Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

Policy Journal of Social Science Review

Let's Start!

Understanding Community Behavior during Floods in Dera Ghazi Khan and Identifying Behavioral Interventions for Flood Preparedness

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Policy Journal of Social Science Review
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ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
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Abstract

Floods affect rural areas of South Punjab after every few years and with the emergence of climate change as a new trigger its frequency and intensity is also increased. Much has been discussed on the impacts of floods on community livelihoods and health, however little has been discussed about effects of floods on human behaviors and in changing community attitude towards flood preparedness. This study therefore explores the behavioral changes in people affected by floods in DG Khan District of South Punjab. A total sample sizes of 200 citizens were selected from different areas of Dera Ghazi Khan which were affected from floods. The sample involved purposive sampling techniques. After collecting the data, Statistical Package for the Social Sciences (SPSS) 24 software was used to conduct various statistical analyses e.g. frequency tables, correlation, and regression analysis. Furthermore, this examination contributes to a more profound understanding of community behavior during floods in Dera Ghazi Khan and identify change in attitude for flood preparedness. The study provided specific policy answers to some complex research questions.

INTRODUCTION

Pakistan has a record of seeing several instances of flooding, including the most current and devastating occurrence being the disastrous floods of 2022. These floods were mostly caused by inadequately regulated flood plains. In addition, the nation has lately seen precipitation levels that are twice as high as the average recorded over a thirty-year period, reaching 390 mm. Specifically, Sindh province alone has witnessed a remarkable 470% surge in comparison to the

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Vol. 2 No. 4 ,(Fall-2024)

usual levels observed in the last three decades. Approximately 50 million persons countrywide have been significantly affected by this scenario. The floods caused a death toll of over 1,200 and the complete devastation of over 372,800 houses. The flooding problem in Pakistan is complex, arising from several sources and resulting in major repercussions. Pakistan has both pluvial and fluvial floods as a result of changed weather patterns in the monsoon period and snow-melt, which affects the key Indus river System. Flooding occurs due to increased intensity of rainfall, whereas fluvial flooding is caused by higher river levels. While the frequency and severity of floods have probably grown, it is still challenging to completely control these events, since they are natural outcomes of rainfall and river flows (Ashraf et al., 2023).

In the field of management, it is necessary to evaluate the target groups and develop the necessary action plan, assessment of the existing effective of implemented and required disasters, supply the special assistance, organize and assess the resources and equipment, deliver the training about disasters, inform about the floods. And address multiple aspects during a flood, such as physical health consequences, health problems related to floods (Krongthaeo et al., 2021).

The focus has recently shifted towards catastrophe preparation because of its capacity to reduce deaths and improve emergency response efforts. This technique is crucial for mitigating the fear linked to natural catastrophes, which are often unforeseeable and may have enduring psychological impacts. Additionally, it is crucial to investigate the promotion of health-preserving actions and to enhance knowledge about natural disasters as efficient tactics for managing the stress caused by these occurrences. Morrissey and Reser (2023) said that the specific actions taken in relation to prevention of natural disasters, might help to reduce the level of psychological discomfort due to possible occurrence of these conditions. Understanding of some challenges. However, actions related to disaster readiness are often prompt, as highlighted by Azhar et al. (2022). Many studies have found that promotion of appropriate behaviors might reduce susceptibilities and enhance catastrophe readiness. This problem can potentially be addressed by media participation, state-sponsored catastrophe-oriented projects,

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Vol. 2 No. 4 ,(Fall-2024)

and other techniques controlling disaster risks. Blake et al (2017) pointed out that most of the studies on disaster preparation embraces a perceptive perspective that enhances the Well-prepared communities and people have the ability of recovering from natural catastrophes and resume their regular activities. This resilience may be cultivated by continuous modifications in behavior. By understanding the consequences of what they do, communities and individuals may make informed decisions on disaster preparedness. The focus on readiness for natural catastrophes and emergencies mostly centers on human conduct. Perceptions of danger, past catastrophe experiences, relationships between persons and their environment, and other factors have a substantial influence on human behavior (O'Sullivan and Lemyre, 2013; Azhar et al., 2022).

Behavioral interventions have emerged as effective and cost-efficient flood preparedness techniques, offering a promising approach to enhance community resilience. These interventions focus on modifying individual and collective behaviors to reduce vulnerability and improve response capabilities (Bubeck et al., 2017). For instance, implementing early warning systems and conducting regular evacuation drills can significantly increase community preparedness at minimal cost (Kreibich et al., 2017). Additionally, promoting household-level flood protection measures, such as elevating valuable items and installing flood barriers, has been shown to reduce potential damages by up to 80% (Poussin et al., 2015). Public awareness campaigns and educational programs can also foster a culture of preparedness, leading to more informed decision-making during flood events (Maidl and Buchecker, 2015). By targeting behavioral changes, these interventions not only improve flood readiness but also build long-term community resilience, making them both effective and economically viable strategies for flood risk management.

Dera Ghazi Khan is located in the southern region of Punjab province in Pakistan and based on its geographical position this city is very susceptible to these occurrences namely through the Indus River from the east and hill torrents from the west. The effects of floods, the management and the level of preparedness can be even more complex due to the diversity of socioeconomic

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conditions within this region, both rural and urban areas being affected. The existing estimates concerning climate change indicate that in the future there will be more frequent floods and they will be even more destructive. This amplifies the need to better understand as well as address the multiple dimensions of economic, social, psychological and communal during these disasters. The purpose of this work is to discover various factors of the community behavior in the DGK during floods and, consequently, identify concrete behavioral changes in relation to floods. For the purpose of gaining the clear picture of the circumstances, it is necessary to analyze the inhabitants' socioeconomic and psychological characteristics. The aim of this project is to bridge the gap between traditional disaster management approach and behavioral science to facilitate development of appropriate interventions, which respond to the needs of the people of Dera Ghazi Khan in particular and across similar geographies and demographics in general. With regards to theoretical background, this research use Social susceptibility Theory, which acknowledges the fact that socio-economic factors are determinants of the susceptibility level to catastrophe in DGH. Protection motivation theory is adopted to understand the cognitive factors that are involved when the decision is being made at the individual and the community level in relation to flood. The use of the term 'paradigm' entails the consideration of mental prejudices as well as emotional aspects that help in determining responses as explained in the Behavioral Economics. The principles of Community Based Disaster Risk mitigation guide the analysis of communal events and aspects especially on the community. Another reason why Intervention Mapping is based on the Diffusion of Innovation Theory is because the latter takes into account that there are different population segments. This all-embracing framework provides a richness of points of view to embrace the numerous elements of community behavior in floods with the intention to address the complex issues of flood preparedness in this vulnerable region (Cutter et al., 2008; IFRC, 2014).

Research Objectives

The objectives of this study will be to;

- Explore the socio-economic characteristics of respondents.

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Vol. 2 No. 4 ,(Fall-2024)

- To explore the impact of floods on community behavior towards flood preparedness
- Identify potential policy interventions for effective community flood resilience.

REVIEW OF LITERATURE

Flood catastrophe vulnerability pertains to the specific attributes and conditions of the community, structure, or asset that render it susceptible to the adverse impacts of floods. The four categories of vulnerability are societal vulnerability, psychological vulnerability, financial vulnerability, and vulnerability to the environment. Vulnerable populations in Malaysia include those residing in flood-prone regions, those experiencing poverty, young people, senior citizens, women, refugees, undocumented migrants, internally displaced individuals, and victims of human trafficking (UNISDR, 2018). Therefore, it is essential to have a flood preparation strategy. Unfortunately, individuals are unable to engage in local disaster preparation programs as a result of their limited understanding (Eisenman et al., 2009). People of the community felt that there was not enough information and they did not have enough knowledge regarding the establishment of the local disaster response plans. On this point, both Hitler and Mussolini were completely unaware of the strategic significance of their respective blueprint.. In addition, the community was unable to ascertain the specific local government officials accountable for addressing disaster preparedness concerns. Consequently, they were unable to communicate the difficulties encountered in engaging locals in local disaster preparedness efforts, as well as the insufficient resources available to initiate community-level disaster preparedness initiative (Ronan et al., 2009).

Disaster preparation training is necessary for those who are vulnerable. It is possible to identify several approaches to teaching oppressed persons and there is no approach that may be considered to well the other. In addition, those who have offered their time in a bid of gaining considerable education will enjoy widened capacities to prevent harm in themselves and the public. Such preventive strategies call for development of effective training programs in disaster preparation (Torani et al., 2019). Flood disaster readiness enables the development of effective, functional, and well-coordinated approaches, which reduces duplicative work as well as

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Vol. 2 No. 4 ,(Fall-2024)

improves the effectiveness of floods preparedness and response projects implemented by National Societies, families, and individuals in communities. (WHO Report, 2012). Engaging in flood disaster preparation efforts, together with implementing risk reduction measures, may effectively avert catastrophes and minimize the loss of lives and livelihoods. This approach enables the afflicted community to swiftly recover and resume normality. The process is ongoing and comprehensive, resulting from a diverse variety of actions and resources aimed at reducing risks, rather than relying on a single sector-specific activity. A diverse array of sectors must contribute, such as training and logistics, healthcare, rehabilitation, livelihood, and the development of institutions (Yusoff et al., 2018; Chan, 2014; WHO, 2020). While it is not possible to prevent all flood-related injuries and fatalities, such as when people are suddenly overwhelmed by water without any time to react, individuals can still make decisions to hinder flood-related incidents by behaving appropriately when dealing with floodwaters during a flood event (Pearson & Hamilton, 2014). Hence, it is important to comprehend human conduct in and near floodwater in order to facilitate the development of efficient preventative techniques. The reason for this is because the choices that influence people's behavioral reactions during floods are often psychological in character, including many social and motivational elements (Pedan et al., 2018; Pearson & Hamilton, 2014). Once the behaviors that compromise safety in and near floods are identified, research may be conducted to understand the reasons that drive these dangerous actions, and remedies can be devised. There is a lack of discussion on flood catastrophe preparedness among people, health care providers, and the government, prior to the occurrence of difficulties. Some groups lack awareness on the need for providing particular care to disadvantaged individuals, including women, children, and the elderly, in emergency situations (Luna, 2014).

Najafi et al. (2017) contended that disaster as well as emergency preparation may be classified as a kind of health-protective conduct, indicating that behavioral methods play a significant role in motivating disaster preparedness behaviour. Encouraging readiness actions is crucial in both the public's and individual safety, since disaster preparation behaviors often yield beneficial

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Vol. 2 No. 4 ,(Fall-2024)

outcomes for the community and provide personal advantages to individuals. However, addressing these difficulties often necessitates individuals modifying their behavior in a manner that prioritizes the well-being of others above their own. Efforts to prepare for natural disasters frequently focus on educating people, with the expectation that providing knowledge alone would lead to changes in behavior. These kinds of policies have emerged indirectly in places where behavioral change models have been deployed under disaster and emergencies (Linnemayr et al. 2016). Previous research indicates that psycho social factors regarding risks assessment of climate change and impact assessment, belief in adaptation effectiveness, and self-efficacy influences self-protective behavioral intentions of an individual (Clayton et al. , 2015; Gifford et al. ,2011). On the other hand, unwillingness to expend effort or thoughts that are negative as regards effort are strong barriers to taking effort (Grothmann et al., 2013). To have a further understanding of the actual adoption of adaptive attitudes it is proper to assess both facilitating factors and constraints that relate to belief systems and action. This integrated study should be conducted at the person level as Meinel and Höferl recommended in their study in 2017. Previous works indicate that flood preparation behavior is associated with the risk decrease behaviors of others (Grothmann & Reusswig, 2006). Research carried out in Australia show that, in this case, the perceived standards proved to have more influence over the decision of the households to take an insurance cover against floods than the perceived risk of flooding by the homeowners (Lo, 2013). Bubeck et al., (2013) conducted a distinct survey that demonstrated a direct correlation between engaging in mitigation behavior as well as having friends and neighbors that implemented flood protection strategies.

Disaster preparedness behavior are affected by critical awareness to disaster, collective effort (Paton, 2007), disaster preparedness attitude (Lindell & Whitney, 2000), risk sensation (Armaş & Avram, 2008; Miceli et al., 2008), social capital which is a sense of belonging and disasters (Paton et al. , 2010) and destruction (Lok et al., 2019). They include the monthly income, disaster experience, residential area, and employment that may greatly affect behavior in preparedness to disaster (Najafi et al., 2015).

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Vol. 2 No. 4 ,(Fall-2024)

The theory of planned behavior is an expectancy-value theory which helps explain why individuals opt to engage in or avoid specific behavior namely; disaster preparation behavior (Skurka et al., 2018). The theory of planned behavior (TPB) is an integrative theory that explains the actions and the processes that people go through that would make them engage in or avoid certain behavior. The theory of planned behavior posits that behavior may be predicted by three determinant variables: personal factor: attitude, perceived control over the behaviour, and the standard that is perceived as appropriate or just (Daellenbach et al., 2018; Skurka et al., 2018; Sutton & Tierney, 2006). Several previous studies on disaster preparedness have established that risk perception plays a major role in individuals' readiness (Miceli and Delaney, 2008). Application of community preparation to disparate catastrophes is defined by disparate natural factors (Bola et al., 2022; Dutta & Sinha, 2023). The causes of flooding may be categorized into two main types: external and internal factors and in particular the natural and human induced causes of flooding (Kim et al. , 2023). Natural floods depend on aspects such as rainfall, sedimentation, physiography, erasure, the capability of rivers, the capability of drainage systems, and tidal forces (Rifino & Mahon, 2024). The effects of flood include, modification of water flow in rivers due to human activities, people displacement near the river banks, destruction of flood control structures, bad drainage system, destruction of forests, and poor planning on flood control (Mohan & Rifno, 2024). Knowledge level in the community defines their knowledge and perceived attitude towards disasters and preparedness especially with those who live in the disaster prone areas (Phillips et al. , 2022; Raheem et al. , 2023). According to Ajzen (1991), intention also defined as the tendency or willingness to perform a specific behavior, willingness to engage in specific behavior. It is based on personal motivational factors as has been pointed out by Sinatra et al. (2012). The behavioral inclination is the variable that acts as the between perception and behavior in the way it relates to the cognitive choice of an individual (Soetanto et al. , 2016).

The flood affected populations feel a sense of vulnerability, host cities seek out structural controls for safety (Schad et al., 2012). The existence of public flood mitigation measures may

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Vol. 2 No. 4 ,(Fall-2024)

considerably affect people's readiness to take preventive measures, which was also observed in this trend (Birkholz et al., 2014).

However, several positions have also found that population displays a fatal preparedness or more precisely, a lack of willingness to take preventive measures against catastrophes. This is because of their dependency on the public flood control measures, which develop the so-called 'buffalo effect,' (Linear, 2008). The lack of sufficient amount of resources and time, money, education or social support could prevent people from changing their intentions into actual preventive activities (Grothmann & Pat, 2005). Kobes et al. (2010) reviewed the literature concerning human behavior during building fires and expounded on the analysis on human behavior in fires evacuation as revealed in past research findings.

All slow walking was prompted by smoking or in an uncharacteristic environment. Even those who are typically mobile had a certain level of constraint during a fire emergency, which reduced their ability to be self-sufficient. A significant lack of knowledge of ceiling signage was observed, as 92 percent of victims in 400 fire escape instances were ignorant of the presence of escape route marking. The efficacy of luminescent low-level exit markers was shown to be higher. This review emphasized the tendency of individuals to priorities evacuating by exits that they are acquainted with, even if those exits are further away, rather than using closer exits that are unknown or may be closed or alerted. The selected course of action was also influenced by the conduct of affiliates. The occupants' high inclination to adhere to their family or friend group significantly impacted their reluctance to respond to danger warnings and commence evacuation. Li et al. (2013) when discussing flood catastrophe, the author analyzed the information obtained for the Asia Pacific area to specify that the frequency of floods in the whole area increased in the period of 1990–2010. The United States is also vulnerable to flooding incidences as they occur frequently with great intensity sometimes. Further, it reveals the highest number of articles published in the area of flood catastrophes; the second country in this regard is China (Yongqiang et al. , 2018). In September 2008, Hurricane Ike hit the Galveston Island in the United States of America. There are some studies on catastrophe

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Vol. 2 No. 4 ,(Fall-2024)

preparation and mitigation focused towards local businesses that have been done by the researchers. Various organizations within the Galveston region that experienced little catastrophes demonstrated a high degree of change in the level of disaster preparedness as compared to the previous times. Existing research confirms that deploying food readiness concepts at the household level causes a reduction in the level of loss incurred post a food-related event (for example, Hudson et al., 2014; Poussin et al. 2015).

Carman & Zint, (2020) some authors stressed a single's perspective as important for the analysis of the psychological processes, underlying adaptation. In addition, countless studies reveal that psycho social predictors including the assessment of climate risks and loss, perceived adaptation efficacy and perceived self-efficacy could influence an individual's motivation to take particular action to protect the self from the effects of a climate risk. However, lack of motivation to change/modify or even negative attitude towards change are factors guaranteed to hinder action. From the above perspective, Kuhlicke et al., (2020) posited that flood risk reduction behavior or actions mean any actions that aim at avoiding or reducing the probable adverse consequences of flood disasters. Such measures, which may be taken before, during or after an event, are proactive actions taken in anticipation of or in response to climate shocks and are exclusive of actions taken by institutions and households to prevent or minimize physical destruction as well as out of pocket expenses resultant from climate risk (Wilson et al., 2020). Dillenardt et al., (2022) I wonder if there are several classifications of behavior that people can choose in preparation for the flood. However, few studies have established the level at which households and, therefore, individuals implement and operational structural adaptation processes and actions. Besides, this research seeks to determine the key psychological factors that cause organizations to adopt them.

According to IPCC (2022), adaptation within human systems can be defined as the intentional process of making changes to current or future climate and its impact with the purpose of minimizing adverse effects and enhancing opportunities. This basically deals with actions that can be individual, grouped or otherwise, taken with an aim of mitigating effects of climate

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Vol. 2 No. 4 ,(Fall-2024)

change specifically floods. The concept being pursued is self-protection and self-advancement with an emphasis on the welfare and sustenance of both self and the externalize in the short run as well as in the long run.

METERIAL AND METHODS

Research design is systematic blueprint or a pattern, which elucidates the strategies that must be applied in the course of conducting an inquiry (Paul et al., 2014). According to Bryman and Bell (2015) the nature of the study and objectives make quantitative research design as the most appropriate for the purpose of identifying patterns and testing hypothesis within a particular research paradigm. Saunders et al. (2012) noted that survey method has numerous advantages to the researchers whom undertake it. First, it helps in acquiring the data from a very large population in an efficient manner. In addition, it provides specific procedures for dealing with all the possible contaminants and to attain a reasonable degree of reliability of the sample for generalization of the findings. The approach that will be adopted for this research will be the survey methods. With an intention to gain some preliminary idea of the community behaviour during floods in Dera Ghazi Khan, this research proposes to undertake a survey. The first and the foremost goal is to identify any possible behavioral interventions that may lead to improvement in flood preparedness. In order to assess the variables in the theoretical model an interview schedule will be prepared after assessing and mapping the variables into the theoretical model. The following interview strategy will be utilized by the researcher in this study.

Descriptive survey research design will be adopted to identify the behavior of the population when there is flood in Dera Ghazi Khan and the behavioral change to be made to prepare for this natural disaster. More specifically, the survey approach will be used to select 160 respondents adopting a multistage sampling technique.

There are different types of sampling methods that are employed in social research, some of these are reliable as opposed to others. In quantitative research, sampling involve the process of choosing a particular number of 142 people from the total population (Malhotra, 2009).

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https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

While performing the research, scholars employ the multistage sampling technique. In the first stage, Four union councils will be purposely selected from the flood prone areas of District Dera Ghazi Khan. In the second step, so the researcher has selected a total of eight villages which will be selected purposely: two villages of each selected union council. In the third step, thus, twenty respondents will be conveniently selected from each village that has been identified.

160 respondents were drawn from various flood affected areas of District Dera Ghazi Khan. Hence, in order to have greater control, in total, eight communities, that is two from each of the identified union councils will be targeted purposefully. The clients will be selected randomly, in a convenient method, from each of the community with a total of about 20 clients. This particular sample was chosen with a view to being able to generalize on the whole population.

Data Analysis Techniques

Gathering information is just one of the main stages of carrying out a research, the other important and essential steps include analysis of the information collected. In other words, unless the data is properly evaluated, cleaned, converted, and modeled, the researcher may never be able to get to the intended goals of the study which is to make conclusions and judgement (Tabachnick & Fidell, 2007). In the process of data analysis, there are various methods and procedures comprising of a number of tools in the analysis of the acquired data (Xia & Gong, 2015). Descriptive analysis provides findings of various aspects including mean, average and standard deviation. While the descriptive analysis provides information on the relationship between the study variables; where the correlation, regression, mediator, test of significance etc tools and methods are used. The researcher employed both inferential and descriptive methodologies with an aim of analyzing the data collected and make conclusions. The different statistical analysis is performed by the Statistical Package for Social Sciences (SPSS) used by the researcher. All information that is to be collected in the course of this project will only be used for educational purposes only. Data and information collected form the respondents and the responses given will be kept secure from other people or other organizations. In the research work, only the data collected will be analyzed and, therefore, only

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Vol. 2 No. 4 ,(Fall-2024)

the raw data will be used without spin, distortion or fabrication by using SPSS data validation test.

RESULTS AND DISCUSSIONS

Demographics Analysis

The results indicated that a huge majority 95% Of the respondents were males while the 5 % remaining were females. This is because the study area is extremely remote and women have little freedom to interact with outside people due to cultural restrictions. This has been consistently reported in research in the past (Mughal 2019; Ghani et al., 2022). Results also demonstrated that a huge majority 46.9% of the respondents were at the age of 25-34, 22.5% of the respondents were at the age of 35-44, 18.1% of the respondents were at the age of 16-24 while 10% of the respondents were at the age of 45-54 while only 2% of the respondents were at the age of 55 and above. This reflects that young people were more accessible and easy to engage for interview. Married people participated in the study 58.1% slightly more than unmarried people. Expectedly no. of young people directly engaged in agriculture were slightly lower 25.6% as young people in rural areas look for better opportunities in other areas (Butt et al. (2011; Mukhtar et al. (2018). It is also important in the context of disaster resilience as these young people bring capital and new knowledge which helps households improve their disaster response.

Table 1 Demographic and Socioeconomic characteristics of survey participants

	Category	F	%
Age	16 - 24	29	18.1
	25 - 34	75	46.9
	35 - 44	36	22.5
	45 - 54	16	10.0
	5	4	2.5

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Vol. 2 No. 4 ,(Fall-2024)

Occupation	Daily wages	25	15.6
	Farming	41	25.6
	Small Business	40	25.0
	Government employee	24	15.0
	Cattle rearing	3	1.9
	Skilled worker	18	11.3
	Unemployed	9	5.6
Gender	Male	152	95
	Female	8	5
Marital Status	Married	93	58.1
	Unmarried	67	41.9
Income	Up to 40000	28	17.5
	40001 - 80000	71	44.4
	80001 - 120000	47	29.4
	120001 - 160000	14	8.8
Education	Illiterate	7	4.4
	Up to primary	20	12.5
	Up to middle	35	21.9
	Up to matric	28	17.5
	Intermediate	35	21.9
	Graduation	20	12.5
	Graduation and above	15	9.4
	Total	**160**	**100.0**

The results about the income of respondents also showed that a vast majority of people are living just above the poverty line with incomes close to minimum wage announced by the government. Similarly, educational achievements of respondents in the disaster prone area is another concern with only 12.5% people reaching graduation. Low education is another obstacle in disaster resilience for household as they are unable to access helpful information (Amriwijaya & Sodjakusumah, 2024).

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Vol. 2 No. 4 ,(Fall-2024)

Multivariate Analysis

This part includes a multiple regression model to see the relationship between dependent and independent variables. The results revealed a relatively high 0.5 R^2 and Adjusted $R^{2\ of}$ 0.48 which means model is a good fit. Similarly, ANOVA results reflected a highly significant F value of 21.937 showing the prediction ability of the model. This reflects that all the variables included in the model are relevant and have meaningful influence on the dependent variable.

Table 2: Results of the Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.710[a]	.504	.481	2.22957

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	763.354	7	109.051	21.937	0.000[b]
Residual	750.621	151	4.971		
Total	1513.975	158			

In this multiple Regression Model losses beard by the household were taken as dependent variables while independent variables included community behavior before the flood, community behavior towards disaster management after the flood, household choice of preferred early warning, possibility of evacuation, perceived effects of flood on behavior, attitude towards flood preparedness. The results clearly indicated that variables like Source of Early Warning, Rate Sources in Early Warning, Perceived effects of floods on the behaviors and how much flood changed your attitude towards preparedness were all found significantly influencing the losses incurred during the floods. Variables i.e Possibility of evacuation when flood hit your area, Community behavior towards disaster preparedness and management before the flood hit and Community behavior towards disaster preparedness and management after the flood hit showed non-significant in the regression model reflecting no potential influence of these on losses due to flood.

These results corroborate with earlier findings of some researchers like Shi et al., (2020) and

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ISSN (Print): 3006-4627
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Vol. 2 No. 4 ,(Fall-2024)

Zang et al., (2022) reported that flood early warning systems (FEWS) are particularly important for mitigating the enormous losses to lives and property caused by highly destructive floods. The study also showed that no significant change in community behaviour was observed due to flood which was earlier described by Gautam & Phaiju, (2013) who stated that early warning systems are essential for reducing flood-related losses, but their effectiveness depends on various factors. Community-based approaches, such as those implemented in Nepal, have proven to be effective in disseminating flood warnings and facilitating immediate responses.

Table 3: Coefficients of the Multivariate Regression Model

Coefficients of the Regression Model					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model	B	Std. Error	Beta		
(Constant)	-6.431	2.189		-2.937	.004
Sorce of Early Warning	.304	.111	.191	2.749	.007
Rate Sources in Early Warning	.100	.041	.152	2.461	.015
Possibility of evacuation when flood hit your area	.003	.063	.003	.048	.962
Perceived effects of floods on the behaviors	.252	.091	.227	2.757	.007
Community behavior towards disaster preparedness and management before the flood hit	.036	.058	.036	.618	.538
How much flood changed your attitude towards preparedness	.651	.123	.424	5.314	.000
Community behavior towards disaster preparedness and management after the flood hit	.120	.105	.079	1.137	.257

Results of the Correlations among selected variables

Correlations give important insights on variables mutual interactions; hence correlations were

Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

used to see association of variables included in the analysis. Results clearly indicated that sources of early warning is positively and significantly correlated with the possibility of evacuation. The relationship hence suggests that source of early warning for household in the study area greatly influences their possibility to evacuate in floods. A study using synthetic data suggests that social preparedness can significantly enhance the efficiency of flood early warning systems, potentially reducing disaster-induced losses by almost half (Lopez et al., 2017). Similarly, variable loss due to flood was positively and significantly correlated with source of early warning and possibility of evacuation when flood hit. Research indicates that the source and delivery of early warnings significantly impact their effectiveness. Samansiri et al. (2023) highlights that failures in current flood warning and response mechanisms have led to significant loss of life, emphasizing the importance of governance, leadership, and standard operating procedures in warning generation and communication. Another important variable of the study perceived effects of floods on behaviors was also significantly and positively correlated with source of early warning and possibility of evacuation. An earlier research in Nepal demonstrated that the implementation of a community-based flood early warning system in the Ratu River watershed led to increased awareness, strengthened upstream-downstream linkages, and greater willingness among communities to help each other prepare for flood disasters (Bajracharya et al., 2021). This change in behavior highlights the positive impact of early warning systems on community resilience and cooperation. In a very similar way, flood changed your attitude towards flood preparedness was significantly and positively correlated with source of early warning and possibility of evacuation. Another striking result was the significant and positive correlation between community attitude towards flood preparedness after the flood and source of early warning and possibility of evacuation. Attitude towards floods reflect the social preparedness during the floods. The recency of flood experiences serves as a proxy for social preparedness, significantly impacting the efficiency of FEWS. Social preparedness is particularly important when technical forecasting and warning capabilities are limited, potentially reducing disaster-induced losses by almost half (Lopez et al., 2017).

Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

Table 3: Results of the Correlations

Correlations

		Source of Early Warning	Rate Sources in Early Warning	Possibility of evacuation when flood hit your area
Source of Early Warning	Pearson Correlation	1	-.334**	.306**
	Sig. (2-tailed)		.000	.000
	N	160	160	160
Rate Sources in Early Warning	Pearson Correlation	-.334**	1	-.115
	Sig. (2-tailed)	.000		.147
	N	160	160	160
Possibility of evacuation when flood hit your area	Pearson Correlation	.306**	-.115	1
	Sig. (2-tailed)	.000	.147	
	N	160	160	160
Loss beared during flood	Pearson Correlation	.382**	-.022	.258**
	Sig. (2-tailed)	.000	.784	.001
	N	160	160	160
Perceived effects of floods on the behaviors	Pearson Correlation	.509**	-.280**	.373**
	Sig. (2-tailed)	.000	.000	.000
	N	160	160	160
Community behavior towards disaster preparedness and management before the flood hit	Pearson Correlation	.037	-.077	.038
	Sig. (2-tailed)	.644	.332	.630
	N	160	160	160
How much flood changed your attitude towards preparedness	Pearson Correlation	.260**	-.088	.256**

Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

	Sig. (2-tailed)	.001	.266	.001
	N	160	160	160
Community behavior after the flood	Pearson Correlation	.179*	-.139	.246**
	Sig. (2-tailed)	.024	.080	.002
	N	159	159	159

Conclusion & Recommendations

Socioeconomic features provide the anchor in the cross sectional data analysis and in this case, we don't see much difference in socioeconomics from earlier reported studies. A lot of young people are escaping agriculture for better opportunities and family income diversification which add to household resilience during floods. Women still face restrictions and were not easily accessible for survey team. More than half of the respondents didn't finish high school, and a large population is at the boundary of poverty line and any shock can push them into poverty. It is also concluded from the findings of multivariate model that source of early warning is an important determinant of lossess due to floods. Similarly, the floods greatly influenced community behaviors when seen thorough community perception about effects of floods on their behaviors. One of the most important conclusion for this study was that flood has compelled people to change their attitudes towards flood preparedness but this change in attitude if not grounded in guided scientific knowledge about disaster may not benefit much to the people. The flood response organizations and government should consider this attitudinal change as an opportunity and add knowledge, training and support to recovering population so that the right shift in attitude may take place which help community in flood preparedness.

Findings

The following findings were made from this research:

- Significant majority 95%% of the respondents were male, 46.9% of the respondents were at the age of 25-34 lived in flood effected areas of Dera Ghazi Khan.

Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

- Majority 58.1% of the interviewees were married and 25.6% of the respondents had the economic activity of farming.
- Majority 44.4% of the respondents have a monthly income of 40001-80000 and onle 21.9% of the respondent's education are intermediate.
- Majority 59.4% of the respondents say that devastating floods occur every year in their area and 35% of the respondents says that devastating floods occur every alternate year.
- Majority 35% of the respondents lived 7-10 km far from the flood passage (Hill torrent) but all the participants lived in flood affected areas.
- Majority 56.3% of the respondents says that due to flood community faced the health risk of Cholera and majority 68.8% of the respondents says that due to flood community face the health risk of Malaria.
- Significant majority 71.9% of the respondents says that due to flood community face the health risk of Cough.
- Majority 50% are agreed to some that they did not get any early warning about flood and 57.5% of the respondents were agreed to some extent that they get informed by local influential.
- Majority 38.8 % of the respondent's rate 5 (maximum) to NDMA/PDMA as a sources in early warning of floods and 32.5% of the respondents rate 4 to Municipal authorities/ District administration as a source of early warning in floods.
- The majority 38.1% of the respondent's rate 4 to local representative as a source of early warning and 28.7% respondents rate 3 to local representative as a source of early warning.
- Majority 20.6% of the respondent's rate 4 to NGOs and 17.5% of the respondent's rate 5 (maximum) to NGOs.
- Huge majority 70.6% of the interviewees were agreed to some extent while 21.3% of the interviewees were also agreed to great extent that there is a communication gap between the authorities and local communities.
- Majority 31.3% of the plaintiffs got informed for preparedness one day before flood

Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

occurred, 18.1% of the plaintiffs got informed for preparedness 12 hours before flood occurred.

- Majority 41.3% of the respondents are agreed to some extent that collaborative neighborhood network for flood relief is possibility of evacuation when flood hit their area, 35% of the respondents were also agreed to great extent with this statement.
- 51.8% of the respondents are agreed to some extent that getting help from local govt is possibility of evacuation when flood hit their area, 39.4% of the respondents were also agreed to great extent with this statement.
- Significant majority 68.1% of the respondents are not agreed that any other possibility of evacuation is available when flood hit their area, 20% of the respondents are agreed to some extent with this statement.
- A huge majority 75.6% of the respondents are agreed to some extent that the neighborhood network for flood relief is functional at community level.
- Majority 48.1% of the interviewee bear the loss of their house structure to great extent, 34.4% of the interviewee bear that loss to some extent.
- Half majority 47.5% of the interviewee bear the loss of their livestock to some extent while 35% of the interviewee bear that loss to great extent.
- Majority 48.8% of the interviewee bear the loss of their crops to some extent, while 32.4% of the interviewee also bear that loss to great extent.
- Majority 33.1% of the interviewee bear the economic loss of 50001 to 75000, 30% of the interviewee bear the immense economic loss of 200001 and above.
- Majority 48.8% of the plaintiffs had gone through average psychological trauma during flood, 30.6% of the plaintiffs gone through huge psychological trauma.
- Significant majority 78.1% of the respondents not face any loss of life of their family member.
- Half majority 49.4% were the respondents says that there is a weak collaborative network of NGOs with the government.
- Half majority 50.6% of the interviewee says that collaboration network of NGOs at the

Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

community level is missing.

- Majority 65% of the respondents have the ability to recover from frequent flood to some extent, while 26.3 also have this ability to great extent.
- Majority 51.2% of the respondents were agreed to some extent that social support is increased during floods while 39.4% of the respondents were agreed to great extent.
- Half majority 50% of the plaintiffs are agreed to some extent that they won't left their homes due to food available at their homes.
- Majority 51.2% of the plaintiffs are agreed to great extent that they will fled to nearest safer place at their own while 45% of the plaintiffs are agreed to some extent about that statement.
- Majority 57.5% of the plaintiffs are agreed to great extent that they depend on external support to be feed and evacuate if flood hit their area while 33.8% of the plaintiffs are agreed to some extent about that statement.
- Significant majority 57.5% of the interviewee were agreed that role of Disaster Management in preparedness for flood is very important.
- Majority 40% of the plaintiffs says that role of Community in preparedness for flood is very important.
- Half majority 50.6% of the defendant says that role of NGOs in preparedness for flood is very important.
- Majority 59.4% of the respondents were agreed to some extent with the opinion that floods have changed their attitude towards preparedness.
- Huge majority 62.5% of the interviewee are agreed to some extent that they develop local network for flood preparedness and 58.8% of the interviewee are agreed to some extent that they trust on local representatives towards preparedness for flood.
- Majority 63.1% of the respondents were agreed to great extent that they have trust on communal people to vacant their houses.
- The majority, 58% of the respondents were agreed to some extent that they prioritize

Policy Journal of Social Science Review
ISSN (Online): 3006-4635
ISSN (Print): 3006-4627
https://journalofsocialsciencereview.com/index.php/PJSSR
Vol. 2 No. 4 ,(Fall-2024)

collective evacuation in emergency.

- 58.8% of the respondents agreed to some extent that they support each other for flood preparedness and managing disaster.

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