

## Research Brief

# Supporting the scale-up of universal cord stump cleansing in Bangladesh: Successes and challenges



Photo by: GMB Akash

A health worker applies 7.1% chlorhexidine solution to the umbilical cord of a newborn.

## Introduction

In 2014, the Bangladesh Ministry of Health and Family Welfare (MOHFW) adopted a policy of universal cleansing of the umbilical cord stump with a single application of 7.1% chlorhexidine aqueous solution (CHX). Between 2015 and 2018, the MOHFW and development partners worked to scale up CHX cord cleansing nationally. The US Agency for International Development's (USAID's) MaMoni Health Systems Strengthening (MaMoni HSS) Project was a key development partner supporting this scale-up. MaMoni HSS support included: technical assistance and financial support for developing policies, guidelines, and training curriculum; financial support for training; and evaluation of facility readiness.

This brief presents the learnings from the documentation study on the scale-up of cord cleansing with CHX in Bangladesh between 2015 and 2018. The results of this study are intended to inform continuing efforts to expand CHX coverage and future scale-up efforts of other innovations in Bangladesh, as well as the CHX scale-up efforts of other countries.

## Key Aspects of the Intervention

- Cleansing of the umbilical cord with CHX has been shown to reduce newborn infections and mortality in several trials in low-income countries and is recommended for high-mortality settings by the WHO.
- In 2014, the Government of Bangladesh adopted a policy supporting universal single application of CHX to cleanse the umbilical cord stump at the time of delivery.
- Bangladesh is using a 7.1% aqueous solution, produced by local manufacturer ACI Pharmaceuticals, in single-use vials that feature pictorial application instructions.
- Between 2015 and 2017, the MOHFW scale-up of this intervention focused on training facility-based workers to apply 7.1% CHX at the time of facility deliveries and ensuring CHX supply to facilities.
- Although the national policy guidelines support behavior change promoting 7.1% CHX cleansing for home births, as well as distribution of 7.1% CHX during antenatal care, the government had not yet implemented these components as of 2017.

# Background

Cleansing the umbilical cord stump with CHX has been shown to be effective at reducing newborn infections and mortality in low-income settings. A recent meta-analysis of three cluster-randomized community trials in Bangladesh, Nepal, and Pakistan, reported a 23% reduction in all-cause neonatal mortality associated with CHX application to the umbilical cord<sup>1</sup>. Additionally, the rates of omphalitis (infection of the umbilical stump) decreased between 27% and 57% in the trials.<sup>1</sup> Based on this evidence, the World Health Organization (WHO) included formal recommendations for CHX use in high-mortality settings (>30 per 1,000 live births) in *Postnatal Care of the Mother and Newborn*<sup>2</sup>.

According to the *Demographic and Health Survey 2014*, Bangladesh has a neonatal mortality rate of 28 per 1,000 live births; 62% of births occurred at home, 13% in public sector facilities, and 22% in private sector facilities. Although prior national guidelines promoted dry cord care, a prevailing practice in the community was to apply various substances to the umbilical cord (e.g., mustard oil, turmeric none), of which are medically recommended<sup>3</sup>. In 2013, Bangladesh's National Technical Working Committee on Newborn Health (NTWC-NBH) for newborn health endorsed incorporating universal 7.1% CHX cord cleansing into national policy, and the government included the intervention in the country's Every Newborn Action Plan (ENAP). Specifically, the ENAP calls for the following: "[a] single application of 7.1% Chlorhexidine aqueous solution on the newborn umbilical cord immediately after cutting the umbilical cord ... for all newborns irrespective of the place of delivery—home or facility. This will be followed by dry cord care." In Bangladesh, aqueous solution was chosen over the gel solutions adopted by other countries; stakeholders involved in policy development had concerns that gel formulations would create a sticky surface that could attract harmful particles. Several partners are supporting the government in scaling up this policy, including the MaMoni HSS Project.

As Bangladesh is one of the first countries to move forward with a national scale-up of universal CHX cord cleansing, documenting and studying the scale-up process provide an important learning opportunity for the global newborn health community. The scale-up process has been defined as "deliberate efforts to increase the impact of successfully tested health innovations to benefit more people and to foster policy and program development on a lasting basis."<sup>4</sup> Within the WHO/ExpandNet model, guided scale up involves both institutionalization of the innovation in policies, plans, and systems and expansion of utilization of

the innovation by those in need of it. Scale up takes place with an implementer (called a "user organization") and is supported by a resource team, led by the implementer and with representatives from the organizations that provide technical assistance and guidance. Many factors influence the outcomes of scale-up efforts, as enumerated in implementation science models such as the ExpandNet Framework and the Consolidated Framework for Implementation Research (CFIR).<sup>5</sup> These models can include characteristics of the innovation itself, the scale-up process, the setting where the innovation is to be implemented (inner setting/user organization), the environment (outer setting), and the individuals delivering or receiving the innovation. The ExpandNet Framework and CFIR informed the data collection, analysis, and presentation in this brief.



Photo by: GMB Akash

## Documentation Objectives

Alongside its support to the government to scale-up universal cord stump cleansing, USAID's MaMoni HSS Project undertook a prospective documentation study on the scale-up of 7.1% CHX in Bangladesh. The specific objectives/research questions of this project study were as follows:

- Document the strategies and activities of the scale-up of 7.1% CHX cord cleansing
- Assess the progress in achieving the two objectives of scale-up of the 7.1% CHX intervention—institutionalization and expansion
- Identify facilitators and barriers to institutionalization and expansion of the CHX intervention

## Methodology/Data Sources

This prospective case study draws on a variety of quantitative and qualitative data sources, ranging from routine health management information system (HMIS) data to in-depth interviews and focus group discussions with national stakeholders, facility providers, and community members. **Table 1** summarizes the data sources included in the study.

<sup>1</sup> Imdad A, Mullany L, Baqui A, et al. The effect of umbilical cord cleansing with chlorhexidine on omphalitis and neonatal mortality in community settings in developing countries: a meta-analysis. *BMC Public Health*. 2013;13(Suppl 3):S15.

<sup>2</sup> World Health Organization. WHO recommendations on postnatal care of the mother and newborn. Geneva: WHO; 2013.

<sup>3</sup> Andrews Johanna Y, Dalal K. 2011. Umbilical cord-cutting practices and place of delivery in Bangladesh. *Int. J. Gynecol. Obstet*. 2011;114(1):43-46.

<sup>4</sup> World Health Organization and ExpandNet. Nine Steps for Developing a Scaling Up Strategy. Geneva, Switzerland: World Health Organization; 2010.

<sup>5</sup> Available at: [www.cfirguide.org](http://www.cfirguide.org)

**Table 1: Sources of study data**

COLUMN	GEOGRAPHIC AREA	SAMPLE SIZE	DATES
<b>Quantitative Data Sources</b>			
▪ HMIS provision data for Director General of Family Planning (DGFP) and Director General Health Services (DGHS)	All districts	813,607 live births	12/2016–11/2017
▪ Facility readiness assessment	All districts	4,479 facilities	11/2016–12/2017
▪ Household survey	Habiganj, Noakhali, and Lakshmipur	39,585 women in six rounds	09/2014–08/2017
▪ ACI sales records	All districts	N/A	01/2015–12/2017
▪ Training records	All districts	3,345 facilities	12/15–02/16
<b>Qualitative Data Sources</b>			
▪ In-depth interviews with national stakeholders	Dhaka/national	13 participants	12/2016–04/2018
▪ In-depth interviews with health care providers and program managers	Dinajpur, Chittagong, Habiganj, Lakshmipur	29 participants	01/2016–02/2018
▪ Focus group discussions with mothers and community members	Dinajpur, Chittagong, Habiganj, Lakshmipur	26 participants in four focus group discussions	01/2017–12/2017
▪ Program documents, including workplans, meeting minutes, etc.	N/A	13 documents	N/A

## Findings

### Finding 1: Leadership of the Resource Team

Following the incorporation of CHX cord cleansing into the Government of Bangladesh's child health policy documents and plans, including "A Promise Renewed" (July 2013) and the Every Newborn Action Plan (May 2014), institutionalization efforts for CHX cord cleansing in Bangladesh were led by a resource team consisting of the MOHFW and the NTWC-NBH. The NTWC-NBH is a group convened by the MOHFW's National Newborn Health Program and Integrated Management for Childhood Illness (NNHP & IMCI) Section, and is composed of national academic and technical experts, government managers, and representatives from professional medical bodies and nongovernmental organizations (NGOs) working in newborn health. Throughout 2014, the NTWC-NBH—with technical support from Saving Newborn Lives (SNL) and the USAID's MaMoni HSS Project—rapidly developed national guidelines for the application of CHX and developed in-service and pre-service training curriculums. The NTWC-NBH drew on technical materials from the global Chlorhexidine Working Group for development of the curriculum. While the initial training curriculum was limited to CHX cord cleansing, this intervention is now integrated in the Comprehensive Newborn Care Package training.

The NTWC-NBH also led efforts to establish a local supply of CHX, with support from USAID's MaMoni HSS Project and other partners. NTWC-NBH members held discussions with local pharmaceutical companies, and when ACI Pharmaceuticals agreed to produce the commodity, the NTWC-NBH facilitated necessary approvals from the Directorate General of Drug Administration. ACI

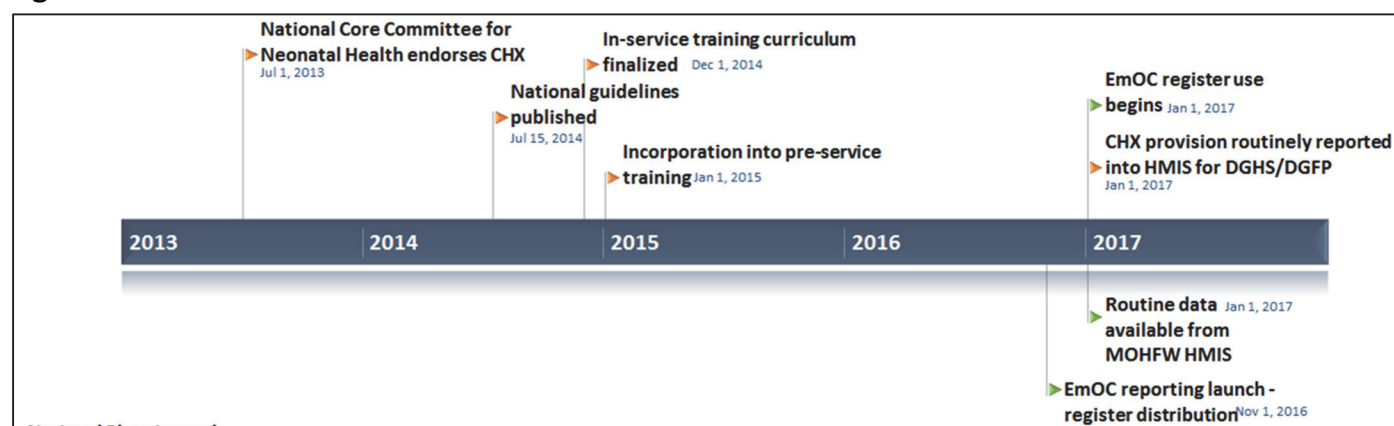
Pharmaceuticals and the NTWC-NBH also worked together on the initial design of the vials, which began production in the first half of 2015. Later, at the end of 2017, ACI Pharmaceuticals adopted changes to the vials recommended by the NTWC-NBH, which included a redesigned cap to better differentiate CHX from eye dropper vials.

### Finding 2: Institutionalization Milestones

The NTWC-NBH published the national guidelines for CHX cord cleansing in July 2014. The in-service training curriculum was finalized by the NTWC-NBH in December 2014 and incorporated into pre-service training in January 2015. Institutionalization in the procurement and logistics management systems (HMIS) within the MOHFW faced greater challenges. Although the government committed funding to the effort in its 2015 budget and made an initial purchase of 600,000 vials shortly after production in May 2017, distribution wasn't operationalized for seven months due to complexities in the system. New Emergency Obstetric and Newborn Care (EmONC) registers that included CHX cord cleansing were not distributed to facilities until the end of 2016, with reporting starting in January 2017. Finally, despite a national policy for universal cord cleansing and institutionalization within the MOHFW, large NGO providers, such as the Bangladesh Rural Advancement Committee (BRAC), had not adopted CHX cord cleansing as a part of their services or birth kits by 2017. Furthermore, no regulatory mechanism exists to ensure CHX application by private providers. **Figure 1** provides an overview of institutionalization milestones.



**Figure 1: Timeline of the achievement of institutionalization milestones**



**Table 2. Facilitators and barriers to institutionalization**

CFIR DOMAIN	FACILITATORS	BARRIERS
Intervention Characteristics	<ul style="list-style-type: none"> <li>Strong evidence base, including a local trial</li> <li>Perceived as preventive rather than therapeutic, exempt from some regulations</li> <li>Product was similar to those already produced by a local company, ACI Pharmaceuticals</li> <li>Local input on size and design of vial</li> </ul>	<ul style="list-style-type: none"> <li>No pre-existing local source of the commodity</li> <li>The only application is for newborns and the formulation is different from other countries, resulting in limited market potential and production incentive</li> <li>Cost-prohibitive for adoption by private sector clean delivery kits</li> </ul>
Outer Setting	<ul style="list-style-type: none"> <li>Recommended by WHO and included on essential medicines list</li> <li>Technical support from the global Chlorhexidine Working Group</li> <li>Funding commitment from USAID mission</li> <li>Sales at private pharmacy outlets facilitated by local producer, ACI Pharmaceuticals</li> </ul>	<ul style="list-style-type: none"> <li>Report from Nigeria of mistaken application of CHX as an eye drop</li> <li>Unregulated private sector difficult to influence</li> <li>Prevailing cultural practices support application of other substances (e.g., mustard oil)</li> </ul>
Inner Setting	<ul style="list-style-type: none"> <li>Commitment from the MOHFW for newborn health generally and CHX cord cleansing specifically</li> <li>Strong engagement of the NTWC</li> </ul>	<ul style="list-style-type: none"> <li>Delay in finalizing register including all newborn interventions</li> <li>Difficult process to change the logistics management systems and HMIS</li> </ul>
Characteristics of Individuals	<ul style="list-style-type: none"> <li>Prior experience of resource team with scale-up of national newborn interventions (e.g., Helping Babies Breathe [HBB])</li> </ul>	
Process of Scale-Up	<ul style="list-style-type: none"> <li>Leadership by the NTWC, which engages a variety of stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Insufficient engagement of private sector and NGO providers</li> </ul>

### Finding 3: Facilitators and Barriers to Institutionalization

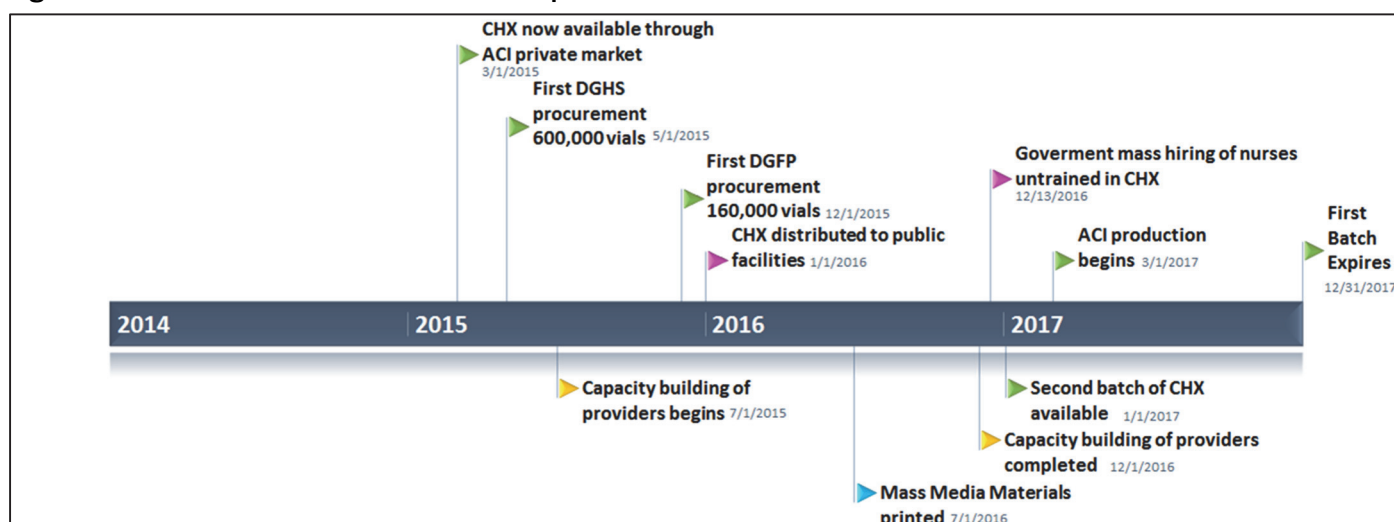
The simple nature of the CHX intervention, as well as its strong evidence base, including one trial conducted in Bangladesh, facilitated the adoption and incorporation of CHX cord cleansing into the MOHFW's policies and plans. Additional external facilitators for MOHFW institutionalization included WHO endorsement of CHX cord cleansing, funding for training activities offered by USAID, and technical support and limited initial support for procurement from the global CHX Working Group. The primary barriers to institutionalization in government services were the lengthy processes for changing MOHFW logistics management system and HMIS. Cost and lack of regulation were other barriers to institutionalization in NGO services and the private sector, respectively. Facilitators

and barriers to the institutionalization of CHX cord cleansing are summarized in **Table 2**.

### Finding 4: Expanding Access to CHX in the Public Sector

Resource team activities to support expansion focused on two key areas: training health care providers and supplying CHX vials to facilities. A nationwide training initiative, led by the MOHFW and implemented by the Bangladesh Sheikh Mujib Medical University (BSMMU) and two other national NGOs, trained over 85,000 public sector providers on CHX cord cleansing as part of essential newborn care and/or the comprehensive newborn care package. The training of trainers for CHX-specific training took place in July and August 2015; the orientation of public and facility providers spanned from August 2015 to December 2016 (**Figure 2**).

**Figure 2. Timeline of the achievement of expansion milestones**



Nurses participate in a training of priority newborn interventions in Khulna.

Trainings were coordinated by a team of retired government doctors who were specifically recruited by BSMMU, under the National Newborn Health Cell, to act as independent monitors.

While rapid progress was made in the training of providers, provision of CHX was delayed in the public sector because of challenges in commodity procurement and distribution.

### Finding 5: Facility Readiness

Between October 2016 and February 2018, the MOHFW conducted a post-rollout follow-up in all 64 districts of the country, with support of USAID's MaMoni HSS Project. The follow-up included a facility readiness assessment that covered 4,479 health facilities. The lowest level facilities included were Union Health & Family Welfare Centers, and the highest-level facilities included were district hospitals. Among all facilities, the following proportions met the readiness criteria:

- **Training:** 3,293 (74%) of facilities had 75% or more of maternal and newborn health providers trained in CHX cord cleansing
- **Job aid:** 3,365 (75%) of facilities had at least one newborn job aid that included CHX cord cleansing
- **Commodity supply:** 2,069 (46%) of facilities had a supply of CHX on the day of the assessment

- **Composite readiness score:** 1,510 (34%) of facilities met all three of the above criteria

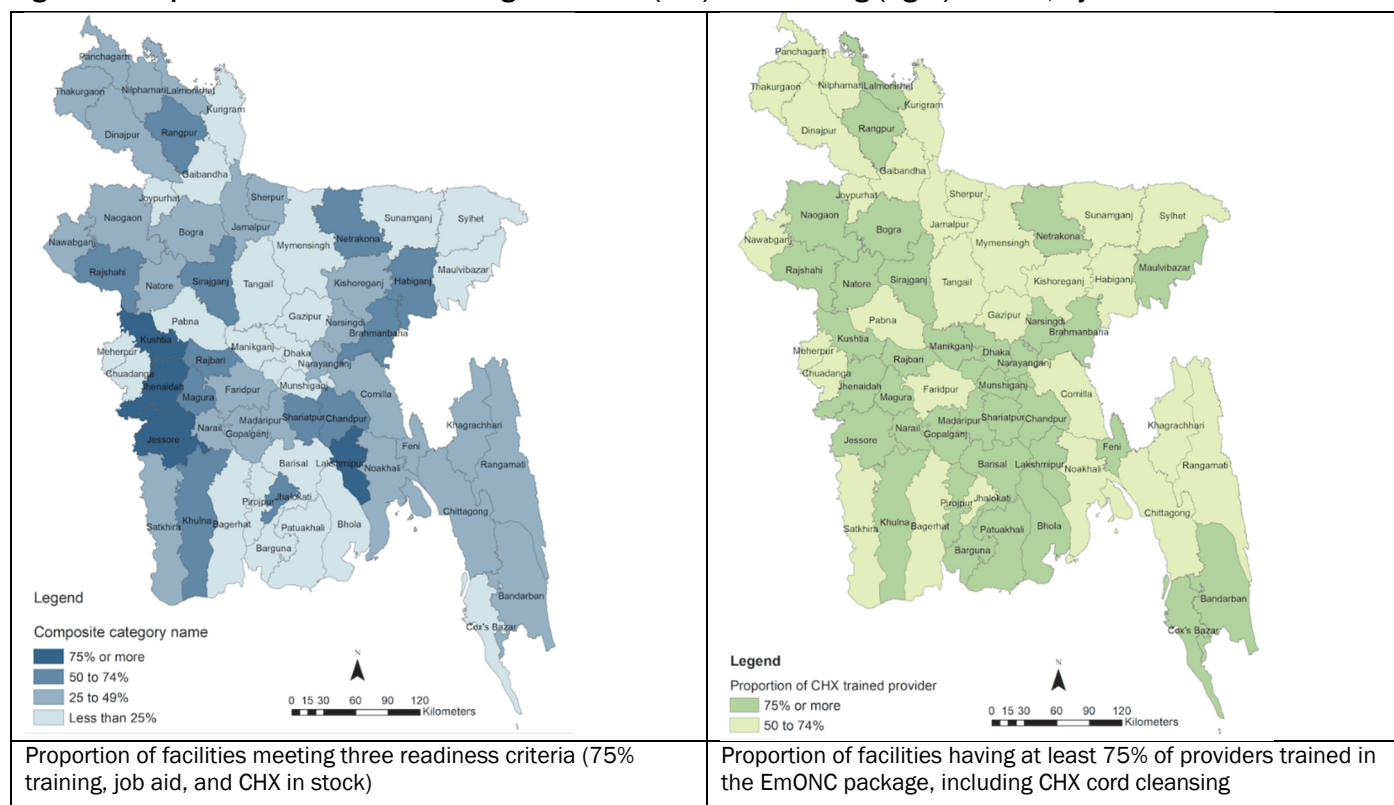
**Figure 3** provides a map illustrating the proportion of facilities ready to provide CHX cord cleansing in each district, by training criteria and the composite readiness criteria. It should be noted that due to the large scope of the survey, the data collection process took approximately 14 months, and districts were visited at different times during this period.

### Finding 6: Provision of CHX in the Public Sector

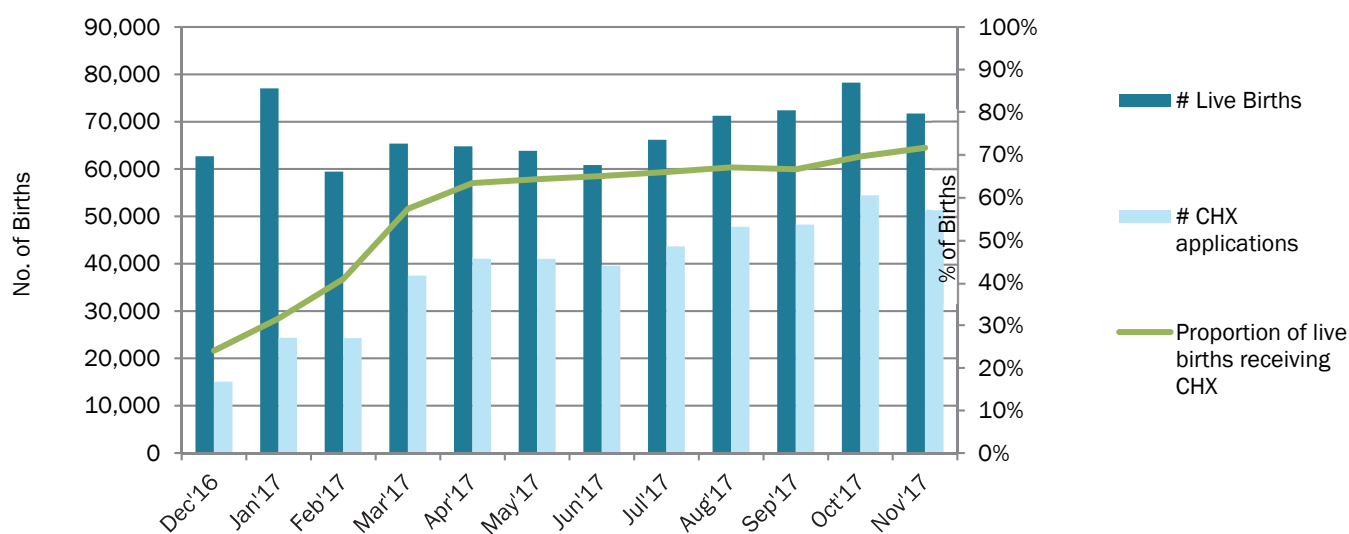
The MIS systems of DGHS and DGFP recorded 813,607 live births in the 12-month period between December 2016 and November 2017. Among these, CHX was applied to 468,249 newborns (58%). The proportion of live births at government facilities that received CHX rapidly increased between December 2016 and April 2017, from 24% to 68% (**Figure 4**). The remaining 7 months saw a more gradual increase, with 72% of live births receiving CHX in November 2017.

The only currently available household survey results measuring CHX coverage at community level come from the rolling survey of tracer indicators from USAID's MaMoni HSS Project. This survey covers the districts of Habiganj, Jhalokathi, Noakhali, and Lakshmipur in six rounds of data collection from 2014 to 2017. The estimated coverage of CHX-only cord care among live births in 2017 was 33%, compared with 1.5% in 2014/2015. **Figure 5** compares coverage increases by place of birth, demonstrating substantial coverage gains—close to 60 percentage-points—for births in public sector facilities. Caution should be taken in interpreting these estimates because maternal recall questions for CHX have not been validated. Moreover, there are considerable challenges related to mothers' recall of which substances were applied to the cord stump, particularly for facility births. These percentages, therefore, are likely an underestimate of CHX coverage.

**Figure 3. Proportion of facilities meeting readiness (left) and training (right) criteria, by district**

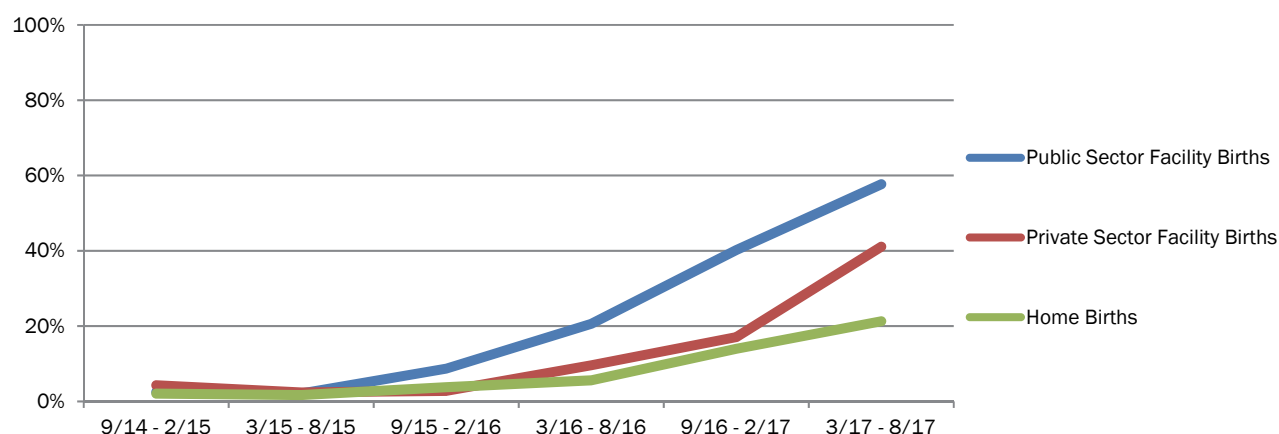


**Figure 4. Provision of CHX at government facilities between December 2016 and November 2017**



\*Notes: This graph includes data from reports from the MIS of both DGH and DGFP facilities.

**Figure 5. Coverage of CHX in four districts of Bangladesh, 2014 to 2018**



### Finding 7. Facilitators and Barriers to Government Services Expansion

The CHX product is considered simple, safe, and highly acceptable to both families and providers. Families traditionally prefer applying medication to the cord over dry cord care. Additionally, before CHX was introduced, many providers reported routinely applying other antiseptics to the cord stump, which was a practice counter to the official dry cord care policy.

While nationwide training of government providers was achieved rapidly in 2015, commodity procurement and distribution mechanisms hadn't yet been established, presenting a barrier to service delivery for about 6 months and resulting in wastage due to expired vials in some districts. Another barrier to CHX coverage is that the national guidelines have not yet been fully operationalized in terms of generating broad demand and distributing CHX during antenatal care (ANC) services. Opportunities exist to better reach home and private deliveries through these channels, as well as to more actively engage private sector providers.

sales in Dhaka, which were primarily sales to the government for distribution to facilities across the country. As discussed in earlier sections, major government procurements took place in June 2015 (approximately 600,000 vials) and December 2015 (approx. 160,000 vials), with additional smaller purchases in April 2016 (approx. 85,000 vials) and July 2016 (approx. 50,000 vials). No government procurement took place in 2017, but plans were in place for a new procurement in early 2018.

The bar chart reflects sales at private sector outlets for all districts outside Dhaka. There is a rather steady increase in sales at private sector outlets outside Dhaka over the 3 year period, from 1,472 vials in May 2015 to 41,452 vials in December 2017. In the last month recorded, December 2017, the average number of vials sold per district was 1,974. The districts with the highest and lowest sales outside of Dhaka were Rangpur (4,157 vials) and Chandpur (693 vials). ACI's efforts to promote private sales included holding seminars with private providers and distributing vials and communication tools to private pharmacy outlets, resulting in relatively steady increases in private sales over a 30-month period.

### Finding 8: Public and Private Sales of CHX

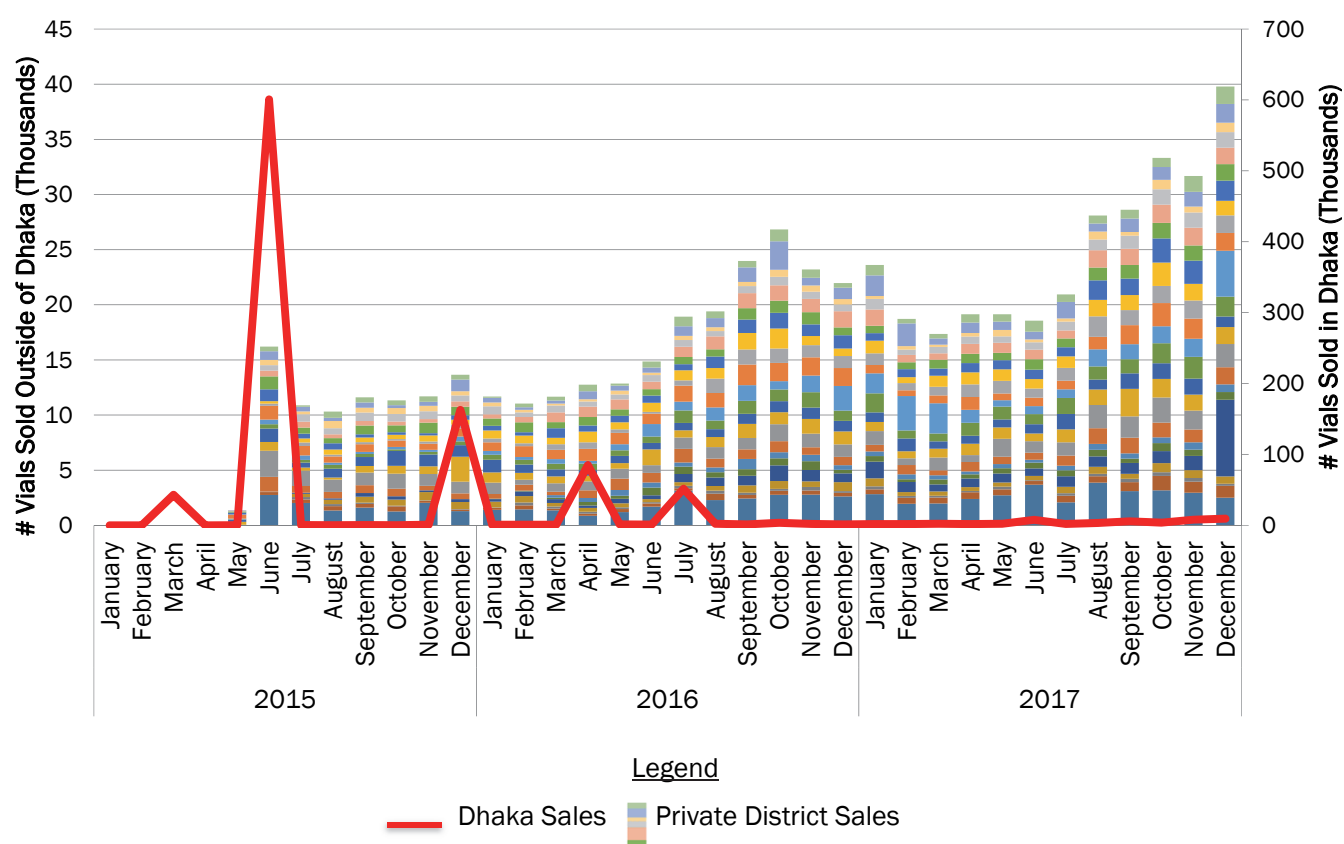
Figure 6 depicts sales of CHX vials in the thousands by the manufacturer, ACI Pharmaceuticals. The line graph reflects

**Table 3. Facilitators and barriers to expansion in the government sector**

CFIR DOMAIN	FACILITATORS	BARRIERS
Intervention Characteristics	<ul style="list-style-type: none"> <li>Simple intervention that is easily taught</li> <li>Consistent with family preferences and the physician practice of applying antiseptic to the cord stump in spite of previous dry cord care policy</li> </ul>	<ul style="list-style-type: none"> <li>Manufacturing and quality control certifications insufficient for commodity purchases by some partners</li> <li>CHX is cost-prohibitive for some families and providers to purchase in private market</li> </ul>
Outer Setting	<ul style="list-style-type: none"> <li>Support from development partners: funding for training provided by USAID; stopgap procurement of commodities supported by UNICEF</li> </ul>	<ul style="list-style-type: none"> <li>Lengthy process required for pursuing higher manufacturing certifications for local producer</li> </ul>
Inner Setting	<ul style="list-style-type: none"> <li>Contracted training partners had previous experience with national scale-up of newborn interventions</li> <li>Local adaptations helped some sites to address commodity shortages, such as recommending family purchase and utilizing community drug funds</li> </ul>	<ul style="list-style-type: none"> <li>Time-consuming process for introducing CHX into commodity procurement and distribution plans and systems</li> <li>Barriers to accessing health facilities (e.g., inadequately staffed facilities, limited geographic coverage) contributing to low utilization of public health facilities for deliveries</li> <li>High rates of staff turnover</li> <li>Supervision for clinical care is weak and irregular</li> </ul>

CFIR DOMAIN	FACILITATORS	BARRIERS
Characteristics of Individuals	<ul style="list-style-type: none"> <li>Providers find the product very acceptable and feasible, and perceive it to be effective at reducing cord infections</li> <li>Families find the product very acceptable and are receptive to providers' advice about cord care</li> </ul>	<ul style="list-style-type: none"> <li>Preferences contributing to high rates of home delivery</li> <li>Families prefer quick separation of the cord stump, and some report delayed separation when using CHX</li> <li>Reports of incorrect application, such as multiple applications</li> </ul>
Process of Scale-Up	<ul style="list-style-type: none"> <li>Initial vertical training for CHX cord cleansing facilitated rapid national training coverage</li> <li>Later integration of CHX cord cleansing with the Comprehensive Newborn Care Package training facilitates sustainable refresher training and incorporation into pre-service curriculum</li> <li>Inadequate planning and preparation for commodity supply mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>Insufficient outreach to private sector</li> <li>Insufficient community mobilization and social marketing</li> <li>Insufficient incorporation of CHX cord cleansing into ANC and community-based services</li> <li>Delays in introducing new registers and HMIS reporting that include CHX</li> </ul>

**Figure 6. Graph of ACI sales data for Dhaka and private sector outlets**



*\*Notes: The line graph depicts CHX sales for Dhaka, including sales to the Government of Bangladesh for national distribution. The histogram bars reflect private sector sales in districts, with each color in the stacked bars showing the total sales for an individual district.*

## Key Recommendations/Take Aways

- CHX cord cleansing is a simple intervention, well-supported by evidence, and is more consistent with families' preference and provider practice than the previous policy of dry cord care. The CHX vials produced locally by ACI Pharmaceuticals incorporated stakeholder design input.
- With the leadership of the MOHFW and stakeholder engagement through the NTWC-NHB, rapid progress was made in the development of technical and training materials and in-service training of providers on CHX cord cleansing.
- The use of CHX as part of essential newborn care has been rolled out country-wide through extensive training and post-training follow-up. The intervention has also been integrated with the monitoring and reporting systems of the MOHFW.
- Challenges with commodity procurement and distribution through government systems led to delays and gaps in care, as well as some wastage of expired



vials; development partners were not able to fill procurement gaps, while the manufacturer had not achieved global manufacturing certifications. Lack of distribution to community health workers and counseling during ANC visits limited the government program's reach for home births.

- While national scale up has been achieved in the government facility-based services, the cost of CHX and lack of regulation of the private sector present barriers for reaching families that seek care outside MOHFW facilities.
- The MOHFW can expand CHX coverage in Bangladesh by increasing community outreach, incorporating CHX counseling and distribution in ANC and community-based services, establishing on-the-job training on CHX

cord cleansing for new staff in maternity wards, and more actively engaging the private sector.

- Leadership by the MOHFW and the NTWC-NHB provide a model for stakeholder engagement in successful scale-up planning. Future newborn intervention scale-up efforts in Bangladesh can have greater success by: 1) ensuring that all health systems mechanisms—including necessary commodity procurement and distribution updates—are included in initial planning; 2) incorporating the intervention across the continuum of maternal, newborn, and child health care, as appropriate; and 3) actively engaging providers outside the government health system.



Photo by: GMB Akash

**About MaMoni Health Systems Strengthening (MaMoni HSS) Project**

The MaMoni Health Systems Strengthening (HSS) is a four-year project of USAID under the global Maternal and Child Health Integrated Program (MCHIP). The focus of this project is strengthening the systems and standards for maternal, newborn and child health, family planning and nutrition (MNCH/FP/N) that will result in declines in maternal, newborn and child mortality in Bangladesh. The project supports the Ministry of Health and Family Welfare (MOH&FW) to introduce and leverage support for scale-up of evidence-based practices already acknowledged in Bangladesh.

MaMoni HSS is primed by Jhpiego in partnership with Save the Children (SC), John Snow, Inc. (JSI), and Johns Hopkins University (JHU)/Institute of International Programs (IIP), with national partners, International Centre for Diarrheal Disease Research, Bangladesh (icddr,b), Dnet, and Bangabandhu Sheikh Mujib Medical University (BSMMU) and six local non-government organizations.

The project covers 40 upazilas in six districts and serves around 12.2 million people. The six focus districts are Habiganj, Lakshmipur, Jhalokathi, Noakhali, Pirozepur and Bhola.

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