Investigating the Influence of Community Participation in Information Sharing As a Flood Mitigation Strategy on Household Livelihood in Nyando Flood Plains, Kisumu County-Kenya

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Abstract: Information is a powerful tool in planning and preparedness. Flood warnings and coping strategies are very vital information in flood mitigation. As such making the information available is crucial in helping households survive floods. This study investigated the influence of community participation in information sharing as a flood mitigation strategy on household livelihood in Nyando flood plains, Kisumu County. The study was based on a descriptive design where quantitative data was collected using researcher designed household questionnaire and key informant interview schedules for qualitative data. A sample of 385 respondents was obtained from a target population of 11,050 using Krejcie and Morgan table distributed into 370 household heads and 15 key informants. Descriptive statistics was used to analyse the quantitative data while correlation was used to make conclusion on the relationship between the two variables. Phenomenological analysis was used to analyse the qualitative data from the key informants. The study concludes that information sharing should be enhanced to improve household livelihood in the event of floods.

1. Introduction

In the United States, national flood damage averaged around 3.9 billion per year in the 1980s and then nearly doubled from 1995 through 2004. Floods continue destroying property and the life of people is threatened despite efforts made to control floods [21]. In the United States, communities are fully participating in flood mitigation strategies and local development process [2]. However the flood mitigation strategies adopted have not yielded enough in terms of household livelihood. A culture of mitigating floods and living with the floods need to be embraced to improve household livelihood [21]. The social, political and cultural processes influence how floods affect communities in varying degrees [13]. This is in agreement with other researchers, who asserts that the vulnerability of communities depend on the erosion characteristics, the culture of the community, political and socioeconomic condition of the community affected by floods [11].

In the United States communities are no longer just recipients or beneficiaries in flood mitigation strategies but are now participants in mitigating floods and hence improve their household livelihood [7]. Equally in Australia community participation in flood mitigation strategies was found to contribute a lot to the well being of the community [9]. Community participation in flood mitigation strategies empowers the community to take their own action to reduce the effects of floods in order to improve their livelihood. Therefore community participation in flood mitigation strategies is a significant factor on household livelihood.

In Kenya, the Flood Management Policy is based on the Integrated Flood Management concept with special emphasis on: Flood management and development where flood management is seen as an essential ingredient in poverty alleviation and sustainable development, floodwaters and natural assets must be harnessed for various economic and social uses through community participation to improve household livelihood [2].

In the 1960s and 1970s, community participation became central to development projects as a means to seek sustainability and equity particularly to the poor [8]. Community participation has been recognized as an additional
element in flood mitigation necessary to reverse the worldwide trend of exponential increase in flood occurrence. The local community is taken as the primary focus of attention in flood mitigation since that is the common unit which is affected by disaster and more importantly responds to deal with the event [4]. Similarly Associated Programme on Flood Management asserts that nobody can understand the local situation and needs better than the local communities themselves hence the needs of the community should be enhanced by developing linkages among communities, government, national disaster management agencies and donors focusing on recovery from floods [6].

Information sharing is essential to enable early intervention and preventive work. It is vital in improving outcome for all [8]. Further research demonstrates that restricted information flow through application of stringent rules makes the community unable to prepare for sudden changes in the environment but also impedes their adaptation to environmental changes [8]. Organizations that encourage information sharing have been found to gain competitive advantage in the long term [6]. Likewise communities that encourage information sharing have been found to improve on their livelihood. In England and Whale, forecasting and issuing warnings are one of the Environmental Agency’s key roles. Alerts are broadcasted via Television and Radio, Agency website and a dedicated telephone and information service. Social media is also opening up new opportunities for communicating with the public [16].

The Nyando River Basin covers an area of 3500 square kilometres in Western Kenya. About 750,000 persons reside within the Nyando Basin, most of who live in the Nyando sub county in the Kisumu County and the Nandi and Kericho counties in the Rift Valley [14]. Nyando Sub - county cover 248.2 km² with 1 division, 6 locations and 17 sub locations. It receives a mean annual rainfall of between 1,000 mm and 1,800mm [20]. However, it is being flooded every year during the long (April-June) and short (October-November) rainy seasons [13]. According to the County Government of Kisumu, Nyando flood plains has two rainy seasons with long rains occurring in March to May while the short rains occur in September to November [20].

2. Literature review

Community participation in information sharing as a flood mitigation strategy can improve livelihood if used effectively. Information through radios, televisions, social media, person to person and also chief’s barazas is important before, during and after floods. A community rich in information is able to prepare well in advance in case of any disaster. Communities in flood prone areas lack adequate information as far as flood mitigation strategies are used hence floods end up destroying properties, killing people, livestock and even destroying homesteads hence putting the livelihood in danger. Media and public information sessions help set the stage well before, during and after floods [3]. The media are key players in the link between public officials and the public who are the community. It helps if the communities are familiar with the terminology used in warnings and forecasts and know whom to contact for more detailed information during an actual flooding. To avoid exposure to critical activities and temporarily shift individuals from flood prone areas, both early warning and evacuation shelters are fundamental. Early warning with individual’s correct understanding of the warning issued can show how they can take action during flooding [3]. Participatory for emergency situations can help build trust and confidence among stakeholders, enhance cooperation, facilitate information sharing and encourage regular communication [3].

Successful emergency operations depend greatly on the availability and reliability of flood forecasting information and lead time provided by warning systems. Flood early warning is a message informing authorities of the impending danger of floods that is the water level rising above the warning level. Longer lead time will provide sufficient time to consider and affect a number of responses, whereas reliability of the warning and confidence with likely respondents determines its effectiveness. Warnings must be provided and conveyed in an easily understandable manner and in the local language through a legally designated single authority [3].

The Kenya Red Cross has been dispatching warning messages on TERA platform through the service providers that are Safaricom and Airtel, a total of 11 million messages have been sent to selected regions in the county with an overwhelming feedback from the affected and displaced populations [19]. The County Governments have been working with KRCS branches to mount initial needs assessment and response. Kenya Meteorological departments has continued to provide updated weekly and monthly weather review and forecasts and this has been useful for KRCS in planning response activities [19]. Hence a gap exists on community
participation information sharing and its influence on household livelihood.

Kenya Electricity Generating Company (KENGEN) has been providing regular updates on the hydro electric power dams’ water level and this forms part of the KRCS early warning messages to communities living along River Tana basin, River Sondu (Sondu Miriu Hydropower Dam in Nyanza) and River Turkwel Hydro power Dam in North Rift [19].

The KRCS continues to providing timely information bulletins on their websites www.kenyaredcross.org. These bulletins are provided to the public for advocating the plight of the affected population as well as ensuring accurate reporting on the ongoing humanitarian crisis and subsequent intervention [19]. In managing disasters affecting the country the KRCS has very good relations with the government and works closely with the organizations as well [19].

Information sharing should be bi-directional, both upward and downward, between the levels of government. Emergency response must include input from the community and political levels. The community and individuals must have a good understanding of what is expected of them. A good example is evacuation. Information that defines evacuation routes, identifies emergency shelters and specifies actions to be taken before leaving such as removing mobile equipment and removing personal goods and furniture must be available in advance [21]. Media and public information sessions help set the stage well. The media are key players in the link between public officials and the public or community. It helps if they are familiar with the terminology used in warnings and forecasts and know whom to contact for more detailed information during an actual flood event [21]. This concurs with Dufty who asserts that the use of social media can help build community disaster resilience [6].

People feel highly burdened to participate in community based preparedness activities during normal times when nothing happens hence according to them perceived risk does not contribute directly to taking protective responses, however some households explained that they were concerned about flood mitigation information to be able to adapt to future floods by putting appropriate measures before, during and after floods [8]. In Nyando, 60% of the community members in greater Nyando district rely on mobile phones for communication and this was not affected by floods of 2010. The area supports a large rural population 75 per cent and stage of economic growth is undermined by high absolute poverty, deteriorating infrastructure and small businesses is also deteriorating. The impacts of these extreme climatic events intertwined with socio-economic constraints have made populations living in this area even vulnerable [6]. The study will seek to investigate whether there is influence of community participation in information sharing on livelihood.

3. Methodology

3.1. Objective

The main objective of this study was to investigate the influence of community participation in information sharing as a flood mitigation strategy on household livelihood in Nyando flood plains, Kisumu County.

3.2. Research design

This study was based on descriptive survey design framework. The descriptive survey design enabled the researcher to collect quantitative and qualitative information thus being able to describe the scenarios as they were [11].

3.3. Data collection

For data collection, researcher’s self designed questionnaire for household heads and key informant interview guides were used. The Household Heads Questionnaire (HHQ) had two sections: Community Participation in Information Sharing (CPIS) and Household Livelihood (HLD).

3.3.1. Target population

This study targeted household heads as the main respondents. As for the key informants, the study targeted village elders, assistant chiefs, chiefs, disaster management officers, heads of CBOs and NGOs involved in disaster management in the area. For the entire sub county, 4 locations were included a total population of 11,050 households [9].

3.3.2. Sample size

Using Krejcie and Morgan table for sample size determination, a sample size of 385 was deemed to be representative of the target population of 11,050 [11]. This was distributed into 370 household heads and 15 key informants to include: 4 chiefs, 8 assistant chiefs, 1 head of NGO, 2 CBO officials and 1 disaster management officer.
3.3.3. Sampling technique

This study used three sampling techniques of multistage, proportionate and systematic sampling concurrently. Multistage sampling was used to select the locations with proportionate sampling used to distribute the sample in the four locations. Further, systematic sampling was used in selecting the actual household where the Kth member of the population was included in the study as the sample [12].

As for the key informants, purposive sampling was used to select the chiefs, assistant chiefs, disaster management officer, heads of CBOs and NGOs for the specific information they hold [17].

3.3.4. Data collection procedure

This research employed primary and secondary data for analysis and deductions. The study used existing government documents, reports, videos and documentaries as secondary data. For primary data, household questionnaires and interview schedules were used together with researcher’s observation guide.

Validity and reliability of the study instruments were investigated. Experts from the department of project planning and management evaluated the content validity of the instruments. For reliability of the household heads questionnaire, the researcher used Cronbach alpha as a measure of reliability. According to Kothari, a reliable instrument is one which consistently measures a construct in different trials [10]. Cronbach alpha was applied for the community participation in information sharing scale and the household livelihood scale. Alpha coefficient of at least 0.70 was considered to be sufficient in declaring the instrument as reliable.

Before data collection, the research obtained relevant authorization from various institutions including the University of Nairobi, National Council of Science, technology and Research, the County Government of Kisumu and the local leadership. The research trained four research assistants with knowledge of the local area who assisted with administering questionnaires. Direct interviews were conducted with the key informants on scheduled days by the researcher.

3.4. Data Analysis

The data collected was both qualitative and quantitative. As such, the research used descriptive statistics and inferential statistics for the analysis of quantitative data. Descriptively, quantitative data was analysed using frequency, percentages, mean and standard deviation. This adequately described information sharing as well as household livelihood in terms of frequencies and percentage. Qualitative data was analysed through phenomenological approach to develop in depth understanding of the variables [10]. Consistently similar statements were grouped into units that described the proposed themes of the study [11].

In order to determine the relationship between community participation in information sharing as flood mitigation strategy and household livelihood, Pearson correlation analysis was used as the inferential statistic. LIKERT scale data was converted into continuous data through summation of the scores for both information sharing and household livelihood scales. Pearson correlation analysis was conducted from the two sets of continuous with the significance value measured at 99%.

4. Findings and Discussions

4.1. Reliability

The researcher conducted pilot test on 37 households in the adjacent Muhoroni Sub County representing 10% of the sample size. Muhoroni Sub County was selected due to the similar geographical and population characteristics. With the data keyed in SPSS, Cronbach analysis was run for the items in information sharing scale and household livelihood scale [8]. The analysis gave a returned a Cronbach alpha value of 0.931 for the information sharing scale and 0.739 for the household livelihood scale. Consequently, the household questionnaire was found to have a reliability index of 0.919 thus considered reliable.

4.2. Demographic Characteristics for Households Heads

The demographic characteristics of the population determine the ability of the community to posses and share information on floods. Consequently, the researcher explored the respondents demographic and background characteristics defined by age, marital status and level of education.

Majority of the household heads who participated in the study were females (57.6%) and were mainly aged from 24 years (61.5%). This shows that the respondents were young and thus could lack traditional information on floods. Further, given that majority were female, they
could be culturally limited to provide information on floods and share with other members of the population. It was concluded that culture prevents women from speaking in gatherings thus their opinion is not always valued and taken seriously [18].

Further, majority of the household heads were married (44.1%) with large households of between 3 and 7 members (66.1%). The finding shows that despite household head being married, majority of them were women implying that men were out in other towns looking for livelihood means and income. High dependency is also evident from the large size of household. Further, the education level of the respondents was generally low with majority (58.1%) having only secondary education while 33.9% having just primary education. The limited level of education could contribute to lack of information to share.

### 4.3. Descriptive statistics

Four indicators of information sharing were analysed to quantify the extent of information sharing and its perceived effect on household livelihood. The data was presented to capture frequencies of the various responses as strongly agree (SA), Agree (A), Neutral (N), and Disagree (D) and strongly disagree (SD). The scores were rated and mean and standard deviation computed and tabulated in table 1.

<table>
<thead>
<tr>
<th>Information sharing</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>Mean</th>
<th>STDev</th>
</tr>
</thead>
<tbody>
<tr>
<td>I normally share information about the floods with my neighbours and this has helped us a lot</td>
<td>79</td>
<td>60</td>
<td>33</td>
<td>180</td>
<td>11</td>
<td>3.04</td>
<td>1.287</td>
</tr>
<tr>
<td></td>
<td>21.8%</td>
<td>16.5%</td>
<td>9.1%</td>
<td>49.6%</td>
<td>3.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have never participated in creation of proper channels of communication therefore floods normally get me unprepared</td>
<td>85</td>
<td>154</td>
<td>51</td>
<td>64</td>
<td>9</td>
<td>3.67</td>
<td>1.093</td>
</tr>
<tr>
<td></td>
<td>23.4%</td>
<td>42.4%</td>
<td>14.0%</td>
<td>17.6%</td>
<td>2.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We normally share signs and warnings from our traditional flood knowledge of the coming floods and this has helped us a lot</td>
<td>51</td>
<td>73</td>
<td>43</td>
<td>104</td>
<td>92</td>
<td>2.69</td>
<td>1.404</td>
</tr>
<tr>
<td></td>
<td>14.0%</td>
<td>20.1%</td>
<td>11.8%</td>
<td>28.7%</td>
<td>25.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have always passed on information to the community members in case one of us require help from flood incidences</td>
<td>67</td>
<td>64</td>
<td>28</td>
<td>95</td>
<td>109</td>
<td>2.68</td>
<td>1.511</td>
</tr>
<tr>
<td></td>
<td>18.5%</td>
<td>17.6%</td>
<td>7.7%</td>
<td>26.2%</td>
<td>30.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The study found that majority of the respondents (49.6%) does not normally share information with neighbours to help them a lot in flood events. The mean of the item was 3.04 and the standard deviation of 1.287 tending towards neutral indicating low level of information sharing in the community. These results concurs with the study done in the same area by Red cross which found that 60% of the community members in greater Nyando district do not necessarily share information on floods with their neighbours[19]. Further, the study found that majority of the residents (42.4% agree and 23.4% strongly agree) have never participated in creation of proper channels of communication therefore floods normally get them unprepared. On the same note, the community does not normally share signs and warnings from traditional flood knowledge of the coming floods to help in flood mitigation as indicated by 54% of the respondents.

These findings were affirmed by the Sub County Disaster Management Officer who was asked to rate the extent to which the community participates in information sharing and this was the response:

Community participation in information sharing here in Nyando is still low, since most community members can only attend barazas if they are going to be given relief food and Non food Items. The risks associated with floods do not worry them so much because according to them floods is not apriority but the basic needs, hence low participation in information sharing and definitely compromising the improvement of the household livelihood [Sub County Disaster Management Officer].
The low community participation in information sharing on floods results to their vulnerability in flood disaster.

4.4. Correlation

Pearson correlation analysis between community participation in information sharing and household livelihood at 99% confidence level is presented in table 2.

Table 2: Correlation between Community Participation in IS and HLD

<table>
<thead>
<tr>
<th>Item</th>
<th>Statistic</th>
<th>Household Livelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Participation in IS</td>
<td>Pearson</td>
<td>.679**</td>
</tr>
<tr>
<td>as a FMS</td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>363</td>
<td></td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).

The study found a strong positive correlation (r = 0.679) which was statistically significant as p < 0.01 (p = 0.000) between community participation in information sharing and household livelihood. This shows how community participation in information sharing is important in influencing household livelihood. As community participation through information sharing increases, the household livelihood improves.

5. Conclusions

From the findings of this study, it emerges that low level of education; high female gender and overdependence limit the community participation in information sharing. Specifically, the study concludes that there is strong positive correlation between participation through information sharing and household livelihood which is statistically significant. Consequently, there should be increased effort to ensure community participation through information sharing to enhance household’s preparedness and coping strategies to improve their livelihood.

6. Acknowledgements

This research was solely conducted funded by the researcher. However, the research wishes to acknowledge the support and contribution of various individuals, organizations and authorities. Specifically, the researcher acknowledges the University of Nairobi, National Council for Science, Technology and Research and the County government of Kisumu for providing permission to conduct the research. The researcher also thanks the residents of Nyando plains who volunteered information for this research without whom, the study would not have been possible.

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