Awareness and Preparatory Measures to Tackle the Natural Calamities by the Island Dwellers of Sandwip in Bangladesh

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ABSTRACT

Background: *In recent years, large-scale natural disasters have frequently occurred in various parts of the world including Bangladesh due to its geographical location and the associated losses have increased. In order to avoid risks and damage, to strengthen resilience to natural disasters, national and local governments and local community need to be prepared. The purpose of the study is to identify consciousness and preparation for frequently occuring natural calamities by the island dwellers in Sandwip.*

Materials and methods: *This was a descriptive type of cross-sectional study performed in the island of Sandwip of Chattogram for a period of 12 (Twelve) months. Sample size was 300 and sampling technique was convenient type of non-probability sampling. Data were collected by face to face interview with pretested questionnaire containing both structured and unstructured questions.*

Results: *The mean ages of the respondents were 49.57 years. 51.3% were illiterate, most of them i.e., 49.2% were from lower class. Regarding occupation, 42.8% were housewife, 24.4% farmer and 7.7% fisher man. Maximum i.e 46.7% respondents were informed about natural calamities from television, majority 70% had not got trained, and only 30% got training from different institution. To remain safe from natural calamities, maximum carefully select the site for residence i.e 52.3% and 44.7% select a safe place to stay during an emergency. 36.7% respondents follow the official weather forecast and warning regularly for evacuation. About 92% had no insurance coverage for their household or business. According to the level of preparedness score, 54% had no preparation, 41.7% were partially prepared and 4.3% had complete preparation to tackle the natural calamities. According to the level of awareness score, only 35.3% were aware about their situation regarding preparedness.*

Conclusion: *Whilst natural disasters cannot be prevented, working together by Public Private Partnership (PPP) utilizing the result and engaging skills to fight against any disaster, attempt can be taken to minimize the effect of disasters, which will ultimately provide the safety and security to the people of Sandwip and costal areas of Bangladesh.*

Key words: Awareness; Natural calamities; Preparatory measures.

Introduction

According to WHO, a natural disaster is an act of nature of such magnitude as to create a catastrophic situation in which the day to day pattern of life are suddenly disrupted and people are plunged into helplessness, suffering and as a result the need for food, clothing, shelter, medical and nursing care and other necessities of life and protection against unfavorable environmental factors and conditions.[1]

According to EM-DAT from the period between 1994 to 2013, 6,873 natural disasters were recorded worldwide and snatched an estimated 68,000 lives on average each year.[2] Since 1970, natural disasters in Asia and the Pacific have killed two million people– contributing 57 per cent of the global death toll.[3] Between 2013 and 2015, for example, globally natural disasters displaced 60.4 million people, of whom 52.7 million were in Asia and the Pacific.[4] Asia pacific disaster report 2015 (UN-ESCAP) has shown Bangladesh is one of the most vulnerable among 15 countries, 10th in terms of high exposure and 5th in terms of risk.[5]

Bangladesh is one of the most disaster prone country. Major disasters that occur in Bangladesh are: tropical cyclone, tidal bore, flood, tornado, river bank erosion,

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earthquake etc.[6] The geographical location, land characteristics, multiplicity of rivers and the monsoon climate render Bangladesh highly vulnerable to natural hazards.

Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. That is, to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations and respond to and effectively cope with their consequences.[7] This requires contributions in various areas, from training and logistics to health care, recovery, livelihoods, and institutional development. In response to the frequent natural disasters, short- intermediate- and long-term prevention and mitigation plans have been formulated in Bangladesh. Implementation of these plans often faces insurmountable challenges because of adverse socio- political settings.

Sandwip is an island along the south-eastern coast of Bangladesh in the Chattogram district that experiences different level of natural calamities every year. Among them most catastrophic was in the year 1825, 1876, 1985 and 1991. For this reason this study was performed in this area. This study is designed to identify consciousness and preparation for frequently occurring natural calamities by the island dwellers in Sandwip, Chattogram, the approximate coastal/regional condition in this regard can be observed approximately.

Materials and methods
The study was a descriptive type of cross-sectional study to assess the awareness and preparatory measures of swandip island dwellers to tackle the natural calamities. From January to December 2019, data were collected by face to face interview through a structured and unstructured questionnaire on 300 inhabitants of Sandwip Island, Chattogram, Bangladesh. Estimated sample size for the study is: 384.Considering time constraints and other limitations, sample size was taken as 300. Results on continuous measurements are presented on mean ±SD and categorical data presented in number and pie chart. Chi-squared test were used to analyze and p value <0.05 was taken as significant. Data analysis was done with SPSS version 25.

Results
Among 300 respondents, most of the study population (33%) was in 48-57 years of age group. The mean age of the respondents was 49.57± 17.57 years (Range: 18-80 years). Pie chart shows the gender distribution of the study people.It depicts that; male to female ratio was about 1:1. Bar diagram shows, out of 300 respondents, 128 (42.8%) were housewife, 73 (24.4%) were farmer and 23 (7.7%) were fisher man. There were Islam

predominance in the study, 277 (92.3%) of them were married, 154 (51.3%) were illiterate, majority (53%) of them were from nuclear family, most of them (49.2%) were from lower class. Figure 1 shows that, 76.4% of the respondents mentioned about cyclone in their experience. Loss of lives during natural calamities mentioned by 21.3%, 65.6% of them had lost at least one life, 61.3% had lost their properties like house (74.5%), crops (35.3%), shop, money, pet animals (22.3%) etc. Maximum 140 (46.7%) of them were informed about calamities from television and internet (0.3%) newspaper (0.7%) plays minimum role in alert system (Table III).

Table IV reveals, majority of the respondents 217 (72.3%) gone to shelter during disaster as school, mosque, government shelter etc. 79(26.4%) of the respondents stay at home during disaster. About 159 (53%) of the respondents out of 300 prefer to take shelter at schools, 102 respondents take shelter at government departments during the natural calamities. Majority 210 (70%) of them had not get training, only 90(30%) get training from different institution. Only 124 acquainted with the health programmes arranged by Govt./NGO working in their area.About 92% had no insurance coverage for their household or business after any disaster events. Figure 2 shows that 194(64.67%) of the respondents unaware about disaster preparedness and only 106(35.3%) respondents aware to tackle the natural calamities according to score.

For keeping safe from natural disaster maximum, 157(52.3%) people carefully select their site for residence and 134(44.7%) provide a safe place to stay during an emergency. Majority of the people 110(36.7%) follow the official weather forecast and warning system regularly. 99(33%) people stock food with safe drinking water for emergency situation (Table V). Figure 3 shows that 162(54%) had no preparation to tackle the natural calamities and 125(41.7%) had partial preparation only, 13(4.3%) had complete preparation according to obtained score. Table VI shows relationship between educational status and socio- economic status with insurance coverage. It shows that the difference is significant between educational backgrounds to insurance coverage. Those who were literate had more consciousness about insurance than illiterate (χ^2 =19.27, p <0.001). Socio-Economic Status has also remarkable influence in insurance systems acceptance (χ^2 =46.192, p <0.001)

Table I Socio-demographic characteristics of the respondents (n=300)

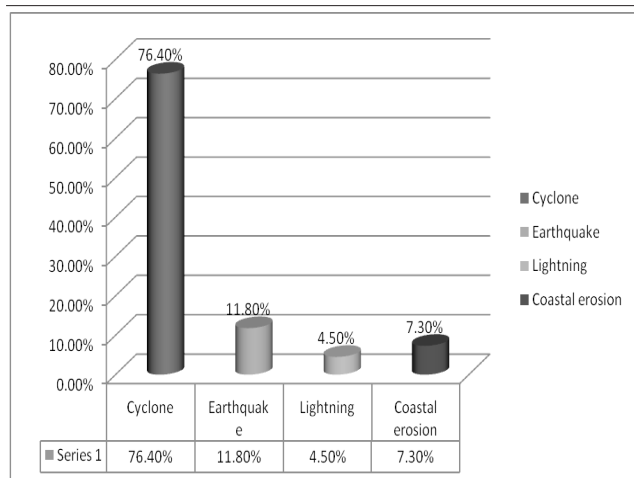| Variables	Frequency	Percentage (%)
Age (Years)		
18-27	51	17.00
28-37	29	9.67
38-47	64	21.33
48-57	99	33.00
>58	57	19.00
Mean ± SD	49.57 ± 17.566years	
Range	18-80 years	
Gender		
Male	152	50.67
Female	148	49.33
Occupation		
Housewife	128	42.7
Farmer	73	24.3
Fisherman	23	4.33
Small traders	22	7.7
Others	48	160
Educational status		
Illiterate	154	51.3
Primary/Equivalent	116	38.7
SSC/Equivalent	22	7.3
HSC/Equivalent	5	1.7
Graduate/Above	3	1.0
SES		
Lower class	147	49.0
Lower middle class	85	28.3
Upper middle class	63	21.0
Upper class	05	1.7

Figure 1 Types of natural calamities experienced by respondents

Table II Loses related to natural calamities (n=300)

Devastation	Frequency	Percentage (%)
Loss of lives during calamities		
No	236	78.7
Yes	64	21.3
Number of losses		
1	42	65.6
2	18	28.1
>3	4	6.3
Loss of properties		
No	116	38.7
Yes	184	61.3
Type of property losses n=184		
House	63	34.24
Crops	65	35.33
Shop/Working place	9	4.89
Money	2	1.09
Pet animals	41	22.28
Others	4	2.17

Table III Sources of alert signal during calamities

Media about getting information	Frequency	Percentage (%)
Television	84	28.00
Radio	83	27.67
Internet	1	0.33
Neighbors	29	9.67
Miking	81	27.00
Newspaper	2	0.67
Others	20	6.66

Table IV Regarding Awareness of the respondents

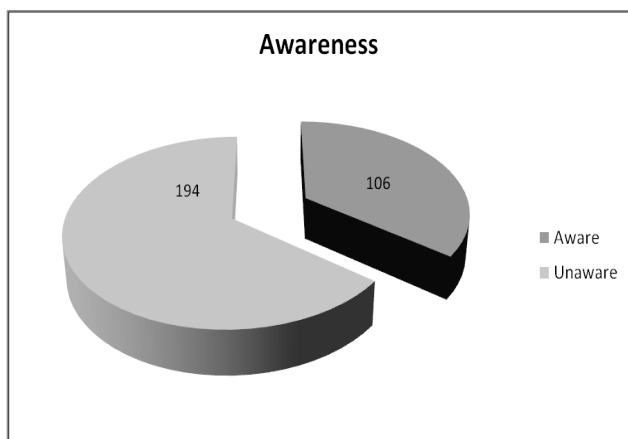| Criteria	Frequency	Percentage (%)
Follow the official weather forecast and local warning for evacuation		
yes	110	36.7
No	190	63.3
Movement for safe place		
Go for shelter	217	72.3
Stay at home	79	26.4
Others	4	1.3
Types of shelter place		
School	104	34.7
Mosque	36	12.0
Government shelter	102	34.0
Relatives home	36	12.0
Others (Multiple answers)	22	7.3
Trained regarding disaster		
Yes	90	30.0
No	210	70.0
Acquainted with health program		
Yes	124	41.3
No	176	58.7
Insurance coverage		
Yes	24	08
No	276	92

Figure 2 The level of awareness of the respondents for disaster management according to obtained score (n=300)

Table V Preparedness for future disaster by the respondents (n=300)

| Preparation to keep safe	Frequency	Percentage (%)
Site for residence	22	7.3
	(Multiple answers)	
Strong house building	27	9.0
Safe place for emergency	134	44.7
Self-education	1	0.3
Transport facilities	6	2
Measures taken after disaster forecast		
Regular forecast following	110	
	(Multiple answers)	36.7
First Aid kit storage	39	13
Food and water stocking	99	33
Fuel stocking	28	9.3
Survival tool stocking	78	26
Others	33	11
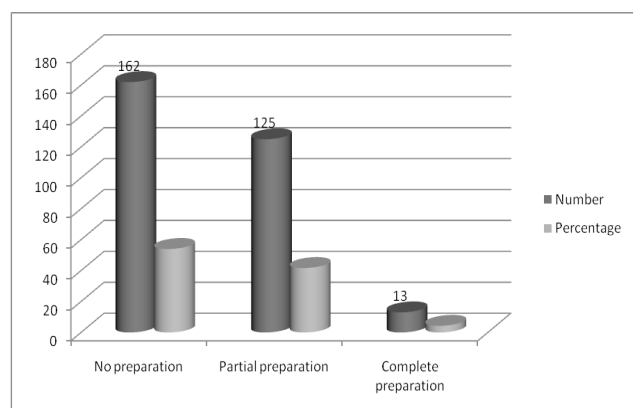
Figure 3 The level of preparedness of the respondents to tackle the natural calamities according to obtained score (n=300)

Table VI Relationship between educational status and socio-economic status with insurance coverage

Educational status	Insurance Coverage			
	Yes	No	Total	
Illiterate	09(5.8%)	145(94.2%)	154(100%)	χ^2=19.27
	(37.5%)	(52.5%)		
Primary	07(6%)	109(94%)	116(100%)	p value
	(29.1%)	(39.5%)		<0.001
SSC	04(18.2%)	18(81.8%)	22(100%)	(vhs)
	(16.7%)	(6.5%)		
HSC	01(20%)	04(80%)	05(100%)	
	(4.2%)	(1.5%)		
Graduate	03(100%)	0(0%)	03(100%)	
	(12.5%)	(0%)		
Socio-economic status				
Lower class	04(2.7%)	143(97.3%)	147(100%)	χ^2=46.192
	(16.7%)	(51.8%)		
Lower middle class	06(7.1%)	79(92.9%)	85(100%)	p value <0.001
	(25%)	(28.6%)		(vhs)
Upper middle class	10(15.9%)	53(84.1%)	63(100%)	
	(41.6%)	(19.2%)		
Higher class	04(80%)	1(20%)	05(100%)	
	(16.7%)	(0.3%)		
Total	24(100%)	276(100%)	300	

● p value derived from Chi-square test[*].
● ns= non-significant, s= significant and vhs= very highly significant.

Discussion
Bangladesh is one of the most vulnerable countries of the world facing flood and cyclone. Tropical cyclones and storms batter Bangladesh almost every year because of its geographical location and progressively changed climate and effect of global warming. In 29th April 1991 cyclone, number of deaths was 138987 and injuries 139149 all over Chattogram division including swandip island. In this study dwellers of Sandwip Island were the study population. Total 300 respondents were included in the study.
In the present study, majority of the study population (33%) was in 48-57 years of age group. The mean age of the respondents was 49.57 ± 17.566 years (range: 20-80 years). A recent study by Kabir et al. described the age distribution of the respondents. Age (Mean ± SD) in years was 44.791 ± 3.5.[8] That is similar with present study report. Out of 300 respondents, 152 were male and 148was female, male to female ratio was about 1:1. According to socio-demographic profile, there were

154 (51.3%) were illiterate, most of them 49.2% were from lower class. Among the respondents, 128 (42.8%) were housewife, 73 (24.4%) were farmer and 23 (7.7%) were fisher man. Kabir et al showed the majority were day laborers or farmers (60%) and (43.5%) had no formal education in their study.[8]

About 73.3% respondents experienced natural calamities in last 5 years. Among them 76.4% mentioned about cyclone and 58.7% respondent experienced natural calamities within last 6-12 months. Similar result found in the study done by Kabir et al about (95.7%) faced extreme weather and cyclone was the most (79.8%) commonly occurring natural disasters.[8]

In present study, out of 300 respondents, the loss of lives during natural calamities were 21.3%, 65.6% of them had lost at least one life, 61.3% had lost their properties like house, crops, shop, money, pet animals etc.Kabir et al also showed that 45.2% people become homeless due to disaster.[8]

Majority (70%) of them had not got trained, only 30% get training regarding disaster preparedness. most of the respondents, 217 (72.3%) of gone to shelter during disaster as school, mosque, government shelter etc. Regarding keeping safe from natural disaster, maximum 157(52.3%) people carefully select the site for residence and provide a safe place to stay during an emergency 134(44.7%). Majority of the people 110(36.7%) follow the official weather forecast and warning regularly and 99(33%) also stock food with drinking water for emergency situation. About 92% of the respondents had no insurance coverage for their household or business after disaster and only 8% had insurance coverage.

According to the level of awareness score Among the 300 respondents, only 106(35.3%) aware about their situation regarding preparedness. According to the level of preparedness score among the 300 respondents, 162(54%) had no preparation 125(41.7%) were partially prepared and 13(4.3%) had complete preparation to tackle the natural calamities.

In this study regarding insurance coverage of their house and business there was a significantly higher proportion observed in educated group than illiterate group. Those who were educated persons had more insurance coverage (p<0.001).Association of socio-economic status with insurance coverage was statistically significant. So, SES influence preparedness activities and insurance system acceptance remarkably (p<0.001).

Limitations
Although optimum care had been tried in every step of this study, still there were some limitations like Sample size was not adequate as calculated, the sampling was done conveniently, so there could be some selection bias and no fund allotted to conduct this study, there were financial constraints.

Conclusion
Bangladesh is one of the world's most disaster vulnerable countries and the vulnerability is so miserable in the southern part of Bangladesh like Sandwip. The findings of this study indicate that there is a potential risk of natural calamities on human health and psychology of that area. Most of the respondents were illiterate and belonged to lower socio-economic status. Two third of the respondents were unaware about the preparedness of the natural calamity. But half of the respondents had no preparation regarding this. Community-based adaptation strategy for preparedness and awareness could be beneficial for the island dwellers in future.

Recommendations
Proper institutional education, ensuring proper training for all adult and initiatives to improve their socio-economic status may play a very important role to aware and prepare themselves. Proper warning system, necessary arrangements (Cyclone shelter reconstruction, ensure safe drinking water and food, sanitation) by Government and NGO to make the people more aware about the natural calamities. Then it will be possible to fight against the situation.

Disclosure
All authors declared no competing interest.

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