

Original Research Article

Effectiveness of mobile short message service intervention to increase parental socio-demographic knowledge of drowning prevention in Bangladesh

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ABSTRACT

Background: Drowning is the third leading cause of death for children aged 0–4 years in many Asian countries, and is a serious but neglected health problem in low and middle-income countries (LMICs) like Bangladesh. In Bangladesh, drowning rates are 10 to 20 times more than those in other developed countries. The aim of this study is the efficiency of mobile SMS intervention for increasing parental socio-demographic knowledge of drowning prevention in Bangladesh.

Methods: A cluster randomized community trial with 788 parents of children aged under five in a rural community of Bangladesh. The intervention was the mobile short message service (SMS) for parents of children under five years concerning the prevention of drowning. The main outcome of this study was the differences in knowledge of parents with socio-demographic factors concerning the prevention of drowning between the baseline and immediate follow-up after the intervention, and after three months.

Results: There was a significant improvement in knowledge in the intervention group compared to the control group at different time points. There is a significant association with parental age, education, gender, and income and to improve childhood drowning prevention knowledge of parents to compare control group of parents.

Conclusions: Special programmes and training could be increase knowledge about childhood drowning prevention in Bangladesh and should be broadcast on the radio and television networks.

Keywords: Bangladesh, Knowledge of patents on drowning prevention, Socio-demographic factors, SMS intervention

INTRODUCTION

Drowning, which can be defined as mortality arising from injury of the respiratory function as a result of immersion in liquid, is the main reason of mortality globally. It has been predicted that, in 2000, 449,000 inhabitants drowned globally. It is the third highest cause of mortality in children aged under five years, and the top cause of mortality due to injury, with the mortality rates in male

children being almost twice as high as those in female children.¹ Bangladesh is a largely rural low-income country with most households located near bodies of water.² Children who live close to ponds, rivers, and lakes, and the poor in society constitute the highest number of victims. More than two-thirds of the country's waterholes are the main bathing place for 160 million people.³ In Bangladesh, drowning is the leading cause of mortality after infancy, 43% of drowning's occurring

between the ages under five years.⁴ Over the past five years, the number of drowning mortalities was 1926 children – the number of drowning mortalities was 361 (2012), 303 (2013), 502 (2014), 464 (2015) and 296 (2016).³ Every half an hour in Bangladesh a child drowns; this is 50 drowning mortalities a day and 18, 225 drowning mortalities per annum.⁵

According to a bulletin report by the World Health Organization, drowning is one of the most common causes of death among the 0 to 14 age group irrespective of gender.⁶ Drowning is the second major general reason for accidental injury death among people aged 0 to 19 years in the US and the European Union.⁷ A study on child mortality in the United Arab Emirates identified drowning as the second leading reason for mortality. It was found that the drowning mortality rate among children under 5 years old is the highest in China, followed by Sub-Saharan Africa.⁸ A small-scale study using Matlab found that the drowning rate among 1 to 4 year-old children in a rural community in Bangladesh is 200 for every 100,000 children per year.⁹ From studies of countries with high and low rates, it is likely that one-year-old children are at maximum risk of drowning, followed by those aged two with the rate decreasing rapidly as the children approach adulthood.¹⁰ The proportion of drowning cases is much lower for males and females among children aged five years old and over, while the gender dissimilarity is high being 9:1 for male: female, with extensive variance across countries.¹¹ The tentative reason for the gender dissimilarity is due to the distinct progress of the gender in terms of poor skills and social development, which also depends on other factors such as a variety of ecological situations including water disclosure.⁷ However, no data on the effects of such an approach on outcomes in resource limited setting are available to date. The results of the study will help the policy makers to understand the importance of this study. The aim of this study is the socio-demographic factors associated with drowning prevention of knowledge of patents in Bangladesh.

METHODS

It was a quantitative study to implement and evaluate an effectiveness mobile-based intervention of the knowledge of parents in respect of childhood drowning prevention. The cluster randomized population trial was performed from August 2015 to December 2015 for approximately 24 weeks. The villages (or clusters) were the unit of randomization, and one of the two arms was allocated to an equal number of villages. It included community trial and pre- and post-assessment through face-to-face interviews using a semi-structured questionnaire (Figure 1). The study population was parents with at least one child aged below five years old in Charghat and Bhayalakshmipur Union of Charghat Upazila, Rajshahi district of Bangladesh. A complete lists of birth registration was collected from the Charghat and Bhayalakshmipur Union administrative units from

January to March 2015. The sampling units were individual parents who had at least one child aged below five years old and were eligible according to the inclusion criteria for this study and sample size calculation which are more details the study protocol already published (Figure 1).¹²

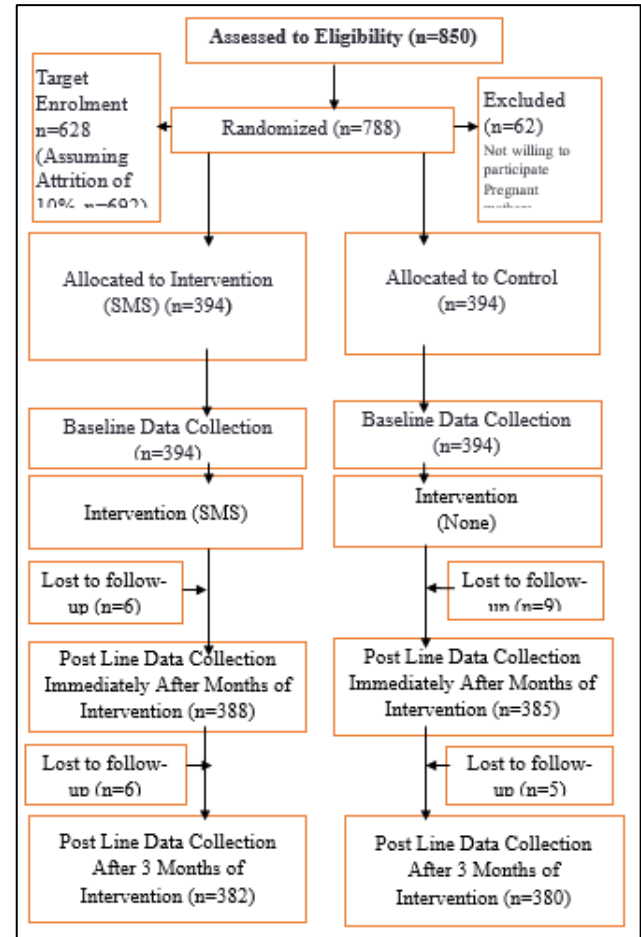


Figure 1: Consort flow chart of the study.

Sampling technique

One Upazila (rural sub-district) was selected at random from one district (13 Upazilas). Two unions (local administrative units) were randomly selected at each Upazila (6 unions). Five villages (approximately 2,000 populations) were randomly selected in each union (20 villages). They picked a total of 10 villages for the study. In the study all parents of children under the age of five were included in the villages. The research performed a cluster randomized controlled trial using the village as the randomization device to prevent spillover effects within the villages. The study used separate randomization lists for each group, due to the heterogeneity of participants in different disciplines (e.g. gender or educational level). In addition, following a computer-generated list using SPSS software, the randomly selected clusters were numerated and equally randomized into both arms. The village research assistants conducting the baseline evaluation

were blinded to the village group allocation. Additionally, community allocation was not released to study participants until their informed consent, username, mobile phone number, and baseline data were given. In addition, when assessing the outcome measures, the research assistants performing the face-to-face follow-up interviews were blinded.

Data collection

Each household received a special identification (ID) number which was placed on the upper front door of the house. Each participant in the household also received a unique personal three-digit ID number (village number/household number/personal number). Guidelines for the data collection were developed during the pilot study. Data collection was conducted in July 2015 (baseline), January 2016 (Post 1) and April 2016 (Post 2). Through household was given a special identification number (ID) that was put at the house's upper front door. Each household participant also received a special three-digit personal ID number (village number/household number/person number). During the pilot study, guidelines were created for the data collection. Data gathering was carried out in July 2015 (baseline), January 2016 (Post 1) and April 2016 (Post 2). All the selected parents were told by study research assistants about the intent and procedures of the trial. Upon reading through the contents of the information sheet of the respondent, all participants voluntarily agreed to participate in the study signed the informed consent document that they were given.

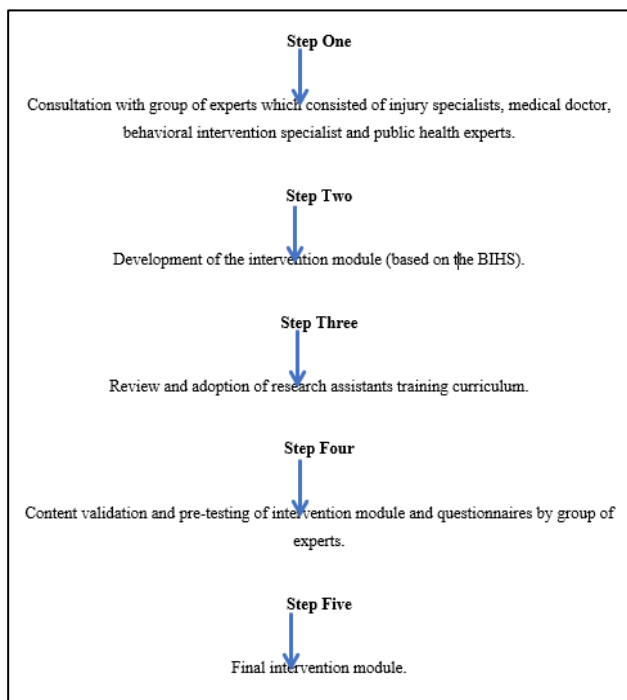


Figure 2: Schematic diagram of the development of the intervention module.

Development of the intervention module

Figure 2 shows a schematic diagram for the development of the intervention module used in this study. The module was developed through the process of consultations with a group of experts. These included one professor of statistics, one expert in behavioral intervention, one senior medical doctor and one injury specialist. The specific contents of the intervention module was developed based on Bangladesh Injury and Health Surveys which addresses attitude towards behavior, subjective norm and perceived behavioral control (Figure 2).¹³

Intervention

The mobile-based short message service (SMS) intervention is designed to increase parent's knowledge about childhood drowning prevention in Bangladesh. The Researcher developed the SMS based on FGDs and reviews of literature. It used informal language, and was sent on Friday weekly, which is a rest day. Everywhere in Bangladesh, cell phones and the Internet are common and popular with people, so the study aimed at determining whether they would be successful and improving parents' awareness, attitudes and practices on drowning prevention.

Dependent variables (knowledge) scores

The outcomes of the study were to determine the knowledge about childhood drowning, as well as to predict the factors of childhood drowning. To determine the knowledge pertaining to childhood drowning, ten questions about the knowledge of childhood drowning were provided. The question was answered YES or NO. A score of 1 was given for a correct answer and 0 for the wrong answer. The scores varied from 0-10 points and were classified into two levels, as follows: Bloom's cut off point, 60-80%. The items were all assessed using a zero-one indicator (dummy variables). These variables were given a value of zero (low knowledge less than 6 points) for 'No' (Bloom's cut off point less than 59%), and a value of one (high knowledge more than or equal to 6 points) for 'Yes' (Bloom's cut off point 60-80% or high).¹⁴

Data analysis

Factors with a statistically significant association with socio-demographic and childhood drowning prevention knowledge at the baseline, immediate post intervention and after 3 months follow up in the logistic model (p value of 0.05) controlling for other variables. To determine the significant difference between the intervention and the control groups, chi-square test was used.

RESULTS

The intervention and control group were compared on socio-demographic characteristics, baseline knowledge. The comparison was done to ensure that the randomization process in this study was able to generate two groups that were compared or comparison are summarized in Table 1.

Of the survey participants, in terms of the social-demographic characteristics, more than half (57.6%) of the children are aged 3 to less than 5 years for the intervention group; while for the control, 61.4% of the children are aged 3 to less than 5 years. There was no association with child's age between the intervention and control group at the baseline. The gender of the children was 51.0% male for the intervention group, and 58.6% male for the control group. There was no association with child's gender between the intervention and control group. Half (48.0%) of the parents were aged less than 30 years, and 42.6% of parents were aged 30 to 39 years for the intervention group and for the control group, half

(48.7%) of the parents were aged 30 to 39 years and 45.9% of parents were aged less than 30 years. There was no association with parent's age between the intervention and control group. Of the study participants, most (77.7%) parents were female for the intervention group, and 72.1% were female for the control group. There was no association with parent's gender between the intervention and control group. Most (42.6%) parents had completed primary education, and secondary and higher education (35.5%) for the intervention group; and the majority (46.4%) had completed secondary and higher education, and 35.8% had only completed primary education for the control group. There was no association with parent's education between the intervention and control group. The majority (62.4%) of parents had a household income of less than 7,000 BDT and 29.4% parents had a household income of 7,000 to 15,000 BDT for the intervention group; and for the control group, 58.9% of parents had a household income of less than 7,000 BDT and 31.5% parents had a household income of 7,000 to 15,000 BDT. There was no association with household income between the intervention and control group.

Table 1: Socio-demographic characteristics of the parents.

Socio-demographic factors	Intervention N (%)	Control N (%)	χ^2	P value
Child's age in years				
1-2 years	167 (42.4)	152 (38.6)	0.021	0.47
3-less than 5	227 (57.6)	242 (61.4)		
Gender of child's				
Male	201 (51.0)	231 (58.6)	4.611	0.13
Female	193 (49.0)	163 (41.4)		
Parents age in years				
Less than 30	189 (48.0)	181 (45.9)	6.365	0.14
30-39	168 (42.6)	192 (48.7)		
More than 40	37 (9.4)	21 (5.3)		
Gender of parents				
Male	88 (22.3)	110 (27.9)	3.265	0.28
Female	306 (77.7)	284 (72.1)		
Education of parents				
Illiterate	86 (21.8)	70 (17.8)	3.323	0.11
Primary	168 (42.6)	141 (35.8)		
Secondary and higher	140 (35.5)	183 (46.4)		
Household income (In Rs.)				
Less than 7000	246 (62.4)	232 (58.9)	1.191	0.55
7000-15000	116 (29.4)	124 (31.5)		
More than 15000	32 (8.1)	38 (9.6)		

*P significant <0.05

The results of association with knowledge of parents on drowning prevention and selected socio-demographic characteristics are presented in Tables 2. Table 2 reveals that for intervention group, there were significant associations among parent age, gender, educational status, family household income, time of day, time of season, distance of house from water bodies, place of drowning and daily activity of mothers with drowning prevention

knowledge after immediate post intervention and after 3-months of intervention. For control group, there were no significant associations among parent age, gender, educational status, family household income, time of day, time of season, distance of house from water bodies, place of drowning and daily activity of mothers with drowning prevention knowledge after immediate post intervention and after 3-months of intervention (Table 2).

Table 2: The results of chi-square (χ^2) test to drowning prevention knowledge among various socio-demographic variables.

Socio-demographic factors	Immediate post				3-months follow-up			
	Control		Intervention		Control		Intervention	
	χ^2 value	P value	χ^2 value	P value	χ^2 value	P value	χ^2 value	P value
Parent age in years	2.13	0.34	6.97	0.04	1.34	0.12	9.67	0.05
Gender of parent	0.15	0.69	10.2	0.01	2.98	0.33	16.9	0.02
Education of parent	2.63	0.26	7.66	0.02	5.12	0.71	14.6	0.01
Family Household income	3.37	0.16	9.10	0.02	2.67	0.45	6.90	0.23

Table 3: Socio-demographic factors associated with knowledge of parents on drowning prevention at the immediate post and 3-months follow-up between control and intervention group.

Socio-demographic factors	Immediate post				3-months follow-up			
	Control		Intervention		Control		Intervention	
	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
Parents age in years								
Less than 30	1		1		1		1	
30-39	1.17 (0.66-2.07)	0.58	0.92 (0.68-1.24)	0.61	1.13 (0.24-7.06)	0.87	0.63 (0.64-1.65)	0.33
More than 40	0.27 (0.03-2.17)	0.22	1.52 (0.85-2.72)	0.15	0.36 (0.02-1.02)	0.68	1.21 (0.80-2.22)	0.15
Gender of parents								
Male	1		1		1		1	
Female	1.05 (0.56-1.99)	0.86	1.42 (1.18-1.98)*	0.03	1.12 (0.81-1.98)	0.97	1.32 (0.88-1.94)*	0.05
Education of parents								
Illiterate	1		1		1		1	
Primary	2.01 (0.81-4.97)	0.13	1.94 (0.81-1.78)*	0.04	0.65 (0.18-10.6)	0.92	1.70 (0.76-1.57)*	0.04
Secondary and higher	1.81 (0.72-4.54)	0.21	1.43 (0.44-1.73)*	0.03	0.26 (0.32-6.05)	0.43	1.48 (0.48-1.83)*	0.03
Household income (in Rs.)								
Less than 7000	1		1		1		1	
7000-15000	1.73 (0.94-3.15)	0.07	1.71 (0.37-1.38)	0.35	2.22 (0.61-7.8)	0.45	1.38 (0.72-1.52)	0.82
More than 15000	0.88 (0.21-3.77)	0.86	1.23 (0.76-2.19)	0.47	0.85 (0.42-2.02)	0.97	1.23 (0.66-1.95)	0.68

*p significant <0.05

In the context of socio-demographic factors, there was no association with parent's age and drowning prevention knowledge at immediate post and 3-months follow-up intervention between control and intervention group in the Table 3. In multivariate analysis, there was no association with gender and drowning prevention knowledge at immediate post intervention and 3-months follow-up intervention for control group. For intervention group, there was a significant association with parents' gender, and drowning prevention knowledge of parents at the immediate post-intervention and 3-months follow-up intervention. The male respondents had 1.42 (OR=1.42, 95%CI=1.18-1.98, p value=0.03) times more drowning prevention knowledge compared to the female respondents after immediate post intervention. The male respondents had 1.32 (OR=1.32, 95%CI=0.88-1.94, p

value =0.05) times more drowning prevention knowledge compared to the female respondents after 3-months follow-up intervention.

There was no association with parent's education, and drowning prevention knowledge at immediate post intervention and after 3-months of intervention for control group. The regression co-efficient for parents who had completed primary, and secondary and higher education was 1.94 (OR=1.94, 95%CI=0.81-1.78, p value=0.04), 1.43 (OR=1.43, 95%CI=0.44-1.73, p value=0.03) times greater drowning for prevention knowledge than parents who had no education after immediate post intervention. For intervention group, there was a significant association with parents' gender and education, and drowning prevention knowledge of parents at the 3-month

follow-up. The regression co-efficient for parents who had completed primary, and secondary and higher education was 1.70 (OR=1.70, 95%CI=0.76-1.57, p value =0.04), 1.48 (OR=1.48, 95%CI=0.48-1.83, p value =0.04) times greater drowning prevention knowledge than parents who had no education after 3-months of intervention. There was no association with gender and drowning prevention knowledge at immediate post intervention and 3-months follow-up intervention between control and intervention group.

DISCUSSION

The current study showed that there were significant associations with parent's age and drowning prevention knowledge of parents after intervention. The parents aged 30-39 years had poor knowledge on drowning prevention compared to those parents aged less than 30 years. This is similar to the finding of a study among parents concerning home related injuries conducted by Akturk and Erci in Turkey in which was found that there was a significant relationship between maternal age and home accidental prevention knowledge with higher age by lower attitude ($p=0.04$).¹⁵ In a study by Barss et al. it was suggested that the home accidental prevention knowledge in a child was increased by advancing parental age.¹⁶ On contrary to our study, there are studies which found no effect of parental age on home accidental knowledge in child.¹⁷ Another study revealed that older mothers statistically had a lower level of knowledge of domestic accident prevention than younger mothers.¹⁸ For parents' education, those parents who had completed primary, secondary and higher education had higher drowning prevention knowledge compared to those parents who had no education after interventions, which is similar to the findings of a study conducted by Lafta et al.¹⁸ in Iraq, which indicated that there was a significant association with education and the level of knowledge in preventing domestic accidents. Higher educated mothers were statistically associated with a high level of knowledge in preventing domestic accidents involving children.

The findings of a study conducted by Akturk and Erci in Turkey, which indicated that there was a significant relationship between education level of a mother and home accidental prevention knowledge in child with decreasing incidence by increasing education level.¹⁵ Similar results were found in some studies in the literature.^{31,32} However, there are studies reporting no significant effect of parental education level on home accidents prevention knowledge in child.^{33,34} There was a significant correlation between the knowledge assessment on child's injuries and the educational attainment. The higher level of education they had, the better they considered their knowledge (Chi-square=18.59; $p=0.02$). In addition, those who had previously accomplished first aid training had a positive impact on the results (Chi-square =18.15; $p<0.05$).³⁵

This study also investigated the factors affecting the knowledge of parents with education on child's drowning. The attitude of mothers towards first aid was investigated in respect of child injuries. It was found that most, 77%, mothers who were highly educated believe that mothers with young children should know about first aid. Regarding training to offer correct first aid, there was a significant difference between low, moderate and well-educated mothers ($p=0.03$). Most of the well-educated mothers (89.4%) were willing to undergo a course on first aid, compared to 79.5% of moderate and 48.9% of low educated mothers, which is similar to the finding of this study.³⁶

Similar results were obtained by another researcher, Thein et al. who reported that mother's educational background clearly indicate the adequate knowledge and practice on prevention of childhood injury.³⁷ Hence, among mother with similar educational background have the similar types of knowledge and awareness. A mother with secondary education was one and half times more possibly (rate ratio 1.5) have the correct knowledge compared to a mother with primary or no education.

A mother with tertiary education was 1.7 times (rate ratio 1.7) more likely to have the accurate knowledge than a mother with primary or no education. A mother with secondary education was 1.9 times more likely to have the accurate practice about first aid management and injury prevention and a mother with tertiary education was 3 times more likely to possess the accurate practice associated to a mother with primary or no education.³⁷ Lack of mothers educational as well as leaving infants alone, children lower than 5 years age, especially males, are the factors that represent the highest risk from drowning; this is consistent with other studies.³⁸ The low educated parents do not have time to pay additional attention to the broadcasting media rather than horticultural activity. There is a need to educate Bangladeshi parents and encourage behaviors changes on supervisions.

A study conducted by Rahman et al. in Bangladesh, which indicated that there was a significant association with household income and childhood drowning prevention knowledge.¹⁹ Another study conducted by Akturk and Erci in Turkey, which identified that, there was a significant relationship between income level and home accidental knowledge and practice in children ($p=0.01$) with lower incidence by increasing income.¹⁵ The children of families who had a lower-income had a (OR=1.4) higher knowledge of drowning compared with high-income families. The increasing the risks of drowning among the lower income community, it's because those people are mostly involved in outdoor activities such as farming, fishing, and many other activities to earn enough money for their life expenses and family requirements. Additionally, the birth of the poor community is high due to the lack of health information and financial supports in the family.¹³

Illiteracy in the mother is a possible marker for traditional roles, rather than a factor in itself. These mothers lack education, not intelligence, and when given facts regarding risks for their very young child, they can use that for the benefit of their child. The low-income parents could not pay more attention to the mass media due to their heavy involvement in agricultural activity. Furthermore, the lack of right education and qualifications among the poor community have hampered them from obtaining a good and permanent jobs in order to safeguard their living expenses, these collections reasons have obligated the poor parents to leave their children's at home rather than sending them into profit day care center and thus, prevent child's from the death caused by drowning.

CONCLUSION

The knowledge about childhood drowning prevention in Bangladesh has been a topic of interest in child's injuries research because of its apparent direct relationship with the lack of child's health facilities, and, indirectly, with society. Male parents, parents more than 30 years old, illiterate parents, and parents from low income family had lower knowledge about drowning prevention compare to other counterparts. Parental education is also a vital factor for knowledge about childhood drowning prevention. This could be because parents in urban areas have access to better facilities than parents in rural areas, which is essential for increasing knowledge, attitude, and practice about childhood drowning prevention. The parents from the low household income family had lower knowledge about childhood drowning prevention than parents from the high income family and have more knowledge of childhood drowning prevention. It is essential to provide more educational programmes for the parents from low income family to increase their knowledge, attitude, and practice about childhood drowning prevention. More ever, the social media such as radio and TV play an important role in increasing the knowledge about childhood drowning prevention as well as child's injuries. Hence, special programmes and training could be increase knowledge about childhood drowning prevention in Bangladesh and should be broadcast on the radio and television networks.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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