which incorporated all newborn health interventions shown to be at least moderately effective through the different testing projects (ProjAHNmo I, ACCESS, Mamoni, and the HBB initiative). The comprehensive newborn care package was developed with three components: one for community-level care providers, one for union-level facilities, and another for upazila-level facilities and higher levels of care. The comprehensive newborn care package was integrated into the fourth SWAp- HPNSP. The program was first implemented in Kushtia district with the intention of developing and demonstrating the effectiveness of a newborn care package before scale-up through the public health system. In 2018, after the study period ended, KIs mentioned that Bangladesh had begun preparations to implement the comprehensive newborn care package in an additional 24 districts with support from UNICEF.

The HBB initiative reached national scale in 2014 although according to research conducted in the same year persistent challenges included poor skill retention and practice by SBAs, especially among lower-level facility providers and community-based SBAs. This challenge was echoed by KIs who added that the HBB was a “training-only” intervention without sufficient provisions for follow up coaching and supervision. Procurement, supply, and maintenance of HBB equipment was also found to be inadequate and insufficient because of lack of resources.<sup>135</sup> The same research, however, found high levels of acceptability of the HBB initiative among health workers.<sup>135</sup>

By 2017, HBB training was included as part of FB-IMCI. In 2019, KIs mentioned that despite efforts to reduce neonatal deaths as a result of birth asphyxia by implementation of interventions such as the HBB initiative, the ongoing issue of poor quality of care and persistent low rates of skilled birth attendance and FBD continue to limit the efforts.

### **4.6.3.2 Kangaroo Mother Care**

*Table 42. Kangaroo Mother Care Key Implementation Strategies*

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"><li>• Stakeholder engagement</li><li>• Community engagement</li><li>• Leveraging partner support</li><li>• Leveraging and integration into existing systems</li><li>• Data use for decision-making</li><li>• Protocol and guideline development</li><li>• Focus on equity</li></ul> |

## **EXPLORATION**

Kangaroo Mother Care (KMC) is a method of care for stabilizing pre-term or LBW infants who need thermal protection, regular feeding and observation, and protection from infection. However, throughout the late 1990s and early 2000s, women had little access to KMC or other thermal care. These services were limited to tertiary

levels like Lamb Hospital in Parbatipur in northern Bangladesh, which began implementing KMC in 1999 for all neonates weighing less than 1,800 grams. In collaboration with Columbia University, Mitra and Associates, BRAC, and the Population Council, between 2004-2007 Bangladesh decided to improve access to KMC by testing the effectiveness of community-based KMC (CKMC) on stabilizing neonates and reducing neonatal mortality. The CKMC program was added to the NNP, an existing community-based nutrition program. (See also Malnutrition section.)

## **PREPARATION**

Preparations included the design of a simple and user-friendly CKMC protocol that did not require birthweight or clinical judgment to identify which newborns should receive CKMC, as in hospital settings.

## **IMPLEMENTATION**

The CKMC method promoted constant skin-to-skin contact, exclusive on-demand breastfeeding, sleeping upright with the baby, using a damp or dry cloth to clean the baby instead of immersing the baby in water, and recommended that the mother seek immediate care if the baby showed danger signs. BRAC's community-based nutrition promoters taught CKMC to pregnant mothers. The CKMC method was implemented in four sub-districts in Dhaka and Sylhet divisions and an assessment showed that it was quickly adopted by women. For example, over three-quarters of surveyed women initiated CKMC and 85% of the mothers with LBW babies continued until the postpartum period. Mothers who initiated skin-to-skin care reported more frequent breastfeeding, delayed newborn bathing, and slept with their babies more frequently. However, according to research published in 2007, the absence of birthweight data limited conclusions on the benefit of CKMC and the program was not scaled up.<sup>136</sup>

## **ADAPTATION DURING IMPLEMENTATION**

Although the CKMC was not scaled up following implementation as part of NNP, the ACCESS program (2007-2009) implemented a CKMC component in Sylhet. Data on its acceptability and effectiveness were not available for the team to review.<sup>129</sup>

By 2013, following a series of consultations coordinated by the Neonatal Technical Working Committee, Bangladesh decided to adopt KMC and scale up across Bangladesh based on both global evidence of its effectiveness and evidence from projects such as the CKMC component of NNP. The Neonatal Technical Working Committee developed national guidelines and protocols on KMC which recommended KMC for facility delivery with follow up at the community level. The target was to scale to 100 facilities by 2022.

When asked about the acceptability of KMC, a KI was said *“it was easy for the health care providers to take it because evidence was there... So, they could easily take it.”* Regarding factors that contributed to acceptability of KMC by mothers, a KI said *“interestingly, mothers were very much aware. When the awareness building program was done, they were very much aware for that because for their premature baby, they want to make him survive. And one of the culture I’ll tell you, for many years, actually if the baby is small or if it is a cold day, an elder person of the family does skin to skin contact or they cover the baby with them. From that, they [the mothers] saw that*



*the elder person was doing like that. Not actual kangaroo mother care, but it is something similar. So, they took it.”*

According to the 2014 Health Facility Survey, only 10% of community clinics and 8% of health facilities had staff trained in Kangaroo Mother Care in the 24 months preceding the survey. Earlier data were unavailable for the team to review. While these data suggest low readiness of facilities, they also reflect the fact that KMC had not reached national scale as of 2014.

Table 43. Kangaroo Mother Care Implementation Outcomes

| Outcomes                           | Implementation Strategy   | Evidence   |
|------------------------------------|---|--|
| Acceptability                      | Stakeholder engagement: led by Neonatal Technical Working Committee<br><br>Community engagement   | (+): Regarding acceptability of Kangaroo Mother Care: “It was easy for the health care providers to take it because evidence was there... So, they could easily take it.”<br><br>(+): Regarding factors that contributed to acceptability of KMC by mothers: “When the awareness building program was done, they were very much aware for that because for their premature baby, they want to make him survive. And one of the culture I’ll tell you... if the baby is small or if it is a cold day, an elder person of the family does skin to skin contact or they cover the baby with them. From that, they (the mothers) saw that the elder person was doing like that. Not actual kangaroo mother care, but it is something similar. So, they took it.”<br><br>(+): See also effectiveness and coverage |
| Feasibility                        | Leveraging partner support for CKMC as part of NNP<br><br>Leveraging existing systems: CKMC implemented as part of NNP and by BRAC’s Community Nutrition Promoters.<br><br>Protocol and guideline development and simplifying for community context | (-): CKMC not scaled up<br><br>(+/-): KMC rolled out although not nationally   |
| Effectiveness and coverage (Reach) | Data use for decision-making: use of global and in-country project evidence on effectiveness to inform decision to roll out KMC.<br><br>Leveraging existing system: NNP   | (+): Deaths due to neonatal preterm birth accounted for the most cause of neonatal deaths in 2000 (26% of all neonatal deaths); by 2016, it dropped to 16% of all neonatal deaths.<br><br>(+): For NNP, over 3/4 of surveyed women initiated CKMC and 85% of the mothers with LBW babies continued till the postpartum period. Mothers who initiated usual skin-to-skin care reported more frequent breastfeeding, delayed newborn bathing, and slept with their babies more often.  |

| Outcomes | Implementation Strategy  | Evidence  |
|----------|--|---|
| Fidelity | Protocol and guideline development   | (-): In 2014, only 10% of community clinics and 8% of health facilities had staff trained in Kangaroo Mother Care in the 24 months preceding the survey. Earlier data were unavailable for the team to review. While these data suggest low readiness of facilities, they also reflect the fact that KMC had not reached national scale as of 2014. |
| Equity   | Focus on equity: CKMC (as part of NNP) and incorporation of community component in KMC program reflected Bangladesh's focus on reaching the unreached. | Not found.  |

## **SUSTAINMENT**

According to research conducted in 2016, KMC units had been set up as part of the comprehensive newborn care package in 21 district- and sub-district-level facilities in Habaiganj, Jhalokati, Kushtia, Noakhali, and Lakshmipur.<sup>137</sup>

### **4.6.3.3 Improving Post-Partum Visits**

*Table 44. Improving Post-Partum Visits Key Implementation Strategies*

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"> <li>• Leveraging partner support</li> <li>• National leadership and accountability</li> <li>• Focus on equity</li> <li>• Community-based delivery <ul style="list-style-type: none"> <li>○ Fixed-site community-based delivery</li> <li>○ Door-to-door</li> </ul> </li> <li>• Focus on equity</li> </ul> |
| <i>See also Improving Access to ANC and SBA sections</i>  |

## **EXPLORATION**

A considerable proportion of maternal and newborn deaths in the neonatal period occur within two days after delivery. Postnatal visits were therefore a key component of Bangladesh's community-based SBAs' and CHCP' role, as well as ProjAHNMo I, ACCESS, and Mamoni. (See also Improving Access to ANC and SBA sections). When a KI was asked why Bangladesh decided to adopt CBD of PNC, they said, "we very smartly thought about dividing facility care and the community care, because many babies who became sick, ultimately, even advised to go to the facility for admission and taking care, they will not go. Will they then be left out from getting care? No. So, that's why community."



## PREPARATION

Preparations for introducing the SNL initiative involved a participatory workshop which included partners and setting up a national technical review committee.

## IMPLEMENTATION

### *Saving Newborn Lives Initiative and Project for Advancing the Health of Newborns and Mothers (ProjAHNMo I), ACCESS, and Mamoni*

In addition to information presented in the Improving Access to ANC and SBA sections, findings from the assessment of ProjAHNMo I showed that early postpartum home visits, within 24 hours, by a trained CHW was associated with a two-thirds lower NMR compared to those who did not receive the visits. As noted, ACCESS and Mamoni also included postpartum care visits. Assessment of ACCESS showed that coverage of postpartum care

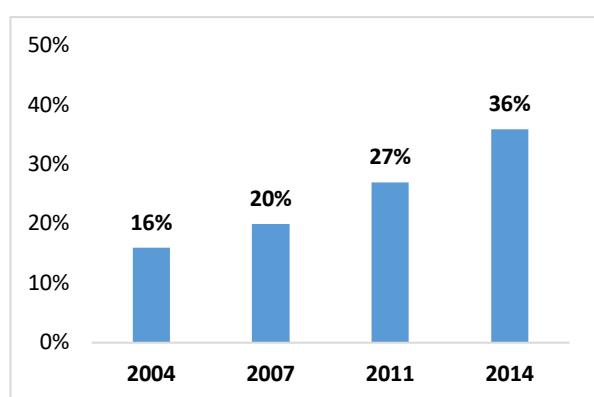


Figure 33. Proportion of women who received postnatal care within two days of delivery by medically trained provider (BDHS)

remained low (15%) in the implementation sub-districts; an assessment of Mamoni showed that coverage of postpartum care remained low (23%) in Sylhet and 17.7% in Habiganj, at the end of project implementation. Data on the association between these postpartum care coverage rates and the NMR were unavailable for the team to review.<sup>129,130</sup>

According to DHS data, the percentage of mothers who received postpartum care within two days of delivery by a medically trained provider – doctors, nurses, midwives, family welfare visitors, community SBAs, or a sub-assistant community medical officer – increased from 16% in 2004 when community-based SBA program was introduced to 36% in 2014 (Figure 36).

Table 45. Improving Post-Partum Visits Implementation Outcomes

| Implementation Outcomes            | Implementation Strategy  | Evidence   |
|------------------------------------|--|--|
| Feasibility                        | Leveraging partner support: participatory workshop<br>National leadership and accountability | (+/-): ProjAHNMo, ACCESS ,and Mamoni implemented although achieved low coverage of post-partum visits  |
| Effectiveness and coverage (Reach) | CBD  | (+): Findings from the assessment of ProjAHNMo I showed early postpartum home visits (within 24 hours) by a trained CHW were associated with two-thirds lower NMR compared to those which did not receive the visits.<br><br>(-): Assessment of ACCESS showed coverage of postpartum care remained low (15%) in the implementation sub-districts. Assessment of Mamoni showed coverage of postpartum care remained low |

|        |                 |  |
|--------|-----------------|--|
|        |                 | (23% in Sylhet and 17.7% in Habiganj) at project end.<br><br>(-): The percentage of mothers who received PNC within 2 days of delivery by a medically trained provider although remained low, increased from 16% in to 36% in 2014.  |
| Equity | Focus on equity | (+): A KI was asked why Bangladesh decided to adopt CBD of PNC said, “We very smartly thought about dividing facility care and the community care, because many babies who became sick, ultimately, even advised to go to the facility for admission and taking care, they will not go. Will they then be left out from getting care? No. So, that’s why community.” |

#### 4.6.3.4 Clean Cord Care, Including Chlorhexidine

Table 46. Clean Cord Care (including Chlorhexidine) Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"> <li>• Learning from other countries</li> <li>• Data use for decision-making</li> <li>• Stakeholder engagement (advocacy)</li> <li>• Public Private Partnership</li> <li>• Leveraging and integration into systems</li> </ul> <p style="text-align: right;"><i>See Improving Access to ANC and SBA sections.</i></p> |

#### EXPLORATION

In the 1990s and early 2000s, the standard of clean cord care had already become dry cord care. In addition, projects such as ProjAHNMo I, ACCESS, and Mamoni encouraged clean cord cutting by educating TBAs and pregnant women and providing clean delivery kits. Between 2007-2009, Bangladesh assessed the impact of two different regimens of chlorhexidine cord care on cord infection and cord colonization compared to dry cord care in an randomized controlled trial (RCT) designed to replicate a similar study conducted in Nepal, to determine effectiveness in Bangladesh.<sup>138</sup>

The study had somewhat contradictory results. While the single dose group had statistically significant 20% lower NMRs (22.5 per 1,000 live births versus 28.3 per 1,000 live births in the dry cord care group), the longer regimen did not reduce mortality. However, the multiple dose regimen reduced severe cord infection while the single dose did not. No reduction was seen when the analysis was restricted to death within the first week of life. As a result of these findings, in 2013 Bangladesh recommended single application of 7.1% chlorhexidine in newborn umbilical cord stump after cord cutting followed by dry cord care in all births irrespective of place of delivery.

## **PREPARATION**

As part of preparations, Bangladesh began advocacy to the private sector to ensure local manufacturing of chlorhexidine with the National Drug Administration Authority providing a license to a local pharmaceutical company to produce chlorhexidine. A KI, describing the success of the advocacy process, said, *“one of the pharmaceutical companies, without making profit they started producing chlorhexidine. They understood that chlorhexidine will not be their cash cow but they were convinced because of persistent advocacy and working with them and they approved, and they started production.”*

## **IMPLEMENTATION**

Despite this work, in 2014, chlorhexidine for cord cleaning was available in only 32% of surveyed health facilities which provided normal delivery services.<sup>139</sup>

*Table 47. Clean Cord Care (including Chlorhexidine) Implementation Outcomes*

| Implementation Outcomes            | Implementation Strategy  | Evidence  |
|------------------------------------|--|---|
| Appropriateness                    | Data use for decision-making   | (+): NMR remained high<br><br>(+/-): Introduction of chlorhexidine reflected data on its effectiveness although data were mixed.                            |
| Feasibility                        | Stakeholder engagement (advocacy)<br><br>Leveraging existing systems<br><br>Local production (PPP) | (+/-): Chlorhexidine for cord care was rolled out although only available in 32% of health facilities by 2016.  |
| Effectiveness and coverage (Reach) | Integration into policy<br><br>Local production (PPP)  | (-): According to 2014 SPA findings, chlorhexidine for cord cleaning was available in only 32% of health facilities which provided normal delivery services |
| Sustainability                     | Integration into systems<br><br>Local production   | (+): Chlorhexidine use included in comprehensive newborn care package   |

## **SUSTAINMENT**

As noted, the comprehensive newborn care package developed in 2013 included chlorhexidine use and in 2018, after the case study period ended, KIs mentioned that Bangladesh had begun preparations to implement the comprehensive newborn care package in an additional 24 districts with support from UNICEF.



#### 4.6.3.5 Management of Neonatal Sepsis

Table 48. Management of Neonatal Sepsis Key Implementation Strategies

| Implementation Strategies  |
|--|
| <ul style="list-style-type: none"><li>• Learning from other countries</li><li>• Community-based delivery</li><li>• Data use for decision-making<ul style="list-style-type: none"><li>○ Data use for adaptation</li></ul></li></ul> |
| <i>See Improving Access to ANC and SBA sections.</i>   |

#### EXPLORATION

Historically, management of neonatal infections was limited to higher-level facilities such as district-level hospitals. However, a study conducted in India in 1999 demonstrated that treatment of neonatal infections such as sepsis was effective and feasible at lower levels of care. This provided impetus for Bangladesh to begin considering the introduction of a similar initiative at the community level.<sup>140</sup>

#### PREPARATION

ProjAHNMo I included home-based treatment of neonatal sepsis in cases where referrals were not possible. As noted, preparations included a participatory design workshop to design and adapt ProjAHNMo I to Bangladesh's context.

#### IMPLEMENTATION AND ADAPTATION

By 2007, ProjAHNMo I showed that community management of neonatal sepsis was feasible and acceptable. For example, assessment of ProjAHNMo I showed that 71.4% of sepsis treatment was home-based even though 91.8% of women perceived it to be a serious complication, suggesting a high level of acceptability of home-based treatment.<sup>141</sup> As a result of this finding, by 2009, although Bangladesh recommended that neonatal sepsis be managed at facilities at the sub-district or higher levels of care with a combination of injectable antibiotics, community-level treatment was allowed. For example, when cases were identified at community clinics or union-level facilities, they were to be referred to a hospital after the first dose of medication had been administered. If referral was not possible the treatment was to be continued at the community level.

In 2014, a study found ongoing gaps in the effective management of neonatal sepsis. This included lack of awareness by caregivers and CHWs of the danger signs and care-seeking needs for newborn illnesses, as well as persistent insufficient numbers of skilled providers in facilities and poor quality of facility care.<sup>142</sup>

Table 49. Management of Neonatal Sepsis Implementation Outcomes



| Implementation Outcomes            | Implementation Strategy                                       | Evidence   |
|------------------------------------|---|--|
| Appropriateness                    | Learning from other countries<br>Data use for decision-making | (+): Introduction of community-based treatment of neonatal sepsis as part of ProjAHNMo I was based on data from India showing its feasibility and effectiveness.<br><br>(+): Deaths due to neonatal sepsis and other neonatal infections accounted for 2580/100,000 neonatal deaths in 2000 (5% of all neonatal deaths)                              |
| Acceptability                      | Data use for decision-making for adaptation                   | (+): Bangladesh's recommendation for expansion of community-based treatment of neonatal sepsis in case of referral failure in 2009, reflected data on its acceptability. Assessment of ProjAHNMo I showed that 71.4% of sepsis treatment was home-based with 91.8% of women perceiving sepsis it to be a serious complication                        |
| Effectiveness and coverage (Reach) | CBD   | (+): Deaths due to neonatal sepsis and other neonatal infections accounted for 2580/100,000 neonatal deaths in 2000 (5% of all neonatal deaths) and by 2016, it reduced to 1466/100,000 although the relative proportion of neonatal deaths attributable remained the same at 5%.<br><br>(-): Insufficient number of skilled providers in facilities |
| Fidelity                           |   | (-): In 2014, a study found ongoing gaps in effective management of neonatal sepsis due to reasons such as poor quality of care.   |

## SUSTAINMENT

According to research conducted in 2014, in addition to antibiotics, tertiary facilities provided other treatment support including blood transfusion, oxygen therapy, and management of hypoglycemia and hypothermia for cases of neonatal sepsis. At district and sub-district facilities, cases were also managed with injectable antibiotics although the type of antibiotic varied depending on the availability of the medicine and the providers' practice. About half of district-, sub-district-, and lower-level facilities referred sepsis cases to higher-level facilities, generally after administering pre-referral antibiotics.<sup>142</sup>

### 4.6.3.6 Neonatal Intensive Care Units

Establishment of Neonatal Intensive Care Units (NICUs) started towards the end of the study period in recognition of the need for more advanced neonatal care. By 2018, at least one NICU had been set up in 46 of 64 districts, with plans to establish same in sub-district facilities.

### 4.6.3.7 Antenatal Corticosteroids for Premature Labor

Table 50. Antenatal Corticosteroids Key Implementation Strategies

| Implementation Strategies   |
|---|
| <ul style="list-style-type: none"> <li>Integration into systems</li> <li>Guideline development</li> </ul> |



Global research found that antenatal corticosteroids (dexamethasone) prevented preterm complications and improved newborn outcomes among premature babies and was accepted as a WHO recommendation. In Bangladesh, research conducted in 2009 noted that although prematurity was a major cause of neonatal deaths, the country did not have specific recommendations on antenatal corticosteroids use.<sup>142</sup>

By 2013, antenatal corticosteroids were recommended as part of the comprehensive newborn care package for pregnant woman at risk of premature delivery. However, mothers with these risk characteristics who gave birth in a facility were excluded, provided gestational age could be accurately assessed and the risk of imminent preterm birth determined; adequate care for preterm newborns including resuscitation, KMC, adequate feeding support, and treatment of infection was available; and timely and appropriate identification and treatment of maternal infection was available.<sup>142</sup>

According to research conducted in 2014, 75% of facilities surveyed mentioned that they were aware of antenatal corticosteroids and its use for the management of preterm deliveries, yet only 2.5% were administering the correct dosage.

*Table 51. Antenatal Corticosteroids Implementation Outcomes*

| Implementation Outcomes | Implementation Strategy  | Evidence   |
|-------------------------|--------------------------|--|
| Fidelity                | Guideline development    | (-): According to research conducted in 2014, although 75% of facilities surveyed mentioned that they were aware of antenatal corticosteroids and its use for the management of preterm deliveries, only 2.5% were administering the correct dosage. |
| Sustainability          | Integration into systems | (+): Integration into comprehensive newborn care package   |

## 4.7 Common Implementation Strategies

Bangladesh was found to have implemented many of the EBIs using a range of implementation strategies, some of which were shared across many or most EBIs. Others were more specific to individual interventions. A number of these were important to facilitating the acceptability, feasibility, and ultimate coverage.

### 1. *Small-scale testing prior to national scale-up*

- Prior to scaling a new EBI, small-scale testing, with expansion and adaptation of processes (phased scale-up) after the testing phase. This contributed to acceptability, feasibility, and effectiveness.
  - Example: FB-IMCI and CB-IMCI.

### 2. *Leveraging a strong community-based care delivery system*

- Bangladesh's CHWs comprised multiple cadres which were used to implement a number of key EBIs through community engagement and direct care delivery. This was usually by integrating additional roles into the existing roles of CHWs, but also through the creation

of new cadres. Leveraging this community health system contributed to acceptability and feasibility in broader scale-up, however, it also led to overburdening of the CHWs as in the case of community-based SBAs.

- Example: FWAs and HAs for CB-IMCI.

### **3. *Leveraging other existing programs and systems***

- New activities often built on existing systems rather than creating vertical ones, saving time and resources.
  - Example: CB-IMCI and FB-IMCI protocol and guideline design leveraged existing programs targeting these conditions; the measles surveillance system leveraged acute flaccid paralysis surveillance resources; and the measles-rubella vaccination program leveraged tetanus vaccination outreach to reach adolescent girls.

### **4. *National leadership and accountability***

- National leadership and accountability were critical to the exploration, preparation, and actual implementation of most EBIs and ensured feasibility.
  - Example: A national steering committee set up for FB-IMCI and CB-IMCI, interagency coordination committee led introduction of PCV and rotavirus vaccine, country coordinating mechanism led preparations for malaria EBIs, and national AIDS committee provided oversight for HIV/AIDS programming.

### **5. *Engagement and coordination of implementing partners and donors***

- Bringing donors and implementing partners together with MOHFW officials and professional bodies to review published evidence and explore feasibility, appropriateness, and sustainability before implementing new EBIs was important for feasibility, acceptability, and appropriateness.
  - Example: IMCI national steering committee included representatives from the MOHFW, BPA, BNF, donors, and partners such as WHO and UNICEF.
- Leveraging partners and donor capacity. This strategy helped to accelerate the implementation of a number of EBIs. However, there were some challenges with this strategy when partners were leveraged for implementation without sufficient support and coordination with MOHFW, for example, vaccination EBIs with supervision challenges.
  - Example: vaccination EBIs, BINP, and ITNs program leveraged NGOs for implementation; multiple EBIs leveraged icddr,b for research capacity; GAVI funds leveraged for vaccination EBIs (co-funding); Global Fund technical and financial support leveraged for malaria EBIs; and funding from UNICEF and credit from the World Bank's International Development Assistance Programme used to implement BINP.

### **6. *Adaptation of interventions to local setting***

- Most EBIs underwent adaptation of implementation components including training and protocols. This contributed to appropriateness, acceptability, feasibility and at times effectiveness/coverage.



- Example: FB-IMCI

## **7. Community engagement and sensitization**

- This strategy was done through a number of approaches, such as mass media and orientation exercises. Usually, though, they included engaging key stakeholders like caregivers, community leaders, and schoolteachers. This engagement was critical particularly for new EBIs including new vaccines and contributed to acceptability and coverage.

## **8. Integrating equity focus into policy and implementation**

- This strategy was core to many of the EBIs. The most common approach was distribution of key items for free or sold at subsidized costs to ensure access for all.
  - Example: Free distribution of ORT, ITNs, free testing with RDT and treatment with ACT, and subsidization of cost of zinc.

## **9. Integration into systems and policy**

- Implementation of EBIs had a clear focus on sustainability through integration of EBIs into the health system and related policy. In some cases, this was done earlier in the program implementation while for others it was done later.
  - Example: Earlier integration into systems and policy: IMCI program unit set up within the directorate of health services at the MOHFW and integration of IMCI into SWAp, national HIV policy developed and reflected in the first National HIV/AIDS Strategic Plan, the introduction of the National AIDS/STDs Programme at the MOHFW, and development of a nutrition policy document, the National Plan of Action for Nutrition.
  - Example: Integration into systems and policy done later in implementation: Integration of IMCI training curriculum into doctors' undergraduate training and the development of the Comprehensive Newborn Care Package and integration into the SWAp.

## **10. Data systems strengthening**

- Implementation of EBIs usually began with strengthening of data systems to ensure feasibility of monitoring and evaluation of EBIs.
  - Example: Integration of FB-IMCI into e-HIS, development of IMCI case recording forms, integration of Hib and PCV into e-HIS.

## **11. Data use for decision-making**

Bangladesh had a strong culture of using data for decision-making before and during implementation of the EBIs. The strategy was supported by the country's existing data systems including the HMIS, long history of implementing surveys such as DHS, and the strong presence of local research organizations such as icddr.<sup>b</sup> Bangladesh also used the results of small-scale testing or ongoing program evaluations. Examples included:

- Data use to understand disease, to ensure appropriateness of EBI.
  - Example: Decision to introduce CDD and ARI programs were based on high disease burden; early focus on neonatal period as part of FB-IMCI was based on disease burden





data; and decision to introduce rotavirus, PCV, and Hib (as part of pentavalent) vaccines were based on disease burden data.

- Data use for prioritization
  - Example: Decision to introduce Rotarix instead of Rotateq and PCV-10 instead of PCV-13, based on cold chain capacity requirements; prioritization of districts for malaria programming based on disease burden data; determination and prioritization of malaria hotspots for IRS; limited testing with RDT in low-endemic areas; early and ongoing focus on prevention of primary transmission of HIV among at-risk populations as a key strategy for PMTCT.
- Data use for M&E and supervision for all EBIs, to identify implementation gaps and monitor coverage
  - Example: FB-IMCI and ITN.
- Data use for adaptation for effectiveness and coverage
  - Example: Adding drowning to CB-IMCI package of care based on evidence that drowning was a leading COD among children; adaptation of PCV immunization schedule based on data showing children were missing last the dose; switching to ACT from chloroquine for malaria treatment; introduction of Pan-RDT (to replace Plasmodium falciparum-specific RDT) to ensure diagnosis of malaria cases caused by Plasmodium vivax.

#### ***12. Increase in national financial commitment to EBIs by increasing budget***

- This was mainly done to account for loss or reduction in donor funding and to ensure sustainability.
  - Example: Increase in budget for FB-IMCI after WHO and UNICEF ended financial support; increase in budget for vaccines as part of the fifth SWAp in response to Government of Bangladesh's increasing co-funding requirement for PCV.

#### ***13. Community-based delivery***

- This was done through both fixed sites such as community clinics and door-to-door delivery. This strategy contributed to improving coverage.

#### ***14. Training and supervision***

- Training was done across most EBIs, usually TOT, and was usually followed up by supervision – although for most EBIs that was infrequent.



## 5 CROSS-CUTTING CONTEXTUAL FACTORS FACILITATING UNDER-5 MORTALITY REDUCTION

A number of contextual factors at the global, national, subnational, community, and implementing partner levels critical to successes and challenges in implementing the targeted EBIs in Bangladesh and others which influenced other causes of U5M, were identified. The facilitating contextual factors were critical in creating the environment and providing the support that contributed to the country's success, directly or indirectly. KIs mentioned that these accounted for the drop in U5M despite low coverage of some EBIs. The challenging contextual factors that represented barriers to success in achieving equitable and quality coverage are also discussed in the Cross-Cutting and Remaining Challenges section, below.

### 5.1 Strong Community Health Systems and Structure

The existence of a strong community health system and CHWs facilitated the U5M reduction work through community engagement activities and direct service delivery. Before and during the case study period, Bangladesh strengthened its community health system, introducing new CHW cadres and establishing community-owned and -managed community clinics between 1998-2001 and from 2009 (See Community Health Program in the Introduction).

Bangladesh's community health system reflected much of WHO's recommendations on factors critical to ensuring a strong community health system. For example, CHWs were selected to ensure acceptability so that, while communities were not involved in the selection or supervision of the workers, CHWs were selected from within communities. Bangladesh had female-only cadres of CHWs where necessary – community-based SBAs and FWAs – which contributed to acceptability. Duration of training was commensurate with the scope of work expected, with HAs trained for 21 days compared to CHCPs who were trained for 12 weeks. Lastly, monetary remuneration was provided to the CHWs as recommended by WHO, with minimal use of performance-based incentives – contributing to sustainability.<sup>1</sup>

Bangladesh was also unique in having a strong NGO CHW system, which it leveraged for broader scale implementation of some EBIs.

### 5.2 Increased Access to and Uptake of Family Planning and Decreased Fertility Rates

Very early on, in the 1960s and 1970s, Bangladesh identified its rapid population growth as a major challenge to its development and began implementing a number of initiatives to increase access to FP and decrease fertility rates. These included the establishment of the DGFP at the MOHFW in 1975 and the drafting of Bangladesh's Population Policy in 1976, though this was only formally introduced in 2004. A major component of Bangladesh's population control initiatives was the 1976 introduction of FWAs, a cadre of CHWs, to visit households every two months and register couples, introduce them to FP, distribute contraceptives, and refer pregnant women for clinical contraceptives, in addition to other child health and adolescent health services.<sup>143</sup> (See Community Health Program in the Introduction.) According to many KIs, these initiatives were successful in facilitating Bangladesh's



drop in U5M, with one KI describing it as *“the number one contributor.”* Bangladesh’s total fertility rate dropped from six in 1975 to two in 2014;<sup>52</sup> contraceptive prevalence among women (any method) increased from 40% in 1991 to 54% in 2000 and 62% in 2014;<sup>144</sup> unmet FP need dropped from 22% in 1993-94 to 12% in 2014; and demand for FP satisfied by modern methods increased from 55% in 1993-94 to 73% in 2014.

### 5.3 Women’s Empowerment

According to KIs and studies including Countdown 2015, women’s empowerment was a key facilitator of U5M reduction, before and during the study period.<sup>145</sup> A key component of Bangladesh’s women’s empowerment initiative was the introduction of micro-credit schemes in the 1980s. Research conducted in 2003 found these to have led to increases in women’s roles in household decision-making as a result of having greater access to financial and economic resources, having greater social networks, and overall greater freedom of mobility.<sup>146</sup> Another women’s empowerment initiative was the Female Secondary School Stipend Project, introduced in 1994. It was aimed at improving girls’ enrolment and retention in secondary schools. The project provided girls in rural areas with stipends for attending school 75% or more of the time, maintaining a passing grade, and delaying marriage until they were 18 years old or had completed secondary school. According to research conducted in 2015, these initiatives were effective in improving Bangladesh’s adult female literacy rate which rose from 26% in 1991 to 62% in 2016.<sup>49,113</sup>

Multiple KIs explained that Bangladesh’s women’s empowerment initiatives were successful and were facilitators of Bangladesh’s U5M drop. They also added that the geographic inequities in U5M reduction seen in Figure 5 with the northeast (Sylhet division) lagging behind the rest of the country, was partly as a result of lower levels of women’s empowerment in the area, reflected in attitudes towards health care. A KI explained, *“For Sylhet, there are few things [accounting for the inequity]...and low empowerment of the women...low empowerment of women because there, women think, ‘we are married, it is the male people who will be taking all decisions.’”* Another KI added that, for Sylhet, *“because Sylhet people are more conservative that’s why...that area is known as the poor setting area of Bangladesh or poor performing area.”* The KI said this contrasted with other areas such as Khulna where *“ladies speak out in family matters,”* and the hill tracts (Chittagong) which *“is a hard-to-reach area but they are different because they are quite happy to take up the things while there is resistance in Sylhet for receiving care.”*

### 5.4 Culture (Facilitator and Barrier)

KIs noted that culture in certain parts of Bangladesh, such as Sylhet, linked to religion and was reflected in attitudes towards women’s empowerment, education, and health care practices. As noted above this was responsible for the geographic inequity in U5M reduction seen in Sylhet compared to other areas like Khulna where the culture was more favorable to factors which drove the reduction in U5M.

### 5.5 Donor and Implementing Partner Resources (External)

These resources included financial as well as technical expertise and direct capacity for implementation. Donor and partner funding was a major facilitator of Bangladesh’s success in U5M reduction. In speaking to this, a KI said *“donors are quite generous... in... many of the programs actually donors helped Bangladesh government.”* Multilateral organizations including the World Bank, GAVI, and the Global Fund invested in Bangladesh’s U5M



reduction initiatives between 2000-2015 (see EBI sections). An example of direct implementation by an international organization was Save the Children, a key implementer of CB-IMCI.

## 5.6 National Implementing and Research Capacity and Professional Bodies (Internal)

A number of the initiatives were implemented by internal partners. For example, NGOs like Proshika and Thengamara Mohila Sabuj Sangha implemented the internal Bangladesh Integrated Nutrition Project. Before and during the case study period, the presence of strong in-country technical and implementation resources and capacity was a key facilitator of U5M reduction. For example, BRAC implemented malaria and ORT EBIs and icddr,b was often relied upon for research capacity before and during the study period. Professional bodies, especially the OGSB, BNF, and BPA were also key facilitators of Bangladesh's successes in U5M reduction. These professional bodies were key to Bangladesh's decision to introduce EBIs, as well as preparations for introducing them such as design of protocols and guidelines, and/or the actual implementation of these EBIs, for example with FB-IMCI and community-based SBAs. In speaking of the importance of these professional bodies for Bangladesh's U5M reduction efforts, a KI said, *"the professional group of people are very good in developing different intervention models, training modules, it is the professional people that can do it. Because if you have a model in the global level, who is going to do the country adaptation? Who are the trainers? ...Master trainers? So...[the] government ultimately realized that they need them and engaged them."*

KIs added that Bangladesh's success in leveraging internal partner resources was linked to the government's "very lenient" disposition towards engaging with them, while ensuring strong leadership and coordination. Other factors such as maintaining active relationships with partners and providing a facilitating environment for engagement were also mentioned as key drivers of the positive relationship. For example, three members of icddr,b's Board of Trustees as of 2019 were government personnel. On the part of the partners, KIs noted that their culture of commitment to influencing policy through communication and engagement with the government, facilitated their role in the U5M reduction efforts. These were reiterated by a KI who was asked to summarize the role of national partners in U5M reduction efforts and said *"Bangladesh has NGOs like BRAC and many others, not only BRAC. I think we are quite lucky that our government also allowed [this], many countries don't allow NGOs to work the way they do work [here]...I also believe that research institutes, many countries they don't have large institutes like icddr,b."*

## 5.7 Donor and Implementing Partner Coordination

Most KIs mentioned coordination and collaboration amongst the MOHFW, implementing partners, and donors as a major facilitator of U5M reduction. During or before the study period, the different U5M-related programs within the MOHFW introduced technical working groups to coordinate all government-donor activities. For example, there was a National Newborn Technical Working Group which provided coordination for all neonatal programming activities in Bangladesh with members such as icddr,b, UNICEF, and the BNF. These technical working groups were then coordinated by the MNC&AH program at the MOHFW.

Another component of Bangladesh's coordination mechanism was the introduction of a health SWAp in 1998, changing emphasis from a vertical, project-based funding and programming approach to a horizontal approach

to support the health sector. During the study period, different EBIs were integrated into the SWAp and donors were required to fund programs through the SWAp (see EBIs section). Each SWAp was developed to last five years and included operational plans and budgets for each program with clear goals that donors and partners were involved in developing, to ensure their priorities and goals were aligned with those of the government. For most U5M-related activities such as IMCI and vaccination, the MNC&AH program operational plan included clear goals on improvement which KIs noted was a major priority for the Government of Bangladesh.

## **5.8 Effective Leadership and Accountability: Setting Clear Goals and Priorities**

Effective leadership and associated accountability to both the citizens and the international community was a key facilitating factor of U5M reduction between 2000-2015, and was mentioned by most KIs. While leadership was most active and effective nationally (especially with Bangladesh's challenges with decentralization of its health system – see below), KIs also reported that the responsibility, accountability, and leadership cascaded to the subnational level.

This commitment to effective leadership and accountability was also reflected in key national goals and priorities which reflected global goals and priorities. For example, the 2000-2015 MDGs, according to KIs, *“made the government have the political will to think about child, infant, and newborn health”* and informed much of the child and newborn mortality reduction targets set as part of Bangladesh's health SWAps. Earlier examples of Bangladesh's goals reflecting global priorities included the commitment to achieving Universal Child Immunization in 1985 based on WHO's recommendations.

At the subnational level, leadership at regional level was active in particular areas such as Khulna which reflected in higher rates of U5M reduction (Figure 5).

## **5.9 Data Availability**

Bangladesh had a long history of ensuring data availability and had been conducting standard DHS since 1993-94. Other surveys such as the MICS, SPA, and Health Facility Survey were also implemented beginning in 1993, 2000, and 2014, respectively.

## **5.10 Data Quality and Use (Facilitator and Barrier)**

Although Bangladesh ensured data availability and, as noted in the EBIs section, surveys were used for designing, planning, implementing, monitoring, and evaluating specific EBIs before and during the case study period, according to KIs, broader value for data use for decision-making only increased during the case study period because of donor priorities. As a KI explained: *“Data or... indicators, these were kind of jargons years back... But at some point of time we thought that your main armament is your data. Because that can tell the policymaker, look, this is the magnitude of the problem, it's not what we have been talking from our own experience, which is...anecdotal data, which would not then be accepted.”* This increased focus on data use led to the development of a HMIS unit at the DGHS (MOHFW) in June 2014, though completeness and quality of the HMIS data remained a challenge. As a KI noted, *“I would say I am very happy to have that [HMIS unit] but much more needs to improve in HMIS.”*



## 5.11 Other Public Health Initiatives with Impact on U5M

The MOHFW's efforts to improve U5M between 2000-2015 were complemented by corresponding efforts which addressed broader public health issues beyond amenable causes of U5M including WASH. Between 2000-2015, Bangladesh invested in WASH initiatives focused on improving access to clean water and improving sanitation facilities. By 2011, 83% of Bangladesh's population had access to clean water and 55% had access to improved sanitation facilities, compared to 76% and 38% in 1990, respectively.<sup>113, 147, 148</sup>

## 5.12 Geography (Hard-to-Reach Areas and Civil Unrest) (Facilitator and Barrier)

According to KIs, the hard-to-reach geography of the hill tracts area in the Chittagong division in southeastern Bangladesh accounted for some of the geographical inequity seen in U5M reduction (Figure 5). Although the difficult geography did not reflect on HRs for health distribution – Chittagong having the second highest density of doctors and nurses after Dhaka (see Table 4) – overall, the area had consistently lower coverage of U5M-related indicators compared to other divisions. For example, according to DHS 2014, the percentage of currently married women aged 15-49 who had used modern contraceptive methods was 47% in Chittagong, lower than every division but Sylhet (41%). (See Women's Empowerment below for reasons for Sylhet's relatively lower coverage rates.)

As noted in the Introduction, the Chittagong Hill Tracts were also the site of civil unrest before and during the case study period. As a result, in addition to the hard-to-reach geography of the area, Chittagong continued to lag behind the rest of the country in U5M reduction (Figure 5). This disparity in U5M reduction existed throughout the study period. The proportion of children not vaccinated in Chittagong improved between 2004 to 2014, yet remained the second highest (only lower than the Sylhet division) at 5.3% in 2004 and 2.9% in 2014.<sup>9,57</sup> In addition, KIs noted that the influx of refugees from Myanmar into the Chittagong division may exacerbate already existing inequity in U5M reduction (see Cross-Cutting and Remaining Challenges).

However, KIs noted that geography was not always a barrier given that Bangladesh is a small country (though with a large population). Physical access to health facilities was not a substantial challenge, with more than 87% reporting being within 1km of a public or private health facility or community clinic by 2014.

## 5.13 Infrastructure (Non-Health Systems Strengthening)

Research conducted in 2015 noted that major improvements in the transportation and road system were a key facilitator of improvements in child health in the country (including U5M) because the roads facilitated improved access to health services for rural communities. There were 9,704 paved roads in 1991 and by 2007, this had increased to 17,321. Between 1991 and 2006, 11,560 bridges were built. Another infrastructural development which facilitated the drop in U5M was the increase in the proportion of households using mobile phones, from 35% in 2007 to 78% in 2010. This increased use was also seen among rural populations with the proportion of households in rural areas who used mobile phones increasing from 29% to 75%.<sup>113</sup>



## 5.14 Human Resources for Health (Barrier)

The HRs for health capacity remained an ongoing challenge with the number of physicians and nurses/midwives well below the WHO target of 2.28 doctors, nurses, and midwives per 1,000 people. In 2011 estimates were 0.3 physicians and 0.1 nurses per 1,000 people.

## 5.15 Health System Structure and Strengthening (Facilitator and Barrier)

The health system structure posed a number of challenges to the effective implementation and sustainment of EBIs. This included some components of the decentralization and the underlying structure within the MOHFW. Bangladesh implemented a number of steps to decentralize its health care system including setting up district and upazila health management teams and the introduction of several policies such as the Local Government (Union Parishad) Act in 1997, the Upazila (sub-district) Parishad Act in 1998, and the Zila (district) Parishad Act in 2000, which assigned subnational health management teams increasing administrative functions and approved direct funding to the union level. However, according to research conducted in 2015, although care delivery was decentralized through CHWs' delivery of ORS and FP services, for example, management of Bangladesh's health system remained heavily centralized with fiscal and policy functions such as disbursement, allocation, and mobilization of resources remaining predominantly central-level led activities.<sup>149</sup> The same research also found that although selection of CHWs was done at the community-level, personnel administration – recruitment, remuneration, and transfers of health workers – was the responsibility of the central level.<sup>150</sup>

KIs noted that the dual structure of the MOHFW continued to pose a barrier to effective and efficient health delivery. For example, the IMCI program unit within the DGHS was responsible for procuring IMCI-related commodities. However, 73% of all union-level facilities belonged to the DGFP as of 2019. As a result, these DGFP facilities often experienced delays in receiving IMCI-related commodities because they had to be ordered by union-level DGHS facilities and delivered to the DGFP facility. As noted in the introduction, Bangladesh attempted to merge both the DGHS and DGFP between 1998-2003 but the merger was not popular with health workers and was not successful. This continued to pose a challenge to care delivery before, during, and after the case study period.

Bangladesh also invested in strengthening its health system to expand access to health services through the introduction of community clinics. At last count there were about 13,000, averaging three to four per village, and each serving a population of 5,000-6,000. Other efforts included improving the capacity of family welfare centers to provide 24-hour delivery services by providing essential equipment, medicines, and supplies, and hiring nurses and family welfare visitors.

## 5.16 Economic Development (Facilitator and Barrier)

Bangladesh experienced improvements in its economy with its GDP per capita rising from US\$509 in 2000 to US\$599 in 2005, US\$758 in 2010, and US\$972 in 2015. Despite these increases, in 2015 Bangladesh's GDP per capita remained below the South Asian average of US\$1,603, as well as below that of its regional neighbors India (US\$1,759) and Myanmar (US\$1,342). Further, the proportion of the population living below the national poverty line showed major declines from 48.9% in 2000 to 40% in 2005, 31.5% in 2010, and 24.3% in 2016 (after the case study period ended), while still remaining high.<sup>151</sup>



### **5.17 Private Sector (Facilitator and Barrier)**

Bangladesh engaged both the for-profit and not-for profit private sectors in the work to expand health care and the EBIs. A significant facilitator was the engagement of NGO CHWs within the national system to support more rapid scale-up. The for-profit health care delivery sector was supported to fill gaps in broader public health service delivery before and during the case study period. This reflected strongly in maternal and child health service delivery, with the proportion of ANC sessions and FBDs occurring at private health facilities – though this was also linked to the distrust for public facilities as a result of poor quality of care and absenteeism of health care providers. (See Introduction and SBA and FBD sections.) However, the sub-optimal coordination between the public and private care delivery sectors and lack of accountability for quality presented a barrier to ensuring good quality of care.

Bangladesh also leveraged the private sector in implementation of EBIs, for example in the production of zinc and ORS.





## 6 CROSS-CUTTING AND REMAINING CHALLENGES

A number of gaps were identified which pose ongoing challenges to the U5M reduction efforts, some of which reflect the negative contextual factors. They are discussed below.

### 6.1 Quality of Care

Similar to many countries, quality of care remained a significant challenge to U5M reduction efforts in Bangladesh. This poor quality of care, including patients' experiential quality, led to distrust and low uptake of public health facility-based services and contributed to the increase use of private facilities. Underlying causes included gaps in monitoring and supervision – accountability – and country leadership's low level of commitment to championing quality. KIs noted that while there was a QI unit at the DGHS in the MOHFW, the oversight provided was not effective. By 2009, KIs noted that implementing partners and donors began to prioritize and advocate for quality improvement (QI) as a means to improve the effectiveness of U5M reduction efforts. In describing this prioritization of QI by donors and implementing partners, a KI said *"I can remember in 2008, '09, WHO came up and wanted to do a quick assessment of quality of in-patient care for children...that assessment also showed very poor readiness and practice in terms of pediatric care in the hospitals, sub-district- and district-level hospitals."* As a result of these findings, with support from WHO, Bangladesh adopted the WHO Pocket Book for In-Patient Pediatric Care in 2010 with the view to improving quality of facility-based pediatric care. Further, UNICEF, USAID, UNFPA, and JICA began providing capacity building support to the QI unit of the DGHS including clarifying the roles and responsibilities of its personnel and providing trainings. Bangladesh also introduced a National QI Strategic Plan in 2015 and by 2018, after the study period ended, implementing partners and donors such as USAID and UNICEF were providing support to districts to set up divisional and district-level QI units to implement QI initiatives at subnational levels, with oversight from the national QI unit.

### 6.2 Reducing Neonatal Mortality

Bangladesh was early in recognizing the need for strengthening neonatal care. While NMRs decreased, however, more work including addressing mortality in LBW and premature infants, increasing FBD, and quality of care were recognized as priority towards the end of the study period. KIs added that these health systems-focused improvements were required for drops in neonatal mortality to continue, as the declines in neonatal mortality before and during the study period were largely due to contextual factors.

### 6.3 Government Funding for Health

As highlighted in the Government Funding for Health section, although Bangladesh prioritized funding for vaccination EBIs for example, all-cause government expenditure as a percentage of overall health expenditure remained low and decreased between 2000-2015, from 26% in 2000 to 21% in 2005, 20% in 2010, and 15% in 2015.<sup>42</sup> In 2015, total health expenditure was 2.9% of GDP – among the lowest in the world.<sup>152</sup> KIs noted that this remained a challenge for the sustainability of programs and for the investments in critical areas needed for continued improvements in U5M reduction.



## 6.4 Out-Of-Pocket Expenditure and Insurance Coverage

The very high OOP expenditure and resulting risk of catastrophic health expenditure poses a threat to achieving equity and further reduction in U5M. The impact of more recent efforts to reduce OOP through initiatives such as insurance schemes was beyond the time period of the study.

## 6.5 Dependence on Donor Funding

KIs mentioned that Bangladesh's ongoing dependence on donor funding for much of its U5M reduction programs, which had implications for sustainability of key programmatic activities, remained a challenge.

## 6.6 Geography (Hard-to-Reach Areas)

The hard-to-reach geography of the Chittagong division continued to pose a challenge to U5M reduction efforts with persisting inequities despite national reductions.

## 6.7 Geographic and Equity Gaps in Coverage of Evidence-Based Interventions and Selected Underlying Conditions

Despite the strategy of focusing on equity, Bangladesh continued to experience challenges with equity of coverage of some of the important EBIs and prevalence of U5M-related CODs. Excellent geographic coverage was seen for FB-IMCI with the closing of wealth-based equity gaps for ORT and early initiation of breastfeeding (Figure 13). However, inequity remained for measles vaccination and underlying conditions such as stunting and underweight prevalence. Notably, some of the geographic coverage gaps represented equity-driven strategies such as the data-driven focus in implementation of malaria EBIs targeting endemic areas. KIs also noted that the narrowing of wealth-based equity gaps in overall U5M reduction, as opposed to for specific EBIs, was as a result of other factors noted above including female empowerment and education, economic strengthening, and reduced fertility rates.

## 6.8 Data Systems Challenges

Bangladesh had a history of data systems strengthening and use as part of EBI implementation and, recently, broader data systems strengthening was noted (see Background and Cross-Cutting Contextual Factors sections). However, as described in the Cross-Cutting Contextual Factors section, the country continued to have challenges with its broader data systems, for example with the completeness and quality of the HMIS.

## 6.9 Human Resources for Health

The HRs for health capacity remains an ongoing challenge with the number of physicians, nurse, and midwives remained well below the WHO target of 2.28 doctors, nurses, and midwives per 1,000 people. In 2011, estimates were 0.3 physicians and 0.1 nurses per 1,000 people .<sup>33</sup>

## 6.10 Political Unrest (Country and Regional)

As noted in the Cross-Cutting Contextual Factors section, political unrest within the Chittagong division represented an ongoing challenge to U5M reduction efforts. Further, KIs mentioned that the influx of refugees



from Myanmar into the Chittagong division may exacerbate already existing inequity in U5M reduction because of pressure on public services in the area, and inability to increase resources to match the increasing population.

## **6.11 Economic Development**

As discussed, although Bangladesh experienced improvements in its economy, for example with growth in its GDP per capita, the proportion of the population living below the poverty line remained high and presented an ongoing challenge to U5M reduction efforts.

## **6.12 Private For-Profit Sector**

While private sector health care providers helped to expand access to critical interventions particularly around ANC and delivery, the sub-optimal coordination and oversight provided the private sector remained a challenge for ensuring good quality of care, as reflected in the rapid increase in Caesarean section rates from 3% in 2000 to 23% in 2014 (Table 6).

## **6.13 Health System Structure**

The continued centralization of the management of Bangladesh's health system as well as the dual structure of the MOHFW were noted as ongoing challenges.

## **6.14 Culture**

The culture in certain parts of Bangladesh such as Sylhet was unfavorable to factors which drove the drop in U5M. For example, women's empowerment and education were identified as an ongoing challenge.

## 7 TRANSFERABLE KNOWLEDGE FOR OTHER COUNTRIES

There were a number of implementation strategies from Bangladesh that have the potential to be adapted and adopted by other countries looking to learn from Bangladesh's successes and challenges to accelerate their own declines in U5M. These include building a strong paid, supervised, community health program. This was used to implement multiple initiatives, expanding access and community engagement, and was recently reflected in WHO recommendations.<sup>1</sup> Bangladesh worked to strengthen and build on existing health system capacity through integrating new initiatives rather than developing vertical systems, with some exceptions. Similar to other countries, Bangladesh also prioritized generating local evidence to inform implementation of new EBIs while leveraging global evidence where appropriate. The country was able to largely rely on internal expertise through professional organizations and in-country research organizations such as icddr,<sup>2</sup> and the research studies often reflected a goal of scale as evidence was generated. Bangladesh also planned for equity from the start of EBI implementation, prioritizing reaching populations most in-need as opposed to reaching everyone.

Other transferable lessons include the systematic and regular consultations and engagements with researchers. Researchers were encouraged to engage with donors and policymakers to ensure evidence-based decision-making. Further, engagement with stakeholders, including national implementing partners like BRAC, multi-sectoral collaboration from early in implementation and throughout, planning for sustainability by integrating into systems, private sector engagement to expand health care service delivery – which also represented a challenge, with limited oversight – and ensuring financing for EBIs, were important lessons. Like a number of other exemplar countries, looking outside direct causes of mortality was also critical. For example, female empowerment, infrastructure investments, and identifying and addressing other public health issues such as WASH activities were important.

There were areas in which Bangladesh experienced challenges such as ensuring quality training and supervision and reducing out-of-pocket spending through health insurance, which also provide a useful lesson to other countries.

### **Areas of strength and recognized challenges:**

#### **1. Develop and/or ensure CHW programs suited to local context and adaptable to current needs, with standardized training, management, and accountability system that involves community and health professionals**

Government CHWs were repeatedly noted as key implementers of U5M EBIs, with multiple EBIs incorporated into their scope of work. The success of the CHW program was related to a number of factors including female-only cadres of CHWs – FWAs and community-based SBAs – to provide FP and delivery services, respectively, which contributed to acceptability. The strong governance structure, which involved both DGHS and DGFP union-level health workers, assistant health inspectors and health inspectors who supervised HAs, and FP inspectors who supervised FWAs, was key to the success of Bangladesh's community health program. Further, participation of the community through community groups, which shared the cost of construction of community clinics with the government and were responsible for the cleanliness and general maintenance of the clinics, contributed to ownership and the success of the program. Bangladesh's willingness to adapt to current needs and demands by introducing additional cadres, including the community-based SBAs and CHCPs, to implement new EBIs and meet emerging needs for increased CHW capacity, was identified as key to the success of the CHW program.



However, Bangladesh's community health program was not without challenges. Despite efforts to ensure acceptability, the community-based SBA program was not fully accepted in their new role given that they remained known as HAs and FWAs within communities, and because they were overburdened; as a result they accounted for only a minimal proportion of skilled birth attendance. Thus, countries looking to achieve Bangladesh's success, and improve on its challenges, should ensure these constraints are addressed.

## **2. Integrate new initiatives by building on existing health system capacity**

Integration of new initiatives into existing structures and previous initiatives was important to reduce risk for vertical projects and duplication of work while providing resources to increase overall capacity. Notable examples of this include:

- FB-IMCI leveraged existing programs including the CDD and ARI, protocols, and guidelines, and CB-IMCI was integrated into the existing community health system involving two existing cadres of CHWs: HAs and FWAs.

## **3. Leverage and ensure integration of data collection for new initiatives into existing health information systems to assess need and monitor effectiveness and coverage of new EBIs**

Bangladesh leveraged existing data collection systems rather than building new systems. This contributed to successful implementation of EBIs and supported sustainability through integrating into routine data. Some examples include:

- Integration of IMCI and new vaccines, PCV and Hib (as part of Pentavalent vaccine), into the HMIS system.
- Bangladesh leveraged the existing pediatric bacterial meningitis and pneumococcal disease sentinel surveillance systems at the MOHFW to monitor adverse events following immunization, after the introduction of PCV.
- Bangladesh's measles surveillance was set up to leverage the existing acute flaccid paralysis surveillance system for polio detection, including its surveillance medical officers.

## **4. Value evidence-based decision-making and use it to determine need and appropriateness of EBIs and create implementation strategies based on global and local scientific evidence. Balancing the need for local evidence with the strength of existing global evidence and prioritizing rapid adoption and scale up of EBIs where appropriate**

Bangladesh had a practice of leading in the introduction of globally emerging EBIs (for example, IMCI strategy), often based on already identified disease burden, and then requiring small-scale testing to determine feasibility and effectiveness before scaling up. However, Bangladesh also recognized the importance of rapid introduction of some EBIs which did not require context-specific adaptation, in cases where global evidence already existed or there was a history of acceptability of similar EBIs. For example, RDTs for malaria were introduced based on the strength of global evidence; and PCV was rapidly introduced and scaled based on the history of acceptability of vaccines. Specific lessons include:

- **Value evidence-based policymaking**
  - Bangladesh valued evidence-based decision-making through inclusion of professional leaders and national research organizations such as icddr, regularly and at a high-level with government



stakeholders; this encouraged their commitment through the long and iterative process of the evidence-policy continuum.

- ***Prioritize locally produced evidence to inform decisions and implementation***

- Bangladesh adopted new EBIs and adapted them to suit the local context based on local research to determine its appropriateness and feasibility. Importantly, this effort engaged and gave leadership to in-country research institutions, fostering a culture of data-driven decision-making and promoting research in the health sector. For example:
  - CDDs and ARI programs were introduced because of high burden of diarrhea and ARI in Bangladesh.
  - The lower age limit for Bangladesh's FB-IMCI was set at 24 hours as opposed to seven days, as recommended by WHO and UNICEF, to reflect data which showed the high burden of neonatal deaths in the country.
  - Studies conducted by icddr,b and surveillance studies by Bangladesh's Institute of Epidemiology, Disease Control and Research, provided the basis for Bangladesh's decision to introduce rotavirus vaccine.
  - Bangladesh conducted studies to determine the appropriateness of existing PCV and rotavirus vaccine types for Bangladesh's serotype prevalence. Based on comparability of effectiveness of different vaccine types and cold chain capacity requirements, Bangladesh decided to introduce Rotarix and PCV-10.
- Bangladesh conducted small-scale testing often done by or with in-country institutions for selected EBIs before scaling up in order to determine feasibility, acceptability, and effectiveness. The small-scale testing phase was used to inform implementation strategies, such as phased scale-up or leveraging NGOs as implementers. For example:
  - Small-scale testing of FB-IMCI and CB-IMCI assessed feasibility and effectiveness. Findings from the small-scale testing phase informed phased scale-up of FB-IMCI and CB-IMCI and leveraging of implementing partners including NGOs like Save the Children for implementation of CB-IMCI.
- Bangladesh adapted EBIs based on emerging local data. For example:
  - Addition of drowning to CB-IMCI based on evidence that drowning was a COD among children.
  - Changing zinc to an over-the-counter medicine to open up the sale of zinc to retail shops and increase sales and profits for sales representatives.

## **5. Plan for equity from the beginning and adapt systems for equity**

Bangladesh implemented multiple systems to address equity. While this was not always successful in achieving wealth-based equity of coverage for specific EBIs, it decreased the equity gap in burden of disease. Other factors including female empowerment and education, economic strengthening, and reduced fertility rates contributed to closing these gaps in U5M reduction overall. Specific examples include:

- ***Ensure financial accessibility through systems designed to ensure equity***

- Free distribution of ORS packets as part of NORP.
- The price of zinc blister packs set at US\$0.18 per pack to ensure it was affordable in the private sector, and it was free at public health facilities.



- Free distribution of ITNs and free test-to-treat with RDT and ACT.
- ***Integrate an equity agenda into program implementation and governance decisions***
  - Bangladesh ensured community participation through the creation of community groups which in collaboration with the government oversaw community clinics. The community groups' membership comprised at least one-third women and adolescent girls or boys, to ensure decision-making representation of these groups who accessed community-level services the most. To further ensure equity, the community groups were required to have at least the president or vice-president to be female.
  - Prioritizing sub-districts with high U5M for initial phase of FB-IMCI implementation reflected a focus on equity rather than equality.
  - Thirteen malaria-endemic districts were prioritized for implementation of malaria EBIs, such as ITN distribution. There was limited RDT use in non-endemic areas. This also reflected a focus on equity rather than equality.
- ***Adapt existing systems to ensure equity***
  - Ensure accessibility through adapting existing systems
    - Phase two of the CDDs Program had an increased focus on rural children under 5 compared to phase one.

## **6. Consultations and participation: Engage and consult stakeholders and leverage their expertise including within the MOH, other sectors, donors, implementing partners, professional bodies, and community**

This approach ensured better acceptability and feasibility of scale up through broad engagement. Consultations and engagement were typically done through committees at national level, but also during actual implementation at the subnational level.

- ***Leverage and engage donors and implementing partners***
  - Bangladesh's interagency coordination committee, which led preparations for introduction of rotavirus vaccine, had donor and civil society representatives including BRAC and Rotary International. Bangladesh's Country Coordinating Mechanism, a coordinating committee responsible for overseeing the implementation of malaria, HIV/AIDS, and tuberculosis interventions, had NGO and civil society members.
  - Bangladesh had a history of leveraging partner capacity for implementation of EBIs which contributed to the feasibility of implementation. For example, BRAC's oral rehydration workers implemented the ORT program and a consortium of 21 NGOs with prior experience in malaria-endemic districts, including BRAC's shasthya shebikas, led the implementation of the ITNs program. BRAC's shasthya shebikas implemented the IRS program and NGO CHWs – community nutrition promoters and community nutrition organizers – implemented the BINP.
  - Technical support from WHO, icddr,b, and UNICEF was key to the small-scale testing phase of FB-IMCI and CB-IMCI, and the BINP was designed by the Government of Bangladesh in collaboration with icddr,b.
  - Donors and implementing partners including research institutions were engaged in decision-making, for example in the development of the SWAp operational plan which encouraged active participation in advocacy for policy change.



- Bangladesh had significant donor support which drove a number of effective initiatives. For example, donors such as the World Bank were key participants in the consultative workshop led by the interagency coordination committee to review information on Hib disease burden and prevention to inform the introduction of Hib vaccine. GAVI co-funded the measles-rubella vaccine introduction and the initial and ongoing implementation of the PCV program; Global Fund funded malaria EBIs; and BINP was funded by UNICEF and the Government of Bangladesh with credit from the World Bank-International Development Assistance Programme.
- ***Leverage national and local stakeholders including professional bodies***  
Bangladesh leveraged its professional bodies and existing program implementers through discussions during exploration and preparation and throughout implementation. Specific examples include:
  - The national steering committee for FB-IMCI included the program managers of the CDDs and ARI programs as well as the BPA and BNF.
  - BPA provided training to health workers as part of SUZY project.
- ***Ensure focus on communities in program design and implementation***  
Bangladesh integrated a focus on communities into the design of its U5M reduction programs. Examples include:
  - Community engagement, education, and sensitization for the introduction of PCV and Hib (as part of Pentavalent vaccine).
  - Community engagement activities targeted at community leaders and women to create awareness of malaria symptoms and the importance of ITN use, as part of the ITNs program.
  - CDDs program targeted community-level influencers such as religious leaders, schoolteachers, and caregivers to promote the use of ORT. School teachers were provided with sample skits, quizzes, and games to include in the curriculum, to increase awareness of ORT among children. Orientation activities were organized for religious leaders to emphasize their status in the society and the importance of their role in promoting ORT use. Posters with Koranic metaphor were put up at mosques and other places of worship to highlight the importance of ORT use and caregivers were provided with reference booklets on dehydration symptoms, ORT use, and symptoms requiring referral.
  - For the SUZY project, national marketing campaigns targeted at caregivers, using television and radio commercials, posters, billboards, branded buses, and rickshaws, were used to promote the use of zinc.

## 7. Ensure multi-sectoral collaboration

Bangladesh addressed U5M through engagement of multiple sectors. For example, the CDD program was implemented in collaboration with the Ministry of Primary and Mass Education, Ministry of Information, and local governments. The National AIDS Committee had members from the Ministries of Education; Youth and Sports; Finance; Information; Home Affairs; Law; Justice and Parliamentary Affairs; Women's Affairs; Religious Affairs; and local government. Further, Bangladesh designated oversight of the EPI program in urban areas to the MOLGRDC; city corporations, and municipal authorities. However, according to KIs this was not very efficient given the inadequate coordination with the MOHFW.





## **8. Plan for sustainability**

Bangladesh used a range of strategies to ensure sustainability in the implementation of EBIs through integration of EBIs into the health system and related policy. In some cases, this was done earlier in the program implementation reflecting an early focus and plan for sustainability. This included setting up an IMCI program unit within the DGHS at the MOHFW, integration of IMCI into the SWAp, development of a national HIV policy and reflecting it in the first National HIV/AIDS Strategic Plan, establishment of the National AIDS/STDs Programme at the MOHFW, and development of nutrition policy document, the National Plan of Action for Nutrition.

## **9. Encourage private sector engagement, including for direct service delivery, and provide sufficient oversight**

In the mid-1970s, Bangladesh began to implement policies which encouraged the growth of the private sector in health service delivery, including the introduction of a low-interest loan scheme for the establishment of private for-profit and not-for-profit NGO health facilities. Other policies and initiatives were introduced to encourage the expansion of the private health sector, including the government's decision to subsidize the cost of land and equipment for private health facilities in 2004-2005 and the reduction in customs duties on medical and hospital equipment. As a result, between the mid-1970s and 2015, the private health sector grew to become an important component of the health system, and filled gaps in service delivery which the public sector was unable to fill. This was especially the case in the Dhaka area where 35% of the private for-profit and not-for-profit NGO health facilities were located in 2003.<sup>30</sup> However, regulation of private sector activities remained largely impaired due to centralization of regulatory activities, which was identified as an ongoing challenge.

For EBI implementation, Bangladesh also encouraged private sector engagement which contributed to feasibility. For example, commissioning Acme Laboratories, a local pharmaceutical firm, to manufacture zinc tablets for the SUZY project.

## **10. Ensure financing for evidence-based interventions**

Bangladesh ensured financing for EBIs through both donor and government funding, though government funding was identified in some cases as insufficient, with an overreliance on donors. This was shown in Bangladesh's all-cause government expenditure as a percentage of overall health expenditure, which remained low and decreased between 2000-2015, from 26% in 2000 to 21% in 2005, 20% in 2010, and 15% in 2015.<sup>42</sup> Nonetheless, to account for loss or reduction in donor funding and to ensure sustainability, the Government of Bangladesh increased its budget for selected EBIs. Notable examples include increase in budget for FB-IMCI after WHO and UNICEF ended financial support, and increase in budget for vaccines as part of the fifth SWAp in response to the government's increasing co-funding requirement for PCV.

## **11. Invest in initiatives outside direct under-5 mortality interventions**

Bangladesh's investment in infrastructure, including roads, telecommunications, and WASH, facilitated its drop in U5M. Investment in improving FP and dropping fertility rate as well as improving women's education and overall empowerment were key in reducing U5M and provide a valuable lesson for other countries. Further, as noted, Bangladesh invested in economic growth which increased the capacity of the population to access care, mainly from the private sector, and contributed to the drop in U5M.



## **12. Invest in good quality training and ensure supervision**

Bangladesh invested in good quality trainings for EBIs, however, supervision remained a challenge for some. This limited the success of some EBIs such as the HBB initiative. Countries looking to achieve success in implementation of EBIs and overall decrease in U5M need to invest in ensuring both quality training and supervision.

## **13. Ensure insurance to reduce out-of-pocket spending**

Although this was an area which posed a challenge for Bangladesh, it provides a lesson for other countries to improve their OOP to ensure financial access to health care mainly for the poor, which remained a challenge.



## 8 CONCLUSIONS

Bangladesh achieved remarkable drops in U5M and neonatal mortality despite ongoing challenges with equity and coverage of some EBIs. A strong community health system, women's empowerment initiatives, dropping fertility rate, supporting and leveraging in-country clinical, research, and implementation expertise, effective leadership, donor and implementing partner engagement and coordination, integration of new initiatives into existing systems, data systems strengthening and data use, community engagement, planning for sustainability, and multi-sectoral collaboration, were identified as some of the facilitators of this drop. However, challenges such as overreliance on donor funding, significant OOP spending on health care, inadequate HRs for health, and low quality of care, amongst other challenges, remained.



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## APPENDIX A

### EXEMPLARS IN UNDER-5 MORTALITY METHODOLOGY AND FRAMEWORK

The University of Global Health Equity is working with the team at Gates Ventures to explore approaches to better understand the successes of countries in reducing under-5 mortality (U5M). This work is initially designed with two aims: 1. Developing and testing an implementation framework and mixed methods approach to understand the success of these countries, and 2. Extracting actionable knowledge focused on implementation strategies and key contextual factors to inform other countries working towards the same goal. The scope of mortality was limited to amenable CODs – those which are potentially preventable with a stronger and higher quality health care system. The work was divided into a number of activities. These included: 1. identifying EBIs in use in LMICs; and 2. understanding how the EBIs implemented by a country were able to achieve success beyond their regional neighbors and other comparable countries. The analysis and conclusions were designed to be data-driven and rigorous, but also to create knowledge that is transferable and accessible and has the potential to be used across a range of key stakeholders. Therefore, the content developed by the Exemplars Project is intended primarily for an audience of national policymakers, implementers, and funders – people with the potential to significantly impact global health policy and implementation at scale. **The work was guided by the development of a framework which was informed by a number of existing frameworks in use for U5M (including Countdown 2015, WHO) and from existing implementation science frameworks (see below).**

#### Identifying evidence-based interventions to reduce U5M in LMICs

The initial work included identifying EBIs found to directly reduce U5M, dividing the work between those targeting the neonatal period (birth to 28 days) and the infant and child period (28 days to 4 years). This work included literature review, discussions with experts in the area, and revisions with them as the work progressed. We focused on those interventions that were relevant to resource-constrained settings, those that were directly related to preventing potential life-threatening conditions (such as vaccinations, safe birth practices, and ITNs), and those treating illness or other complications (such as antibiotics, antimalarial medication, and neonatal resuscitation). We included interventions that were at the individual process level (administering the right antibiotic at the right time) as well as those targeting inputs (development of neonatal intensive care units) and systems needed to deliver the EBIs meeting the definitions of quality including effectiveness, safety, timeliness, and equity (such as CHWs). For neonatal mortality we also expanded to a limited set of prenatal and intrapartum interventions proven to reduce neonatal death. We did not focus on those interventions that resulted in reductions in stillbirths, as those are not included in the assessment of U5M rates. This was driven in part by the changing epidemiology of neonatal CODs seen in some countries, with LBW and prematurity increasing in importance in causes of mortality.<sup>153</sup>

Table 52. Infant and Child Under-5 Mortality Evidence-Based Interventions

| Cause of Death                     | EBI   |  |
|------------------------------------|---|--|
| Lower respiratory infections       | Antibiotic treatment  |  |
|                                    | Vaccination: PCV  |  |
|                                    | Vaccination: Hib  |  |
|                                    | Community-based management  |  |
|                                    | Facility-based management   |  |
| Diarrheal diseases                 | Oral rehydration therapy  |  |
|                                    | Zinc supplementation  |  |
|                                    | Vaccination: Rotavirus  |  |
|                                    | Community-based management  |  |
|                                    | Facility-based management   |  |
| Malaria                            | Antimalarial combination therapy  |  |
|                                    | Rapid diagnostic testing  |  |
|                                    | Insecticide-treated nets  |  |
|                                    | Indoor residual spray   |  |
|                                    | Intermittent preventative therapy for high-risk groups                                |  |
|                                    | Community-based management  |  |
|                                    | Facility-based management   |  |
| Measles                            | Vaccination: Measles  |  |
|                                    | Vitamin A supplementation (prior to vaccination)                                      |  |
| Malnutrition                       | Exclusive breastfeeding for six months  |  |
|                                    | Continued breastfeeding and complementary feeding after six months                    |  |
|                                    | Vitamin A supplementation   |  |
|                                    | Management of severe acute malnutrition (ready-to-use food, rehydration, antibiotics) |  |
| HIV                                | ARV treatment for infants and children  |  |
|                                    | HIV testing of children born to HIV+ mothers  |  |
|                                    | Prevention of mother-to-child transmission  | Early diagnosis of pregnant women (or pre-pregnancy)                           |
|                                    |   | PMTCT treatment for mothers* and post-partum to exposed infants                |
|                                    |   | Elective Caesarean section for untreated HIV+ mothers**; replacement feeding** |
|                                    |   | ARV treatment for mother for life as prevention (started in 2012)              |
| Meningitis                         | Exclusive breast feeding  |  |
|                                    | Vaccination: PCV meningococcal  |  |
|                                    | Vaccination: Hib  |  |
|                                    | Vaccination: Meningococcal  |  |
|                                    | Antibiotic treatment  |  |
| Other vaccine preventable diseases | Chemoprophylaxis during acute outbreaks   |  |
|                                    | Vaccination: Tetanus  |  |
|                                    | Vaccination: Diphtheria   |  |
|                                    | Vaccination: Pertussis  |  |
|                                    | Vaccination: Polio  |  |

\* No longer recommended (PMTCT versus ART for life)

\*\* No longer recommended for women on ART with suppressed viral load



Table 53. Neonatal Mortality Evidence-Based Interventions

| Period of Risk | EBI   |  |
|----------------|---|--|
| Preconception  | Folic acid supplementation  |  |
| Antenatal      | Tetanus vaccination   |  |
|                | Malaria prevention and treatment  | Intermittent presumptive treatment                 |
|                |   | ITNs   |
|                | Iodine supplementation (in endemic iodine deficient settings)   |  |
|                | 4 or more antenatal visits (ANC4)   |  |
|                | Prevention and treatment of preeclampsia and eclampsia  | Calcium supplementation*                           |
|                |   | Low-dose aspirin for high-risk women*              |
|                |   | Antihypertensive treatment for severe hypertension |
|                |   | Magnesium sulfate                                  |
|                |   | Early delivery                                     |
| Intrapartum    | Antibiotics for PPROM   |  |
|                | Corticosteroids for preterm labor   |  |
|                | Caesarean section for breech or obstructed labor  |  |
|                | Active management of delivery (including partograph)  |  |
|                | Clean delivery practices (incl. clean cord-cutting)   |  |
|                | Trained birth attendant   |  |
|                | Facility-based delivery   |  |
|                | Basic emergency obstetric and newborn care (BEmONC)   |  |
|                | Comprehensive emergency obstetric and newborn care (CEmONC)   |  |
|                | Timely transport for higher level care for mother   |  |
| Postnatal      | Newborn resuscitation   |  |
|                | Immediate breastfeeding   |  |
|                | Prevention and management of hypothermia  | Immediate drying and wrapping                      |
|                |   | Delayed bathing                                    |
|                |   | Skin-to-skin                                       |
|                |   | Baby warming                                       |
|                | Kangaroo care for LBW/prematurity   |  |
|                | Timely transport for higher level care for mother   |  |
|                | Post-partum visits to identify danger signs and provide active referral                                   |  |
|                | Antibiotics for suspected or confirmed infection  |  |
|                | Surfactant therapy for respiratory distress syndrome and prematurity                                      |  |
|                | Neonatal intensive care units (equipped, trained staff, standards and protocols established and followed) |  |

\* Further assessment needed in literature review



Both the desk review and the primary research are informed by an implementation science framework that incorporates a number of existing frameworks and is designed specifically for this project. While we are often able to identify policies and EBIs chosen by a country to reduce U5M, the key lessons in how these were chosen, adapted, implemented, and sustained are often missing from available published or gray literature. Because the same policies and interventions brought different results in different countries, implementation science offers important tools for analyzing and understanding how to think more holistically about how and why countries were able to reduce U5M and from where lessons in replication can be drawn. To guide the overall work, we developed a framework to understand the contribution of contextual factors and the different levels of actors involved: global, national, ministry, subnational, facility, and community.

We reviewed existing implementation science frameworks and have combined a number of commonly applied ones as well as insights from work underway by Dr. Binagwaho to guide how we interpret existing evidence and to design tools for primary research.

The primary frameworks and implementation science resources we drew from include:

1. **Exploration, Preparation, Implementation, and Sustainment (EPIS)**<sup>50</sup>: This framework walks through four key steps of the implementation process needed to achieve long-term change-starting. Within each phase there are important contextual factors which may influence success (Figure 37).

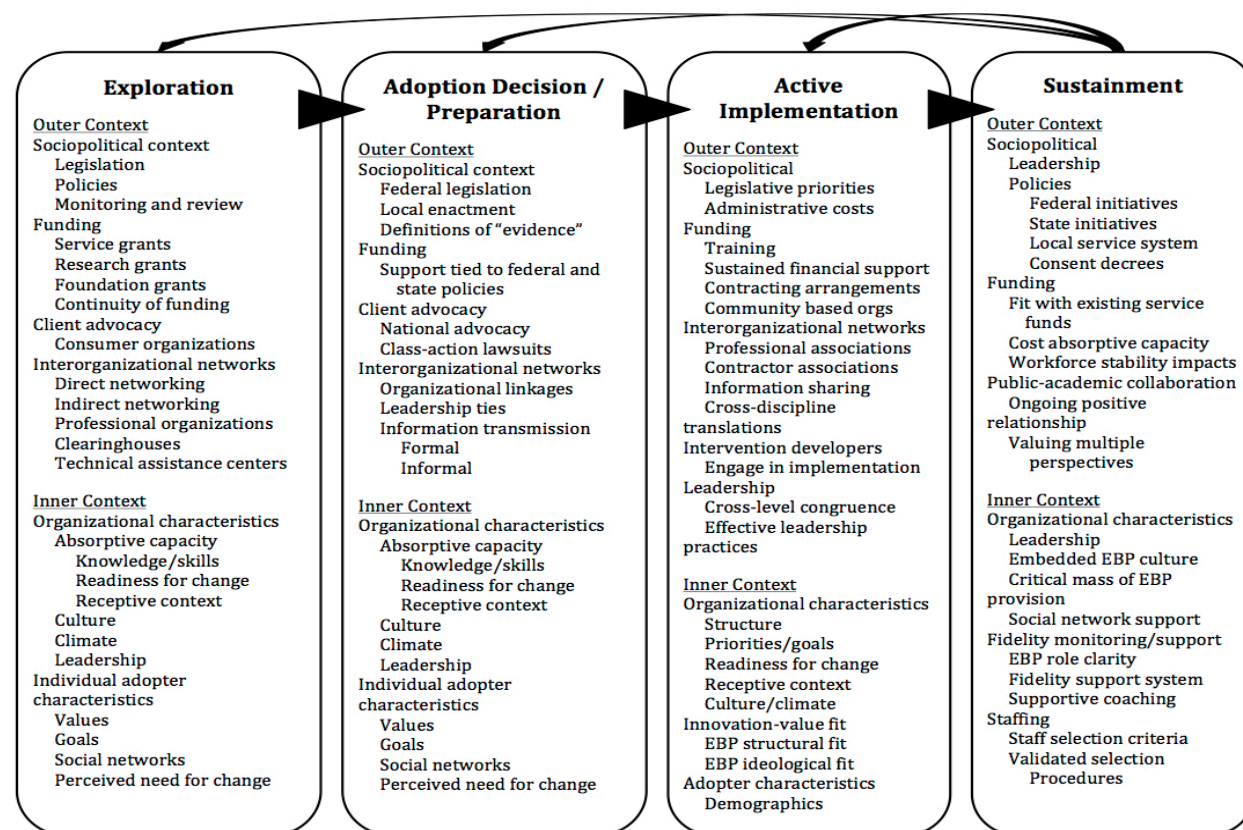


Figure 347. EPIS model of implementation (Source: Aarons, et al)



2. **Re-AIM<sup>154</sup>**: This evaluation framework breaks down implementation outcomes into Reach (coverage), Effectiveness, Adoption (range and proportion of individuals and organizations willing to participate), Implementation (fidelity, time, cost, and adaptations made) and Maintenance (institutionalization into routine care and policies, and long-term impact). It is designed to better understand the range of factors that influence success or failure at the individual and broader levels.
3. **Consolidated Framework for Implementation Research (CFIR)<sup>155</sup>**: This framework serves as a guide to understand the contextual factors that influenced the success or failure of implementation of a specific intervention. These include the outer context, the inner (organizational) context, the characteristics of the intervention, the implementation approach, and the individual actors responsible for implementation.
4. **Implementation Outcomes (Proctor et al)<sup>156</sup>**: This approach distinguishes implementation outcomes from the more traditionally measured intervention and system outcomes. It identifies and defines key areas that are critical to achieving overall effectiveness, core goals of initiatives targeting U5 mortality. Outcomes include acceptability, adoption, appropriateness, costs, fidelity, feasibility, penetration (reach), and sustainability (Figure 38).

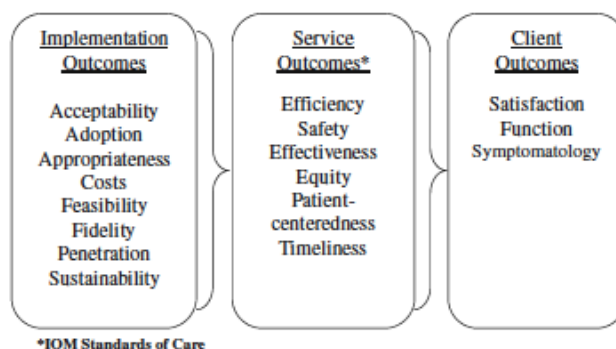


Figure 38. Types of outcomes in implementation research  
(Source: Proctor, et al)

5. **The implementation principles for managing all levels of a health sector as described in the book in progress by Dr. Binagwaho**: This book is written to share her experiences on what was successful, what failed, why, and how, when she served in technical and political positions in the health sector in Rwanda between 1996 and 2016.

None of the frameworks alone were felt to cover the complexity the implementation strategies and steps undertaken at the national, subnational, and care-delivery levels. By combining them we have developed a framework that will be used to guide how we prioritize areas for primary research, interpret the secondary research, and form the themes for synthesis of the entirety of our work (Figure 39).

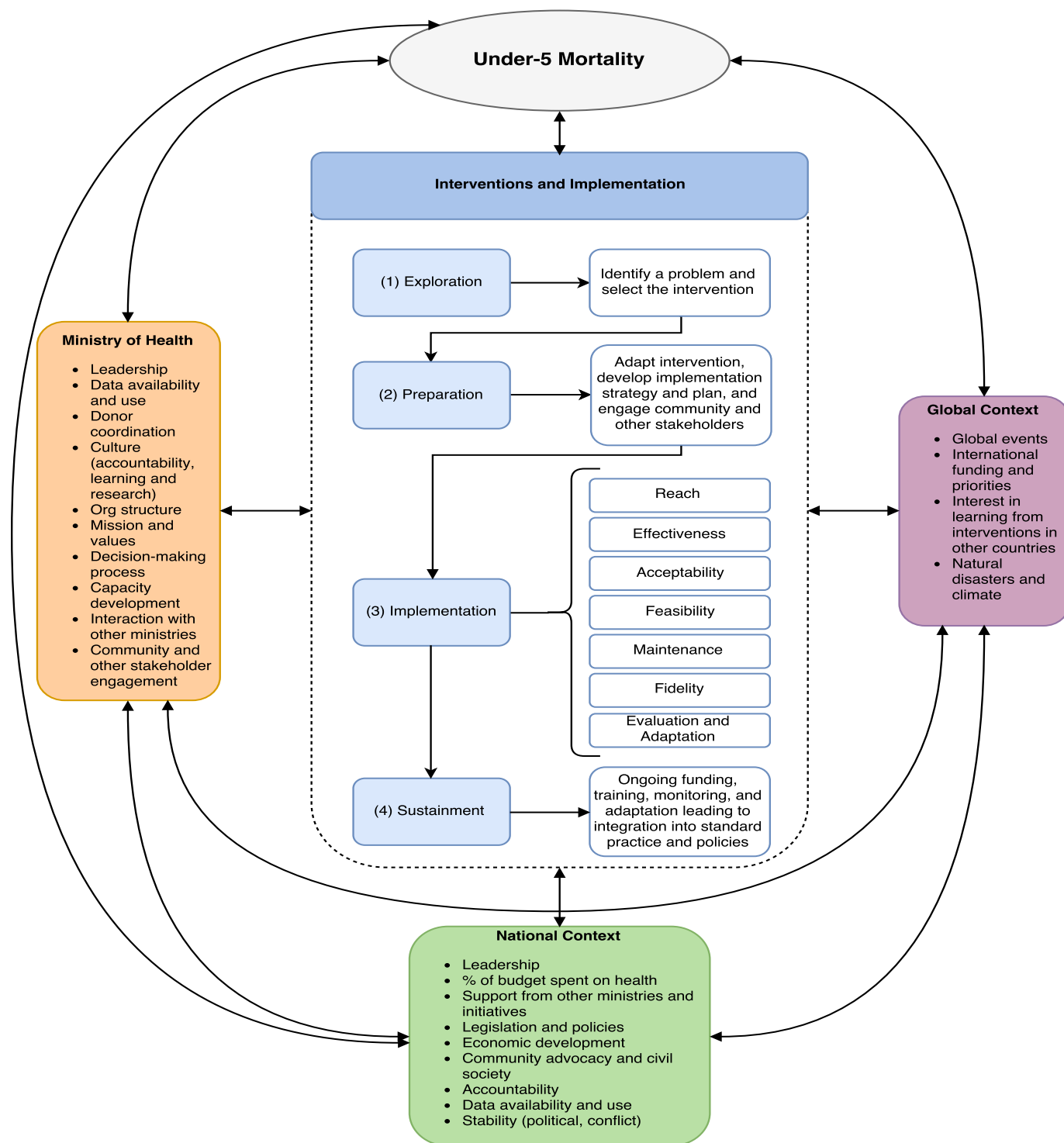


Figure 39. Framework for understanding interventions to reduce under-5 mortality (copyright UGHE)

### **Desk Review (Led by Evaluserve with in-depth support from UGHE team and Gates Ventures)**

The team undertook an extensive review of available information and published data on the rates and progress of U5M, policies, strategies, specific EBIs available to potential exemplar countries, and the uptake and implementation of these EBIs in five exemplar countries defined as countries which have reduced U5M beyond expectations based on regional or resource comparators. Initial secondary research was performed through MEDLINE (PubMed) and Google Scholar, using the search terms “child mortality” or “under-5 mortality” and the country’s name. Further searches included specific EBIs, CODs, or contextual factors as search terms (e.g. “insecticide-treated nets,” “malaria,” or “community health workers”). Initial desk research was synthesized and then reviewed by the UGHE team for accuracy and completeness. The desk review is an iterative process, with ongoing additions occurring throughout the primary research process. As noted, the initial review was limited to CODs felt to be “amenable” with effective interventions and targeted all U5M, from neonatal through infancy and early childhood. While maternal health is a critical determinant of child survival, given the extensive work already underway and the limited resources and time of the contract, we did not include an exhaustive review of these EBIs but focused on those more directly related to the childbirth period or primary data analysis. This will be supplemented by selected maternal interventions. We purposely did not include in-depth reviews of important broad interventions that contributed to U5M reduction including education, poverty reduction, water and sanitation, and programs designed to improve nutritional status. These will be captured as important contextual factors in the country case studies.

### **Primary Research (Led by UGHE team and icddr,b)**

In collaboration with our in-country partners, the icddr,b, Dhaka, we identified KIs reflecting a broad range of experience and viewpoints. KIs were chosen based on the topics identified in the desk review and through other analyses in close collaboration with the in-country partner, prioritizing KIs able to provide information on the Exploration, Preparation, Implementation, Adaptation and Sustainment (EPIAS) stages during the period of study. KIs included current and former MOHFW employees responsible for high-level strategic direction of the ministry or specific disease or intervention areas; implementing partners; and other multilateral organizations or donor organizations who had managed partner-supported or partner-led activities. Some informants represented more than one area or role based on their experience over the 15 years and were interviewed for each of their multiple viewpoints. We prioritized individuals active in the study period but were able to also capture some experiences from before 2000 and after 2015.

Informed by the framework and review of relevant literature on contextual factors and implementation outcomes, we developed core interview guides for four main routes of inquiry.

1. Global and national level actors;
2. Ministry of Health and Family Welfare (MOHFW) actors;
3. Project managers and implementers for specific CODs or EBIs; and
4. Other partners



The interviews were designed to address the EBI implementation process, from exploration to preparation, implementation, adaptation, and sustainment. This included critical contextual factors at the relevant global, national, ministry, and local levels. The interviews also identified additional sources of data and information which could be added to the knowledge base and understanding already developed from the desk review. Interview guides were adapted from the core tools based on Bangladesh's context and translated to Bangla and interviews were conducted in Bangla or English depending on the linguistic comfort of the KIs.

All interviews were led by the project co-PI (Lisa Hirschhorn), UGHE Research Associate (Kelechi Udoh), with support from in-country lead (Dr. Fauzia Akhter Huda), Research Associate (Dr. Hassan Rushekh Mahmood), and Research Coordinator (Md. Omar Faruk) taking notes and operating recorders as needed. Following the close of the interviews, notes were combined and the tape recordings (if allowed) were used to clarify areas as needed. Recorded interviews were translated as needed, transcribed and reviewed for quality and consistency by both icddr,b and UGHE teams.

### **Human Subjects Review**

The work was approved by the RRC and ERC of icddr,b, Bangladesh. The ethics review committees of UGHE and Northwestern University also exempted the study. No quotes or specific viewpoints were included which were identifiable to the source without explicit permission. All recordings and interviews had names removed and were kept in password protected computers and stored on a limited access Google Drive. All recordings were destroyed once the interview coding had been completed.

KIs were informed about the goals and structure of the project, and consent for participation and recording was obtained separately from the interview.

### **Analysis and Synthesis**

The UGHE team used a mixed methods explanatory approach, applying the framework to understand the progress (or lack thereof) for each COD and coverage of chosen EBIs, as well as facilitators and barriers at the local, national, and global levels. This approach was designed to understand what, how and why the Government of Bangladesh was able to achieve success in decreasing U5M and what the challenges were. The analyses were also informed by work completed by other initiatives, including Countdown 2015, equity plots from the International Center for Equity in Health (Victora and team), and geospatial mapping from the Institute for Health Metrics and Evaluation (Simon Hays and team), amongst others.

KI interviews were coded by one of the researchers using the framework developed for the overall U5M Exemplar Project, to extract the EPIAS steps, implementation strategies, implementation outcomes and contextual factors. One of the Principal Investigators reviewed the first six (one-third) coded transcripts, to quality assure the coding process and a sample were co-coded with icddr,b team to ensure agreement. Disparities in codes and themes and recommendations for adapting the coding process going forward, were then discussed with the researcher. Also, as emerging themes were identified, a priori codes for contextual factors and strategies were adapted and expanded.

## Final products

The work done by UGHE and Gates Ventures will result in new knowledge examining the implementation strategies for developing needed policies and identifying, adapting, and scaling EBIs, supporting and obstructing contextual factors from countries successful in reducing U5M using an implementation science approach. The final products will include (1) the generally-applicable implementation science framework shown here, (2) in-depth case studies of four exemplar countries using primary and secondary research, (3) case studies of three exemplar countries based on desk research and buttressed with light-touch primary research, and (4) a cross-country synthesis of insights from all seven exemplar countries. Although all countries deserve deeper research on and analysis of their successes in U5M reduction, limitations in resources and time bound the scope of this project. The work done related to these seven exemplar countries will serve as a proof of principle of the added value of applying implementation science to the research of U5M interventions and successes. The products from this work will be disseminated through a larger online platform created by Gates Ventures to highlight actionable lessons from exemplar countries on a variety of health topics.

