The Bangladesh Experience: A research and evidence-based approach to develop an effective, large-scale, sustainable child drowning prevention program suitable for developing countries

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ABSTRACT

Bangladesh has one of the world’s highest child drowning rates, (28.6/100,000 children 1-17 years). Approximately 17,000 children fatally drown each year, including (12,000) children aged 0-4 years. Most of the drownings occur in ponds, ditches and other common water hazards at or within 20 meters of the child’s home.

The Centre for Injury Prevention and Research, Bangladesh and partners created a comprehensive water safety program among 754,188 rural villagers, including over 319,098 children. Interventions are keyed to the child’s age. For children under four, interventions are increase adult supervision and decrease water hazards in, at and near the home. For children over four, survival swimming is taught.

The program allows water safety education and training in a poor country lacking infrastructure normally associated with water safety such as swimming pools, life-guards and professional instructors. Key features include use of local resources, reliance on local community participation, and the creation of a heightened culture of water safety.

The results of the mid-term review conducted in July 2007 are presented. The review examines the impact of the program after two years of operation. It provides evidence on the feasibility of large-scale interventions that prevent child drownings is a sustainable and cost-effective manner in developing countries.

INTRODUCTION

Drowning is a leading cause of death of children and young people across the globe, but as such, it is also a neglected, public health problem. The statistics available at the global and regional level underestimate the true incidence for several reasons. One, they exclude many deaths that are commonly assumed to be included. These are drownings from natural disasters, such as floods, cyclones, typhoons and tsunamis. They also exclude drownings from boats and ships, classifying these as transport related deaths. However, the single largest source of exclusion results from the source of the reported drownings. Almost always these are the aggregated reports of drownings that present at or are reported to hospitals, clinics and other health facilities. In developing countries like Bangladesh, reports of fatal drownings to health facilities are the rare exception, rather than the rule, as in the case of rich countries.

The undercounting of drownings leads to a lack of visibility of child drownings as a major public health issue. One result is the perception that it is not a leading cause of child death. This has resulted in a lack of concerted effort focused on prevention. Unlike other leading child killers such as measles, tetanus, whooping cough, malnutrition, or malaria, there has not been a concerted, focused effort to develop interventions to prevent child drownings in developing countries such as Bangladesh.

Bangladesh has a long history of drowning being a common cause of child death. The country itself is a delta formed from the tributaries of three of worlds great rivers: the Brahmaputra, the Ganges and
the Meghna. The rivers exist because of the need to drain the melting snows and glaciers in the mountains to the far north, as well as the heavy rains in the lengthy rainy season in Bangladesh and it’s neighbors. In a normal rainy season, up to a third of the entire country is flooded. Along with this are the periodic cyclones which sweep up from the Bay of Bengal and commonly cause thousands of deaths from the high storm surges. Because of these factors, water exposure is a daily fact of life for almost all Bangladeshi’s, of both sexes and of all ages. Due to these daily exposures, drowning is a very common occurrence, especially in young children.

Bangladesh is also famous for another cause of death in young children—dehydration caused by diarrheal diseases. In fact, three decades ago, the diarrheal disease death rates were so high in young children that an international consortium of maternal and child health institutions created the International Center for Diarrheal Disease Research, Bangladesh (ICDDR,B) and this institution is now world-famous for pioneering the development of oral rehydration therapy to prevent these diarrheal disease deaths in young children. They showed that child deaths from dehydration could easily be prevented simply by mothers feeding their children a sugar and salt solution whenever they had an episode of diarrhea. The tradition of the community helping themselves to combat a major child killer was borne in Bangladesh. We have extended that tradition now to address the leading killer of Bangladeshi children, which is drowning.

Early this decade, we began an activity along these same lines that dealt with injury as an invisible killer of children—invisible in the sense that it escaped notice as a leading cause of child death in Bangladesh. Recognizing the enormous toll of drownings on children, UNICEF Bangladesh, The Alliance for Safe Children (TASC) and the Institute for Maternal and Child Health (ICMH) in Dhaka decided to measure the actual toll of drowning, as well as other causes of injury death in children and adults. The logic was that to understand the magnitude of the problem, it was necessary to carefully count all child deaths, from any cause, and then determine what those causes were. When done by counting the deaths that occurred in the community, as well as in the hospitals, a full and complete picture of child mortality would be created.

**Defining the problem and developing prevention strategies based on good data**

This was the primary goal of the Bangladesh Health and Injury Survey (BHIS), conducted jointly by these organizations in 2003. It was then, and remains today, the world’s largest community based survey of mortality and morbidity conducted in a developing country. More than 170,000 households (171,166) were visited to find 2410 child deaths which had occurred in those houses in the preceding two years. The deaths were then carefully and systematically examined for the actual cause of death. Drowning was defined as death by submersion in water, regardless of how the submersion occurred—whether by flood, boat or ferry sinking or in a pond or other body of water.

When all the causes in all ages of children had been determined, the results showed drowning was:

- the single leading cause of child deaths after infancy
- from age one until age eighteen, drowning caused about one quarter (23%) of all child deaths
- in early childhood, age one to four, it caused more than a quarter (26 %) of all deaths
- the fatal drowning rate in children 1-17 years of age was 28.6 per 100,000 children in this age group
- the near-drowning rate in the same child age group was 118.0 per 100,000 children
- these are among of the highest childhood drowning and near-drowning rates in the world
- about 17,000 children drown every year in Bangladesh
- there are about 68,000 child near-drownings every year in Bangladesh
- this is over 230 children each day
The figure below shows that actual drowning rates by year of age.

From this it is clear most child drownings occur early in life. Almost nine-tenths (87%) occurred before the age of five years. Other factors of note were:

- About 70% occurred in ditches and ponds
- Most (85%) infants and very young children drowned in water bodies within 20 meters of the house
- Almost all occurred during daylight hours (97%)
- Most infant and young child drowning happened when the supervisor or mother was distracted

A case-control study looking at risk factors for drowning was nested inside the larger BHIS survey, which was mainly a cross-sectional survey. The case-control study was used to identify specific risk factors associated with the drownings. The table below shows the results:

<table>
<thead>
<tr>
<th>Risk factors for child drowning</th>
<th>Odds ratio for drowning death</th>
<th>95%Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accompanying person</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother/Care givers</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>25.4*</td>
<td>14.4-45.3</td>
</tr>
<tr>
<td><strong>Main attendant of the child</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other than mother</td>
<td>74.5*</td>
<td>29.6-198.9</td>
</tr>
<tr>
<td><strong>Swimming ability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can swim</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Can not swim</td>
<td>4.5*</td>
<td>1.25-19.4</td>
</tr>
<tr>
<td><strong>Mothers Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary+</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>1.69*</td>
<td>1.01-2.81</td>
</tr>
<tr>
<td>Primary</td>
<td>1.24</td>
<td>0.71-2.14</td>
</tr>
<tr>
<td><strong>Number of Children in family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3-4</td>
<td>1.13</td>
<td>0.68-1.87</td>
</tr>
<tr>
<td>5 and more</td>
<td>1.95*</td>
<td>1.2-3.3</td>
</tr>
</tbody>
</table>

(*bold faced type indicates statistical significance at the P=0.05 level or less*)
From the table it is clear that being in a large family, with a mother lacking education, with many other children increases the odds of being supervised by an older sibling, and not by the mother. This greatly increases the risk of drowning. Being old enough to swim, and knowing how to, is strongly protective from drowning. (Swimming was defined with the operational definition: if the child were to fall into a pond 25 meters across, would that child be able to cross to the other side and climb out).

The figure below shows the rates of drowning plotted against the ability to swim in these children:

As a result of the research, a prevention strategy was developed as shown below:

- The prevention of drowning in the 0-4 age group is through improved supervision by the mother combined with protection by increasing barriers to access potential drowning sources within and immediately around the house.

- The prevention of drowning in children over 5 is through teaching them to swim as early in life as possible, given the highest drowning rates in this “swimming-protected” group are at age 6 years.
Operational research to further define prevention strategies

These two fundamental strategies, supervise and protect for ages below five, and swim teaching at five and above were then considered for feasibility and safety.

The issues relating to supervision and protection mainly revolved around the feasibility of fencing or other barriers around ponds and ditches near the home, given the ubiquity of these and the lack of funds in the family. A variety of approaches were examined, including:

- Using bamboo and other naturally available materials for fencing
- Creating a “safe play” area within the home that uses barriers to prevent infants and young toddlers from roaming outside (similar in concept to a playpen)
- Creating community crèches where young toddlers could be closely supervised for four hours a day, allowing the mothers to complete housework and be able to devote the rest of the day to supervision of the toddler

The feasibility and acceptability of these approaches were tested using qualitative research methods such as focus group discussions, community panels, and key-informant interviews. The different approaches were further refined in small scale testing in selected areas.

The issue of swim teaching was especially complicated, as in Bangladesh, like most developing countries, the swim teaching infrastructure is non-existent for all practical purposes. Pools, life guards, certification of swim teaching and water safety, etc., do not exist outside of one or two cities. However, it was very clear from the research that a culture of water safety already existed in rural Bangladesh, as naturally acquired swimming ability began before the age of five years and rapidly increased, with 50% of children being able to swim before the age of nine years in rural areas. The next step was to study how this natural swimming ability was obtained: who was teaching the children, where were they learning, was it being done in a safe manner, other than swimming, what other water safety skills were being learned, e.g., rescue, etc?

An anthropologic study of swimming and water-safety in rural villages was conducted over a six month period to try to fully understand the processes involved. A representative sample of villages was selected and a series of qualitative research was done to define beliefs, attitudes and practices concerning water exposure, hazards and risks, and social processes employed in developing water familiarity in young children. Behavioral scientists conducted standardized observational studies of naturally occurring swim training of different groups of children of varying ages in the villages. As a result, a series of best practices and potentially hazardous practices were identified for the various components of water familiarization, water safety and swimming learning.

At the same time, quantitative research was conducted to understand and define the various levels of swimming skill and relate them to protective ability. Further research on time undertaken and level of skill acquisition was done to understand potential hazards involved in the naturally occurring processes under observation. Assistance from the Bangladesh Swim Federation and TASC allowed a basic level of skill to be defined as being protective of drowning, using the actual data from BHIS and the ensuing operational research. This was defined as “survival swimming”, or the ability to float for ninety seconds, and cross 25 meters of water deeper than a child’s height.

The Royal Life Saving Society of Australia was invited to assist in formalizing these best practices into a set of defined skills and to incorporate them into a standardized water safety and swim learning training process. The process set core standards for swim trainers (local village residents), training venues (local ponds), trainees (children four and older) and defined a gradual and graded acquisition of key skills necessary for survival swimming, including basic water safety and rescue techniques. A core basic water safety knowledge package was developed for parents of children below swimming age as well.
Having done the extensive research necessary to develop a safe, rural village-based water safety and swim learning program, it was incorporated into the UNICEF Bangladesh child injury prevention program.

**PRECISE – PREVENTION OF CHILD INJURIES THROUGH SOCIAL INTERVENTION AND EDUCATION**

Following the completion of BHIS and the documentation of the fact that injury had become the leading killer of Bangladeshi children after infancy, the partners who had conducted BHIS were determined to develop interventions for these. TASC assisted in creation of a new Bangladeshi non-governmental organization (NGO) called CIPRB, or The Centre for Injury Prevention Research, Bangladesh.

UNICEF, TASC and CIPRB developed a large scale, quasi-experimental community research program where basic cost and efficacy research on the various potential child injury interventions could be conducted. Bangladesh, like most developing countries has almost none of the resources available to rich country prevention programs. As a result, any sustainable interventions must be developed and shown to be effective using only what is locally available, and with a minimum of additional human and financial resources. The PRECISE program research area was developed to allow this.

**Community research design**

Four sub-districts, each with about 40,000 households were designated as study communities. In total, these contain 172,160 households with a population of 754,188 persons, including 319,098 children under 18 years, and 89,341 under 5 years. The four areas are representative of rural Bangladesh, have local functioning partners like other non-government organizations (NGOs) present, and have high rates of injury mortality and morbidity.

Three of the four chosen areas are designated as intervention areas, and each of the three have different levels of intervention, and different packages of interventions operating applied. The fourth serves as a control with no interventions being conducted.

In the three intervention areas, each household is enrolled in an active surveillance system, and receives a monthly visit where demographic events (births, marriages, etc) and health events (deaths, hospitalization and any occurrence of significant injury) is recorded for all members of the household.

Guiding principles of the program include use of local resources, reliance on local community participation and the creation of a heightened culture of water safety

The three color coded areas shown on the map are the districts where the intervention sub-districts are located. The intervention sub-districts are categorized into three intensities - Raiganj sub-district of Sirajganj being the high intensity area, Sherpur Sadar of Sherpur being the medium intensity area, and Manohardi of Narsingdi the low intensity area. The levels of intensity differ as follows:

- **High intensity of intervention (Raiganj):** A community-based Community Injury Prevention Promoters (CIPP) makes monthly visits to help establish and operate Safe Home, Safe School and Safe Community programs.
- **Medium Intensity of intervention (Sherpur Sadar):** The same basic mix of programs are in operation, but no external staff are present. Training is given to local health care providers (HCP) staff and NGOs, a small amount of funds are provided to cover the expenses of the travel involved for the local staff, but nothing else is provided.
Low intensity of interventions (Manohardi): A minimal set of programs are implemented with training and materials for program operation supplied. There are no operational ‘top-up’ funds or other resources provided.

Prior to the beginning of the PRECISE project, each household in all four areas participated in a baseline survey to determine rates of significant health events for each household. All four will also have a post-line survey conducted to allow a comparison of the pre- and post- intervention periods effects to be measured. Additionally, in the three intervention areas, the monthly surveillance system records the ongoing health events each month to allow time trends, temporal effects and periodicity to be determined.

PRECISE planning and readiness activities began in September 2005 and field-level interventions and general operations were started in January 2006. The water safety and drowning prevention activities have been fielded since February 2006. The strategies of the water safety program are keyed to child’s ages which include:

1. raising awareness of children of all ages (under 18) and parents on water hazards and prevention of drowning
2. improving supervision of the young children (under 5 years)
3. equipping older children (4 – 10 years) with the life saving swimming skills
4. modifying environmental water hazards through community participation
Intervention design

For under 5 children

Improved supervision

To improve supervision of children 0 – 4 years the PRECISE has adopted two approaches:

1. **Home safety counseling**: To make a home safe haven for children, every month a community volunteer counsels the household occupants, especially mothers, for removal of drowning hazards in, at and near the home and the importance of constant supervision of children by a responsible adult in the household.

2. **Establishment of crèches**: For every village, one community crèche has been established to accommodate around 25 children, for institutional supervision for 4 hours a day of children under five years old. The principle of developing a crèche is to keep the children under direct supervision of a trained volunteer supervisor while mothers are busy with their household chores. Moreover, there is an early childhood development (ECD) component in the crèche program resulting in the social, emotional, cognitive, and physical growth of the young children.

For children 4-10 years

For children 4-10 years teaching life saving swimming skills “Swim for Life” have been adopted. The strategies include

1. Establishing collaboration with the national and international organizations involved in teaching life saving swimming skills of children.
2. Developing swimming teaching strategies and a curriculum
3. Developing community swimming centers
4. Involving local people as Community Swimming Instructors (CSIs)
5. Involving community leaders to support the program

Collaboration with national and international organizations

Life-saving and swimming skills teaching was almost non-existent in Bangladesh. The Bangladesh Swimming Federation conducts this teaching only in the swimming pools of Dhaka city on a limited basis without having any structured curriculum. Therefore a collaborative activity was developed between CIPRB, the instructors of the Bangladesh Swimming Federation with technical assistance from the Royal Life Saving Society Australia (RLSSA).

Swimming teaching strategies and a curriculum

A series of workshops were held to draft the strategies and a curriculum for teaching life-saving swimming skills for children. The strategies include using local ponds and low cost, locally-available resources. International criteria of life-saving swimming skills i.e. 25 metres swim and 90 seconds treading water have been set as the demonstrated standard for graduation of children. The curriculum includes all the major steps of swimming learning including rescuing peers.

Community Swimming Canters

The “Swim for Life” program is being conducted in community ponds. These ponds vary from steep sloping banks, gentle sloping banks to man-made structures including brick and concrete walls. The ponds have been selected based on the following criteria;

1. water quality
2. water depth
3. community consultation
4. convenience and permission from pond owner
5. venue already used for recreational swimming

In each case a swimming area has been designated by the construction of bamboo staging areas and perimeter fencing. The construction methods are very inexpensive and use local materials and labor. Where water depth is not suitable for swimming and water safety lessons, a platform is constructed. This platform creates a water depth of approximately 40 – 60cm. This depth is considered optimal for teaching early swimming development to children aged 4 – 10 years of age. The platform features a perimeter fence that is used for both safety and instructional purposes. The fence railing restricts student’s access to deeper water. It also provides a rail for holding in floating, kicking and stroke development activities. The diagram below outlines the common features of the instructional pond. If water depth is suitable only a perimeter fence and safe entry area are constructed.

Consideration is given to ensuring that sufficient space is created for the conduct of lesson activities in a safe manner where the instructor can clearly see all children participating.

Water quality is considered in the context of the local environment. The project identifies the most suitable water space through community consultation. It is likely the water quality would not meet acceptable standards for aquatic recreation facilities in developed countries. However, it must be understood that these water bodies are used for daily washing and recreation. This means that all children are constantly exposed to this water in everyday life. Additional safety measures are taken such as the monitoring of water quality on a daily basis and the condition of the platform and the fence by the Community Swimming Instructor. In each swim centre there are safety ropes, rails, and signage.

**Community Swimming Instructors (CSIs)**

The Community Swimming Instructors (CSIs) provide swimming and water safety instruction to the children at each community pond. These instructors are selected with the help of the local leaders with criteria which includes swimming ability, residence in community, education and temperament. For each village, one CSI was selected and trained by the national trainers of the Bangladesh Swimming Federation, for a period of seven days, five days at the Swimming Complex of the Bangladesh Swimming Federation and two days at the local ponds.
The training involves knowledge and practical skills in the delivery of the ‘Swim for Life” program. This program also includes pond management and the promotion of drowning prevention across the community. The CSIs also receive training on first aid including cardiopulmonary resuscitation (CPR).

**Trainers of the Community Swimming Instructors**

Swimming trainers of the Bangladesh Swimming Federation act as trainers of the CSIs. The executive board of Bangladesh Swimming Federation selects the most suitable trainers for this program from their pool of trainers.

The national instructors of the Bangladesh Swimming Federation and the senior CSIs attended a one-week Training of Trainers program from the instructors of the RLSSA. The Swimming Federation’s instructors also participated in the training program on “Life-saving Swimming” organized by Rastrio Life Saving Society of India (RLSSI).

The CSIs also receive a three-day training on first aid including CPR from an expert group of trainers using a standard training manual.

**For all children**

**Awareness building**

To improve knowledge and create awareness on drowning prevention among the community, various communication strategies have been adopted which include: conduct of court yard meetings with community people, social autopsy meetings after any fatal drowning occurs in the village, documentary drama video-shows, performing interactive popular theater groups with water safety as themes for the drama, and distribution of booklet and posters. These community activities are designed especially to increase men’s participation in the program. In the Bangladeshi context it is often difficult to reach men during day time. To ensure male participation most of these, where interactions are required, are organized during their leisure time - in the afternoon or in the evening.

Additionally, there is a school-based set of activities. The portion of the curricula developed for this includes water safety, drowning and its prevention. There is also a skills-based first aid course that includes components of water injury prevention.

**Role of community leaders**

In each village the PRECISE project has formed a Village Injury Prevention Committee (VIPC) by the local leaders. The responsibilities of this committee are to supervise PRECISE activities, support and promote programs, motivate people to be involved in the programs and finding means to do by themselves in future. Each month, the committee holds a meeting where the CIPPs/HCPs, crèche supervisor and the CSI discuss the progress of the activities.

**PROJECT ACCOMPLISHMENT**

**Swim Centers**

Between September 2005 and December 2006 a total of 5,938 children learned survival swimming from 75 swim centers. This year another 75 swim centers have been started. As a result a total of 150 swim centers are currently made functional. It is expected that a total of 15,000 children will have learned survival swimming by the end of this year.
Crèche
There are currently close to 4,000 children in the 203 crèches. Each crèche can accommodate 15-20 children.

Costing
1. The operational costs of each crèche, after their establishment, come out on a per-child basis, of less than three US cents per day per child attending. In Bangladesh currency, this is about 2 taka per child per day. There are substantial opportunities for cross-program operations which might allow subsidy of operating costs to further decrease this minimal cost. There are also opportunities for crèche sponsorship which will be explored in the near future.

2. Costing of swimming – This is still being calculated due to the yet-uncertain costs of maintaining the swimming centers over several years as well as allowing for turn-over in CSI staff. Currently, the marginal cost of teaching one child to swim is estimated at about $2.50 US dollars and as the centers expand and economies of scale develop, it is projected to be decrease to about half of this current cost.

IMPACT ON CHILD DROWNING DEATHS

Safe Community

Crèche Program - There are currently close to 4,000 children in the 203 crèches, with only 2,000 that had completed one year’s participation. To date, there have been no fatal or near drownings in crèche participants while in the crèches. This small sample size limits the ability to look at impact, as it is not large enough to have expected one death to occur. More information will be available in October when the full crèche cohort of 4,000 plus children will have completed at least one year of crèche attendance.

Water Safety / Swimming Learning - Among the 5,938 children who have graduated with demonstrated competence in survival swimming, no child has drowned or near-drowned. There were 13 fatal child drownings and 96 near-drownings during the same period, in children 4-10 years not enrolled in the swimming learning. There have been anecdotal reports of children using their rescue skills to avert drownings in peers, and we are currently collecting these in a systematic fashion to document rescue rates resulting from graduates of the program.

<table>
<thead>
<tr>
<th>Area</th>
<th>Swim For Life graduates (5,938 total) followed for one year</th>
<th>Non-participant drowning rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raiganj – high</td>
<td>0 among 2,150, graduates 3 expected at baseline drowning rates</td>
<td>31 among 31,850 = rate of 100.3/100,000 4-10 year olds</td>
</tr>
<tr>
<td>Sherpur – medium</td>
<td>0 among 2,105 graduates, 2 expected at baseline drowning rates</td>
<td>30 among 40,094 = rate of 74.9/100,000 4-10 year olds</td>
</tr>
<tr>
<td>Manohardi – low</td>
<td>0 among 1,683 graduates, 2 expected at baseline drowning rates</td>
<td>48 among 34,619 = rate of 138.3/100,000 4-10 year olds</td>
</tr>
</tbody>
</table>

The numbers of trained graduates is still too low to allow for statistical significance of these rates, but with the additional children currently enrolled, by year’s end the numbers of program graduates should allow statistically significance to be measured.
**Safe Home** – Although there is only one year of data, the impact is already well demonstrated.

- These reductions are statistically significant in all intervention areas.
- They represent a reduction by about half in both age groups of children.

**CONCLUSION**

While rich countries have the luxury of using wealth and technology as fundamental inputs to solving major public health problems, these are not available to developing countries such as Bangladesh. Consequently, the most efficient use of the available resources is paramount. This is best served by using research to develop an evidence-base upon which to allocate effort and resources. When these are used efficiently and effectively, it is clear that a great deal can be done to address child drownings.

Despite a lack of recognition regarding the magnitude of the child injury problem, and in particular that of child drowning, the collaborating institutions followed a research- and evidence-based approach to the problem. The collaborators first defined the magnitude of the problem with a national survey that was of sufficient scale to precisely characterize the problem of drownings in all age groups. Next, through a series of quantitative and qualitative studies, a set of proposed interventions were developed. These were then tested for acceptability in the community, and for sustainability within the existing limitations of health and financial resources in Bangladesh. Finally, they were introduced in a very large study area in a quasi-experimental research design and carefully monitored for prevention efficacy, and cost-effectiveness.

The program has been underway for almost two years and will require a longer period of time to provide the solid evidence of efficacy and cost-effectiveness needed to decide which interventions and at what level of intensity are optimal for resource-poor Bangladesh. However, they already show clear evidence that child drownings are preventable, at low cost and using only existing human resources and infrastructure. Given that drownings are the leading cause of child death after infancy in Bangladesh, this shows a locally-developed set of interventions are already available to meet this critical public health need.
Additionally, the evidence gathered in Bangladesh will likely be applicable to other developing countries. Since the vast majority of child drownings globally (over 90% by most estimates) take place in these countries, there is a singular need for expansion of this work.

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