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Effects of Flood on Food Security and Livelihood of Rural Communities: A Study of Tehsil Taunsa, Punjab

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Abstract

In the mid of 2022, Pakistan encountered a dreadful flood which led to the horrendous consequences in the country, particularly in the case of Tehsil Taunsa, Pakistan. The objectives of the study included investigating the challenges faced by those flood-affected people, effects of the flood on the livelihoods of the people, and food security challenges faced by the rural areas. For this research, the researcher used questionnaires as a tool for data collection. The target population was 384 individuals from the 200 flood affected villages in the Tehsil Taunsa. To analyze the data, the researcher used statistical software, Statistical Package for Social Sciences. The findings of this research study demonstrated terrible consequences of the floods on various facets. These facets included the livelihoods of the people, food security challenges which were aligned with the contemporary studies on the impacts of floods. The research laid stress on the distinctive characteristics of the Tehsil of Taunsa and also demonstrated how this research findings can be beneficial in policy making. This research also revealed that agriculture was the main sustenance for the flood-affected people. Moreover, the flood had affected the natural resources of the area badly, like land and irrigation, cattle and orchids. The flood also led to instability and food shortage in the area. People had to purify the materials for consumption like water. The research suggested that both sectors, private and public, should work in collaboration for the solution of the problems that flood-affected communities face. The results also demonstrated that there is a dire need for the formulation of context-specific comprehensive plans to minimize the disastrous impacts of floods, and to promote the long-term development in the area.

Keywords: Floods, Flood-affected areas, Food Security, Livelihood

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Introduction

Natural disasters such as floods impact the rural population all around the world. They not only create life threatening situations, but also pose food security challenges, and affect their lifestyles. Climate change has serious repercussions particularly for those with vulnerabilities as it has intensified the extreme weather events and increased the frequency. Such conditions lead to excessive floods that affect the availability of nutrient rich food, farming and food production. This research was conducted to trace the challenges that rural communities face due to flood disasters, and how the floods alter the livelihoods of the inhabitants, and how they pose serious challenges.

Floods are also considered among the poorest disasters of our era as they claim more lives and destroy more properties as compared to any other natural or human made disaster. Due to this, climate scientists believe that floods complicate the process of determining the weather forecast. Flooding is the overflow of water that ends up on the lands that are nearby. It may injure human beings and kill many. The floods caused by climate change are more frequent and stronger. That is detrimental to food safety, food production, distribution, and consumption (Wizor & Week, 2020).

The country has lost a great deal due to floods in recent years and the flood affected regions have always been behind in socio-economic development. Floods are among the most destructive and costly natural hazards, undoing years of progress. In the past, flooding in Pakistan has been associated with heavy and intense rainfall in which powerful flood waves have been generated (Shah *et al.,* 2022).

On average, 3000 to 4500 mm of rain falls annually in this region. The highest amount of rain is received between July and September. The sample size of 790 people was used to represent the local population in the study. Fifty heads of families in every of the five villages in Bayelsa, Delta, and Rivers States made up the sample in this

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case. The study

reveals that the core area of Niger Delta is very vulnerable to floods. The socioeconomic situations, employment and food security of the individuals residing in the flood prone areas has been deteriorated by flooding as time goes by. The area of research consists of hamlets and the location of each of them enhances the severity of floods due to the size and frequency of the latter (Wizor & Week, 2020).

As global temperatures rise, the IPCC is expecting more rainfall, or increased intensity of rain. The shift may exacerbate flash floods in the Hindu Kush–Himalayan region, including the Indus Basin. Eight floods in the Indus Basin have been triggered by past events like avalanches and debris flows and additional floods downstream are possible because of erratic rains and runoffs. The downstream river basins are more vulnerable to frequent flooding and the Himalayan river basins are more vulnerable to extreme floods. Several factors can affect risk perception, such as exposure, previous experience, cognitive capacity, risk knowledge, and socio-political factors. The perception of disaster risks is a crucial input for developing disaster management strategies, influencing people's disaster preparedness, adaptation and response (Shah *et al.,* 2020).

In 2022, a fatal flood struck Pakistan and killed more than two million individuals nationwide. In Punjab alone, crops and animals were destroyed, 1.7 million acres of land was destroyed, 200 villages were destroyed, and 500,000 homes were destroyed by the flood. Flash floods and torrents of hills led to a high level of damage in the regions such as Khyber Pakhtunkhwa, Sindh and Balochistan.

The Punjab province was the worst hit by this disaster. Taunsa, in the Punjab province of Pakistan, is situated along the Indus River on the southern side of Punjab. The house of Sharif Shahid is approximately 30 kilometers away when compared to

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Taunsa. According to the Flood Forecasting Unit, the Indus River will soon flood. The Indus River at Sharif is flooded and highly dangerous and so the people residing in the affected regions have been

advised to evacuate immediately as it is life threatening. The notable districts in Tehsil Taunsa Sharif include; Basti Mangota West, Jhokebhakwani, Narishumali, Narijanubi, Soker and Makwalkalian.

The initial process of managing flood risks is the analysis and assessment of flood risks. The second step involves identifying methods of preventing and reducing those risks. The use of Remote Sensing (RS), And Geographic Information Systems (GIS) helped in creating multi-thematic scenarios. This enabled the determination of the various degrees of risk and the amount of risk. The largest item that the investigation investigated was the Taunsa Barrage Wildlife Sanctuary. An evaluation was made in order to see which assets were prone by computing the number of damages after every year, per unit area. The area was mapped indicating the location of these.

Researchers created layers of risk zonation and classified them into three categories, which are high, medium and low risk. This assisted us in determining the degree of danger of something. We examined the population to understand the distribution of people across the various risk groups. The depth of the water was calculated using the impacts of flooding. The 2010 flood that hit was about 4, 200 big and small towns and villages. The number of people on the right bank was approximately 1,750 and on the left side was 2,450. One should also understand that methods of calculating various risk measures including damage evaluation and flooding simulation are only proposals. Nevertheless, they are continuing to provide a solid foundation to people who make decisions (Ashraf *et al.,* 2021).

There is a correlation between communities' level of hazard awareness and their

coping and preparedness. Social groups with risk identification skills tend to be better at predicting disasters and disseminating disaster knowledge amongst members. Thus, it is concluded that risk perception is an important factor to improve the adaptability of communities. One fundamental problem is that, however, there is a huge gap between the

flood hazard and flood awareness. This is further complicated by poor understanding of the community perception of flood risk, and is considered a vital concern in effective communication of flood risks (Shah *et al.,* 2022).

This study was carried out on Tehsil Taunsa in Southern Punjab. The place of study selected was especially susceptible to flooding. Researchers employed questionnaires to conduct surveys to 384 individuals who had suffered through floods. The results revealed agriculture as the main source of income. The findings of the study reveal that agriculture was the main source of income to the region. However, the flood destroyed much of the natural aspects of the land such as land, irrigation, and livestock that further complicated people in their use of money. Due to this fact, the affected population experienced difficulty in accessing sufficient food and were unstable which made them consume dirty items such as water.

The disaster that Pakistan has been facing since June 2022 is the result of a weather-induced disaster. It has led to floods of cities, massive rain and flash floods. Due to this disaster, many people and cows have lost their lives, and many buildings have been destroyed in the entire country. Heavy rainfall impacted the environment which led to landslides and other issues (NDMA, n.d).

Objectives of the Study

1. To investigate the effects of floods on food security challenges.
2. To analyze the effects of floods on the livelihoods of people.

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3. To explore the challenges faced by flood affected people.

Significance of the Study

This study is significant because there are not ample studies conducted with reference to Tehsil Taunsa, Pakistan. Tehsil Taunsa has remained neglected as there had been a population gap in the previous studies. This study highlights the disaster-prone state of Taunsa Tehsil, Pakistan and demands that there is a need to implement a climate emergency. This study also demonstrates the plight of the people of Tehsil Tauna, how they are prone to floods with reference to the food security challenges, lives, and livestock. This study is also beneficial for the disaster management department as well as policy makers to analyze the ground realities, and to take measures to lessen the future cost of floods in Tehsil Taunsa, Pakistan.

Literature Review

Natural disasters differ significantly in their predictability and impact. The threat they pose is especially severe when they affect large populations, resulting in major social and economic consequences. The economic losses from such events can vary greatly between countries. Common types of natural disasters include droughts, floods, extreme weather conditions, temperature extremes, landslides, wildfires, volcanic eruptions, and earthquakes. Globally, the total number of natural disasters has nearly reached three hundred, with flooding and extreme weather events being the most prevalent (Ritchie, Rosado & Roser 2022).

Flood frequency and intensity have been recorded and have led to increased interest in the impact of flooding on human systems. Local knowledge and data on the impacts of flooding on food security is a key concern for humanitarian actors and particularly relevant in rural areas within Africa which feed the continent. Food security outcomes can vary greatly

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between a local and regional spatial scale, with the same weather conditions causing a degradation of food security at one scale, and an improvement at the other (Reed et al., 2022).

Recent research offered a comprehensive analysis of the prevailing climate scenario in Bangladesh. The research highlighted the need for a green economy, bolstering the anticipatory action system, enhancement of disaster risk reduction, and highlighting the establishment of a locally-led climate-resilient system in dealing with these challenges (Das, *et al.,* 2024).

In the same way, Ahmad *et al.,* (2022) investigated how food security remains a global challenge, and how Pakistan's population is still encountering a worsening situation due to floods. The research highlighted the effect of flood in interrupting the daily livelihood matters to creating the challenges of food security.

A study by Usman *et al.,* (2025) highlighted that floods, along with other natural disasters and biological diseases have profoundly negative effects on rural food security. This study revolves around the novel idea of highlighting the importance of raising awareness among the local farmers in relation with food security and climate calamities in the local context.

Das *et al.,* (2022) research explored how climate change affects the food loss in Bangladesh. The research intends to explain how climate change increases losses of food and its overall effects because the country is quite susceptible to climate changes. To mitigate the adverse impacts on food security, the research suggested investments in sustainable food systems and agriculture, reforms in the law, and how to manage climate change.

According to Shah *et al.,* (2020), floods occur frequently in Pakistan, and it is a natural threat. Floods have adverse impacts on people, buildings, and the environment; therefore, to reduce the impacts of such disasters, one should be aware of the

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impacts of

floods and implement the appropriate mitigation strategies (Lazzarin & Defina, 2025). The researchers were interested in developing dependable vulnerability curves to help estimate the direct damage (drowning) to most common farm animals.

If data are scarce, their use is still useful and effective if combined with expert judgement which remains one of the most effective approaches to derive quantitative vulnerability curves, at least for some categories of assets (Pita, 2023). Livestock are an integral part of agricultural systems and are important to farmers and rural communities for their role in food security and economic viability (Sekaran *et al.,* 2021).

The South Asian region, and Pakistan, in particular, is the center of attention since the country experiences numerous and catastrophic floods on a regular basis. The primary objectives of this research paper are to examine the existing situation of flood hazard and risk management, locating the core challenges of regulating flood hazards, and food security considering the key issues in the field.

Research Methodology

This study adopts quantitative data gathering and analysis procedures. This is done using the following strategies that provide empirical support to hypothesis in the study. The research methodology is a detailed guideline which defines each stage of the research process.

Population and Sample

The population that this study was the rural population in Taunsa Shareef. The entire rural communities of Taunsa Shareef were included in the target population. The researcher could not have gathered data of everybody living in the rural parts of Taunsa Shareef because of financial and time limits. Thus, two-stage sampling was adopted. Initially, basic sampling was used to select eight rural communities that were readily

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accessible: Mohrotha, TibiQaisarni, Sokar, Retara, JaluWali, KotQaisarni, Nutkani and Toba Imam.

In the second stage, the researchers employed a stratified random selection method to get a representative sample of the target population. Stratified random sampling is a typical technique whereby it is critical to cover all the groups within the target population, or the researcher is specifically interested in a certain stratum. This is a cost effective and highly precise method and hence the findings can be extrapolated into the entire population.

Sample Size

In order to attain the objectives of the study, researchers calculated a proper sample size with a high level of care to ensure accuracy, accessibility, and representability of the whole population under study. In social research, particularly in quantitative research, determining the appropriate sample size is very crucial. The selection of sample volume is highly vital as it is representative and accurate since this impact is enormous on the accuracy and validity of study conclusions. Excessively small and excessively large sample sizes fail to provide accurate representation of the group under study thus resulting in erroneous, imprecise and inaccurate results. In this research 384 people out of eight villages in Taunsa Shareef were studied by G power method.

Data Collection Technique

A questionnaire was developed as a research tool. data was obtained and revisions were done after a pilot test was carried out. Reliability was ensured through the moderate Cronbach alpha level of .713, Coding and tabulation data analysis requires programming in order to facilitate its analysis. The variables of this study were all properly coded and incorporated into the SPSS v-20 spreadsheet to do additional processing and analysis. The descriptive and inferential statistics was used for data

analysis. The SPSS which is a popular statistical application was used to perform statistical analysis in this study.

Ethical Consideration

The respondents were informed about the objectives of the research. The researcher promised the confidentiality of their names and responses. Informed written consent was taken from all the respondents.

Results

Data analysis and interpretation are the most important things about undertaking social scientific research. Without adhering to these techniques, generality and forecasting that are paramount within the framework of social research is not possible.

Descriptive Statistics

Descriptive statistics was used to generate frequency and percentage of demography, and to investigate the perception of respondents regarding flood risk area, capital loss, damage to social assets, and food security of the Tehsil Taunsa.

Table 1

Distribution of Respondents with Respect to their Sex

Categories	Frequency	Percent
Man	265	69.0
Women	119	31.0
Total	384	100.0

The Table revealed that 265(69.0) of the respondents were men and 119(31) were women hence, most of the respondents were men.

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Table 2

Is your area designated as a flood risk area?

Categories	Frequency	Percent
Yes	226	58.9
No	157	40.9
Don't know	1	.3
Total	384	100.0

According to the Table, 58.9% people flood risk area, 40.9% no flood risk area and .3% Don't know indicated a flood risk area. The majority of the respondents were yes.

Table 3

What are the financial capital damages you have faced in flood?

Categories	Frequency	Percent
Cash payments	176	45.8
Animal loss	158	41.1
House brakeage	50	13.0
Total	384	100.0

The Table indicated that 45.8% respondents were Cash payments, 87.0% of the individuals were no Animal loss and 13.0% House breakage. Most respondents, therefore, are victims of the Cash payments.

Table 4

Due to the flood, what are the major damages to social assets?

Categories	Frequency	Percent
Child Health	154	40.1

children education	144	37.5
Business loss	64	16.7
Any other	22	5.7
Total	384	100.0

The Table revealed that 40.1% of the respondents were Child Health, 37.5% of people were children education, 16.7% were Business loss and 5.7% any other. Thus, child health is seen as the major factor affected by the majority of respondents.

Table 5

How does flood affect food security?

Categories	**Frequency**	**Percent**
Infrastructure	148	38.5
Croplands	175	45.6
Livestock	61	15.9
Total	384	100.0

The table found that 38.5 percent of the respondents were infrastructure, 45.6 percent, were croplands, and livestock were 15.9 percent. Most of the respondents therefore see that croplands significantly were impacted.

Inferential Statistics

Inferential statistics was used to generate the differences between two categorical variables. The chi-square was used to investigate the association between floods, and food security.

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Hypothesis

Null Hypothesis:

There is no correlation between floods and food security.

Alternate Hypothesis:

There is a correlation between floods and food security.

Chi-Square Test= Chi-Square test was applied to find out the relationship between independent variable and dependent variable, $X^2 = \sum \frac{(fo - fe)^2}{fe}$

Table 6

Cross Tabulation between Floods and Food Security

Responsible for protection	**How does flood affect food security?**			**Total**
	Infrastructure	**croplands**	**livestock**	
Federal &Provincial Governments	73	48	29	150
Village Committee Head	46	70	0	116
Myself	21	49	13	83
All of the above	8	8	19	35
Total	148	175	61	384

The data in table 06 shows that cropland damage has been perceived one of the most affected areas (45.6%, n=175) in context of floods and food security, Secondly, infrastructural damages was also (38.5%, n=148) affected by the floods adversely. Livestock was amongst the third main area badly affected (15.9%, n=61) by floods. A majority of the respondents (48.7%, 73/150) considered federal and provincial government responsible for

the flood protection and ensuring the food security. Whereas as a matter of fact most of the participants of the study relied on the village community head for cropland damage (60.3%, 70/116) identifying the importance of agriculture loss and food security in floods.

Table 07

Chi-Square Test

Test	Value	Do	Asymp. Sig. (2-sided)
Pearson Chi-Square	80.960[a]	6	.000
Likelihood Ratio	88.049	6	.000
Linear-by-Linear Association	18.680	1	.000

The p- value.000 is less than .05, (p-value .000< .05)

The p-value.000 is also smaller than.05, (p-value.000<.05). The researchers accept the alternative hypothesis at the.05 level of significance because the P (value of the Chi-Square) = .00 and it is lower than the level of significance = .05. This means that floods affect food security.

Discussion

The authors examined how floods affect the livelihood, and the food security challenges of rural populations in the Tehsil of Taunsa, South Punjab, Pakistan. As the present research suggests, floods have negatively impacted the economic welfare of rural populations worsening poverty and endangering food security. Both ecological, and financial resources that are essential in supporting livelihoods have been washed away due to floods.

This calamity has taken down the development of these people hit by the floods by several years, which require colossal efforts and focus to restore strength. It is evident

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that they will not be able to build this resiliency only by relying on themselves. Therefore, the collaboration between the state and business, along with other foreign investors, is vital in meeting the long-term goals.

It aimed at trying to get to know the specific problems of the communities and provide recommendations on how to enhance their resilience. The researcher collected detailed information using primary data. A survey was administered to collect the primary data from the residents who had been affected by flooding. This paper has examined the impacts of floods on the challenges of food insecurity and livelihood of the inhabitants of Tehsil Taunsa, Pakistan. This was aimed at acquiring an in-depth understanding of the special problems that these communities face due to the disasters of floods and subsequently giving recommendations on how to make them more resilient.

These face-to-face contacts played a vital role in receiving first hand reports and opinions by the people who went through the disastrous consequences of flooding. The quantitative methodology helped the scholars to identify delicate impacts of the floods on the livelihoods, and the food security challenges, which provided a strong basis on which the investigation was based.

After a detailed analysis of the combined set of data, there were several interesting conclusions. This research article highlighted the compound means through which floods cripple lives, and food security in rural settings. The main consequences of flooding events were identified to include the following: damages of the infrastructure, disruption of the supply chain, and crop loss.

These repercussions reverberated through the socioeconomic landscape of the inhabitants which aggravated the susceptibility and lengthened their poverty cycle. It can be concluded that this research was an eye opener into the complicated interplay of the floods, livelihoods, and food security challenges in the Tehsil of Taunsa, South Punjab,

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Pakistan. The information gained through the study was enlarged by the masterful incorporation of the primary data, which gave the findings strong evidence.

The extensive nature of the research methodology enabled the examination of the challenges facing these rural societies in a very comprehensive way leading to tangible recommendations that would enhance the resiliency of these communities and reduce the horrendous effects of the floods. This paper highlights the significance of multidisciplinary approaches in responding to complicated socio-environmental issues and forms a good basis in future research and interventions in similar situations.

Lastly, this paper highlights the significance of dealing with the consequences of the floods, livelihoods, and the food security in the rural areas, specifically in the Tehsil of Taunsa, South Punjab Pakistan. This paper also emphasizes the demand for good and pragmatic planning of disasters and the quick response strategies that do not only focus on immediate assistance but also resilience building over the long term.

The interventions that should be adopted are sustainable agriculture, development of infrastructures, and equitable access to resources especially by the most underprivileged individuals. In this way, the horrendous effects of the floods on the health of the rural

populations can be reduced, and the ability of these population groups to overcome future disasters is enhanced.

Conclusion

Pakistan has faced a tragic and massive flood in 2022. The disaster occurred was of unprecedented level. In this regard, a present study was conducted in Southern Punjab. Using primary data sets collected from Tehsil Taunsa Pakistan, this paper analyzed the effects of floods on food security challenges, effects of floods on the livelihoods of people, and the other challenges faced by flood affected people. The

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researcher used chi-square to find out the association between floods and food security.

This study found that floods had affected the Teshil Taunsa badly. The floods proved fatal and resulted in the financial capital damages like cash payments, animal losses and house breakages. The study also found that along with social capital damages, the flood affected people in the terms of damages to their social assets like child health, child education and business loss as well. Along with these researchers also found that floods also affected the food security of Tehsil Taunsa in terms of infrastructure, croplands, and livestock.

From the findings, it can be concluded that to minimize the effects of the floods, the flood risk management practices need to be scaled out among the farming community through disaster management departments as well as other departments. There is a need to delve more deeply into the insurance schemes.

Recommendations

The heavy monsoon rains have led to increased levels of floods in the Indus river system in a manner that it has never experienced any higher levels before. After conducting this research, I want to offer some suggestion, which are mentioned below:

1. It is suggested that the farmers be sensitized on the advantages of crop insurance and how it can be used to reduce the impact of bad weather by initiating awareness programmes.
2. It is also suggested to make crop insurance products more accessible and affordable with the collaboration with banks and agricultural cooperatives. One of the measures is to enhance the capacity of the insurance companies to estimate and rate the risks of floods and droughts correctly.
3. The collaboration of NGOs, national and international funding agencies, the public and the private sector is required to make the communities stronger.

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4. It is proposed that government agencies, insurance companies and people in the agricultural sector should collaborate to identify superior methods of dealing with the risks and use crop insurance more productively.
5. Disaster management requires that the victims of the flood be provided with tools that will help them rebuild their lives and an early warning system established.
6. All the areas in the country that may be prone to floods are expected to take these steps. Indeed, the Punjab government referred to 2010 floods as a super flood while the 2022 floods also inflicted heavy casualties, and damages, and aggravated the food security challenges.

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