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From dissemination to response: in search of new strategies for broadcast media in terms of cyclone warnings for Bangladesh

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ABSTRACT: Media and communications technologies play a significant role in disaster management procedures in regards to the mobilization of resources in emergency situations. While the dissemination of warning messages relayed via broadcast technologies have had some positive outcomes in terms of reducing casualties in emergency situations in Bangladesh, there remain some specific problems in regards to the manner in which these messages are distributed within this developing nation. These problems are addressed within this paper. Examining the existing cyclonic warning dissemination system and the manner in which warning information is distributed and received, this study addresses citizen responses to mediated warning messages in the vulnerable coastal regions of Bangladesh. The results indicate that attitudes towards mediated warnings held by Bangladeshi citizens in these environs differ depending upon their access to media, type of dwelling and differing levels of literacy. This study also provides recommendations for media professionals and policymakers in regards to disseminating more effective warnings to the inhabitants of Bangladesh's cyclone-prone coastal belt.

Introduction

The broadcast media play a crucial role in protecting lives and properties in the event of a natural disaster. Both radio and television can prove pivotal in bridging the gap between awareness and decision-making by disseminating warnings and related instructions from meteorological offices to the public.[15,2,10] It is believed, however, that broadcast media in Bangladesh have difficulty in handling cyclonic disaster mitigation efficiently as there is a general lack of confidence in the media. Therefore a climate of confusion and misunderstanding pervades this warning process which is further compromised by inadequate public access to media facilities throughout the cyclone-prone coastal regions of this country.[8] Despite this adverse situation, disaster management agencies such as the Storm Warning Centre (SWC) in Bangladesh persist with a policy that promotes 'awareness' via media channels and marginalises both the mitigating circumstances that problematize this warning method and other warning approaches that may better suit the social, cultural and economic situations of Bangladeshi citizens.

Usually the efficiency of warnings is measured in terms of lives saved and reduction in losses, which are directly related to the execution of an anticipated response by people and institutions once a warning is issued.[9] Similarly, the Bangladesh Disaster Management Bureau considers the key purposes of creating awareness through radio and television to be: preparing people mentally for the challenges of disaster; reducing panic amongst citizens; and alleviating trauma after a cyclone.[1] Studies by Talukder et al.,[16] Chowdhury et al.[3] and Ullah[18] on perception and disaster-related behaviour in Bangladesh reveal however, that lack of self-evacuation and a dearth of nearby shelters are the major causes of death. Ullah[18] opined that an early and easily understandable radio warning in the local dialect can reduce the potential death toll of a catastrophic cyclone and tidal bore. Successful public awareness programmes aimed at changing the mindset and developing the capacities and skills of people will, it is hoped, reduce substantially the number of lives and properties lost.

In spite of the media's active role during the super-cyclones (cyclone Sidr, 2007; cyclone Aila 2009), a few questions remain unanswered about the use of broadcast media in disseminating cyclone warnings and people's safety concerns: (a) did the warning messages reach the people in time?, (b) if the warning

messages did reach them in time, did people understand the warning adequately? and (c) if they did understand, what was their response and course of action? This study utilises interviews with 400 hundred coastal inhabitants and local disaster management personnel via a preset questionnaire. The empirical study examines their responses in regards to the perceived credibility of mediated warning messages during cyclonic disasters. The findings reveal that awareness is not the key to cyclone preparation and evacuation but rather people's responses are also influenced by other variables such as house type, personal economic and social status, location, level of education, previous experience of disasters, media access, neighbours' influence and age.

Cyclones and Bangladesh: a deadly combination

Bangladesh, a densely populated South Asian disaster-prone country, usually faces cyclonic storms before and after the monsoon periods between April and May and November to December. According to worldwide data, around 70 to 80 cyclonic storms are generated in this tropical zone in a year, and 7 per cent of these originate from the Bay of Bengal, hitting the Bangladeshi coast with devastating results. These cyclones and tidal bores affect around 20 million poverty-stricken people in thirteen districts, offshore islands and hundreds of shoals along the country's 710 km of coast. With increased population pressures, increasing numbers of people are compelled to live in the risky coastal areas threatened by cyclonic storms and tidal surges. Subsequently tens of thousands of Bangladeshi citizens are endangered by these hazardous weather conditions which appear on an annual basis.

The Bangladesh Disaster Management Bureau[1] recorded a total of 104 cyclones during the last 250 years in the country. Of these, 68 were recorded as severe, claiming between fifty thousand to half a million lives. The deadliest killer cyclone hit the Bangladesh coast on 12 November 1970, and took a toll of half a million lives, with property losses amounting to more than a billion US dollars. Within a little over two decades, Bangladesh was lashed by another cyclone of catastrophic magnitude on 29 April 1991 claiming the lives of close to 138 thousand people and inflicting extensive damage to property worth more than two billion US dollars.[16,14] It is widely believed that the cyclone of 19 May 1997 was similar to that of 1991 but the death toll reached only 155 because nearly 0.6 million people were shifted to cyclone shelters after a warning message from the disaster management authority.[2]

Similarly, during the two recent cyclones that hit the south-west coast of Bangladesh (super-cyclone Sidr in 2007 and Aila in 2009) 3,406 and 190 lives were lost respectively owing to the premature issuance of warnings and the failure to undertake adequate motivational measures by the warning agency in terms of sheltering.[13] Cyclones Sidr and Aila proved that there were not enough cyclone shelters for the people in the coastal area. Evaluating the Sidr experience, BDMB reported that, in spite of repeated dissemination of warning messages, people preferred to stay at home with their belongings. The lesson learned from cyclone Sidr regarding warning messages was that they were not properly understood by all and some communities did not even believe the warnings. In addition, district, and *Upazila* (sub-district) officials and communities also faced difficulties in translating warning messages into risk scenarios. BDMB observed, 'risk mapping for storm surge and flash flooding would have enhanced early warning and community response' (2008). This official statement indicates that although Bangladesh is well-known for its success stories in terms of cyclone preparation, in this instance community response was not forthcoming in the context of taking shelter after the issuance of warnings. Thus, cyclones with tidal bores are still the major killer in the coastal region of Bangladesh. Around seven and a half million people in this area are so vulnerable that they have little resistance to an imminent cyclone and they await such natural calamities virtually defenceless.[6]

Rationale of the study

Disaster preparation measures in this particular socio-economic context, various studies[5,8] and practical experience[17,12,18,6] have indicated that after the issuing of mediated warnings, evacuation practices and the provision of shelter remain the major problems in Bangladesh during the event of cyclonic conditions. Citing faith-based convictions, many of the coastal citizens decide to remain within the home rather than venture into shelters. They invoke a 'wait and see' approach, even after receiving motivational calls from Cyclone Preparedness Programme (CPP) volunteers. Therefore Bangladesh still needs to ensure

broadcast media are used as a catalyst in creating awareness and motivating the public to take shelter and minimise risks. Media, particularly radio and television, can play a vital role in the disaster mitigation process through the dissemination of information on a timely basis. However, low levels of access to broadcast media in these areas, misunderstandings of the signal warnings (often delivered in technical language), lack of motivation to evacuate themselves, a lack of effective coordination between different local disaster mitigation agencies and the media, an absence of official media guidelines and the general low credibility of the media, all contribute to limiting the effectiveness of disaster prevention and management efforts in Bangladesh.

The credibility of the news media is a *sine qua non* when they perform the critical role of disseminating information to alert the public about any disaster or potential disaster, because under these circumstances human lives and properties are at risk. Therefore, disaster preparation and management agencies worldwide still consider broadcast media, both radio and television, as crucial components of disaster mitigation.[15,11] The Tampere Declaration in 1991 recognised the critical role of these media in providing public information to communities at risk and their broader role in education and opinion formation. The Kobe Declaration in 2005 also recommended early warning dissemination though media aimed at the mitigation of losses in disasters.[4]

Various studies and surveys[3,18,8] related to the catastrophic cyclones of 1991 and 1997 revealed that cyclone-warning transmission through radio and television played a significant role in limiting the number of deaths by cyclone and tidal bore as the affected populations made adequate preparation after listening to regular and special weather bulletins. Cyclone Aila which hit the southern Bangladesh coast in May 2009 affected more than three million people but caused only 190 confirmed deaths. Effective early warning systems, special cyclone bulletins and evacuation measures seem to have saved countless lives in this event. Some 600,000 people were evacuated to shelters prior to the cyclone which proved a significant factor in minimising the loss of life.[7] Poverty and illiteracy, however, place millions of isolated coastal people in Bangladesh beyond the purview of conventional mass media. Understandably there remains a significant section of the population with little or no access to broadcast media technologies.

The government of Bangladesh has placed the media at the centre of their disaster preparation plans. A number of chartered responsibilities (under the Standing Order for Broadcast Media 1985) are vested in the broadcast media immediately before, during and after disaster situations. Radio and television operators are expected to comply with these responsibilities during various phases of cyclonic disaster management in association with the Bangladesh Meteorological Department, Storm Warning Centre and the Ministry of Disaster Management and Relief. A survey by the Community Development Library revealed that around 69.7 per cent of people in coastal areas have confidence in radio announcements relating to cyclones.[16] Though nation-wide radio penetration was recorded at 41 per cent by the National Media Survey 2008, television is still not available in remote islands owing to its high price and the lack of power facilities.

In these circumstances, and considering the ten most important challenges in the Hohenkammer Charter 2005 (for details, see Loster[10]) in optimising the effectiveness of media-disseminated warnings, this study has been undertaken to examine the role of the media in the evacuation and sheltering of Bangladeshi citizens before and during cyclonic conditions. In investigating the function of broadcast media and citizen responses, it questions the subjective rationality preventing some Bangladeshis from responding to disaster warnings. How does competing folk wisdom or traditional practice interfere? What are the options citizens have when a cyclone is about to strike?. Therefore, the main hypotheses of this study are:

(a) Cyclonic warning and management systems must consider a more inclusive and wide-ranging set of communication strategies of which broadcast media represents only one facet**.** This is due to the many other mitigating factors that influence the comprehension of broadcast messages within a Bangladeshi social, economic and cultural context. Therefore:
(b) Poverty levels, the availability of broadcast media, housing types, frequent exposure to and experience of cyclonic conditions, education levels, the availability of nearby cyclone shelters, age and religious convictions are more influential in the Bangladeshi context.

Method

To generate information relating to public response a questionnaire consisting of 67 questions was administrated to 400 households in July 2009 in the worst-affected areas over the last 200 years. To ensure proper representation within these samples, seven out of thirteen districts were selected, from both coastal and offshore islands covering the coast from the River Naaf that separates Bangladesh from Myanmar in the south-east of the country to the River Raimangal, along the Indo-Bangladesh border in the west. The districts were Kutubdia of Cox's Bazar, Banshkhali and Sandwip of Chittagong, Char Alexander of Laxmipur, Hatiya of Noakhali, Charfashon of Bhola, Patharghata of Barguna and Galachipa of Patuakhali. The questionnaire was mainly based on the respondent's personal psyche after a 'Danger' warning by the broadcast media, their (non-)adoption of preparedness strategies, their observation of cyclone and media roles within their socio-economic situation and their traditional coping system in terms of mitigating losses. The proportional sampling method (proportional to the total number of households in respective areas) was adopted for selecting the number of households from different areas and the random sampling method was followed during information collection. Feasibility of the preset variables and hypotheses were verified by Chi-square statistics (*c2, df* and $P < .05$ value).

Distribution of the respondents

Of the respondents, 67.5% (270) were male and 32.5% (130) female. Their ages ranged from 15 years to 60+ years. Some 361 (90.3%) were Muslims, 36 (9%) Hindus and the rest (0.7%) belonged to other religions. Their monthly incomes ranged from below Tk. 1,000 ($15 approx) to above Tk. 10,000 ($150 approx). Most of the respondents' (62.5%) monthly income was around Tk. 1,000 to Tk. 4,000, and they had an average family size of six to eight members. The principal occupation of the respondents was cultivation (39.8%), followed by small trade (14.5%), day labour (13%) and fishing (7.3%). Most of them (48.8%) had received no formal education and about a quarter (25.8%) had primary (class I- IV) grade education, 11.5% secondary grade, 9% higher secondary grade and 4.8% were undergraduates. Thirty-eight per cent had experienced three to four cyclones, 22% five to six and 11.6% ten or more severe cyclonic storms and tidal bores during their lifetime. Also, 63.8% of respondents had lost loved ones during various cyclones. Of the total, 38.4% lived in cottages (usually made of bamboo and straw), 47.5% lived in Sheet-GI made houses and 1.8% in brick-built *pucca* (built with bricks and cement) houses. A significant percent of the sample (65.2%) live within a kilometre of cyclone shelters, 23.8% live outside of the 1 kilometre zone and 10.9% of houses were located within two kilometres of cyclone shelters. Some 91% of the residential area is flooded by three to four feet of tidal surges during cyclonic storms.

Findings

Traditional preparation measures: People throughout the coastal belt along the Bay of Bengal take some indigenous preparation measures in advance of cyclones and tidal bores due to their lifetime of experiences coping with these disasters. Though the measures are very traditional and non-scientific in nature, various state and NGO agencies have identified these practices as sometimes proving effective. This study investigated these traditional preparation practices and found that 83.3% of respondents strengthened their respective houses by roping them to large trees located nearby. In addition, 47.8% of respondents stored their valuable household belongings including food, grain and ornaments underground, and 62.8% took shelter at nearby *Killas* or embankments. In response to another question, however, around 70.3% of the respondents said that they were not confident that their house would withstand a strong cyclonic hit. A significant percentage (43.8%) remain at home during cyclones (Appendix table-1).

News source before cyclonic hit: Earlier studies indicated that radio bulletins were the main source of cyclonic disaster news amongst coastal people. Considering this, the survey attempted to examine the validity of previous findings. According to this survey, people consult a number of sources for news of cyclonic depression: radio (72.0%), neighbours (73.8%), CPP volunteers (82.2%) and previous

experience (55.0%). Some 86.3% of the people agree, however, that radio announcements could lessen casualties and loss of property. Findings are shown in Appendix table-2.

Reasons for not using cyclone shelters: It is apparent that among the respondents only 49.8% consider cyclone shelters safe and 48.5% never think of moving to cyclone shelters for various reasons, such as religious convictions (41.8%), the protection of household belongings (28.3%), preserving *Purda* for women (32.8%), inadequate safety measures for women (22.0%) and social status (10.0%). In addition, 31.2% of respondents indicated that cyclone shelters were not located near their residence and they therefore observed a 'wait and see' approach. The other possible causes for not moving to cyclone shelters are shown in Appendix table-3.

Understanding of warning bulletin: It is believed that people in the coastal region do not fully understand the meanings of warning signals for various reasons. The conventional cyclone warning signals in Bangladesh are criticised widely by the disaster management agencies. Therefore, a question regarding the causes of partial or no understanding of the warning bulletins was administered. Of the respondents, 65.3% indicated that they can understand the signal, 22.3% said that they can understand partially and just 9.3% answered that they fail to understand the signals. The reasons behind their non-comprehension (Appendix table-4) are unfamiliarity with the technical language used by the mass media (19.3%). The other reasons indicated were failure to mark the difference between sea and river ports clearly (14.3%), confusion regarding the signal (24.0%), and carelessness (8.0%).

News regarding preparation: The mass media do however play a role in persuading the public to take shelter, and it is widely believed that community members play a major role in informing and motivating the public to take measures to deal with cyclonic disasters. Therefore this study examines this media role within the disaster-oriented context. The survey found that 80.8% of respondents received their primary education in regards to disaster preparation from the CPP (Appendix table-5). They also mentioned that radio (75.3%) is another source of information regarding appropriate preparation methods. The other sources of information were television (20.3%), NGO workers (16.8%), posters (8.0%), and billboards (3.8%).

Results analysis and discussion

This study found that 51.1% of the respondents' households own radio sets; only 9.6% have access to newspapers and some 12.8% own television. Here it is appropriate to note that 8.4% of television owners also read newspapers at home but 47% said that they had no access to any media. It is evident that media access depends on the income level of the respondents. Among media owners, 46.7% preferred to take the necessary precautions during cyclones, 10.0% felt worried about moving to shelters because of their social status in the community, and 30.5% showed reluctance to heed warnings. The relationship between media access and preparedness (Appendix Cross table-1) measures is $c2= 242.697, df=80, P< .000$ and thus the finding strongly supports that there is a vital association between the access to mass media and evacuation/sheltering.

Coastal people mostly live in *Katcha* (cottages) (38.3%) and semi-*pucca* (tin –shade) houses (47.5%). These houses are extremely vulnerable to cyclonic storm speeds of up to 64 Kph. It is believed that people living in fragile houses try to take refuge in the cyclone shelters and other safer places immediately after they receive the warning news, unlike others who own concrete houses. The relationship (Appendix Cross table-2) between perceived importance and households is $c2=117.438, df= 35, P<.000$. This finding indicates that giving due importance to the media warnings is significantly related to the possession of different types of shelters / houses by the citizens. Therefore, it is evident that the residents of *Katcha* houses, usually vulnerable to cyclone, give due importance to the media advice (39.3%) to take shelter in safer places before cyclonic hits. The study reveals that the majority of people (41.5%) who reside in low cost *Katcha* houses depend on and trust the physical (non-mediated) communications operated by the Red Crescent Volunteers more than the radio announcements made by the government. Red Crescent volunteer activity in disaster management then engenders a greater level of credibility and trust amongst the low income groups residing in these coastal regions. This may also be due to the persuasive skills and communicability of the Red Crescent Volunteers working in disaster management.

It is a common belief that people who have experienced cyclones more frequently usually follow the media announcement warnings regarding preparation and sheltering. Of the sample, 152 (38%) have experienced cyclonic storms three to four times and regard Red Crescent volunteers' announcements more cautiously than those broadcast on radio (75.3%, N. 301). The relationship (Appendix Cross table-3) is described by *c2=45.418, df=35, P<.112*. The analysis of citizens' attitudes towards their available warning options indicated the importance of media announcements in alerting citizens to potential danger despite their previous experiences within cyclonic weather conditions. People who experienced cyclones more frequently than others considered volunteers' announcements important (80.8%- N. 323) in terms of preparation and sheltering. Many of the citizens who had previously been exposed to cyclones were found to have taken more effective precautions and attributed greater significance to the alerts received from the Red Crescent Volunteers.

Disaster management agencies both at home and abroad claim that most of the coastal people fail to understand radio and television broadcast warning announcements for technical reasons; one of the most cited reasons is the use of 'polished' 'textual' language in the bulletins along with 'meteorological jargon' (Ullah, 2003; UNISDR, 2007). As most of the elderly people and women are illiterate in the coastal region and off-shore islands, they are not familiar with the use of language within these bulletins and hence fail to perceive the impending threat. Subsequently low levels of literacy are a significant variable in the success (or lack thereof) of mediated cyclone warning messages. Among the respondents of the questionnaire, 19.3% admitted that they are not familiar with the technical language of cyclone warnings and announcements that are used by the mass media. They indicated that the language was too technical for them to comprehend; 14.3% reported that they failed to mark the difference between sea and river ports clearly during the media announcement, 24.0% indicated confusion in regards to warning messages and 8.0% were very careless about radio warning signals. This is proved by *c2= 33.947, df= 15, P< .003*. This analysis indicates that there is a strong relationship (Appendix Cross table-4) between educational status and level of understanding of the warning signals, which means that illiterate and less educated people in the coastal areas face difficulties in interpreting media-transmitted cyclone warning signals. Subsequently the illiterate and un-educated placed much greater stock in the interpersonal warnings received from Red Crescent Volunteers.

A study by Islam and colleagues (2004) demonstrated that coastal people applied their own life-saving strategies during cyclones. They stayed at home (41.3% in 1991, 20.9% in 1997) or sought shelter in a neighbour's homes (14.1% in 1991, 9.2% in 1997), schools or mosques (37.2% in 1991, 18.5% in 1997) and other buildings (6.8% in 1991 and 2.8% in 1997). After the construction of 3,800 schools-cum-cyclone shelters, however, in 1997 a total of 48.6% people took refuge in these formal brick-built three-storeyed shelters. Others expressed some confusion or concern in regards to these shelters, such as the distance of the shelters from their home (31.2%), the security of household belongings (28.3%) and prestige issues for the local well-to do families (10.0%). *Is there any connection between the mediated warning dissemination and taking refuge in shelters?* Some 41.5% of respondents answered in the negative to this question. The relationship (Appendix Cross table-5) is described by *c2=13.901, df =8, P<.084*. Thus, it is not proved that there is a strong relation between the media-transmitted warning and the distance of shelter centres.

The coastal region of Bangladesh represents a traditional society where a strong patriarchal extended family system is dominant and people respect the decisions of aged and experienced persons in regards to taking shelter during cyclonic storms. Evidence (Appendix Cross table-6) is supported at *c2=71.682, df =63, P<.212*. Findings and evidence demonstrate that age is not significant in regards to the heeding of cyclone warnings. This study argues that socio-economic status is also an important variable in indicating likely survival rates and should receive greater focus in future in terms of addressing the human cost of cyclonic disaster in Bangladesh.

The results further demonstrate that people who receive the warning signals relatively early (five hours before N-168, 42.0%; two hours N-71, 17.7% and one hour N-13, 3.3%) through the broadcast media can prepare themselves more effectively than those who receive the message immediately prior to the arrival of the cyclone. Following instructions from SWC, however, media-disseminated danger warnings were issued around 24 hours before the forecast landfall of cyclone Sidr, however in actuality it hit much later. Many people were confused, and after waiting several hours most of them left their shelters with disastrous consequences (BDMB, 2008). This experience led authorities to decide not to issue warning bulletins too early, but only six to ten hours before the forecast landfall. Thus, media bulletins need to be responsible,

effective, and reliable, as they are vital in terms of people taking practical steps to protect themselves from cyclonic havoc. Correspondingly, this study argues that coastal people still have some confidence that successful public awareness programmes with the aim of changing the mindset and developing the capacities and skills of the high-risk population will hopefully reduce the loss of life and property.

Bangladesh media traditionally issue signal nos. 1 to 11 for maritime ports and signal nos. 1 to 4 for river ports and take necessary steps as per instruction from SWC (see Standing Order 1985). These signals for lay people are highly criticised by the disaster management experts and they complain that misunderstanding is the major cause of death. In spite of this criticism, it has been found that the production of technologically sound warnings can be nearly meaningless if not preceded by an assessment of the risk or followed by clear dissemination and appropriate response capacity. For instance, Hurricane Katrina, which struck New Orleans in the USA and claimed 1,280 lives in 2005, demonstrates very clearly that even the best and most sophisticated warning is useless if the alerts do not reach the people at risk or if there is little awareness of what risk-appropriate action should be taken or heeded in regards to warnings.[10] UNISDR therefore redefines awareness as:

'the process of informing the general population, increasing levels of consciousness about risks and how people can act in order to reduce their exposures towards natural hazards. It fosters changes in behavior leading towards a culture of risk reduction. This involves the development and dissemination of public and educational information through radio, television and print media, as well as the establishment of information centers, networks, and community or participation actions'.[19]

Recent cyclones in Mozambique and Cuba prove that early warning and people's response worked in reducing fatalities.[6]

The traditional framework of the early warning system in Bangladesh is composed of three phases: monitoring of precursor, forecasting of a probable event, and notification of a potential catastrophic disaster. Within this framework broadcast media transmit the warning signals to the public. This study argues that the role of media occurs in the third stage, where the authorities can make use of it for timely and efficient warning, because media are one of the most important tools for lifeline agencies in the disaster preparation and management process but are greatly undervalued by many experts as a means of increasing public awareness and providing information related to disaster reduction. Talukder and colleagues,[16] Chowdhury,[2] and Islam and colleagues[8] claimed that owing to the lack of proper skills and ideas relating to disaster preparation issues among media professionals, the media failed to adopt appropriate strategies to mobilise human capital in Bangladesh. According to Chowdhury:

> 'current media coverage is overwhelmingly devoted to disaster events and the dramatic aftermath of damage and the provision of emergency assistance to survivors. With a few noteworthy examples, coverage about recurrent hazards or reporting about existing disaster risk management practices is much less in evidence here in Bangladesh' (2003:167).

Similarly, evaluating Sidr, BDMB agrees that the current warning signal alerting system must be reviewed to ensure that communities can better understand the level of actual risk they face and the actions they must take to protect themselves and their livelihoods. Thus, media can still be utilised as an instrument for issuing early warning and hazard alerts at the national and local levels by assisting in the provision of clear, consistent and timely messages to communities at risk. The findings reveal that broadcast media have some impact through airing round the clock messages during the pre-cyclone emergency period. They broadcast warning announcements, publicise emergency public meetings, provide evacuation announcements in a reassuring and calm manner, all of which serve to dispel myths and rumours. In addition, the media provides timely and accurate updates on the level of damage incurred, produces programmes in which victims can express themselves, establishes contact with the meteorological office and broadcasts regular weather bulletins. Behind the scenes, media must implement safety measures for all station personnel, call station briefing meetings for effective warning signal dissemination, and monitor all official announcements and activities of national government, local government and aid agencies.

The study therefore suggests some initiatives for media and policymakers: (a) a cyclone warning system should be reoriented according to the need and understanding of the people; (b) radio and television should check the authenticity of information and its credibility; (c) all state-run and private radio and television stations should be in operation round the clock throughout the country to disseminate information on cyclonic havoc during a depression; (d) year-round programmes on cyclonic preparation

should be broadcast; (e) media professionals should keep in constant contact with the SWC to disseminate news to the people on the formation of a cyclone and its progress; (f) broadcast the origin of the epicentre of cyclones and track their progress at suitable times in order to reach the maximum number of listeners or viewers at regular intervals; (g) language used in warnings should utilise only minimal jargon and instead be communicated in a comprehensible manner that is mindful of the significant illiteracy within sections of the Bangladeshi community. (h) On-the-job training should be provided for correspondents and reporters, especially on interviewing skills, self-safety and ethical codes regarding disaster reporting; and (i) more research should be conducted to analyse the role of broadcast media and the improvement of disaster communication. (j) the installation of radios for emergency purposes in all threatened communities. (k) the installation of automatic alarm systems in all threatened communities.

Conclusion

This study indicates that it may be possible to minimise the damage cyclones cause in Bangladesh via the implementation of a range of policies, measures and campaigns designed to make more effective the channels of communication between official sources and the public. The damaging effects on people's lives and properties in Bangladesh could be reduced greatly by two methods; structural and non-structural measures. The first one requires billions of dollars of investment in the form of infrastructural development. While Bangladesh has provided quite a substantial amount of capital resources in this area, it still remains well outside the required investment. For a resource-poor and highly disaster-prone country like Bangladesh, it is strongly advocated that policymakers should use a combination of hardware and software and opt for less expensive non-structural measures in response to these meteorological threats. The results of this study indicate the need for a greater use of media in the task of preparing cyclonic warning programs in order to further link citizens with the disaster prevention infrastructure, e.g. the maintenance and use of cyclone shelters during an impending disaster. The media still has great potential as a medium for the promotion of awareness through transmitting emergency evacuation announcements in a reassuring and calm manner and dispelling myths and rumours through providing timely and accurate updates of an impending cyclone. Importantly within a Bangladeshi context, these messages must be culturally and linguistically mindful and therefore be provided in at least three local dialects six to ten hours before a cyclone hits. In addition, Red Crescent-trained volunteers' use of siren warnings at local level has substantially reduced death tolls from cyclones and tidal bores. Their motivational warning call is the most important factor in the context of evacuation and sheltering. This study argues that awareness is still the most important variable in reducing the collateral damage associated with cyclonic disasters, but also views the broadcast media as retaining an important role in catalysing this awareness and in motivating the community to realise their vulnerability in the face of these extreme climate conditions.

Appendix

Question-1.
What kind of local / indigenous preparation measures do you take prior to the arrival of cyclones and tidal bores? (Multiple answers can be given)

i. Strengthening the house with rope
ii. Take shelter at *Killas* and embankments
iii. Safe harboring (mooring) of boats
iv. Take shelter in the home (rely on religious convictions/faith)
v. Untie the cattle
vi. Storage of food grains in bunkers

Table 1. Traditional Preparedness Measures .

Preparedness Measures Taken	Respondents (Yes)	Respondents (No)	No Response
Strengthening the house with rope	333 (83.3%)	16 (4.0%)	51 (12.8%)
Shelters at *Killas* and embankments	251 (62.8%)	22 (5.5%)	127 (31.8%)
Mooring boats safely	86 (21.5%)	123 (30.8%)	191 (47.8%)
Take shelter at home	175 (43.8%)	173 (43.3%)	31 (7.8%)
Untie cattle rope	266 (66.5%)	55 (13.8%)	78 (19.5%)
Storage of food and grain underground	191(47.8%)	35 (8.8%)	174 (43.5%)h

Question-2.
How do you usually receive the cyclone warning? (Multiple answers can be given)

i. Immediate neighbours
ii. Personal weather prediction from experience
iii. Observing sea conditions
iv. Radio bulletins
v. Newspapers
vi. Siren of the Red Crescent volunteers
vii. Television
viii. Signal flags hoisted on the rooftop

Table 2. News Sources of Cyclone Warning.

Name of the Sources	Respondents (Yes)	Respondents (No)	No Response
Neighbours	295 (73.8%)	44 (11.0%)	61 (15.3%)
Predictions from experience	220 (55.0%)	103 (25.8%)	77 (19.3%)
Sea condition	165 (41.3%)	138 (34.6%)	97 (24.3%)
Radio	288 (72.0%)	69(17.3%)	43 (10.8%)
Newspapers	44 (11.0%)	248 (62.0%)	107 (26.8%)
Red Crescent volunteers	331 (82.2%)	38 (9.5%)	31 (7.8%)
Television	76 (19.0%)	227 (56.8%)	97 (24.3%)
Signal flags	186 (46.5%)	142 (35.5%)	72 (18%)

Question-3.
What reasons stop you from taking refuge in the cyclone shelters? (Multiple answers can be given)

i. Distance of the shelters from the house
ii. Fear of household theft
iii. Religious convictions
iv. Safety concerns of the female members of the family
v. Lack of clean drinking water and sanitation facilities in the shelters
vi. Conservative values and desire to keep women away from public exposure
vii. Desire to maintain social status and prestige in the locality

Table 3. Reasons for not taking Shelter.

Pattern of Causes	Respondents (Yes)	Respondents (No)	No Response
Distance of shelters	125(31.2%)	158 (39.6%)	117 (29.2%)
Fear for household belongings' safety	113 (28.3%)	29 (7.3%)	258 (64.5%)
Religious convictions	167(41.8%)	224 (56.1%)	9 (2.3%)
Women's safety	88 (22.0%)	51 (12.8%)	261 (65.3%)
Lack of facilities (water & sanitation)	27 (6.8%)	11 (2.8%)	362 (90.5%)
Conservative values	131 (32.8%)	202 (50.5%)	67 (16.8%)
Social prestige	40 (10.0%)	86 (21.5%)	274 (68.5%)

Question-4.
Why do you think that you could not understand or partially understand the warning bulletins broadcast over radio and television? (Multiple answers can be given)

i. Warning message is disseminated in polished Bangla language (with technical jargon)
ii. The message is often confusing in making distinctions between sea and river ports
iii. Confusing signal (Three types for coastline)
iv. Poor radio and television signals
v. Indifferent and careless attitudes by broadcasters in relation to the impending danger
vi. Scepticism in regards to the information provided in the bulletin

Table 4. Causes of failure or partial understanding of warning bulletins.

Causes	Respondents (Yes)	Respondents (No)	No Response
Polished language & Jargon	77 (19.3%)	295 (73.8%)	28 (7.0%)
Confusion in words	57(14.3%)	33 (8.3%)	310 (77.5%)
Confusing signal	96(24.0%)	295 (73.8%)	9 (2.3%)
Poor signal & Radio noise	25(6.3%)	62 (15.5%)	313 (78.3%)
Disbelief	29 (7.3%)	301 (75.3%)	70 (17.5%)
Scepticism	32 (8.0%)	67 (16.8%)	301 (75.3%)

Question-5.
What are the sources of information you have been exposed to in regards to preparation during cyclonic periods? (Multiple answers can be given)

i. Poster displayed on the street
ii. Billboards near the coastal region
iii. NGO information
iv. Radio programmes or announcements
v. Television programmes or announcements
vi. Discussion by the Red Crescent volunteers

Table 5. Preparedness Information Sources.

Information Sources	Respondents (Yes)	Respondents (No)	No Response
Poster	32 (8.0%)	246 (61.5%)	122 (30.5%)
Billboard	15 (3.8%)	256 (64.0%)	129 (32.3%)
NGO workers	85 (16.8%)	211 (52.8%)	122 (30.5%)
Radio	301 (75.3%)	54 (13.5%)	45 (13.5%)
Television	83 (20.3%)	211 (52.8%)	106 (26.3%)
Red Crescent	323 (80.8%)	35 (8.8%)	42 (10.5%)

CrossTable-1. Media instruction and preparation activities for safety.

Perception and Action	Media									Total
	Newspaper (NP)	Radio	TV	Radio & TV	Radio & NP	TV & NP	Radio, TV& NP	No Response	None	
Moderately follow	2	32	-	8	2	1	-	1	46	92
Usually follow	-	34	-	4	3	1	1	-	21	64
Positively follow	-	20	2	6	2	-	5	-	15	50
Strongly follow	-	10	-	3	-	-	3	-	6	22
Partially believe	-	6	-	-	-	-	0	-	4	10
Take shelter	-	2	-	-	2	-	1	-	1	6
Follow neighbour	-	2	-	-	1	-	1	-	-	4
Official measures	-	3	-	1	1	-	3	-	-	8
Don't believe	-	7	-	-	-	-	-	-	29	36
Rarely follow	-	26	1	1	-	-	-	-	66	94
No response	-	2	-	4	0	-	8	-	-	14
Total	2	144	3	27	11	2	22	1	88	400

$\chi^2 = 242.697$, $df=80$, $P < .000$

Cross Table-2. House type and importance of media-disseminated warning signals for evacuation.

House Type	Give due Importance Media Warnings								Total
	Radio	Television	Red Crescent CPP	CPP & Radio	CPP & TV	Radio &TV	NGO	No Response	
Homeless	1	-	1	-	-	-	-	1	3
Cottages	60	-	70	11	-	2	1	9	153
Built of mud	14	1	10	-	-	3	-	3	31
Tin shade	77	8	80	22	1	1	-	1	190
Brick-made	1	1	1	1	-	3	-	-	7
Semi-*pucca*	4	2	4	2	1	3	-	-	16
Total	157	12	166	36	2	12	1	14	400

$\chi^2 = 117.438$, $df=35$ $P < .000$

Cross Table-3. Media announcement importance and previous experience of facing cyclonic disaster.

Previous exposure to cyclones	Give due Importance to Media Warnings to Preparedness and Evacuation								Total
	Radio	Red Crescent CPP	TV	CPP & Radio	CPP & TV	Radio & TV	NGO	Undecided/ No response	
1-2 times	25	16	5	2	-	3	-	4	55
3-4 times	49	75	5	14	1	5	-	3	152
5-6 times	35	39	1	6	1	3	-	3	88
7-8 times	19	16	1	4	-	-	-	3	43
9-10 times	10	3	-	3	-	-	-	-	16
Over 10 times	19	17	-	7	-	1	1	1	46
Total	157	166	12	36	2	12	1	17	400

$\chi^2 = 45.418$, $df=35$ $P < .112$

Cross Table- 4. Education and perception of the cyclone warning signal.

Education	**Perception about Warning Signals**				**Total**
	Understand	Understand Partially	Could Not Understand	No Response	
Illiterate	117	38	30	10	195
Primary	68	29	4	2	103
Secondary	29	15	2	0	46
Higher secondary	27	3	1	1	32
Undergraduate	17	2	0	0	19
Madrassa (religious)	3	2	0	0	5
Total	261	89	37	13	400

$\chi 2$= 33.947, df=15, P< .003

Cross Table- 5. Refuge in shelters and media warning.

Refuge in shelters	**Instructed by Media**			**Total**
	Yes	No	No Response	
Every time	36	21	141	198
Frequently less	22	22	64	108
Frequently more	18	8	55	81
Never	3	2	2	7
No response		1	5	6
Total	9	54	267	400

$\chi 2$=13.901, df=8 P< .084

Cross Table- 6. Importance of media warning and age.

Age (Years)	**Give Due Importance Media Warnings**								**Total**
	Radio	Television	Red Crescent CPP	CPP &Radio	CPP &TV	Radio &TV	NGO	No Response	
15-20	5	-	3	-	-	-	-	1	9
21-25	9	3	4	6	-	-	-	3	25
26-30	16	2	14	4	-	3	-	1	40
31-35	22	2	20	5	1	1	1	-	52
36-40	24	3	24	7	-	1	-	2	61
41-45	22	2	25	3	-	3	-	-	55
46-50	17	-	14	1	-	-	-	-	32
51-55	10	-	14	4	-	2	-	1	31
56-60	14	-	20	-	-	1	-	3	38
60<	18	-	28	6	1	1	-	3	57
Total	157	12	166	36	2	12	1	14	400

$\chi 2$=71.682, df=63 P< .212

Notes and references

[1] BDMB (2008), *Bangladesh Disaster Management Bureau* (2008), Super cyclone Sidr 2007: Impacts and Strategies for Interventions, Ministry of Food and Disaster Management Bangladesh Secretariat, Dhaka, Bangladesh, February 2008 http://www.dmb.gov.bd/reports/Sidr-ReportText%2017Feb2008.pdf, accessed on 20th September 2009.

[2] A. Chowdhury (2003), *Media and disaster management*, in Media in time of crisis: National and International issues, Srabon, Dhaka, 165-75.

[3] A. Chowdhury et al. (1999), *Coping: People and Society in the Coastal Area: A. Report on Three High Risk Areas- Hatiya, Banskhali and Patharghata*, Vol-1 and 2, Oxfam, Dhaka.

[4] N. Fujibayashi (2009), *Know Disaster, Tell Disaster Risk Reduction: Training Handbook for Media Professionals*, SEEDS Asia, Kobe, Japan.

[5] H. Hossain et al. (1992), *From Crisis to Development: Coping with Disaster in Bangladesh*, ed. by Hameeda Hossain, Cole P. Dodge and F. H. Abed; Upl; Dhaka, 1992.

[6] IFRC (2009a), *International Federation for Red Cross and Red Crescent Societies*, World Disaster Report-2009; Focus on Early Warning and Early Action; http://www.redcross.ie/help/annual_reports/world_disasters_report_2009.pdf, accessed on Sept 19, 2009.

[7] IFRC (2009b), *Bangladesh: Cyclone Aila Emergency appeal n° MDRBD004 Operations*, Update n°2, 31 July 2009 http://www.ifrc.org/docs/appeals/09/MDRBD004_OU2.pdf, accessed on Sept 17, 2009.

[8] P.S. Islam et al. (2004), *Community Response to Broadcast Media for Cyclone Warning: A Perception Study of Coastal People with Special Reference to Meghna Estuary in Bangladesh*, by M. Shahidul Islam, Mohammad Sahid Ullah and Alak Paul, *Asian Journal of Water, Environment and Pollution* **1**(1&2): 55-64.

[9] J. Leon, C. Villagran and J. Bogardi (2007), *Early Warning Systems in the context of disaster risk management*, *Agricultural and Rural Development* **1**: 43-45.

[10] T. Loster (2007), *Disaster Prevention: Risk awareness is the key*, *Agricultural and Rural Development* **1**: 46-47.

[11] A.M. Major and L.E. Atwood (1997), *Changes in Media Credibility When A Predicted Disaster Doesn't Happen*, *Journalism and Mass Communication Quarterly* **74**(4): 797-813.

[12] News Network (1999), *Cyclone and Life in Coastal Belt*, News Network, Dhaka.

[13] A. Rahman (2009), *Reducing the Destructive force of Cyclone*, The Daily Star, Dhaka, May 27, 2009.

[14] M.S. Rahman (1999), *'Disaster Management' in Bangladesh 21st Century*, Mohiuddin Ahmed ed., CDL, Dhaka, May 1999. Pp 105-125.

[15] G.N. Ritchie (1997), *Disaster Reduction and Preparedness*, *Asia-Pacific Journal of Rural Development* **6**(2): 1-14.

[16] A.J. Talukder et al. (1992), *Living With Cyclone: Study on Storm Surge Prediction and Disaster Preparedness*, ed. by Jyotirmoy Talukder, Gauranga Deb Roy and Mohiuddin Ahmed, CDL, Dhaka.

[17] The Bangladesh Observer, Dhaka, Bangladesh (1991) Issues from 30 April to 6 May 1991.

[18] M.S. Ullah (2003), *The role of dialect specific radio warnings in saving lives during cyclonic disaster in Bangladesh; Turning the tide on disasters towards sustainable development*, World Disaster Reduction Campaign 2003, UNISDR.

[19] UNISDR (2007), *Living with Risk: A global review of disaster reduction initiatives'*, Chapter 4.5 'Public awareness, Building understanding: development of knowledge and information sharing', pp. 282-295.

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