Impact of Health Education in Raising Community Awareness on Flood Preparedness

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ABSTRACT
Background: In India, 168 floods have been reported from 1980-2008, occurring at a frequency of 5.79 per year. Karnataka’s total coastline of 280km is often struck, more severely Dakshina Kannada and Udupi coasts. In Udupi District, from April 2009 - April 2010, 14 lives have been lost, 408 hectares of crop area and 668 houses were damaged. Because of the causal link between people being aware of a hazard and acting appropriately, an education program will be useful in increasing the resourcefulness of the community in the event of a flood.

Aims and Objectives:
(a) To determine existing awareness about flood preparedness;
(b) To significantly increase public awareness of flood risk;
(c) To determine impact and effectiveness of health education on the community;
(d) To identify any possible risks or vulnerability of the community to the hazards of flood.

Methodology: The study subjects chosen (sample size of 55) were the population from flood prone areas of Heroor and Uppoor, Udupi Taluk. They were addressed at their monthly meeting where a questionnaire was used to assess the community’s vulnerability and concern about the risk of flood, and existing awareness on flood preparedness measures. Following this, a community flood education program (which included a talk, a Microsoft PowerPoint Presentation, and a short interactive session) was implemented. The data has been summarized using proportions. The impact of the intervention has been analysed using Paired Sample T Test.

Results:
(a) The pre-test determined a baseline awareness score of 5.87 (39.2%);
(b) The post-test gave an awareness score of 11.62 (77.5%);
(c) The improvement was by 5.75 (38.3%) which was found to be statistically significant (p<0.001).

Conclusion: The study was able to determine the community’s pre-existing awareness level and through the flood education program, improve on it. The community was found to be highly vulnerable to floods due to lack of acquaintance with flood preparedness measures and the number of dependents.
Limitations: Most of the participants (92.3%) were female. In India, men usually make the decisions for the family and hence the flood education material taught to the participants may not be effectively implemented. However, if a flood strikes in the absence of the men, educated women can carry out the appropriate actions.

Keywords: Awareness, community, education, flood, mitigation, preparedness

Introduction

The unique geo-climatic conditions of India make it one of the most disaster prone countries in the world. 24 out of 35 States and Union Territories are vulnerable to one or the other geo-climatic disaster. Over 55% of landmass is vulnerable to earthquakes, 8% to cyclone, 5% to floods and 70% of the land under cultivation is vulnerable to drought. Natural disasters are taking a heavy toll of human life and property year after year and the loss in terms of lives and assets is incalculable.

The genesis of the worry to cope with a natural disaster was in the tsunami that struck the Indian coastline on December 26th 2004. India, with her vast coastline spanning about 7517 kilometres, is often struck by natural events like cyclones crossing from land to sea and the resultant coastal storm surges. The recent tsunami in Indian Ocean has forcefully added a new dimension to the natural calamities affecting India. In India, 168 floods have been reported from 1980-2008, occurring at a frequency of 5.79 per year, and affecting more than 4 million people each time.

The recent upsurge in natural disasters also stems from the impact of rising sea levels caused by global warming. Populations living along the coasts are, therefore, particularly vulnerable to the ingress of water caused by rising seas. As compared with the rate of rise of global average sea level in 1961-2003 of 1.8 millimetres per year, the rate in 1993-2003 was 3.1 millimeters per year (which is 70% faster).

In Karnataka, the state's total coastline of 280 kilometres is often struck by floods, with the problem being relatively more severe in Dakshina Kannada and Udupi coasts, where about 28 per cent of the total stretch is critical. The villages in Udupi District of Karnataka state, which are continually affected by floods, are namely Heroor, Uppoor, Bannadi, Vaddarse, Kavadi, Barkur, Handadi, and Neelavara. The total population of Udupi Thaluk is about 1, 10, 000 (as per 2001 India census). 14 lives have been lost to floods in the flood affected areas since April 1st 2009. Other losses include 12 livestock, 408 hectares of crop area and 668 houses being severely or fully damaged.

While natural hazards cannot be controlled, the vulnerability to these hazards can be reduced by planned mitigation and preparedness measures. There needs to be concentrated and sustained steps towards reducing the vulnerability of the community to disasters. This can be achieved only through education of the general public shifting the
focus from a reactive to a preventive one, using cooperation from a knowledgeable public.

Flood resilient communities will be critical in an uncertain future of ‘accelerated’ climate change. The focus of this study is therefore to evaluate the existing community awareness about flooding and to raise it further, through an effective flood education program. Because of the causal link between people being aware of a hazard and acting appropriately for that hazard, such an education program will be useful in increasing the resourcefulness of the community in the event of an unforeseen flood.

To carry out participatory flood risk management in local communities, it is necessary to understand how residents perceive flood risks in their areas and what type of consciousness residents have regarding flood preparedness actions. Hence the first part of the questionnaire is designed to answer these questions. The flood education material consists of methods of flood mitigation and preparedness, because both mitigation and preparedness take place in the pre-disaster context. The objective of the program therefore is to establish sustainable, replicable non-government mechanisms for disaster alleviation and watchfulness with a focus on flooding.

**Review of Literature**

A disaster means a catastrophe, a calamity, which causes serious disruption of the functioning of a society, resulting in widespread human, material or environmental losses exceeding the ability of the affected society to cope using only its resources. They can either be natural, such as floods, droughts, earthquakes; or human-made such as riots, fire, epidemic, industrial accidents. Globally, natural disasters account for nearly 80% of all disaster affected people. If one counts the losses in countries like India, where most of the property of the people, especially in the rural areas remains uninsured, the losses are exorbitant.

A flood is an overflow or inundation that comes from a river or other body of water and causes or threatens damage. There are three main types of flood:

1. Flash flood: which often happen in small rivers or streams in mountainous areas, usually the result of very heavy rains in sloping areas where trees and plants have been destroyed and water cannot be absorbed into the soil. They start soon after the rains begin and are therefore difficult to determine where they occur.
2. River flood: characterized by river water flowing faster and at a higher level than normal and are also usually caused by heavy rains upstream.
3. Coastal flood (sea surge): which occur when storm surges or sea waves arise suddenly in combination with high tides which break or overflow the sea dyke.

Flooding can be very dangerous; only 15 centimetres of fast flowing water is needed to knock one off one’s feet. This is the reason why several researches have been undertaken to improve the communities’ awareness on flood mitigation and preparedness. Flood awareness is an appreciation of the likely effects of flooding and knowledge of the
relevant flood warning, response and evacuation procedures. [6] The flood education material that has been used in the study consists of methods of flood mitigation and preparedness. Mitigation consists of policies and actions taken before an event, which are intended to minimize the extent of damage when an event does occur. Mitigation activities include land-use regulations; where to locate particular facilities, settlements, and activities. Preparedness measures are the second line of defense against disaster; their objective is to enhance the ability to respond when a disaster occurs. Preparedness activities include formulating emergency plans; providing training and education for disaster responders and the general public to improve their understanding of what to do in a disaster; communicating with the susceptible audiences about levels of disaster vulnerability and what to do to reduce that vulnerability. [7]

Community educators have shown over the years that there is a linear relationship between becoming aware of an issue, clarifying attitudes and values about that issue, and then acting appropriately. Awareness is viewed as one of a nest of factors that precipitate appropriate behaviours. [8] For example, in relation to hazards, ‘critical awareness’ is identified as one of a sequence of components that determine a person’s adoption of a protective action and hence a community flood education program should be designed to raise awareness in the population and thereby convert them to preparedness.

Dufty (2008) identified the following as the functions of flood education:
1. Preparedness conversion
2. Mitigation behaviours
3. Adaptive capability
4. Post-flood learnings
These functions are related as education interventions to the ‘flood cycle’ as seen in the following figure. [9]

In a “Flood Management and Drainage Strategy” developed in Melbourne, Australia, the study done showed that flood awareness allowed landholders to defend themselves, their property and their community from flood threats and to effectively evacuate themselves and their possessions when necessary. In communities with a high degree of flood awareness, the response to flood warnings was prompt and effective. In communities with a low degree of flood awareness, flood warnings were liable to be ignored or misunderstood, and the residents were often confused about what they should do, when to evacuate, what to take with them and where it should be taken. [6] This shows that enhanced community education, flood awareness and preparedness helps alleviate the damage incurred from a flood event as the community is capable on its own to take care of itself.

In another study held in Japan, they concentrated more on the communities’ perception to the risk of floods and how it affected their actions at the time of such a disaster. The study showed that it is difficult for people to appropriately perceive natural disaster risks. [10] For example, people tended to perceive flood disasters as periodic phenomena instead of as probable and random phenomena. Moreover, people tended to believe that if a major flood disaster occurs in a certain year, no major flood disasters will occur for some time after. The results of this study revealed that people accepted flood risks only when they have a strong consciousness of self-responsibility. Hence through flood education programmes, the community can be taught to be self-reliant and this can invoke a sense of self-responsibility amongst the population. This study also showed that to swiftly carry out relief activities at the initial stages after the occurrence of disasters, it is necessary to carry out community-based disaster preparedness activities on a habitual basis. However our study involves only one educational session. Further sessions if undertaken by the concerned administrative bodies can increase the effectiveness of the community to respond. As disasters do not occur frequently, people feel highly burdened to participate in community-based disaster preparedness activities during normal times when nothing happens. Hence these activities should be undertaken at appropriate times such as before the monsoons, as was done in our study, or even after the floods so that the community can be better prepared by experience for the next flood.
A study conducted in India (Assam, Bihar and West Bengal) showed that in India the present level of community participation in flood management is characterized by inadequacies and inefficiencies in several aspects, primarily due to lack of community spirit among villagers. Even during heavy floods, many households prefer to stay back in their own houses to look after their belongings and cattle even though instances of theft and related problems are not frequent. The reasons for not shifting to safer places (temporary shelters) as cited by the villagers, are lack of privacy and space for keeping their belongings as also location of such shelters, which are far off from their houses. Hence, they generally respond to flood by way of raising bamboo/wooden platforms for providing safety and security to children and women. While leaving their houses, the family generally moves together. However, in some cases, one male member of the family stays back to guard the property against possible thefts. [11] The objective of their study was therefore to improve their awareness, remove false ideas, and foster self help and a cooperative spirit in the village community, which is also what the aim of our study is, so that the community can engage in safer practices at the time of floods.

Similar results were obtained in studies done in Thailand and Cambodia showing how improvement of the community knowledge and awareness is a practical, low cost strategy that brings about a positive influence in the performance of the community. [12] By involving community members it not only increases the likelihood of increased action by communities to help mitigate flood disaster but also brings communities together to address flood issues cooperatively. [13]

Yet another study performed in Japan by the PAFRICS (Participatory Flood Risk Communication Support System) [14] did a study in the same format as the one we conducted. A teaching session was organized and a pre and post lecture questionnaire was handed to be answered which was designed to examine whether the respondents gained a better understanding of flood disasters and a basic understanding concerning flood mitigation and preparedness. The results showed a favourable outcome after the teaching session and displayed that this system can thus be used to provide education in places where knowledge about namely flood risk is needed.

**Aims and Objectives**

a) To determine the existing awareness about flood preparedness among the community.

b) To significantly increase the public awareness of flood risk, so that the public demands and works to achieve safer communities in which to live.

c) To determine the impact and effectiveness of health education on the community.

**Methodology**

**Setting**
The areas chosen for the study are the villages Heroor and Uppoor, Udupi Taluk, Karnataka. The subjects will be the coastal population in these areas, who are the ones primarily affected by the floods.

The study was conducted at the monthly Giants’ Group Meeting held at Udhyavara where the above mentioned population gathered regularly.

**Study Period**

The study was carried out in June and July 2010, before the monsoon season and the subsequent floods hit the coastal villages, so that the community can put to use the newly acquired education on flood preparedness.

**Sample Size**

A pilot study was conducted among the coastal population of Heroor and Uppoor on Sunday, 7th of February 2010 and the existing awareness of the community on flood preparedness was assessed. The pilot study revealed a baseline awareness of 48.3% in the community.

Anticipating an awareness of 48.3% and an improvement on intervention by 30%, for a power of 80% and level of significance 5%, a sample size of 20 will be required. Taking a design effect of 2.5, the total sample size required will be 50.

Thus keeping with the statistical calculations, it was ensured that there were at least 50 subjects in the final study. The final study had 55 subjects, which was the number of participants of the Giants’ Group meeting.

**Data Collection Methodology**

After contacting the Vice President of Chanthar Panchayat, Mr. Dinakar, and the head of the Giants’ Group, Mr. Madhusudan, the study was arranged to be held at the Giants’ Group monthly meeting with the coastal population, who are the change agents. The participants of the study were informed about the purpose and details of the study in the language understood by them (Kannada) via a Subject Information Sheet (Annexure I). A consent form (also in Kannada) was signed by each of them before partaking in the study (Annexure II).

A pre-test knowledge assessment of the subjects on the topic of flood preparedness was carried out, the questionnaire for which is annexed at the end of this document (Annexure III).

Following this, a community flood education, awareness and preparedness program was implemented for the community in the form of a health education session. The following topics were addressed:

- precautions to be noted
actions that can be undertaken
- care for oneself and family
- community response to a flood situation
- health hazards following an event of flood
- simple measures of attending to common health problems encountered following a flood

The education session included a talk, with a Microsoft PowerPoint presentation and a short interactive session at the end, which involved sensitizing them to the dangers and calamities that have occurred due to the floods in their area and reviewing the materials they needed to keep ready with them in the event of a flood. A copy of the health education material that was used is annexed at the end of this document (Annexure IV).

The community flood education session was shortly followed by a post-test knowledge assessment. The presence of any improvement in test scores will help to tell about the impact and effectiveness of the health education on the community.

The initial plan to carry out another post-test knowledge assessment two months later for the same population was not feasible because
- the monsoon season arrived early this year, and the area got hit by floods
- there were time constraints due to the Panchayat elections that were held this year in the villages during this time period

**Statistical Analysis**

The data has been summarized using proportions. The impact of the intervention has been analysed using Paired Sample T Test.
Observations & Results

General Details
1. Number of individuals in the study: 55
2. Percentage of male to female:
   Male: 7.69%
   Female: 92.3%
3. Age of the Participants
   Mean age: 35.2 years
   Median age: 35 years
   Mode age: 32 years
   Range of ages: 24 to 48 years

Family Details
1. Situation of living

<table>
<thead>
<tr>
<th>Living Situation</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Family with Children</td>
<td>92.30%</td>
</tr>
<tr>
<td>(b) Family without children</td>
<td>1.92%</td>
</tr>
<tr>
<td>(c) Living with others, not family</td>
<td>3.85%</td>
</tr>
<tr>
<td>(d) Alone</td>
<td>0%</td>
</tr>
<tr>
<td>(e) Other</td>
<td>1.92%</td>
</tr>
</tbody>
</table>

2. Type of dependents:
   (a) 83.6% of the participants had Children, below 12 years of age in their family
   Out of those who had children below 12 years of age, there was an average of 1.78 children per participant.
   (b) 67.3% of the participants had Elderly, above 60 years of age in their family
   Out of those who had elderly, above 60 years of age, there was an average of 1.28 elderly per participant
   (c) 7.27% of the participants had Handicapped individuals in their family
   Out of those who had handicapped individuals, there was an average of 1 handicapped per participant

Flood Events in the Community

1. Flood events experienced by the participants

<table>
<thead>
<tr>
<th>Number of Floods</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Never</td>
<td>0%</td>
</tr>
<tr>
<td>(b) Once</td>
<td>61.8%</td>
</tr>
<tr>
<td>(c) Twice</td>
<td>29.1%</td>
</tr>
<tr>
<td>(d) Three or four times</td>
<td>0%</td>
</tr>
<tr>
<td>(e) More than five times</td>
<td>9.09%</td>
</tr>
</tbody>
</table>
2. **25.5%** of participants have received information on flood preparedness earlier

3. Out of the participants who received information, how recently was it received

<table>
<thead>
<tr>
<th>Time</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Within the last 6 months</td>
<td>0%</td>
</tr>
<tr>
<td>(b) Between 6 and 12 months</td>
<td>50%</td>
</tr>
<tr>
<td>(c) Between 1 and 2 years</td>
<td>35.7%</td>
</tr>
<tr>
<td>(d) Between 2 and 5 years</td>
<td>7.14%</td>
</tr>
<tr>
<td>(e) 5 years or more</td>
<td>7.14%</td>
</tr>
</tbody>
</table>

4. Source of received information:

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>News Media</td>
<td>64.2%</td>
</tr>
<tr>
<td>Not Sure</td>
<td>35.7%</td>
</tr>
<tr>
<td>PHC</td>
<td>0%</td>
</tr>
<tr>
<td>Government Agency – Panchayat</td>
<td>0%</td>
</tr>
<tr>
<td>Non-profit Organization</td>
<td>0%</td>
</tr>
<tr>
<td>Insurance Agent or Company</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>0%</td>
</tr>
</tbody>
</table>

5. Preparedness Activities Done

<table>
<thead>
<tr>
<th>Preparedness Activities</th>
<th>Percentage of Participants who Have Done</th>
<th>Plan to Do</th>
<th>Not Done</th>
<th>Unable To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Attended meetings or received written information on floods or emergency preparedness</td>
<td>4.65%</td>
<td>9.30%</td>
<td>65.10%</td>
<td>20.90%</td>
</tr>
<tr>
<td>(b) Talked with members in the household about what to do in case of a flood</td>
<td>20.50%</td>
<td>17.90%</td>
<td>43.60%</td>
<td>17.90%</td>
</tr>
<tr>
<td>(c) Developed a “Household/Family Emergency Plan” in order to decide what everyone would do in the event of a flood</td>
<td>6.06%</td>
<td>24.20%</td>
<td>45.50%</td>
<td>24.20%</td>
</tr>
<tr>
<td>(d) Prepared a “Disaster Supply Kit” (Stored extra food, water, batteries, clothes, medication)</td>
<td>4.65%</td>
<td>17.90%</td>
<td>61.80%</td>
<td>15.60%</td>
</tr>
</tbody>
</table>
6. Concern about risk of floods

<table>
<thead>
<tr>
<th>Concern About the Risk Of Flood</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not a lot</td>
</tr>
<tr>
<td>(a) Participants who have thought about floods</td>
<td>16.30%</td>
</tr>
<tr>
<td>(b) Participants who have talked about floods</td>
<td>12.50%</td>
</tr>
<tr>
<td>(c) Participants who have thought that a flood could pose a threat to their personal safety</td>
<td>30.80%</td>
</tr>
<tr>
<td>(d) Participants who have thought that a flood could pose a threat to their daily activities (work, leisure, etc)</td>
<td>25.70%</td>
</tr>
</tbody>
</table>
**Flood Emergency Response Awareness**

Awareness Grading out of 15 – Based on Questionnaire for each participant

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Pre Test</th>
<th>Post Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>10</td>
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<td>4</td>
<td>3</td>
<td>9</td>
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<td>5</td>
<td>5</td>
<td>10</td>
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<tr>
<td>6</td>
<td>4</td>
<td>10</td>
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<tr>
<td>7</td>
<td>7</td>
<td>11</td>
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<tr>
<td>8</td>
<td>3</td>
<td>10</td>
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<tr>
<td>9</td>
<td>3</td>
<td>10</td>
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<tr>
<td>10</td>
<td>1</td>
<td>9</td>
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<tr>
<td>11</td>
<td>3</td>
<td>11</td>
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<tr>
<td>12</td>
<td>6</td>
<td>13</td>
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<tr>
<td>16</td>
<td>6</td>
<td>14</td>
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<tr>
<td>17</td>
<td>7</td>
<td>12</td>
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<tr>
<td>18</td>
<td>1</td>
<td>9</td>
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<tr>
<td>19</td>
<td>6</td>
<td>10</td>
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<td>21</td>
<td>6</td>
<td>11</td>
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<td>22</td>
<td>8</td>
<td>12</td>
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<td>23</td>
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<td>26</td>
<td>6</td>
<td>13</td>
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<tr>
<td>27</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>28</td>
<td>8</td>
<td>12</td>
</tr>
</tbody>
</table>
Paired Sample T Test

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Number</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test</td>
<td>5.87</td>
<td>55</td>
<td>1.973</td>
</tr>
<tr>
<td>Post Test</td>
<td>11.62</td>
<td>55</td>
<td>1.312</td>
</tr>
</tbody>
</table>

The increase in score on intervention is **5.75** (95% confidence interval = [5.3, 6.2]), which was found to be statistically significant (**p < 0.001**).

**Discussion**

The participants of the study had a mean age of 35.2. This means that the majority of the participants were of an age group which is young, capable of making decisions by themselves and healthy enough to carry out the preparedness activities in the event of a flood.

A large proportion of the participants (92.3%) live in a family with children, which means there is a greater responsibility on each participant should they face a flood. In terms of dependents on the participants, 83.6% have children below 12 years of age, 67.3% have elderly above 60 years of age and 7.27% have handicapped individuals in their family. The more the dependents the more is the preparation that will be required of the participant at the time of a flood since the dependents are too weak to handle themselves.

The above information indicates the vulnerability of the community to floods, which in turn indicates their higher need to be well aware and prepared about flood mitigation and preparedness.

All the participants have experienced a flood event at least once, however only 25.5% have received flood education in the past, the majority of which (50%) have received such information through news media. News media, although very informative in its own respect, may not be specific to this particular community and its needs. The lack of any flood education programme can be dangerous for the community and makes them ill prepared to face such a calamity. It calls for the need to implement more educational programmes in the community.

Even though only a strikingly small percentage of the participants have attended meetings on floods or emergency preparedness (4.65%), developed a “Household/Family Emergency Plan” in order to decide what everyone would do in the event of a flood (6.06%), or prepared a “Disaster Supply Kit” (4.65%), it was noticed that at least 20.5% of them talked with members in their household about what to do in case of a flood. The statistics however are not relieving as it shows the lack of knowledge on how to deal with floods by the community.
Regarding the community’s concern about the risk of floods, it was noticed that a considerable portion of the participants thought and talked about floods and considered floods to pose a risk to their personal safety and more-so to their daily activities (work and leisure). This is consoling, because the more concerned the community is about the risk of floods, the more receptive they are likely to be towards a flood education programme; just as was depicted by previous researches. [10][11]

The average baseline awareness score (graded out of 15) of the community prior to the flood education programme was found to be 5.87 (39.2%). This is less than what was expected through the pilot study performed that had given an average baseline awareness of 48.3%. This slight discrepancy of 9.1% is probably due to the larger number of participants in the final study, which is favourable because of the smaller margin of error. The average awareness score of the community following the flood education programme was 11.62 (77.5%). Therefore the improvement in score on intervention, and thereby the impact of the education, was by 5.75 (38.3%) (which is slightly more than what was expected prior to the study). This increase in score of 5.75 (95% confidence interval = [5.3, 6.2]) was found to be statistically significant (p<0.001).

Hence the results prove that the flood education material has been successful in developing a change in the community and had improved their awareness significantly. The linear relationship between one’s awareness and thereby actions, as shown by previous researches, favourably point that this current enhancement in the community’s awareness will reflect in their future actions in the event of a flood.

Limitations

Most of the participants (92.3%) were female which may be a limitation because in India men usually make the decisions for the family and hence the flood education material taught to the participants may not be properly implemented.

However on the contrary if a flood does happen to hit at a time when the men are out at work, the educated women can then thus carry out the appropriate actions for alleviation against the risks of flood.

How The Information Meets The Aims And Objectives Set

The existing awareness of the community has been discovered and the study was able to bring about substantial improvement in the local community awareness about flood preparedness and management, and thereby has prompted a spirit of well regimented self help among them. The significant improvement in knowledge and awareness that was brought about through the flood and health education has demonstrated the impact that the educational material had on the community.
The vulnerabilities of the community to the hazards of flood have been identified to be very high in terms of their dependents and the percentage of the participants who have not received education on floods prior.

Through the educational session in the study the participants have been made more knowledgeable and thereby more functional and capable of making relevant decisions in order to ensure successful flood mitigation.

**New Avenues of Research**

This study could only point out the immediate improvement on awareness in the community. If the same population could have been interviewed following a flood, their responses could have been noted which in turn could have further indicated the effectiveness of the educational session that was held.

With the information now received on the awareness on flood mitigation and preparedness by the community, new educational sessions can be implemented more frequently and more elaborately involving a larger population, so that relief activities can be swiftly carried out in the event of a flood.

**Conclusion**

‘Forewarned is forearmed’, goes the saying, and India, the world’s second most populous and with a large proportion of its people desperately poor, must prepare as best as it can to cope with this new trend of heavy rains and floods. A National Disaster Management Authority has been established and similar bodies are to be set up at the State level too to enhance preparedness and provide a coordinated response in the event of a calamity. But it is also necessary for not only administrative bodies but also residents in local communities to participate in disaster preparedness activities and the residents need to cooperate with the administrative bodies.

To achieve this, the community requires adequate knowledge on flood mitigation and preparedness. At the end of this study we have determined the pre-existing awareness level of the community (5.87/15) and through the flood education programme held have improved on it (11.62/15). The community was also found to be highly vulnerable to the damages and effects of the floods because of their lack of acquaintance with flood preparedness measures and because of the number of dependents they each had per participant.

The study calls to attention the need for further flood education programmes for the community on a regular basis so that they are kept up to date and informed on methods to alleviate the damages incurred from floods.
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Kurt A. MacLeod, PACT, Cambodia

A better integrated management of disaster risks: Toward resilient society to
Annexure I - Subject Information Sheet

Protocol title: Community Awareness of Flood Preparedness and the Impact of Health Education on the Community

Sponsor Name: Private

Language: English / Will be translated into Kannada for the subjects of the study

Principal Investigator: _________________

Designation: _________________

Area of Study: Heroor / Uppoor

Contact number: _________________

Please read this form carefully. If you do not understand the language or any information in this document, please discuss with study doctor. If you decide to volunteer to take part in this study you must sign the end of this form.

About the research study:
You are being asked to take part in this study because you live in a coastal area and your community is prone to floods frequently. In this study you will be asked to answer a questionnaire, after which you will be given a health education talk, teaching about preparedness against floods. Following this, you will be asked again to answer a questionnaire to assess your awareness on flood preparedness. Two months later, we will approach you and ask you to answer the questionnaire again.

Purpose of the study:
To find out the prevailing awareness of your community about flood preparedness.
To assess the impact of health education on your community.
To improve the community awareness on flood preparedness in order to significantly reduce the impact of floods in your community.

Who can take part:
All living in the coastal regions of Heroor and Uppoor can participate in the study.

Risks involved:
There are no risks involved for those partaking in this study.
**Potential benefits of participating in the study:**
Obtaining a better awareness about how to prepare and manage in case of an event of flood, with regards to safety and health of yourself, your family and community.

**Cost of participating in the study:**
All procedures involved in the study (the questionnaire and health education talk) will be provided at no cost to you/

**Confidentiality of information:**
Information from the study including your name, address, study results will be reviewed only by authorized personnel from the sponsor or their representative, Ethics Committee or regulatory bodies. Information and results from this study may be presented at meetings or published in journals without including your name and personal identifications.

**Voluntary participation:**
Entering the research study is voluntary. If you volunteer for a research study, you have the right to stop at any time and you need not give any reason for the same. The sponsor or the investigator may stop the research or your participation in it at any time for some or other reason without your permission.

**Whom to contact in case of any questions:**
If you have any questions about this form or any study related issue, you may contact the following person, (the principal investigator of the study)

Name: ______________________________

Telephone No.: _______________________

Annexure II - Informed Consent Form

**Project title:** Community Awareness of Flood Preparedness and the Impact of Health Education on the Community

**Name of the Research Subject:**

**Age of the Research Subject:**

I have read the Subject Information Sheet and its contents were explained. I had the opportunity to ask questions and received satisfactory answers.

I understand that my participation in the study is voluntary and that I have the right to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

I agree to take part in the above study. I confirm that I have received a copy of the subject information sheet along with this signed and dated informed consent form.

__________________________         _________
Signature of the research subject               Date

__________________________
Name of the research subject

__________________________          _________
Signature & the name of the witness                     Date

__________________________            _________
Signature of the person explaining the consent              Date

__________________________            _________
Name of the person explaining the consent                   Date
Annexure III - Questionnaire/ Study Tool

Part I: Personal Details

(1) Name: _____________________________________________________

(2) Age: __________

(3) Sex: 
  Male
  Female

(4) Address: _________________________________________________

(5) Occupation: ______________________________________________

(6) Which best describes the situation you are living in now?
  (a) Family with children
  (b) Family without children
  (c) Alone
  (d) Living with others, not family
  (e) Other
    Specify

(7) Number of members in the family: __________
  (a) Children, below 12 years of age: __________
  (b) Elderly, above 60 years of age: __________
  (c) Handicapped: __________

Part II: Flood Events in the Community

(1) How many times have you experienced flood in your community?
  (a) Never
  (b) Once
  (c) Twice
  (d) Three or four times
  (e) More than five times

(2) Have you ever received information about how to make your family and home safer from floods?
  (a) Yes [if yes, go to question (3)]
  (b) No [if no, go to question (5)]
(3) If “YES”, how recently?
   (a) Within the last 6 months
   (b) Between 6 and 12 months
   (c) Between 1 and 2 years
   (d) Between 2 and 5 years
   (e) 5 years or more

(4) From whom did you last receive information about how to make your family and home safer from natural disasters? (Please check only one)
   (a) PHC
   (b) News Media
   (c) Government Agency - Panchayat
   (d) Non-profit Organization
   (e) Insurance Agent or Company
   (f) Other
   (g) Not Sure

(5) In the following list, please check those activities that you have done in your household, plan to do in the near future, have not done, or are unable to do. (Please check one answer for each preparedness activity)

In your household, have you or someone in your household:

<table>
<thead>
<tr>
<th>Preparedness activity</th>
<th>Have Done</th>
<th>Plan To Do</th>
<th>Not Done</th>
<th>Unable To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Attended meetings or received written information on floods or emergency preparedness?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Talked with members in your household about what to do in case of a flood?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Developed a “Household/Family Emergency Plan” in order to decide what everyone would do in the event of a flood?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) Prepared a “Disaster Supply Kit” (Stored extra food, water, batteries, or other emergency supplies)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(6) How concerned are you about the risk of floods?

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little</th>
<th>Sometimes</th>
<th>Often</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) I think about floods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) I talk about floods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) I think a flood could pose a threat to my</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part III: Flood Emergency Response Awareness

(1) On what ground should your house be built to be the safest from a flood?
   (a) Sloping ground
   (b) Flat ground
   (c) High ground
   (d) Low lying ground
   (e) Don’t know

(2) Do you need a first aid kit when you are preparing for a flood?
   (a) Yes
   (b) No
   (c) Don’t know

(3) How many days’ worth of supplies must you pack (example: clothes, food, water) in case you need to leave your house?
   (a) 1 day
   (b) 3 days
   (c) 1 week
   (d) Don’t know

(4) Should the main power switch to your house be switched off?
   (a) Yes
   (b) No, in case you need to use an electrical appliance
   (c) Don’t know

(5) How can you keep your property papers and other important documents safe from flood waters?
   (a) Put them in your emergency kit
   (b) Keep them in plastic waterproof packets and hang from the ceiling
   (c) Don’t know

(6) Does anything need to be done about the toilets in your home?
   (a) No, there is nothing important concerning them
   (b) Yes, they must be cleaned
   (c) Yes, they must be filled with sandbags
   (d) Don’t know

(7) Beyond what level of water is it advisable for you to NOT enter into the flood waters?
(a) Beyond knee level
(b) Beyond mid thigh level
(c) Beyond stomach level
(d) Don’t know

(8) How long must you boil water before drinking it?
(a) 1 minutes
(b) 5 minutes
(c) 10 minutes
(d) 20 minutes
(e) Don’t know

(9) What should you do with food that has come in contact with flood waters?
(a) Cook it very well at a very high temperature and then it can be eaten
(b) Do not give it to children but adults can eat it
(c) If it doesn’t smell or taste bad it can be eaten
(d) Throw it away and do not use
(e) Don’t know

(10) How do you dispose of garbage?
(a) Throw into a common street dumping area
(b) Burn immediately
(c) Keep in the house until the flood subsides
(d) Tie in bags and throw in the community dumping area
(e) Don’t know

(11) What do you do if you see a dead animal, such as a rat?
(a) Do not touch the animal
(b) Take the animal and throw it far away from you and your family
(c) Make sure it is dead and then burn it
(d) Don’t know

(12) When someone has diarrhea after an event of flood what should be done?
(a) Treat immediately with antibiotics
(b) Give oral rehydration solution (ORS)
(c) Do not give any more food or water to that person
(d) Don’t know

(13) If someone has a wound what should be done?
(a) Clean with soap and water, apply ointment and bandage
(b) Just bandage immediately
(c) Only clean with soap and water, no bandage should be applied
(d) Nothing needs to be done
(e) Don’t know
(14) How will you use an ORS packet?
(a) Mix the whole packet with one litre of water and use it the same day
(b) Mix half the packet with one litre of water and use it the same day
(c) Mix the whole packet with one litre of water and use it for 3 days
(d) Eat straight from the packet without mixing it with water
(e) Don’t know

(15) What will you do if you see a drowning victim?
(a) Extend a stick to which he can grab onto
(b) Throw a floating object (like an empty sealed drum) so he can use it to float
(c) Try saving him yourself immediately
(d) Don’t know

(16) How prepared do you feel for future floods affecting your community?
(a) Very prepared
(b) Somewhat prepared
(c) Not very prepared
(d) Not prepared at all
Annexure IV - Health Education Material

There are many things that you can do to prepare for a flood. What you have on hand when a flood strikes, or are trained to do when a flood strikes can make a big difference for your comfort and safety in the hours and days following the disaster. Basic services, such as electricity, gas, water and telephones, may be cut off, or you may have to evacuate at a moment’s notice.

Flood preparedness planning is about putting in place a set of appropriate arrangements in advance for an effective response to floods. You, the community, have to realize that to reduce the risk from a disaster, active participation is needed on your part too. You can be a help to yourself, your family, as well as to your community. By following these few simple steps you can be protecting not only yourself but also your belongings. This talk is to help you understand how to respond in case of an event of flood so that you will be prepared and you will not be defenseless.

Flood Mitigation Strategies:

There are two different ways to mitigate floods: -
1. Structural
2. Non- Structural

Structural measures are in the nature of physical measures and help in “modifying the floods”, while non- structural measures are in the nature of planning and help in “modifying the losses due to floods”.

In the structural measures we keep the water away from people and in the non-structural measures to try to keep the people away from water.

Structural Measures:

a) Raised Shelter Areas: Such areas have been extensively used for protection against floods of important towns and lands. They are areas developed, to which people can shift for temporary shelter during floods. However, these shelter areas must not become permanent settlement because that can mess up proper maintenance, making them susceptible to breaches during floods.

b) Water Shed Management: Timely cleaning, de-silting and deepening of natural water reservoir and drainage channels must be taken up.

c) Reservoirs: The entire natural water storage place should be cleaned on a regular basis. Encroachments on tanks and ponds or natural drainage channel share must be removed well before the onset of monsoon.

e) Buildings on elevated area: The buildings in flood prone areas should be constructed on an elevated area and if necessary on stilts and platform.
Non Structural Measures:

a) Flood Plain Zoning: Try restricting use of land on flood plains for construction or for agriculture. This can reduce the cost of flood damage.

b) Flood Forecasting and warning: Listen to the radio for any warning of weather disturbances or incoming flood.

Flood Preparedness:

Floods, which are a natural hazard, need not become a disaster, if we are prepared and are aware of how to deal with them. This would reduce the losses of life and minimize human suffering. This guide lists simple things one can do to stay safe and protect one from floods.

Before flooding occurs:
1. Know the route to the nearest safe shelters that you are aware off
2. Keep the First Aid Kit ready
   - Adhesive bandages (different sizes)
   - Cotton gauze / Roller bandages
   - Band-Aid (Plasters)
   - Oral Rehydration Solution
   - Alcohol swabs
   - Vaseline
   - Chlorine tablets
   - Soap (Lifebuoy, Dettol, etc.)
   - Scissor
   - Needle (for sowing tents) and Safety Pin
   - Medication (Benadryl capsules, Aspirin, Paracetamol, Antacid)
   - Mosquito repellent (Neem Oil)
3. Strong ropes for tying things
4. A radio, torch and spare batteries
5. Stocks of fresh water, dry food, candles, matchbox, kerosene, etc
6. Umbrellas and bamboo sticks (to protect from snakes)
7. Locate higher ground where people and animals can take shelter

When you hear a flood warning:
1. Tune in to your radio or watch for warning and advice
2. Keep vigil of flood warning given by local authorities
3. Keep dry food and drinking water and warm clothes ready
4. Check your emergency kit (keep at least 3 days worth of supplies – food, water, clothes and other things mentioned previously, namely first aid kit, radio, torch, spare batteries, candles, matchbox, kerosene)
5. Important documents (like property papers) can be put into waterproof packets and hung from the ceiling so that it does not come in contact with the flood waters.
**If you need to evacuate:**
1. Pack clothing, essential medication, valuables, personal papers, etc in water proof bags to be taken to the safe shelter.
2. Raise furniture, appliances on beds and tables
3. Turn off the main power switch to your home
4. Put sandbags in the toilet bowl and cover all drain holes to prevent sewage back flow
5. Do not get into water of unknown depth and current
6. Lock your house and take the recommended or known evacuation routes for your area of safe shelter

**During Floods:**
1. Drink boiled water or use chlorine tablets (available at the PHC) to purify water before drinking
2. Keep your food covered
3. Do not let children remain on empty stomach
4. Use bleaching powder to disinfect the surroundings
5. Avoid entering flood waters. If you need to enter use the stick to know the water level before moving ahead.
6. Stay away from water over knee level
7. In the event of having to enter into waters, use sealed empty drums as floaters
8. Closely watch out for downed power lines and electrical wires. Electrocution is another major cause of deaths in floods because electrical current passes easily through water. Report downed lines to the utility company immediately.

**After a Flood:**
1. Stay tuned to local radio
2. Do not allow children to play in, or near, flood waters
3. Stay away from drains
4. Do not use electrical appliances
5. Be careful walking around. After a flood, steps and floors are often slippery with mud and covered with debris, including nails and broken glass.
6. Be careful of snake bites (snakebites are common during floods)
7. Sow bleaching powder into all wet and marshy areas
   - This helps to kill any disease causing organisms present in the surrounding
   - Following this, dry all surfaces to prevent rotting which can attract more organisms
8. Rinse walls at least several inches above the highest flood level
   - Apply bleaching powder to the walls and let it remain for 15 minutes for adequate kill time
9. Do not use water directly until it is disinfected, even if it does not have a bad odour and taste.
   - Filter the water using a piece of clean cloth to remove solid particles
   - Bring it to a rolling boil for about 10 minutes and let it cool for at least 30 minutes before using
If facilities for boiling is not available, use chlorine tablets (available at the PHC)
Do not use well water directly until it has been adequately treated by the concerned authorities
10. Do not eat food, which has been in floodwaters
- Throw away food that has come in contact with flood water regardless of whether it was stored in closed cupboards
- Food that have an unusual odour, colour, or texture must especially be thrown away immediately
11. Wash hands thoroughly with soap (such as Lifebuoy) and water
- After handling materials contaminated by flood water
- Before touching the body, particularly face, mouth, eyes, nose
- Before handling utensils, cooking, and eating
12. Bathe regularly if possible
13. Waste Disposal
- Do not throw household garbage into the street
- Put them into bags and dispose of them appropriately
- Use toilets only if they drain properly
14. Mosquito Control
- Mosquitoes breed and become a menace immediately after a flood
- Mosquito repellents should form part of the emergency kit
15. Report any observations of sick or dead animals, especially rats to the local health department. Do not handle them.
- Eliminate sources of food and shelter for rats
- Remove heaps of garbage and debris
16. Help to rescue the victims, if any.

Health Hazards and Safety

Seek medical help in case of any illness or wounds. Those with symptoms of fever, cough, diarrhoea, vomiting, abdominal pain should immediately approach a medical camp or PHC and request treatment.

In case of diarrhea, the person should be given oral rehydration solution. This is prepared as follows:
1. Mix the contents of the ORS packet with one litre of drinking water (the water must be disinfected by boiling or chlorine tablets).
2. Use the solution on the same day. Do not keep for the next day
3. Let the person drink as much as he likes.

In case of wounds the following must be done.
1. Clean the wound with water and soap (Lifebuoy, Dettol)
2. Apply antiseptic ointment over the wound
3. Cover with waterproof bandage
4. If it is a deep wound, besides the home treatment just explained you must approach a medical camp or PHC for a TT injection.