Original Article

Knowledge and Practice on Management of Drowning in a Rural Community of Bangladesh

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Abstract

Background: *Drowning is a significant public health issue in Bangladesh. The World Health Organization (WHO) reports that drowning is one of the leading causes of death among children aged 1 to 4 in Bangladesh. Contributing factors include a lack of swimming skills, inadequate supervision, and the proximity of residences to open water sources.*

Objective: *This study was designed to assess the knowledge and practice on management of drowning in rural community.*

Materials and methods: *This descriptive cross-sectional study was conducted in Jamtoyel, Ajugora and Subornosara in Belkuchi upazila under Sirajganj District from January to December 2019. Convenience sampling was adopted to select 350 respondents. Data were collected through face-to-face interview with a semi-structured questionnaire. Collected data were checked, cleaned, entered into computer and analyzed using SPSS version 23.*

Results: *Among the respondents, 76.3% were male, 39.7% were businessmen, and 21.1% were housewives. About 80% had some form of education. Most (96.3%) of the respondents were Muslims, and mean monthly income was Taka 14,785.7 taka with SD ±7816.2. Majority (74.0%) had poor knowledge, 23.1% had average knowledge, and only 2.9% had good knowledge regarding the management of drowning. About practice of managing drowning victims, it was observed that all of the them who participated in management had poor practice, with none demonstrating average or good practice.*

Conclusion: *Efforts to mitigate this crisis include community education programs, swimming lessons, and the construction of barriers around hazardous water bodies, but much work remains to effectively address and reduce drowning rates in the country.*

Key words: *Drowning, Bangladesh, Rural Community, Sirajganj District*

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Introduction

Drowning is the third leading cause of unintentional injury death worldwide. Children, males and individuals with increased access to water are most at risk of drowning. In 2019, an estimated 236,000 people died from drowning, making drowning a major public health problem worldwide. In 2019, injuries accounted for almost 8% of total global mortality. Drowning is an important cause of unintentional injury death, accounting for 7% of all injury-related deaths.[1] It is defined as a process of experiencing respiratory impairment from submersion/immersion in a liquid medium. To delineate the incident's outcome, this is further divided into descriptive terms such as death, morbidity, and no morbidity. Wet drowning, dry drowning, and near-drowning are no longer accepted terms, although they may still be used when discussing drowning.[2,3]

Over one-quarter of deaths among 1–4 year-olds in Bangladesh were due to drowning in 2003, and the proportion increased to 42% in 2011. A household survey was carried out in 51 union parishads of rural Bangladesh between June and November 2013, covering 1.17 million individuals. Information on fatal and nonfatal drowning events was collected by face-to-face interviews using a structured questionnaire. Fatal and non-fatal drowning rates were 15.8/100,000/year and 318.4/100,000/6

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months, respectively, for all age groups. The highest rates of fatal (121.5/100,000/year) and non-fatal (3057.7/100,000/6 months) drowning were observed among children 1 to 4 years of age. These children had higher rates of fatal (13 times) and non-fatal drowning (16 times) compared with infants. Males had slightly higher rates of both fatal and non-fatal drowning. Individuals with no education had 3 times higher rates of non-fatal drowning compared with those with high school or higher education. Non-fatal drowning rates increased significantly with decrease in socio-economic status (SES) quintiles, from the highest to the lowest. Drowning is a major public health issue in Bangladesh, and is now a major threat to child survival.[4]

According to the Health and Injury Survey (BHIS) survey conducted in 2016, every year at least 14,438 children (0-17 years) die from drowning. This translates to 43 child deaths from drowning per day. For young children, all water receptacles (be it a bucket, bathtub, pond, or pool) could cause them to drown. A 2022 study by Hossain et al suggested that, in Bangladesh, around 80 percent of drowning deaths occur due to exposure to ponds, channels, buckets, and ditches within 20 meters of a victim's home. Six major reasons behind drowning deaths, according to WHO, are 1) lack of physical barriers between people and water; 2) lack of (or inadequate) supervision of young children; 3) uncovered or unprotected water supplies and lack of safe water crossings; 4) lack of water safety awareness and risky behavior around water, such as swimming alone; 5) travelling on water, especially on overcrowded or poorly maintained vessels; and 6) flood disasters.[5]

Drowning is one of the leading causes of death in Bangladesh and claims the lives of approximately 50 children per day. Rates of drowning are higher in rural populations, most likely due to high number of water sources in rural areas compared to urban areas. Survival after drowning depends on a well-functioning chain of survival, starting outside the hospital and continuing in-hospital during post-resuscitation phase. Pre hospital care personnel provide the opportunity to perform rapid rescue from submersion events. Re-establishing ventilation of drowning victim before cardiac arrest nearly assures no long-term neurological consequence. In rural people, traditional first aid and resuscitation responses to drowning are very poor. However, the common practices on management of drowning in the community is not well documented in Bangladesh. This study was designed to assess the knowledge and practice on management of drowning in rural community.

Materials and Methods

This descriptive cross-sectional study was conducted among rural people of Jamtoyel Ajugora & Subornosara villages of Belkuchi upazila under SirajganjDistrict. The study was conducted from January to December 2019. A total of 350 villagers were included in the study. Convenience sampling technique was adopted. Data were collected through face-to-face interview using a semi-structured questionnaire. Proper pretest was done prior to the data collection. Collected data were checked, edited and entered in computer. Data analyses were done with SPSS version 23. Ethical clearance was obtained from IRB of NIPSOM.

There were twenty questions related to knowledge on management of drowning. Each correct answer received one (1) score and incorrect answer received zero (0). The respondents were categorized having good knowledge (score 13–20), average knowledge (7–12) and poor knowledge (score 0–6). Again, there were 9 practice related questions. The practice was also categorized into poor (0–3), adequate (4–6), and good practice (7–9).

Results

Among the total 350 respondents, majority [131 (37.4%)] were in the age group 30-40 years, 110 (31.4%) were in 20-30 yrs. age group, 70 (20.0%) had age 40-50. Mean age was 36.7 with standard deviation ±10.13 years (Table I).

Table I: Distribution of the respondents by age

Age (years)	Frequency	Percentage
20 -30	110	31.4
30 -40	131	37.4
40 -50	70	20.0
50 -60	35	10.0
>60	4	1.1
Total	**350**	**100.0**

Figure 1 opines that among the respondents 267 (76.3%) were male and the rest 83 (24.7%) were female.

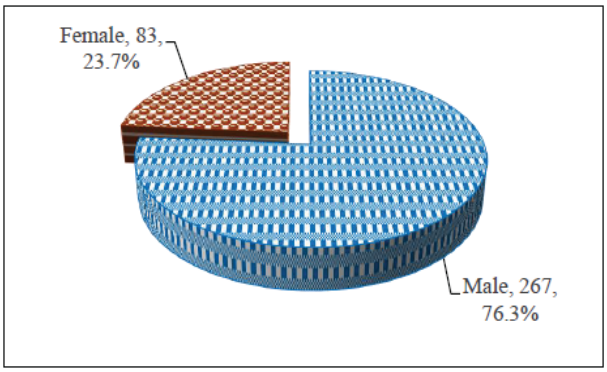

Figure 1: Distribution of the respondents by gender

Majority [139 (39.7%)] of the respondents were businessmen. About one fifth [74 (21.1%)] were housewives, 39 (11.1%) were day laborers, 36 (10.3%) were students, 35 (10.0%) were farmers and 27 (7.7%) were service holders (Figure 2).

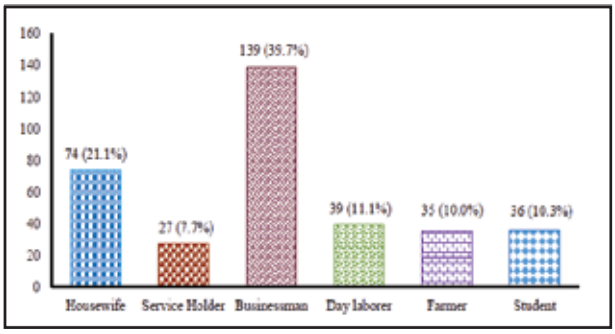

Figure 2: Distribution of the respondents by occupation

Among the respondents 79 (22.6%) could sign only, 66 (18.9%) passed JSC, 56 (16.0%) had primary education, 46 (13.1%) passed HSC exam, 39 (11.1%) passed SSC, 32 (9.1%) were graduates and another 32 (9.1%) were illiterates (Table II).

Table II: Distribution of the respondents by education

Education	Frequency	Percentage
Illiterate	32	9.1
Can sign only	79	22.6
Primary	56	16.0
J.S.C	66	18.9
S.S.C	39	11.1
H.S.C	46	13.1
Graduate	32	9.1
Total	**350**	**100.0**

Among the total 350 respondent, 155 (44.3%) had their monthly income <10,000 taka, 144 had monthly income 10,000-20,000 taka and 45 (12.9%) had monthly income 20,000-30,000 taka. Mean monthly income was 14785.7 taka with standard deviation ±7816.2 taka (Table III).

Table III: Distribution of the respondents by monthly income

Monthly income (Taka)	Frequency	Percentage
<10,000	155	44.3
10,000-20,000	144	41.1
20,000-30,000	45	12.9
30,000-40,000	3	0.9
40,000-50,000	3	0.9
Total	**350**	**100.0**

Regarding religion it was seen that, most [337 (96.3%)] of the respondents were Muslims and 13 (3.7%) were Hindus (Figure 3)

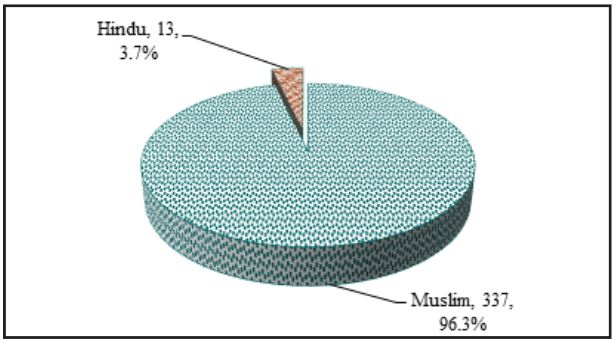

Figure 3: Distribution of the respondents by religion

Knowledge about the first response to drowning

Among the total 350 respondents 217 (62.0%) had theknowledge about seeking for help by calling or shouting to seek help in rescuing a drowning person. About one third [120 (34.3%)] of the respondents had the knowledge of throwing a flotation device or giving an extension to save the drowning person (Table IV).

Table IV: Respondents' knowledge about seeking for help by calling, shouting and throwing a flotation device (n=350)

Variables	Had knowledge	Did not have knowledge
Shouting or calling for help	217 (62.0%)	133 (38.0%)
Throwing a floating device or giving an extension	120 (34.3%)	230 (65.7%)

Respondents were asked about the first response for drowning victim. More than a half [239 (68.3%)] mentioned of 'application of pressure on the belly to take out water', 110 (31.4%) said of immediate referral to hospital, 94 (26.9%) mentioned 'spinning the body to take out water' and 38 (10.9%) mentioned 'chest compression and mouth to mouth breathing'. There were multiple responses (Table V).

Table V: Respondents' knowledge about the first response for drowning victim(n=350)

Variables	Frequency	Percent
Pressure to be applied on the belly to take out water	239	68.3
Immediate Referral to hospital	110	31.4
Spinning the body to take out water	94	26.9
Chest compression and mouth to mouth breathing	38	10.9

About resuscitation of unconscious drowning victim chest 'compression and mouth to mouth breathing' was mentioned by 10 (3.1%) respondents, 86 (24.6%) mentioned only 'mouth to mouth breathing, and 4 (1.1%) mentioned of 'chest compression' (Table VI).

Table VI: Respondents' knowledge about the process of resuscitation if drowning victim is unconscious (n=350)

Knowledge about the process of resuscitation	Frequency	Percent
Mouth - to - mouth breathing	86	24.6
Chest compression and mouth to mouth breathing	10	3.1
Chest compression	4	1.1

'Pneumonia' was said as complication of drowning by 53 (15.6%) respondents, 43 (12.3%) mentioned 'respiratory distress' and 59 (17.0%) respondents mentioned 'hypothermia' (Table VII).

Table VII: Respondents' knowledge according about complication of drowning (n=350)

Complication of drowning	Frequency	Percent
Pneumonia	53	15.6
Acute respiratory distress syndrome	43	12.3
Brain damage	2	0.6
Chemical and fluid imbalance in the body	1	0.3
Hypothermia	59	17.0

Regarding manage low body temperature of the victim, 103 (29.4%) mentioned of 'covering the body with salt', 42 (12.0%) mentioned 'wrapping with warm blanket', 4 (1.1%) said 'covering the body by ash' and 43 (12.3%) mentioned 'urgent removal of wet clothes' (Table VIII).

Table VIII: Respondents' knowledge to manage low body temperature of the victims(n=350)

Measures to manage victim's low body temperature	Frequency	Percent
Covering the body with salt	103	29.4
Wrapping with a warm blanket	42	12.0
Covering the body with ash	4	1.1
Urgent removal of wet clothes	43	12.3

Figure 4 reveals respondents' knowledge on management of drowning. Out of the total 350 respondents, majority [259 (74.0%)] had poor knowledge, 81 (23.1%) had average knowledge and only 10 (2.9%) had good knowledge on management of drowning.

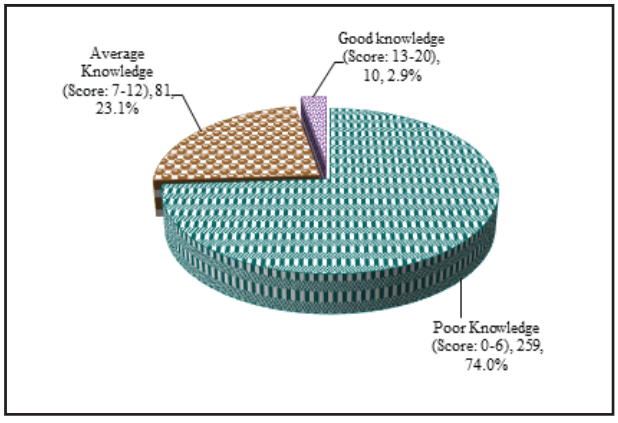

Figure 4: Distribution of the respondents by level of knowledge on management of drowning (n=350)

Practice on drowning management

Among the 350 respondents, 297 (84.9%) saw drowning victim. In the case with management of drowning victim, 110 (31.4%) undertook measure (Table IX).

Table IX: Distribution of the respondents by practice on management of drowning victim (n=350)

Variables	Frequency	Percent
Respondents ever seen drowning victim	297	84.9
Immediate management given to drowning victim	110	31.4

Table X opines management given to the drowning victim by the respondents. Majority [87 (79.1%)] applied pressure on the belly of the victim to take out water, 49 (44.5%) mentioned spinning the victimon head22 (20.0%) covered the body with salt, 18 (16.4%) did oil massage and 17 (15.5%) did mouth to mouth breathing.

Table X: Distribution of the respondents according to management given to drowning victim by them (n=110)

Management given to the drowning victim by the respondents	Frequency	Percent
Applying pressure on the belly to take out water	87	79.1
Chest compression	1	0.9
Mouth to mouth breathing	17	15.5
Oil massage	18	16.4
Spinning the victimon head	49	44.5
Chest compression and mouth to mouth breathing	1	0.9
Covered the body with salt	22	20.0

Regarding level of practice of management of drowning victims, it was seen that among 110 respondents who took part in the management, all (100.0%) had poor practice (score 0–3). None were having average practice (score 4–6) nor good practice (score 7–9).

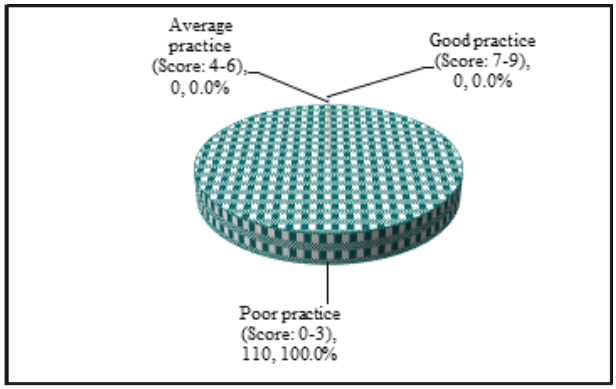

Figure 5: Distribution of the respondents by practice on management of drowning (n=110)

Discussion

Majority (76.3%) of the respondents were male and the rest 24.7% were female. This is not consistent with the Bangladesh population sex ratio. In Bangladesh the percentage of the male population is 49.5%, compared to 50.5% of the female. This inconsistency may be due to the fact that in this study convenient sampling was done.[6]

Among the respondents 9.1% were illiterates. That means 91.9% of the respondents have some sort of literacy. Literacy rate, adult total (% of people ages 15 and above) in Bangladesh was reported at 73.91% in 2018 according to the World Bank collection of development indicators, compiled from officially recognized sources.[7] Among the total 350 respondent, 44.3% had their monthly income <10,000 taka, 41.1% had monthly income 10,000-20,000 taka and 12.9% had monthly income 20,000-30,000 taka. Mean monthly income was 14785.7 taka with standard deviation ±7816.2 taka. It is similar as shown in the data as per 'Bangladesh Household Income and Expenditure Survey: Household Income per Month' which shows 8,795.0 BDT.[8] Most (96.3%) of the respondents were Muslims. In Bangladesh 91.04 percent of population follow Islam, Hinduism is followed by 7.95 percent of the population as second-largest religion,[9] Finding of the study is consistent with the national data. For many, the first response is to jump in the water to save the person in distress. But experts warn against that, saying it's safer to throw a lifesaving device, towel, rope or even a pool noodle to the person in the water, wait until the person grabs hold and then tow the person to safety.[10] In this study regarding first response on drowning 62.0% mentioned of seeking for help by calling or shouting to seek help in rescuing a drowning person and 34.3% mentioned of throwing a flotation device or giving an extension to save the drowning person.

In this survey conducted on responses to drowning victims, it was found that 68.3% of participants mentioned the application of pressure on the belly to expel water, while 31.4% recommended immediate referral to a hospital. Additionally, 26.9% suggested spinning the body to remove water, and 10.9% mentioned performing chest compressions and mouth-to-mouth breathing. Performing CPR with rescue breaths on a drowning victim is crucial for maintaining blood flow and oxygenation to

the brain. During a hypoxic event such as drowning, oxygen supply to the brain is compromised, leading to respiratory and cardiac arrest. According to the Health & Safety Institute, room air typically contains about 21% oxygen, whereas respired air contains approximately 16-17% oxygen, which is adequate to support life in a critical emergency. Integrating rescue breaths with chest compressions can elevate the oxygen level in the victim's blood, effectively mimicking respiration with a life-sustaining oxygen supply and consequently safeguarding vital organs. Drowning CPR stands as a pivotal element of emergency preparedness, serving as a vital safeguard that, if administered correctly, has the potential to save lives.[11]

'Pneumonia' was said as complication of drowning by 15.6% respondents, 12.3% mentioned 'respiratory distress' and 17.0% respondents mentioned 'hypothermia'. Sometimes, a person might emerge from a non-fatal drowning incident without facing any major health issues. However, in other instances, non-fatal drowning can have a profound effect on a person's long-term health and overall quality of life. This can lead to damage to the brain or other organs, with consequences ranging from mild to severe. Such damage is referred to as hypoxic brain injury, which occurs when the brain is deprived of adequate oxygen.[12]

Regarding manage low body temperature of the victim, 29.4% mentioned of 'covering the body with salt', 12.0% mentioned 'wrapping with warm blanket', 1.1% said 'covering the body by ash' and 12.3% mentioned 'urgent removal of wet clothes'. For a hypothermic patient who is conscious, it is advisable to remove wet clothing and begin passive or active external warming. This can be done by using warm blankets, specially designed heated garments, heating pads, radiant heaters, or forced warm air.[13]

Out of the total 350 respondents, majority 74.0% had poor knowledge, 23.1% had average knowledge and only 2.9% had good knowledge on management of drowning. Regarding level of practice of management of drowning victims, it was seen that among 110 respondents who took part in the management, all (100.0%) had poor practice. None of the individuals demonstrated average or good practices regarding drowning prevention and rescue. This may be attributed to the lack of information available to the community about drowning prevention and its consequences. Additionally, rescues are often carried out using traditional methods, which are rarely scientifically sound. To gain a comprehensive understanding of how people perceive the causes and prevention of childhood drowning in rural Bangladesh, a qualitative study employing focus group discussions (FGDs) was conducted. This study took place in a rural Bangladeshi community and included FGDs with mothers of children under five, adolescent boys and girls, fathers, and local leaders. Each group participated in a single FGD session. The respondents identified children aged 5-10 years as being particularly at risk of drowning. They frequently mentioned ponds, ditches, and canals as common drowning sites, with most incidents reported to occur around noon. To prevent childhood drowning, participants recommended constant supervision of children, filling unwanted ditches, fencing ponds, and increasing community awareness through local leaders. They also suggested that the government should organize campaigns to prevent childhood drowning, promote swimming lessons for children, and encourage communities to fence ponds. Although people are generally aware of the causes and prevention measures for childhood drowning, they often do not take preventive actions. This is because they do not see it as a critical child survival issue and lack clear action points to change their behavior.[14]

Conclusion

The aim of the study was to assess the level of knowledge and practices related to the management of drowning in a rural community. The findings indicate that most respondents have limited knowledge about immediate response efforts following a drowning incident. Villagers often apply incorrect practices in managing drowning situations, reflecting their poor understanding of proper procedures.The government should implement regular drowning prevention and management training programs to increase awareness about saving drowning victims and providing basic management. Drowning is evidently a neglected public health issue in Bangladesh, particularly affecting children. A national effort is needed to establish a comprehensive drowning management program for all ages to reduce the overall drowning mortality rate in Bangladesh.

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