Abstract

The scale of the child drowning epidemic in Asia has been greatly underestimated by the global public health community. Recent surveys conducted by TASC and UNICEF in Vietnam, Thailand, Bangladesh, China and Cambodia have shown that drowning is the leading killer of children after infancy. It is responsible for more child deaths than AIDS, tuberculosis, malaria and dengue combined. There are actually two epidemics – one in children under five, and one in children over five and both epidemics differ from those in same-aged children in high income countries.

Most drowning results from everyday activities rather than recreational activity. It occurs near the home and in water bodies used for household purposes and there is no association with alcohol. Factors associated with the drowning are poverty, lack of education, large family sizes and a very high prevalence of water bodies in the environment.

Over the last four years, TASC has worked with UNICEF Bangladesh, the Centre for Injury Prevention Research, Bangladesh and the Royal Life Saving Society – Australia to do large scale operational research on the efficacy and cost-effectiveness of village crèches and survival swimming teaching interventions suitable for the low resource setting of a rural LMIC.

The program has shown a four-fold reduction in drowning mortality in children early childhood and a five-fold drowning mortality reduction in middle childhood and adolescence. The program is now focused on achieving national scale in Bangladesh and to be used in other LMICs in the Asian region.
LMICs are different from rich countries

Rich countries got rich before they got safe
- They had educated populations
- And well-developed civil governance structures
- With enforced building codes and zoning ordinances
- And large civil services that staffed public safety institutions
- And were already predominantly urban
- And then they built a culture of safety on those foundations

LMICs have none of that

- As a general rule, they are:
  - Predominantly rural
  - Environmental hazards are ubiquitous in and around the home and throughout the community
  - Universal primary education is a goal, not a reality
  - Parents, who often have 4 or 5 children must rely on the older children to supervise the younger ones
  - There are few, if any, social services, such as emergency medical and rescue services that extend life saving services outside the hospital and other safety infrastructure

That’s why they are called developing countries
Fatal drowning rate – Asia LMIC vs Australia

Cause-specific mortality in Cambodian children after infancy (1-17 years)

Drowning causes over half of all child deaths after infancy
more than dengue fever

more than AIDS

more than malaria
more than SARS or Avian flu combined

more than tetanus, whooping cough and polio put together

Bangladesh shows the problem— and the solution

National Swimming Pool Foundation ∙ 4775 Granby Circle ∙ Colorado Springs, CO 80919 ∙ (719)540-9119 ∙ www.nspf.org
It’s not pools, it’s not beaches, and there is no association with alcohol use – it’s just daily life.

Cause-specific mortality in Cambodian children after infancy (1-17 years)

Age group (years) and Country

Non-fatal

Fatal

National Swimming Pool Foundation ∙ 4775 Granby Circle ∙ Colorado Springs, CO 80919 ∙ (719)540-9119 ∙ www.nspf.org
Untrained resuscitation

- Generally fell into three categories of methods:
  - attempts to expel water from the drowned child’s body by physical force
    - (e.g. whirling the child overhead, pressing or jumping on the child’s chest and stomach)
  - attempts to expel water from the drowning child by inciting vomiting or coughing
    - forcing rotten food into the child’s mouth to induce vomiting, or inserting sticks into the child’s trachea to induce coughing
  - attempts to expel water from the drowned child’s body through other physical means that involved drying
    - packing the child in ashes, covering the child in mud, heating the child’s body over a warm fire
Where The Children Are Living

- No swimming pools
- No life guards or instructors
- No training infrastructure
- Water everywhere in daily life

Child drowning

Prevention of Child Injuries through Social Intervention and Education (PRECISE and follow-on program)

The Alliance partners
- UNICEF Bangladesh
- The Centre for Injury Prevention Research – Bangladesh
- Royal Life Saving Society Australia
- The Alliance for Safe Children
- Australian Agency for International Development
- UNICEF Innocenti Research Centre
Prevention of Child Injuries through Social Intervention and Education (PRECISE and follow-on program)

Improved supervision of children and safer environments (0-5 years)
- Establishment of community créches (Anchals)
- Home safety counseling (home visits of community créche mother)
- Promotion of external hazard fencing, door barriers and play pens

Prevention of Child Injuries through Social Intervention and Education (PRECISE and follow-on program)

Water safety survival and rescue skills (4+ years)
- SwimSafe program
  - Water safety including parental involvement
  - Certified curriculum and teachers
  - Using specially modified ponds
  - Safe rescue skills
  - Avoidance of ineffective or harmful resuscitation practices
  - Ongoing monitoring for safety, increased risk-taking and outcomes

Anchal – a village-based community créche

Institutional supervision, most vulnerable time for injury, most vulnerable age groups

- **Children**
  - 1-5 year olds
  - 25-30 children
  - Live in 60-70 households cluster

- **Anchal Mother**
  - Woman from the community
  - Age 18-35 years old
  - Secondary level education
  - Assisted by one assistant
Community awareness building

- Courtyard meetings
- Participatory theatre
- Video shows
- Social autopsy

Social autopsy
held at every injury death to increase community awareness

- Parents describe the event
- Moderator explores why it occurred
- Community discuss possible counter measures
- Education on other injury prevention measures
- Community commits to interventions

Community Swimming Center

National Swimming Pool Foundation ∙ 4775 Granby Circle ∙ Colorado Springs, CO 80919 ∙ (719)540-9119 ∙ www.nspf.org
Community Swimming Instructor (CSI)

- Selected by village
- 18 years+
- Good swimmer
- Secondary level education
- Volunteer
- Acceptable by the community
- Can be taught:
  - Swim-teaching
  - Pond maintenance
  - Rescue & resuscitation

SwimSafe

Children learning to swim  Children learning rescue technique

Over 134,000 children learnt swimming during 2006-2010 through SwimSafe programme

Centre for Injury Prevention and Research Bangladesh (CIPRB)

Does It Work?

National Swimming Pool Foundation ∙ 4775 Granby Circle ∙ Colorado Springs, CO 80919 ∙ (719)540-9119 ∙ www.nspf.org
Precise intervention numbers

Community crèche program –
640 community crèches, 20,000 children attending

SwimSafe survival swimming and water safety program
134,000 graduates from 250 training ponds

Community Crèche Outcome Summary

<table>
<thead>
<tr>
<th>Death Rate (per 100,000 child-years)</th>
<th>RR</th>
<th>CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drowning Intervention</td>
<td>11.67</td>
<td>0.156</td>
<td>0.047 – 0.533</td>
</tr>
<tr>
<td>Non-Intervention</td>
<td>74.76</td>
<td>1.000</td>
<td>1.000 – 1.000</td>
</tr>
</tbody>
</table>

Enrolled Non-Enrolled
Mean
Duration 2.1 2.0
# 12,403 12,403
child-years 26,046 24,806

SwimSafe Outcome Summary

<table>
<thead>
<tr>
<th>Death Rate (per 100,000 child-years)</th>
<th>RR</th>
<th>CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drowning Intervention</td>
<td>1.08</td>
<td>0.051</td>
<td>0.007 – 0.393</td>
</tr>
<tr>
<td>Non-Intervention</td>
<td>21.10</td>
<td>1.000</td>
<td>1.000 – 1.000</td>
</tr>
</tbody>
</table>

Enrolled Non-Enrolled
Mean
Duration 1.6 1.6
# 56,233 56,233
Child-years 89,972 89,972
What about safety of the intervention?

- 640 crèches, 4 years and 20,000 children
- 250 ponds, 4 years and 134,000 children
- 0 injuries, 0 adverse events

What does PRECISE tell us?

- Child drowning can be prevented in the setting of rural Bangladesh
- Effectively with low resource use
- Acceptably for the community
- Safely for the children

If this is their walk to school, shouldn't they know how to swim and about water safety?
If this is how they go to the store, shouldn’t they know how to swim?

If this is their backyard, shouldn’t they know how to swim?

If they live on a boat, shouldn’t they know how to swim?
If they are unsupervised, or together, shouldn’t they know how to swim?

Portable pools

Beach site
Thank you
If you would like to help or be involved in our ongoing research in Asia, we would welcome your involvement.

Contact me at mlinnan@tasc-gcipf.org
Prevention efficacy methodology

- Intervention cohorts:
  - Children 18mos – 5 yrs attendee/graduates of community crèche only
  - Children 4-12 yrs graduates of SwimSafe only

- Non-intervention cohorts:
  - Age- and sex-matched community crèche non-participants
  - Age- and sex-matched SwimSafe non-participants

- Comparison of survival between the intervention and control
  - Equal time of exposure to home and community environments
  - Matched for the main risk factors of age, sex and geographic area