Child supervision practices for drowning prevention in rural Bangladesh: a pilot study of supervision tools

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ABSTRACT

Background Injuries are an increasing child health concern and have become a leading cause of child mortality in the 1—4 years age group in many developing countries, including Bangladesh.
Methods Household observations during 9 months of a community-based pilot of two supervision tools—a door barrier and a playpen—designed to assess their community acceptability in rural Bangladesh are reported in this article.
Results Statistical analysis of 2694 observations revealed that children were directly supervised or protected by a preventive tool in 96% of visits. Households with a supervision tool had a significantly lower proportion of observations with the child unsupervised and unprotected than households without a tool. Families that received a playpen had 6.89 times the odds of using it at the time of the visit than families that received a door barrier.
Conclusions Interventions such as the playpen, when introduced to households through community-based programs, are accepted by parents. Field trials are urgently needed to establish the effectiveness of barrier-based interventions at reducing under-five drowning mortality rates in low-income countries like Bangladesh.

Drowning is the second leading cause of injury-related mortality among children worldwide,[1] with 90% of child drowning deaths occurring in low- and middle-income countries.[2] Despite the high rates of drowning, limited research has been conducted on causes and prevention strategies specific to the unique hazards in low- and middle-income countries.[2—6] There is a clear need for research that identifies risk factors for drowning in low- and middle-income countries and helps lead to effective interventions.[3 4 6]

This article discusses findings from household observations made during a community-based pilot exploring potential interventions to prevent drowning in children under age 5 years in rural Bangladesh. The incidence rate of drowning for children under 5 years in Bangladesh is estimated at 156 deaths per 100 000 child-years, and up to 43% of deaths among 1- to 4-year-olds are due to drowning.[5 7 8] Recent work demonstrates that the vast majority of childhood drowning deaths in Bangladesh occur when at least one parent is at home and engaged in household chores.[9] These findings are consistent with other research demonstrating that parental supervision practices are correlated with injury rates.[10—13]

The goal of this article is to contribute to the body of knowledge on childhood drowning in low- and middle-income countries. The specific objectives of this study in Bangladesh were (1) to assess utilisation and preferences for supervision tools and factors associated with their use, and (2) to assess the effect of supervision tools on childhood supervision practices.

METHODS

This pilot study of potential intervention strategies to prevent childhood drowning was conducted in Matlab, Bangladesh, between February 2004 and August 2006 by the Johns Hopkins University Bloomberg School of Public Health and the International Centre for Diarrhoeal Disease Research, Bangladesh. The playpen and door barrier were identified and developed during earlier formative research as interventions for testing in a pilot feasibility study.[14]

Six villages were purposively selected to participate in the pilot study, with two villages randomly assigned to each of three intervention packages: (1) educational drowning prevention messages, (2) educational messages and door barrier, and (3) educational messages and playpen. A convenience sample of households from the villages with children aged 6—54 months was recruited to participate through community meetings conducted by community health workers. Participating households received an initial enrolment visit from the community health worker during which the intervention was delivered. Afterwards, community health workers made up to 11 unannounced follow-up observations at each enrolled household to record supervision practices and tool use on a standardised observation form. Observations occurred at staggered times, and intervention use was defined as the child being in the home and behind the door barrier or the child being inside the playpen, both at the time of the observation.

Observation forms were collected by community health worker supervisors, and responses were entered into a Microsoft Access database and converted to STATA v. 8.0 for statistical analysis.[15] Descriptive statistics of the observation data were compiled for each study arm, and the differences between continuous means and binomial proportions were tested using the Kruskall—Wallis and the Wilcoxon rank-sum non-parametric tests to account for the non-normal distribution of the data.[16] A logistic regression model was used to evaluate factors that predict the use of the intervention in the playpen and door barrier arms.

RESULTS

A total of 2694 household observations were conducted over a 9-month period with a median of 3 observations (IQR 2 to 5) per household. The

Table 1 Key child observation characteristics by intervention in Matlab

| | Study arm | | | |
	Education only	Playpen	Door barrier	p Value
No of eligible households	343	326	373	—
No of participating households (response rate)	192 (56%)	147 (45%)	133 (36%)	—
No of visits	1093	802	799	—
Average child age in months—first visits only (SD)	29.5 (13.33)	25.9 (12.98)	25.48 (12.92)	<0.05
Average number of visits per HH (SD)	4.03 (2.47)	3.52 (1.96)	3.8 (2.06)	—
No of observations where intervention tool is in use* (%)	N/A	454 (56.6)	149 (18.7)	<0.01
No of observations with child directly supervised by adult (%)	1032 (94.4)	285 (35.5)	628 (78.6)	<0.01
No of observations where no form of protection is being used (%)	61 (5.6)	10 (1.3)	16 (2.0)	<0.01
No of positive feedback comments (%)†	1045 (96.9)	726 (90.9)	427 (54.3)	<0.01
No of negative feedback comments (%)†	25 (2.3)	30 (3.8)	53 (6.7)	<0.01
No of mechanical or other problems reported (%)†	8 (0.7)	43 (5.4)	307 (39.0)	<0.01

*Door barrier and playpen groups only.
†Percentages for positive feedback, negative feedback and mechanical problems are calculated as a proportion of total feedback comments for each respective study arm. Percentages for all other rows are calculated as a proportion of the number of observation visits for each respective study arm.

average age of children included in the study at the first observation was 27.27 months (CI 26.08 to 28.47), with the education-only arm having a higher average age by approximately 4 months (p<0.05).

Community health workers observed the child being directly supervised by an adult at the time of the observation or protected by an intervention tool in 96.8% of household observations (table 1). Community health workers only reported 87 observations where neither adult supervision nor an intervention was being used; in 41 (47%) of these observations, the child was being supervised by someone under the age of 16 years. In the education-only arm, there were 61 observations with the child unprotected, statistically significantly more than that observed in the playpen and door barrier arms.

Community health workers observed intervention tool use during 56.6% of observations in the playpen arm and only 18.7% of observations in the door barrier arm (p<0.01). Direct adult supervision was the most often observed protection in use in the door barrier arm (78.6%), while the playpen was most frequent in the playpen arm (56.6%). The door barrier group accounted for 49% of negative intervention comments and 86% of mechanical problems reported.

Simple and multiple logistic regression analyses demonstrate that intervention type, child age and observation number have a significant impact on intervention tool use. Households given the playpen had a 6.89 times greater odds (CI 5.43 to 8.75) of using the tool than households that received a door barrier, when controlling for child age (months), observation number and time of day. Increasing child age and observation number decreased the odds of using the intervention tool; an increase in age of 6 months results in 0.83 times lesser odds of using the intervention tool while each progressive observation causes 0.89 lesser odds of using the intervention tool. The time of day of the observation did not have a significant effect on use.

DISCUSSION

This pilot study revealed that when households in Bangladesh are provided with supervision tools, they use them; moreover, having a supervision tool is associated with a significantly lower proportion of observations where children are unprotected (through either supervision or proper use of the tool). Moreover, households seemed to prefer the playpen over the door barrier and were seven times more likely to use the playpen than the door barrier at the time of an observation. This study was not an effectiveness trial and did not include a control group; the households enrolled in the study were a convenience sample. However, the study indicates that the playpen, when introduced to households in Bangladesh through community-based interventions, has good uptake and the possibility of improving parental supervision practices. Effectiveness trials are needed to establish the impact of these tools on under-five drowning-specific mortality rates.

What is already known on this subject

Drowning is now the leading cause of death for children ages 1—4 years in Bangladesh, and preventing childhood drowning deaths will require intervention strategies specific to the hazards and risks in this area. However, there is a paucity of research into drowning interventions in low-income countries in general, and Bangladesh in particular.

What this study adds

This study indicates that the playpen, when introduced to households through community-based interventions, has good uptake and the possibility of improving parental supervision practices. This study also utilises random household observations by community health workers, an innovative strategy to empirically measure intervention acceptability and use.

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