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A Comprehensive Analysis of Community Preparedness in Punjab: Assessing Communication Strategies and Natural Disaster Awareness

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Abstract

This study has focused on analysing community preparedness and measuring communication strategies during a natural disaster, specifically the 2023 flood in Punjab. The basic purpose of this study is to conduct a comprehensive examination of the communication plans of disaster management institutes in Punjab. In the 2023 flood, the Sutlej River affected eight districts of Punjab. Bahawalnagar district is one of the most flood-affected districts in Punjab. This study explores the community preparedness in that district. The study population was selected based on the 2023 floods that devastated the district of Bahawalnagar. The sampling method used in this research is convenience sampling; 350 respondents living in the Bahawalnagar district in Punjab have been included in this study. The information is collected and examined using inferential statistics. The research concluded that the local community in district Bahawalnagar had knowledge of the natural hazard, i.e., floods, but there was a disconnect between the community and government institutions regarding preparedness and mitigation in the face of the hazard.

Keywords: Disaster Management, Preparedness, Communication, Flood, Awareness

Introduction

The past few years have seen the frequency and intensity of natural disasters and tragedies increase significantly. This explains the importance of community readiness in minimizing the adverse outcomes that are associated with such incidents. The state of Punjab has been the one especially prone to the potential damage that the natural disasters can cause because of its agricultural and cultural significance. The strategies of communication, as well as sustainability of community information about natural disasters, are the main elements that will enhance the preparedness and mitigate risks posed by such occurrences. The best aim of this entire study is to provide a cautious examination of the intricate connection between the factors that caused the level of readiness of the communities in the Punjab area. The primary purpose of the analysis is to assess how knowledge level of the natural disasters is connected with the efficiency of communication means. Using relevant scientific sources and policy models, as well as, empirical research, the present study is expected to offer a limited insight into the existing issues and prospects of a resilient community formation with regards to unforeseen natural disasters.

The Global Context of Natural Disasters

The global correlation of natural disasters concept is a higher degree of correlation which involves the events and impacts of natural disasters on a global scale. On the one hand, the quantity of natural disasters throughout the world is growing, and the preparedness strategies should be evaluated (Smith and Petley, 2016). According to the Intergovernmental Panel on Climate Change (IPCC, 2018), the rise in the incidence and intensity of the occurrence of natural disasters has been strongly driven by climate change, and it has a grave danger on the populations of the world.

Natural Disasters Vulnerability of Punjab

The Punjab province is vulnerable to most disasters such as earthquakes, floods, and extreme weather conditions that are largely dependent on agriculture as their main activity (National Media Discourse and Society

Disaster Management Authority, 2019). In reference to these weaknesses, an overall perspective of the community preparedness approach has been identified (Khan et al., 2020).

Disaster Preparedness

Effective means of communication should be used during the planning stage to manage vermin. Communication is a significant element of the prompt exchange of instructions and information (Cuny, 2015). According to Landsay (2016), the appropriate framework to apply in the preparation process would be based on the inclusion of social media and community engagement and government communication channels.

Natural Disaster Responsiveness in Punjab

Community awareness is an essential part that should be evaluated to test their readiness and ability to respond (Scolobig et al., 2015). The gaps in knowledge should be identified, and the socio-cultural factors affecting awareness must be understood to implement specially designed treatments that solve the problem (Paton et al., 2017). The study aims at offering major findings that can be used in policy formulations, community involvement processes and development of effective communication strategies that are closely tailored to the situation of Punjab. This project will be an undertaking that seeks to offer a basis upon which the resilience and preparedness of Punjab in case of a natural catastrophe can be strengthened.

The Objectives of the Study

This research has the following objectives;

1. To assess the effectiveness of the existing communication strategies in the distribution of information on natural disasters.
2. To determine the level of knowledge on the topic of natural disasters among the individuals living in Punjab.
3. To identify the determinants influencing community preparedness towards response to natural catastrophes.

Research Questions

RQ 1: How well is the population of the River Sutlej within the district of Bahawalnagar aware of incidences of natural disasters, such as deforestation, flooding and other disasters?

RQ 2: What are the practical strategies that can be implemented in order to effectively deliver transportation-related messages related to evacuation and flooding to residents of the Bahawalnagar district with the objective of raising awareness and educational purposes?

RQ 3: How well are the people living in the Bahawalnagar district knowledgeable about natural disasters?

RQ 4: What are the barriers that hinder the understanding of information and communicative messages that aim to create awareness among the residents of the Bahawalnagar district?

Literature Review

Disaster preparedness is an important element of community preparedness, which makes certain that the community is prepared to respond efficiently to natural disasters. This literature review discusses the community preparedness situation in the state of Punjab in terms of awareness on transportation practices and natural disasters. The aim of the analysis is to offer information on the possible positive changes in the existing framework, difficulties, and preparedness of the community.

Communication Strategies

Effective communication is essential in determining the effectiveness of the efforts put into the preparation of the pests. The use of different forms of transportation in Punjab is very crucial in relaying information to the people. The above investigation by Bradley et al. (2014) clarified the importance of applying technology, including mobile applications and social media platforms, in the process of improving communication when situations are critical. The

adoption of community mobilisation in local radio and television broadcasts has proven to be an effective tool for dealing with numerous community challenges positively (Shah et al., 2023). Still, one should remember and address the challenges like language barriers and limited technological capabilities. Collaborative programs with governmental agencies, nongovernmental organisations (NGOs), and community leaders can be effectively used to adapt the communication strategies to the needs of local communities and their specific needs and demands (Rajabi et al., 2021).

Theoretical perspective

Theoretical perspective is a guideline or prism of phenomena that are comprehended and interpreted in academic fields. The concept of community preparedness in Punjab Pakistan can be elaborated in the context of the synthesis of numerous overlapping theoretical schools of thought, which all contribute to the enlightenment of the perception, reception, and reaction of the locals towards the information of the disaster. The most important way to this synthesis is the Risk Communication Theory, Community Resilience Framework., and the Diffusion of Innovations Model, and thereafter how the awareness is formed and translated into protective action.

Risk Communication Theory

According to the theory of Risk Information Seeking and Processing (Rogers, 1995), and the framework of the Social Amplification of Risk theory (Kasperson et al., 1988), it is worth noting that the effect of objective severity of hazard on risk perception is a position of the previous but that such a process is mediated by the levels of trust, cultural narratives and information channels. In Punjab, the traditional (radio, television) and new digital media (WhatsApp, Facebook) co-exist but disparities in the media literacy and access increase the risk to the disproportion. It is founded on the belief that the transmission of rumors might be minimized on the so-called trusted messengers customarily, local religious leaders, leaders of

communities, or district authorities and can utilize their authority to augment the truthfulness of the official warnings (Gover, 1993). Mechanisms Empirical data in South Asian societies suggests that risk communication must be based on the frames of messages that are consistent with the values in the local area and the two-way feedback mechanisms where the interests of the communities could be voiced to the decision makers (Zhang and Yang, 2020).

Framework of Community Resilience

In contrast to personal preparedness, the Community Resilience Model (Berkes, 2009; Cutter, 2016) encompasses social capital, economical stability and systems of governance. In Punjab where monsoon floods and cyclones are developing to be more threatening to the agrarian livelihoods, resilience is anchored in the idea of collective efficacy, also described as the view that leading to disaster consequences by collective action is in the power of everyone to mitigate the impact. The framework identifies the following three layers which are interdependent: (i) social cohesion (trust and cooperation), (ii) institutional capacity (local disaster management units, early warning systems) and (iii) adaptive coping strategies (crop diversification, insurance uptake). The resilience theory suggests that the participating in planning scenarios and the community-driven mapping techniques are effective communication methods that create a feedback channel that assists in strengthening all the layers and enhances the overall preparedness (Moser and Priesemann, 2019).

The Diffusion of Innovations Model

Diffusion of Innovations can be used to explain that the model of the spread of new preparedness practices in the heterogeneous communities of Punjab can be explained (Rogers, 2003). The innovators (ex: NGOs, progressive local leaders) play a vital role since the rural-urban gap is present and the early-warning technologies (SMS alerts, sirens) will be introduced by the innovators and the training programs will be conducted by the innovators. The theory describes the contribution made by the opinion leaders and the early adopters in shaping the

dynamics of the communication channel and the social system through which the uptake can take place. Interestingly, the reinvention process, i.e., the process of adjusting innovations to the local conditions, is also on the agenda of the model since it takes into account that communication tools (e.g., vernacular language alerts) will not lose their value and usefulness (Liu and Field, 2017).

The integrative implication of Punjab is as follows. By taking these theories and putting them together, one can get the big picture, according to which, the preparation in Punjab depends on the trustful, culturally applicable communication that is anchored in the powerful social system and executed through the channels that will enable the diffusion of the best practices and adjustment to them within a short period. The policies should hence concentrate on the creation of the message with the representatives of the community to make it more specific and credible. Training of the local institutions in order to sustain early-warning systems and plan response. Complementary use of digital and traditional media, where access is equalized and an absence of misinformation is achieved. The theoretically founded methodology altogether illuminates why some of the communities in Punjab have good disaster preparedness, why the others are vulnerable, and offers viable channels of improving communication plans at all levels of society.

The present paper is based on the Perception/Reception principle. This mental process that assists individuals to interrelate external sensory stimuli with internal conscious and unconscious processes in order to comprehend and frame the reality in their immediate environment has been defined as perception (Barry, 2002). This is the area that is largely subjected to theorists of media and communication. It is an area of interest in the study of the cognitive dissonance theory, selective exposure theory and the reception theory. According to Klapper (1960) in his work about Mass Communication, Mass Communication does not have a direct impact on the people as a mediator in the persuasive communication. However, it do

makes the inner tendencies that the individual possesses stronger. Klapper identifies five mediating factors to this process. These include predispositions and selective exposure, perception and retention process. On the same note, the groups and group norms that the audience members belong to also play an important role in mediating the effects of Mass Communication. The problem at hand is the nature of mass media with a free business regime, and this was discussed by Klapper in 1960.

Methodology

The survey research design was applied in the research. It is deemed that the survey research design is suitable in the study as the population to be studied is very large. Application of a survey technique will also aid in selection of a sample that could be utilized to represent the whole population of study. The methodology applied allows retrieval of a high volume of information on an impressive sample size in a cost-effective manner (Saunders et al., 2003). The suggested method is considered to be more favorable regarding the convenience and cost-effectiveness. The research instrument that will be used in the study was a designed questionnaire. In this study, the researchers used the convenience sampling technique to select one of the samples of respondents that could be used to represent the population. The researchers intentionally selected persons and professionals with the knowledge of disaster management, environmental studies, and environmental communication in order to acquire their insights and view on the subject of study. The study involves a population size of 350 individuals as inhabitants of population living in the local governments of Bahawalnagar district of Punjab. All the participants were selected based on the flood affected land. As per PDMA, the riverside of the Sutlej River had 157 flood affected villages in the Bahawalnagar district. Among the other 2023 flood-affected Punjab districts, Bahawalnagar district was very susceptible to floods. Thus, the study was conducted on the Bahawalnagar district.

Data Analysis

The sample population of 350 people who were living in five local government units within the Bahawalnagar District of Punjab was obtained. Out of the total 350 questionnaires that were mailed, 340 were collected successfully. After that, 320 respondents who responded positively to item 3 were considered in the final sample size. The reason why Item 3 was included in the survey was to determine the respondents who are knowledgeable about the issues that come with natural disasters, such as floods, in the Bahawalnagar District of Punjab. This item was used to filter out those who answered this question as being No.

The research had 320 participants, resulting in a response rate of 91%. A total of 250 individuals were identified as male, accounting for 78.125% of the sample. Conversely, there were 70 females, representing 21.875% of the population. The survey data obtained were analysed and quantified in the form of percentages.

Table 1: Familiarity with the frequency of natural catastrophes that occur in Bahawalnagar

Selection	Frequency	Proportion (%)
I have a lot of knowledge	145	45
I am somewhat familiar	136	43
I don't know a lot	39	12
Never heard of such a disaster	0	0
Total	320	100%

The respondents' knowledge regarding the "frequency of natural calamities" in the Bahawalnagar district of Punjab, including floods, was solicited. A considerable proportion of the participants (145, or 45% of the total) expressed that they possess substantial knowledge regarding these incidents in the field of study. An additional group comprising 136 (43%) of the sample population certifies that they have a reasonable understanding of these catastrophes. It can be inferred that there is a high degree of awareness regarding the recent occurrence of a

flood in the Bahawalnagar district of Punjab and, more specifically, the definition of a natural disaster. An extremely tiny proportion (12%), or 39 respondents, appears to have limited knowledge regarding these catastrophes. Based on the data presented in Table 1, it can be inferred with a certain degree of certainty that there exists a substantial degree of knowledge concerning the presence and frequency of flood disasters. This may explain why no one claimed to have never heard of inundation incidents occurring in the Bahawalnagar district of Punjab.

Table 2: Knowledge of the community being vulnerable to these disasters

Selection	Frequency	Proportion (%)
Yes	305	95
No	0	
Not Sure	15	5
Total	320	100%

As a result, replies were requested from respondents on their degree of awareness of the specific towns and localities vulnerable to disasters such as flooding. An overwhelming majority (95%) responded positively. This suggests that most of the sampled population is aware of the communities that are likely to be flooded. Only fifteen people, or 5% of the population, said they are unsure about the areas where such natural disasters are likely to take place.

Table 3: Perception of responsibility for generating catastrophe awareness communication

Selection	Frequency	Proportion (%)
Flood Commission Punjab	80	25

Provincial Authority	Disaster Management	120	38
Pakistan Meteorological Department		100	31
Flood Relief NGOs		20	6
Total		320	100%

The persistent topic of whose job it is to communicate information about natural calamities such as flooding and erosion has long been a source of contention. When this subject was posed to responders, the results were significantly disparate. The eighty (25%) respondents assigned this role to the Flood Commission of Punjab. While 120 (38%) respondents agreed on the Provincial Disaster Management Authority (PDMA). Compared to other participants, 100(31%) assigned this role to the Pakistan Meteorological Department (PMD). There are 20 (6%) respondents who agree to allot this role to disaster-related NGOS.

Table 4: Real exposure to a natural calamity, such as floods, in a community

Selection	Frequency	Proportion (%)
Yes	310	97
No	0	0
Not Sure	10	3
Total		320
		100%

Individual experience with floods in their immediate areas revealed that the majority of the selected communities or individuals have faced flooding in one form or another. In all, 97% (310) of respondents said they have been directly affected by natural catastrophes, floods. In addition, zero respondents said "NO" since they had not experienced any floods in their localities. Those who are unsure are in the minority. They account for 3% of the total (10 responders).

Table 5: Communication Channels that respondents are exposed to for information

Selection	Frequency	Proportion (%)
Social influencer/Word of mouth	100	31
Television	40	12
Internet websites	60	19
Social Media	120	38
Total	320	100%

The study aims to learn about the many modes of communication accessible to respondents as means of obtaining information. This is significant since each community is unique. Their information access varies. According to the statistics acquired, Social media is the most common medium for inhabitants to access information. It provides a significant quantity of information to around half of the population (38%) or 120 respondents. What we can conclude from this is that social media has the highest level of penetration in rural populations, as seen by the chart above. Television is a key information channel but it has lowest ranking. This has enabled access to information via television in these places, with 40 respondents (12%) utilising it as a source of information. However, in other communities, word of mouth/opinion leaders remain the primary conduits for getting information, according to the community's degree of exposure, norms, and values, and the village square remains a prominent focus of information distribution. Some people still acquire their news from newspapers. These are the more literate responders, who are in the minority.

Table 6: Opinion on earlier warnings about imminent flooding

Selection	Frequency	Proportion (%)
Yes	190	59
No	10	3
Not Sure	120	37

Total	320	100%
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Prior to the previous instance of floods, a significant quantity of material communicated to the communities under investigation was focused on the impending danger that awaits them if specific actions are not taken to either avoid or mitigate the impending risk. These messages advocated for better environmental practices, such as the blocking of streams, the indiscriminate dumping of garbage into drainages, and the construction of structures in wet regions, among other things. As a result, the study tried to determine if these cautions were followed. The majority of respondents (190-59%) indicated these warnings were followed. This, we can claim, is largely responsible for the zero deaths in recent incidents of floods and erosion in villages in the district of Bahawalnagar, since residents of these areas heeded the cautions included in these communications. Only 3% of those polled, or 10 people, ignored the warnings. At the same time, 120 respondents (37%) were certain that these warnings were followed.

Table 7: Satisfaction with the messages received before the flooding

Selection	Frequency	Proportion (%)
Yes	251	78
No	40	13
Not Sure	29	9
Total	320	100%

When natural catastrophes such as flooding and erosion occur, blame is sometimes assigned to specific agencies and individuals charged with the obligation of bringing knowledge to the affected people, particularly if warnings were not adequately made available to them. To that purpose, the study intended to determine if the communities surveyed in Bahawalnagar were pleased with the volume and quality of information they received before the flooding via the previously mentioned channels. Again, based on the findings, the majority

were happy with the information they received, believing it to be successful in that such early warnings and messages sparked preventative steps.

Specifically, 251 (78%) respondents reported they were happy with the quantity of information made accessible to them about the approaching threat of floods and erosion. However, 41 respondents (13%) disagreed, stating that the information made accessible before to the floods was not adequate in their opinion. This allows for some future adjustments and improvements in designing communications for the consumption of these flood-prone populations. The twenty-nine respondents, however, were unsure about the effectiveness of the communications they received. They are, nevertheless, in the minority, accounting for 9% of the population. They couldn't say if they were happy with the information they got about the impending flooding.

Discussion of Findings

Research Question 1: *How well is the population of the River Sutlej within the district of Bahawalnagar aware of incidences of natural disasters, such as deforestation, flooding and other disasters?*

The survey found that the citizens of District Bahawalnagar had a strong understanding of what a natural catastrophe is. When asked about their acquaintance with natural catastrophes such as floods, erosion, and so on, a significant proportion of respondents reported that they had extensive awareness of these events in the research region. Based on this, the study may infer with reasonable certainty that there is a high degree of knowledge of the presence and incidence of disasters such as flooding.

Another conclusion is that the majority of locals are already aware of or have an idea of which communities are likely to face floods as the rainy season approaches. This is a positive development since preventive measures and early warning indications of impending disaster may be easily conveyed to such areas, which are known to be prone to floods.

Research Question 2: *What are the practical strategies that can be implemented in order to effectively deliver messages related to evacuation and flooding to residents of the Bahawalnagar district with the objective of raising awareness and educational purposes?*

The study intended to identify the different channels of communication accessible to the respondents as avenues of obtaining information on how communication messages on floods are packaged for the knowledge or enlightenment of the people of the Bahawalnagar district. This became significant due to the uniqueness of each town in the area, as well as the fact that their access to information differs. According to the findings, social media is the most preferred medium for inhabitants to obtain information. This leads to the conclusion that social media has the highest level of penetration in rural areas. Although television remains a popular medium in the region, nowadays people are converted on social media. However, in other communities, word of mouth/opinion leaders remain the primary conduits for getting information, according to the community's degree of exposure, norms, and values, and the village square remains a prominent focus of information distribution. All of these were the ways in which communication messages on floods were presented to the people. It is one thing to gain access to information; it is quite another to gain access to information about natural catastrophes such as floods via these channels. The study thus attempted to determine the extent to which these channels provide information about floods, as well as whether respondents are aware of these messages. The survey revealed that a significant proportion of people thought these networks' messaging about natural catastrophes was effective.

Research Question 3: *How well are the people living in the Bahawalnagar district knowledgeable about natural disasters?*

The goal of any effort aiming at raising awareness is about impending natural disasters, such as flooding, which provides earlier warning indications, in the run-up to the recent floods that devastated riverside villages. A significant number of media organisations, as well as the previously mentioned non-traditional channels, made aggressive attempts to raise awareness about the impending flood risk. They reiterated warnings from the Pakistan Meteorological Department, Provincial Disaster Management Authority, NGOs, and others to evacuate impacted villages in order to avoid casualties. The majority of respondents acknowledged that they did not get information about the coming threat of a flood through the available channels. This implies that the country's mainstream media are still unsuccessful at disseminating information about natural catastrophes. Obviously, the majority of the information and awareness available to the general public was developed or transmitted by various organisations and individuals through existing Social media channels.

Research Question 4: What are the barriers that hinder the understanding of information and communicative messages that aim to create awareness among the residents of the Bahawalnagar district?

Before the recent occurrences of floods and erosion, a significant quantity of information was provided to the communities under investigation, focusing on the impending peril that would befall them if certain measures were not implemented to mitigate the immediate threat. The present study thus indicates that the provision of warnings through messages played a partial role in preventing loss of life during recent instances of floods and erosion in villages located in Bahawalnagar. The citizens of these societies listened to warnings, which were contained in these messages, hence playing a part in the lack of casualties. Again, in the event of natural disasters like floods, there is a disposition to hold some of the agencies and individuals

responsible for distributing information to the affected individuals, especially when proper warnings were not sufficiently communicated to them. To accomplish this goal, the study sought to explore the satisfaction of the residents with the amount and quality of information they received before the floods had taken place, as provided by the channels established above. Judging by the achieved results, it was identified that a substantial percentage of respondents were satisfied with the information they received, which is why they consider it to be effective to start precautionary measures in response to the early warnings and messages.

Conclusion

Awareness has now become a crucial requirement to be propagated during the tragedy period. It cannot be denied that the Punjab environment is featured with numerous environmental problems, which make both rural and urban inhabitants suffer greatly. As a result, successive administrations have been very concerned with such predicaments. Nevertheless, all the apparent efforts of multiple governmental organisations at the local, state, and federal levels to alleviate the situation experienced by the population still leave a huge knowledge gap in the citizens, as the flow of information on the disaster is poorly delivered. The purpose of this study was to analyse communication and knowledge about natural disasters, in the case of floods in 2023, in selected flood-prone villages under the district of Bahawalnagar, Punjab. The findings of the research indicate that on the level of population residing in the region under consideration, the disaster awareness is large. This has been supported by majority of the respondents who told that they were aware or had previous information on which communities are more prone to flooding during the rainy seasons. This is definitely a step in the right direction as this could enable the successful implementation of prevention measures and early warning signs to the already identified population that is likely to be affected by flooding. It was also determined in the research that the radio remains the most widespread source of information among the residents of the district of Bahawalnagar. This is more evident in the

rural areas where the social media has achieved a significant level of penetration and has a massive number of followers. This has in turn, led to easier delivery of messages to the people and has been effective in ensuring that information is accessed in these societies.

Recommendations

1. Despite the findings of the study indicating a satisfactory level of understanding among the surveyed residents regarding the concept of natural disasters, it is crucial to propose a recommendation for the media, in conjunction with relevant governmental entities, particularly the meteorological department, to disseminate timely alerts to inhabitants residing in flood-prone regions. This proactive measure will facilitate their preparedness in advance.
2. It is advisable for the mass media to assist in disseminating disaster awareness messages in the native language of the population, particularly through TV. This approach would enhance comprehension among individuals and enable them to respond appropriately to the circumstances. In the context of social media, it is advisable to incorporate the locality-based information and images of the disaster. Additionally, utilising imagery sourced from the immediate location of the target audience may serve as a powerful means of reminding them of the tangible threats their surroundings provide.
3. In addition to disseminating disaster awareness information in the impacted regions, it is imperative for mass media outlets and government organisations to implement educational initiatives aimed at providing rural residents with comprehensive knowledge on environmental preservation and mitigating flood-related concerns.
4. It is imperative for the mass media and relevant organisations entrusted with the task of environmental management and disaster relief to enhance the quantity and quality of information disseminated to rural communities prior to any environmental calamity.

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