
Nutritional Surveillance Project Cyclone Preparedness Study

How Ready Were We? Results from the HKI/UNDP
Post-Cyclone Study



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Cover Picture: Volunteers delivering cyclone preparedness messages.

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Introduction

After the devastating cyclone which struck Bangladesh in 1991, there was a recognition that many vulnerable people had either not received the warning that a major cyclone was imminent or had not believed or responded to the warnings. Some of those who did attempt to respond could not find appropriate shelter. Since 1991, there have been many attempts to improve warning systems and shelters. In the three intervening years, there have been two near misses when cyclone warnings were given and storms came close to hitting the Bangladesh coast. These events may have served to improve warning systems, but may also have reduced credibility of warnings in the view of coastal residents.

Prior to landfall of the May 2, 1994 cyclone, mass media, governmental and non governmental agencies were involved in informing coastal people of the approaching cyclone. Because of a happy set

of circumstances (low tide at landfall, short area of the coast affected), the human impact of the storm was apparently relatively light. But, because of the potential danger, the warning system performed at peak capacity. The coastal belt from Teknaf to Chittagong was under the most severe storm warnings and the entire coastal area of the country was under major storm warnings.

The Study

The May 2 cyclone offered a unique opportunity to assess the efficacy of the investments made in cyclone preparedness following a potentially devastating cyclone, which fortunately left relatively minor damages and loss of life. Helen Keller International (HKI), proposed to enlarge the scope of its data collection under the Nutritional Surveillance Project (NSP) to assess what information was received by coastal residents and how they responded to the information received. Immediately after the cyclone (May 14-19) HKI



*CPP volunteers
delivering cyclone
preparedness messages*

fielded special teams to assess nutrition and health status of the population of one thana. Teknaf as well as key socio-economic indicators. This rapid assessment demonstrated that over 60% of residents stayed in their own home during the cyclone, and that of those seeking shelter 8.8% did so in a cyclone shelter and 5.7% in a school or mosque. The goal of this study was to assess delivery of information, perception of information and cyclone related behavior.

Methodology

Three coastal thanas (sub-districts) were selected for inclusion in the study according to the severity of the 1994 cyclone. Teknaf was representative of the most severely affected areas; Moheshkhali, representative of areas moderately affected and Kutubdia, representative of areas not affected by the cyclone but which fell under severe storm warnings. Of these three thanas, two, Teknaf and Moheshkhali, are currently in the NSP system.

A questionnaire was developed to address the objectives detailed above, using the standard NSP questionnaire as a basis. The cyclone preparedness component was extensively pretested. Special survey teams were used for all data collection. All staff received intensive training on the questionnaires. Field supervision, quality control, data entry and validation followed normal HKI procedures (1).

Sampling was done following the NSP's standard sampling protocol. In each thana, 25 villages were randomly sampled using probability proportional to size. Once a village was selected, the starting household was determined by randomly selecting from the EPI (expanded programme of immunizations) list. This household was surveyed and then the next closest household, etc., until 16 households had been sampled. The total sample size per thana was 400 households. The total sample size for the three thanas was 1201 households. With an average family size of 7.3

persons these households represent approximately 8755 people.

Summary

After the May 1994 cyclone Helen Keller International conducted a survey to assess the cyclone preparedness activities and response in three thanas of the southeast coastal belt of Bangladesh. The cyclone preparation system performed well in informing citizens; a majority of people on all three thanas knew the cyclone was coming. The main vehicles of cyclone information were three sources; the radio, loudspeakers and volunteers of the Cyclone Preparedness Program. In general it was the respondents of Kutubdia, a thana which experienced the severest effects of the 1991 cyclone, which took the most preparation activities. Ironically this thana was spared during the 1994 cyclone. Respondents from Kutubdia were better informed than the respondents of the other two thanas; they generally had greater knowledge of the messages regarding the storage of food and water, protection for animals and the seeking of shelter. They also found the cyclone messages to be credible. Residents in Teknaf, the area where the 1994 cyclone hit the hardest were the most skeptical about the warnings they received and also the least knowledgeable about what to do when the cyclone hit. A majority of the respondents from this thana lost their homes in the cyclone. Education and wealth were highly correlated. Educated households tended to have slightly better preparation activities. However, a majority of respondents came from households in which neither parent had any education at all and they too were participating in preparedness activities.

Cyclone Information and Sources

The cyclone warning system in 1994 was fairly effective. Almost all those surveyed knew that the cyclone was coming (Table 1). 100% of the respondents in both the island thanas of Kutubdia and Moheshkhali had prior knowledge of the

cyclone. It was only in Teknaf, a more geographically isolated thana, that only 86% of the respondents stated that they knew the cyclone was coming. 14% did not know about the cyclone.

On the two island thanas, almost 70% of the respondents had heard news of the impending cyclone at least two days before the cyclone was supposed to hit. It was only in Teknaf where people heard about the cyclone much closer to its arrival; 30% knew about the cyclone the day before, 23% the morning of the day and 15% stated that they knew about the cyclone just a few hours before it arrived.

Residents in the three thanas received the initial news that the cyclone was coming from various sources. "Miking", the use of a loudspeaker to broadcast information was the most common source (see cover photograph). 93% of respondents had heard the news from a mike in Kutubdia, 78% in Moheshkhali and 50% in Teknaf. At the same time, residents were getting news via other means. Radio broadcasts also served to inform people about the impending cyclone; around 73% of households in Kutubdia and Moheshkhali had tuned into a radio with a smaller percentage in Teknaf, even though only 15% of households had working radios.

Table 1.
Did you know before that the cyclone was coming?

	Teknaf %	Moheshkhali %	Kutubdia %
Yes	86	100	100

The jointly organized Cyclone Preparedness Program (CPP) set up by the Bangladesh Red Crescent Society and the Ministry of Relief and Rehabilitation was also substantially involved in the warning activities. CPP volunteers also use miking as a method of informing the community. CPP volunteers seemed to have thoroughly covered Kutubdia; 92% of respondents had received

information through a CPP volunteer. In Moheshkhali 47% of respondents had been informed by a CPP volunteer with the number dropping to 14% in Teknaf. Other common sources of information were from relatives, the marketplace and neighbors. Very few people heard about the cyclone through their school age children, the local imams, GO workers or teachers.

Almost all residents understood that a big storm was on its way. However very few people understood the meanings of some of the common terminology used in cyclone messages. A small minority knew what the difference was between a signal number 10 and 8. This is clearly a source of confusion. (The Danger Signals between 8 and 10 are primarily concerned with the direction of the cyclone wind in the port and not the intensity of the storm).

As stated earlier, most residents knew that the cyclone was coming; yet the percentage of people that could recall specific preparedness messages differed in the three thanas. Householders surveyed in Kutubdia were the most knowledgeable about effective preparedness activities. 70% had heard that they should store water in a container and a similar proportion knew to bury food. 96% knew to pack and bury valuables. Fewer of the residents in Moheshkhali had heard cyclone preparedness messages; 35% knew to put water in a container and bury food. In Teknaf even fewer respondents had heard specific preparedness messages about the cyclone. Respondents were queried as to the main source of their information; the three main sources were the radio, miking and from the CPP volunteer.

When asked what they believed to be the most efficient way of getting information about a cyclone to residents, respondents enthusiastically supported the concept of miking (Table 2). 57% felt that using the loudspeaker was the best way to obtain information about a cyclone. 23% said the a CPP volunteer was the best way. A smaller percentage,

17.5%, felt that the radio was the most efficient way to find out about the cyclone.

Perception of Information Received and Credibility of the Warning System

Respondents from the three thanas generally had a positive response to the warning system. 87% of those surveyed responded that the warning had been repeated enough times. Almost all the respondents felt that the warning had been given far enough in advance to warrant whatever actions they felt necessary. This was especially true in Kutubdia and Moheshkhali where approximately 90% of the respondents had received a warning by the day prior to the cyclone. Residents in Teknaf were a little less enthusiastic; 78% felt that the cyclone warning was far enough in advance. A majority of the Teknaf respondents who did not feel the warning was far enough came from those respondents who did not know about the cyclone at all. Interestingly enough, in all thanas, a majority of those who knew about the cyclone only a few hours before the cyclone was due felt that they had enough advance warning.

Generally respondents did believe that the cyclone would occur (Table 3). Again, Teknaf respondents tended to differ from the two island thanas. They were more skeptical about the advancing cyclone; 14% did not believe the cyclone would occur at all and 31% believed it would happen but did not seriously believe anything bad would occur. Only 55% fully believed the messages they were receiving that a cyclone was on its way. In Moheshkhali over 80% of the respondents found the warning system credible. 18% thought the information probable but did not take it seriously. Residents in Kutubdia were not only the most informed about the cyclone, they were also the least skeptical that a cyclone was on its way. 97% found the messages that they were getting credible.

Cyclone Preparedness Actions

Although people may be knowledgeable about preventative measures to ensure their safety, whether or not they actually put their knowledge into practice is another story. In the case of the 1994 cyclone it appears for the most part that the



HKI field workers interviewing households on cyclone preparedness

Table 2.

What do you believe is the best source of information about the cyclone?

	Teknaf %	Moheshkhali %	Kutubdia %
Radio	13.3	20.3	19
TV	.3	0	0
Mike/loudspeaker	80	53.8	36.7
CPP Volunteer	3.5	21.3	44.4
NGO Worker	.3	1.5	0
UP Member/Chairman	1.5	1.5	0
School Teacher	.5	0	0
Imam	.3	.8	0
Neighbors	.5	.3	0
Family Members	0	.3	0
Others	0	.5	0

residents of the two thanas that had been severely affected by the 1991 cyclone (Kutubdia and Moheshkhali) put their knowledge into practice. This was most evident in Kutubdia where a large percentage of those who responded took precautionary measures such as storing food, letting animals loose and burying and packing valuables in a safe place (Table 4). Ironically, the residents of Teknaf, which had been spared the more devastating effects of the earlier cyclone and experienced the more dramatic effects of the 1994 cyclone were the ones that did the least in preparation for the cyclone.

TEKNAF

In Teknaf, 35% of those questioned stated that they had taken one or more precautionary measures in preparation of the cyclone. 6% made plans to leave the area and 7.3% made plans to go to a cyclone shelter. Six percent reported that they stored some

Table 3.

Did you believe the warnings?

	Teknaf %	Moheshkhali %	Kutubdia %
Yes	55	80.8	96.5

Table 4

Preparedness activities undertaken (% affirmative)

	Teknaf %	Moheshkhali %	Kutubdia %
Took animals to safe place	4.0%	22.8%	45.9%
Buried food/water underground	8%	4.5%	51.9%
Bought food and stored	1.3%	2.8%	4.0%
Removed handle of tubewell	0	.3%	2.2%
Packed and buried valuables	0	5.0%	65.6%
Put on jewelry	1.8%	2.5%	10.5%
Put valuables in safe place	9.3%	48.5%	51.9%

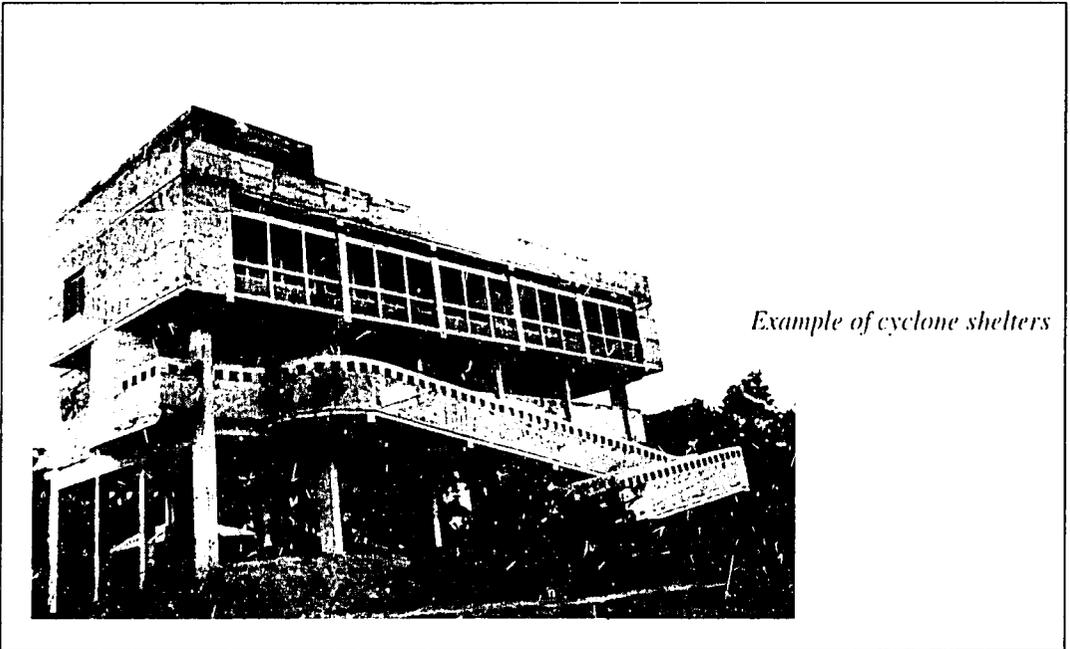
food in a safe place and 10% stored valuables in a safe place. Less than two percent stored jewelry in a safe place, made emergency rafts or bought any extra food to store underground. Fourteen percent reported that they had done something to protect their animal(s), either taking them to a hill or letting them loose around the house.

Most of the residents of Teknaf did not actively participate in preparations at the community level. 9% informed people about the impending cyclone and only 4% helped in the evacuation.

MOHESHKHALI

In Moheshkhali 75% of families made some plans to ready themselves for the cyclone. These included, 22% making plans to leave the area and 17% preparing to go to a cyclone shelter. 8% took measures to store water in a safe place and 10% to store food in a safe place. Over 20% did take some precautions for their animals and 24% stored valuables in a safe place.

At the community level, 13% helped by informing others about the impending cyclone and 13% helped in the evacuation.



KUTUBDIA

Residents of Kutubdia were by far the best prepared for the cyclone. 98% of those surveyed stated that they had taken precautionary measures for the cyclone. While only 2.5% had made plans to leave the area, 77.3% made plans to go to a cyclone shelter. 30% put water in containers and 50% buried food underground. Half of those who responded also had the foresight to bring water to a cyclone shelter. Almost half took a precautionary measure to ensure the safety of their animals and a similar proportion stored or buried their valuables.

Kutubdia residents were much more active at the community level. 25% helped by informing others about the cyclone and 31% helped in the evacuation procedures.

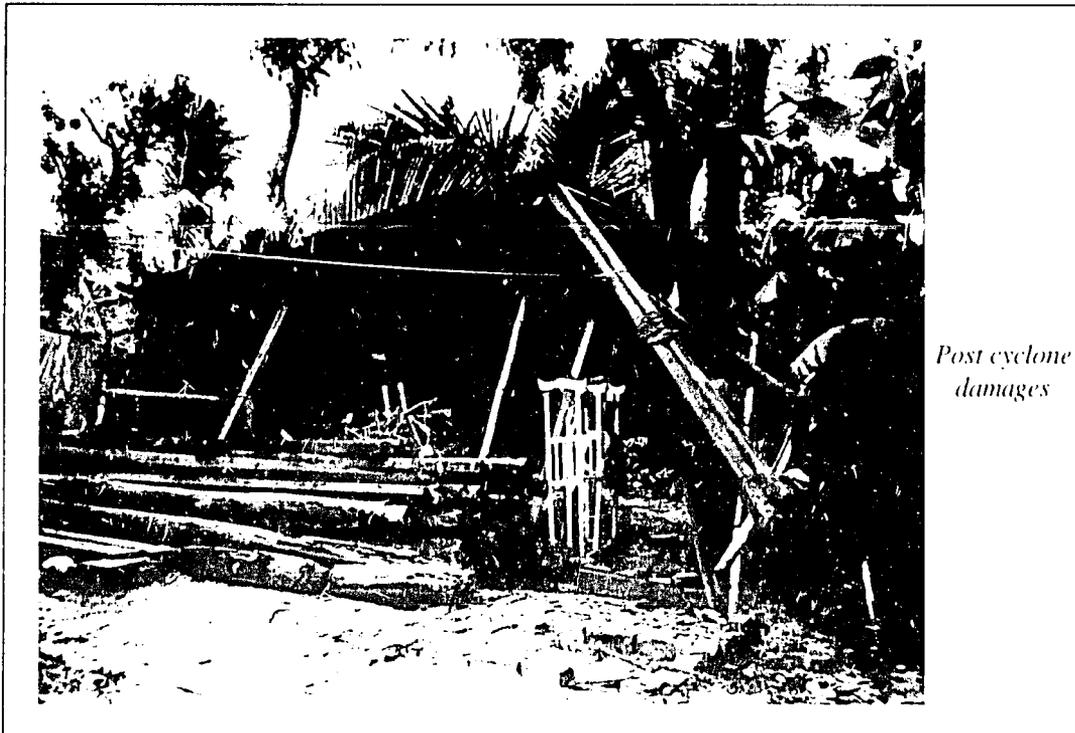
Respondents Seeking Shelter

In general a majority of residents from all the three thanas ended up seeking some sort of shelter although the type of shelter and when they left for

the shelter varied. About 80% of the households ended up in shelter outside of their homes. Table 5 details where respondents from each of the thanas took shelter and Table 6 when residents left for shelter. Again, residents from Kutubdia were the most prepared. 19% of them left several hours before the cyclone with approximately 70% leaving either when the rain or winds started. A majority of respondents stated that they made preparations and then left. 73% of the residents in Kutubdia sought their shelter in a formal cyclone shelter with a little under 5% staying in a solid house. In

Table 5.
Where did residents seek shelter?

	Teknaf %	Moheshkhali %	Kutubdia %
Cyclone shelter	16.3	14.8	72.6
School	.8	5	11.7
Mosque	15	1.5	0
Concrete house	28	6.8	4.7
Evacuated area	.3	5.8	1
Killa/hill	.3	13	.5
Others	13.8	14.8	5.7
Not applicable	25.8	38.8	3.7



Post cyclone damages

Moheshkhali only 9% of the households surveyed left their house a few hours before the cyclone hit with a greater majority leaving when the winds and rains started. 15% sought shelter in a cyclone shelter and 13% went to a hill. In Teknaf, where the cyclone hit the hardest 57% of respondents left their house for shelter only when their house collapsed. Very few had made any preparations and responded that they left suddenly. Most residents fled to a cyclone shelter or a solid house and 15% went to a mosque.

In all three of the thanas the time required to reach the chosen shelter was for the majority of the respondents under 30 minutes. Very few respondents had to travel over an hour to get to their destination. Almost all of those who left for shelter traveled by foot with a very small minority taking a rickshaw. The main complaints people had in getting to the shelter was that the roads were bad and that they had to carry a child. Very few felt they were overburdened with articles and no one complained at the lack of adequate transportation.

Table 6.

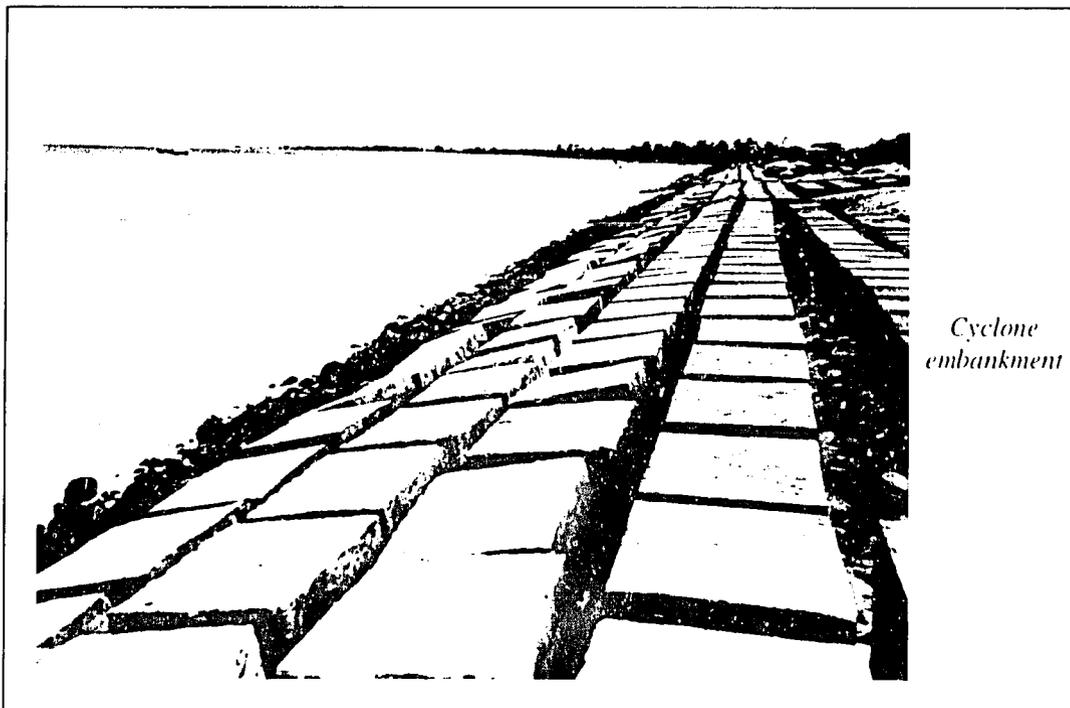
When did you leave your home?

	Teknaf %	Moheshkhali %	Kutubdia %
Cyclone day	0	.5	4
Several hours before	1	9.3	19
When the winds started	15	33	38.7
When the rains started	1.5	18.5	35.2
When the house collapsed	57	.3	0
Other	0	.3	0
Not Applicable	25.5	38.3	3.2

Table 7.

Main problem faced by those who sought shelter in a cyclone shelter

	%
No problem	14
Latrine Problem	13
Theft	1
Assault on Women	1
Fights	3
No place to move/lay	67
Other	1



*Cyclone
embankment*

It was only those residents of Teknaf, who left hurriedly and without as much preparation as had taken place in the other two thanas, where respondents complained of theft of articles. 25% stated that something had been stolen whereas less than 2% complained about stolen goods in Moheshkhali and Teknaf. The perception of goods being stolen could also be a reflection of the way the cyclone hit Teknaf. 97% of respondents stated that their house had collapsed during the cyclone. In Moheshkhali this number drops to 56% and Kutubdia 5.5%.

Of those who responded that they had gone to a cyclone shelter many were troubled by the lack of space in the building (Table 7). 67% said they had no space at all to walk or lie. Others complained that there was no latrine in the shelter and a few were troubled by fights within the shelter. 14% responded that they had no troubles at all. Assaults on women were a minor problem (less than 1%).

Respondents Who Did Not Seek Shelter

Whereas 35% of the respondents initially did not intend to seek shelter it appears that many households in Teknaf eventually left their homes for shelter when it became obvious that the storm would be serious. In the end, 19% of the households in the three thanas did not seek shelter during the storm. Of those who did not seek shelter a majority (53%) felt that they would be safer in their homes than in the other options they had available. Those who made this decision came proportionately more from solidly constructed homes but over 70% still had bamboo and straw or bamboo and tin sheeted houses. Another 15% felt that the storm would not be severe enough to warrant seeking shelter. Only 13% of the respondents who decided not to go for shelter stated that they had no place to go and a very small percentage felt that they did not have enough time to reach the shelter.

Table 8.

Percentage of respondents who post-cyclone had:

	Teknaf %	Moheshkhali %	Kutubdia %
A collapsed house	91.3	56.5	5.5
Crops destroyed	49	33.3	5
Lost seeds	33.3	2.5	.7

Those households who stayed at home said that they had stayed inside their house and closed the door behind them.

POST CYCLONE

Respondents in Teknaf were the most affected by the cyclone (Table 8). Not only did most households lose their homes, half said that their crops were destroyed and that they had no food or water afterwards. Almost 90% lost their animals and 33% stated that they had lost seeds. NGOs in the area were the most effective and responsible for giving help after the cyclone. About half of the respondents received some sort of financial help from an NGO. Under one percent stated that their main source of help was from a family member or CPP volunteer.

Moheshkhali was the next hardest hit by the cyclone. About half of the respondents lost their house and had trees uprooted. 33% stated that crops were destroyed and 22% lost animals. None of the households in Moheshkhali received any financial help for reconstruction of houses or replacement of seed.

Very few of the respondents from Kutubdia stated that they had damage from the cyclone. All had

Table 9.

If you have to leave your home in a crisis do you object to taking the women and girls in your family to a cyclone shelter?

No	94
Yes	6

adequate food and water afterwards and under 2% had trees uprooted or crops destroyed. The greatest complaint was that 11% stated that they had lost animals. No financial help was received by any household after the cyclone.

PERCEPTIONS OF SHELTER AVAILABILITY AND MESSAGES COMPARED TO 1991

By all measures, peoples perceptions were that shelter was more plentiful and cyclone preparedness activities more efficient in 1994 compared to 1991. 81% of the respondents felt the warning system in 1994 was better than the warning system for the 1991 cyclone. An even larger percentage (90%) responded that they thought there was more shelter space available now than there was earlier. Whereas most respondents felt the messages were clear and repeated enough for the 1994 cyclone they were not as enthusiastic about the system that was in place in 1991. 50% said that they had not had enough warning in 1991 and 77.3% said that the messages were not believable.

INFLUENCE OF SOCIO-ECONOMIC STATUS ON AWARENESS AND PREPAREDNESS

In the three thanas studied, socio-economic status was not surprisingly positively correlated with the educational status of the parent. That is, if one or both of the parents were educated they were more likely to come from a household which also had more expensive possessions (radios, televisions), land and from an occupation that would bring a higher income.

Socioeconomic status had little bearing on whether the respondent believed the information that the cyclone was coming. However, the source of information varied somewhat; respondents from wealthier families heard the news about the cyclone disproportionately more from the radio.

Better educated respondents also made slightly more preparations for the cyclone. A higher

percentage of them brought valuables to a safe place before the cyclone hit as well as buying and storing food and water. Whether this reflects better understanding of the cyclone messages or that they had more resources to buy food and more valuables to lose in the event of a cyclone will have to be explored further. A larger proportion of educated and well-off respondents felt safer in their own (more solidly constructed) homes during the cyclone. Wealthier households also tended to be more conservative; they expressed more objections to taking women to a shelter. Overall, only 4% of respondents had objections to taking females to shelters (Table 9).

VILLAGE LEVEL PREPAREDNESS MEASURES

An assessment was made at the village level to know what kinds of cyclone structures were in place at the village level. In Teknaf 64% of the villages surveyed had an embankment, and a little over half had a protective mangrove plantation. In Moheshkhali 44% of the villages had an embankment and 32% a mangrove plantation. Half of the villages in Kutubdia had an embankment but there were no mangrove plantations in any of the villages surveyed.

In all three thanas the distance to the nearest concrete mosque or school was on average less than one mile. It was only in Teknaf that the distance to the nearest cyclone shelter was an average of over three miles. 10 of the 25 villages surveyed in Teknaf had a cyclone shelter over a mile away.

CONCLUSIONS AND RECOMMENDATIONS

The cyclone preparedness system appears to have performed at peak capacity for the 1994 cyclone. It was only in one thana that a minority of households in the survey had not heard messages about the cyclone. Although there seems to be some confusion about some of the official messages,

respondents were well aware that a big cyclone was coming. Whether households actually took preparatory actions for the cyclone is another story. While it appears that the most preparation was done in those thanas which were hardest hit by the 1991 cyclone, efforts will have to be made to try to convince people to take appropriate actions before the cyclone hits. Particularly worrisome is the fact that most residents in Teknaf did not leave for shelter until after their homes had collapsed. In the other two thanas many waited until the wind started before taking adequate shelter. In the event that the cyclone had been more severe, this delay in shelter seeking could have had even more disastrous consequences. Clearly the current numbering system of cyclones is a source of confusion. Formative research to develop a numbering system which more closely corresponds to people's perceptions of cyclone danger would be valuable.

Although people felt that there was more shelter space in 1994 as compared with the 1991 cyclone, the major complaint of those who went to a cyclone shelter was that there was not enough room to move. Existing shelter capacity would seem to have been used to its full capacity, but only 35% of households had sought shelter. Increasing shelter seeking would severely tax existing capacity. Continued efforts will have to be made at increasing shelter number and capacity, especially in Teknaf. Shelters can be built that can also serve as schools and community centers so that the buildings are put to use during non-cyclone periods. The complementary strategy of villages building *killas* should also be reassessed. It is encouraging to note that in an emergency situation, safety concerns generally override other concerns about evacuating women to shelters.

Preparedness activities other than leaving for shelter, are still not well established. Household level actions such as burying food and water, removing handles from pumps, moving livestock to higher ground, etc., can significantly aid recovery

and reduce damage. It would be worthwhile to explore the introduction of a cyclone preparedness module into the curriculum of formal and non formal primary education in cyclone prone areas.

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Collaborating Organizations

Aga Khan Community Health Project (AKCHP)
Bangladesh Rural Advancement Committee (BRAC)
Christian Commission for Development in Bangladesh (CCDB)
Comilla PROSHIKA
CONCERN
Family Planning Association of Bangladesh (FPAB)
Gono Unnayan Prochesta (GUP)
Grameen Jano Kallyan Sangsad (GJKS)
International Center for Diarrhoeal Disease Research, Bangladesh (ICDDR,B)
Institute of Public Health Nutrition (IPHN)
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