Natural and Applied Sciences International Journal (NASIJ)
eISSN: 2788-4619 (online)
https://www.ideapublishers.org/index.php/nasij
Vol. 5, No. 1 (January-June), 2024, pp. 113-129
https://doi.org/10.47264/idea.nasij/5.1.8
Research Article | Original Research

Measuring community disaster resilience in Southern Punjab: a study of 2022 floods in Pakistan

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Abstract:
Pakistan only contributes 1% of the global greenhouse gas emissions. The country's substantial vulnerability to the effects of climate change was highlighted during the 2022 floods. One-third of the country was underwater, 33 million people were affected, and 8 million were displaced. The destruction caused by the 2010 floods is dwarfed by the disaster's scale in Pakistan. This study discusses the rehabilitation and recovery goals of the affected area, along with additional mitigating strategies. This can be done through resilient and sustainable repairing and upgrading the physical infrastructure. An analysis was done to estimate how resilient this target community is to disaster. Data collection and analysis techniques of the research were adopted. The resilience of the community to disasters was investigated using the Assessment of Resistance of Communities to Natural Disasters (ARC-D) toolkit created by GOAL International. The affected Southern Punjab region was selected, and qualitative and quantitative techniques were employed. Using the toolbox, a structured survey form was created. The findings showed that communities were unaware of their risks and problems and were not provided with the necessary plans and solutions. Specific tools and methods are required to measure the resilience of various communities and social activist groups.

Article History

Received:
10-Mar-2024

Revised:
28-Mar-2024

Re-revised:
10-May-2024

Accepted:
23-May-2024

Published:
31-May-2024

Keywords: Flood resilience, Disaster, ARC-D tool kit, Resilient communities, Monsoon, Disaster risk management, Climate change, Greenhouse gas emissions.

How to Cite: Aleha, A., Zahra, S. M., Memon, A. W., & Mahar, W. A. (2024). Measuring community disaster resilience in Southern Punjab: a study of 2022 floods in Pakistan. *Natural and Applied Sciences International Journal (NASIJ), 5*(1), 113-129. https://doi.org/10.47264/idea.nasij/5.1.8

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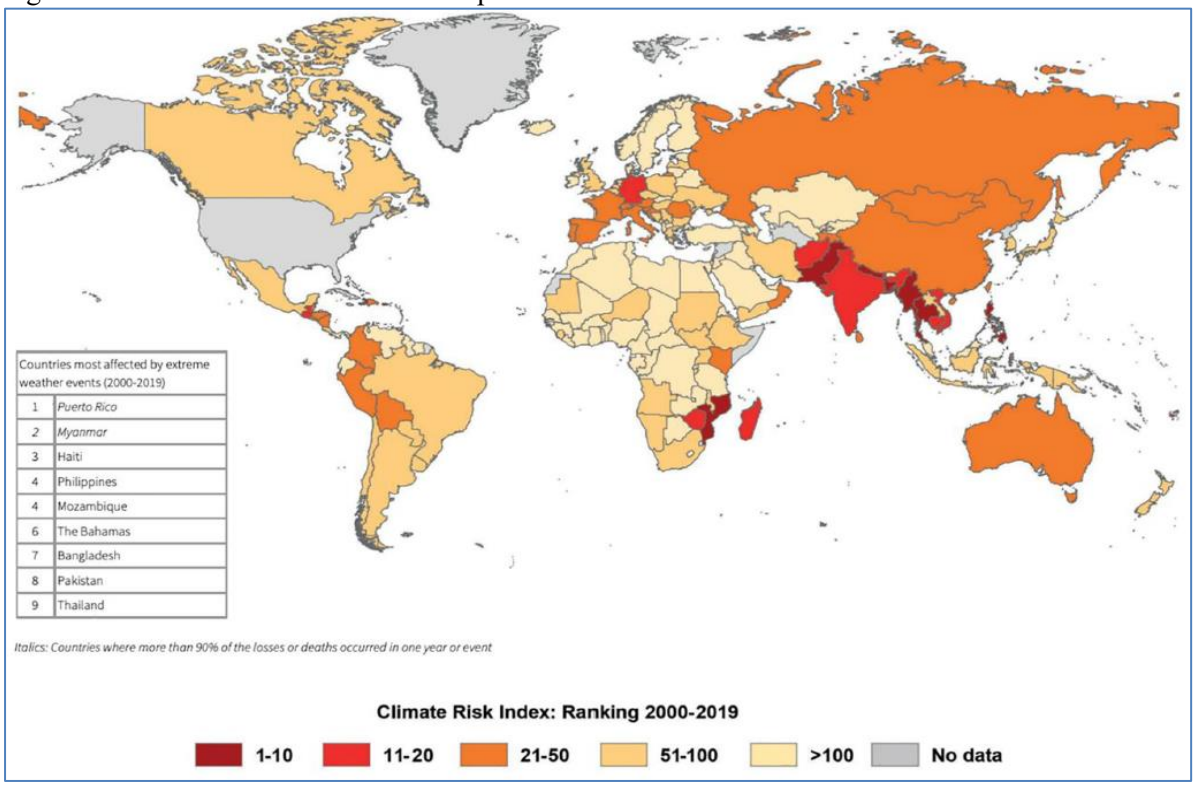
1. Introduction

Extreme climate variability is causing an increase in disaster frequency, scope, severity, and magnitude. More natural, ecological, and environmental disasters than ever affect millions worldwide. The Global Climate Risk Index 2021 (Figure 1) is derived from average data collected over 20 years, covering the years 2000–2019 (Eckstein *et al.*, 2021). The patterns and impact of catastrophes are changing as a result of austere climatic changes and other factors (Field *et al.*, 2012). According to assessment studies from the Intergovernmental Panel on Climate Change (IPCC), severe events, including droughts, hurricanes, cloudbursts, heat waves, etc., are changing in terms of rate, length, and strength due to climate change. According to the World Disaster Report, 97.6 million people were affected by 308 different natural disasters in 2019, and 24,396 people died as a result (Chisty *et al.*, 2022). One of the key conclusions of the Global Disasters Report 2020 was that climate and weather-related disasters affected 97% of those affected by disasters in 2019 worldwide. Scientists anticipate that risks such as floods, heat waves, droughts, and cyclones will worsen and grow in the forthcoming years due to significant climate change. Floods made up a total of 46% of disasters between 2010 and 2019, according to the Emergency Events Database (EM-DAT) (IFRC, 2020).

Figure 1: Global Climate Risk Index Map 2000 – 2019



Source: Sacramento (2023)

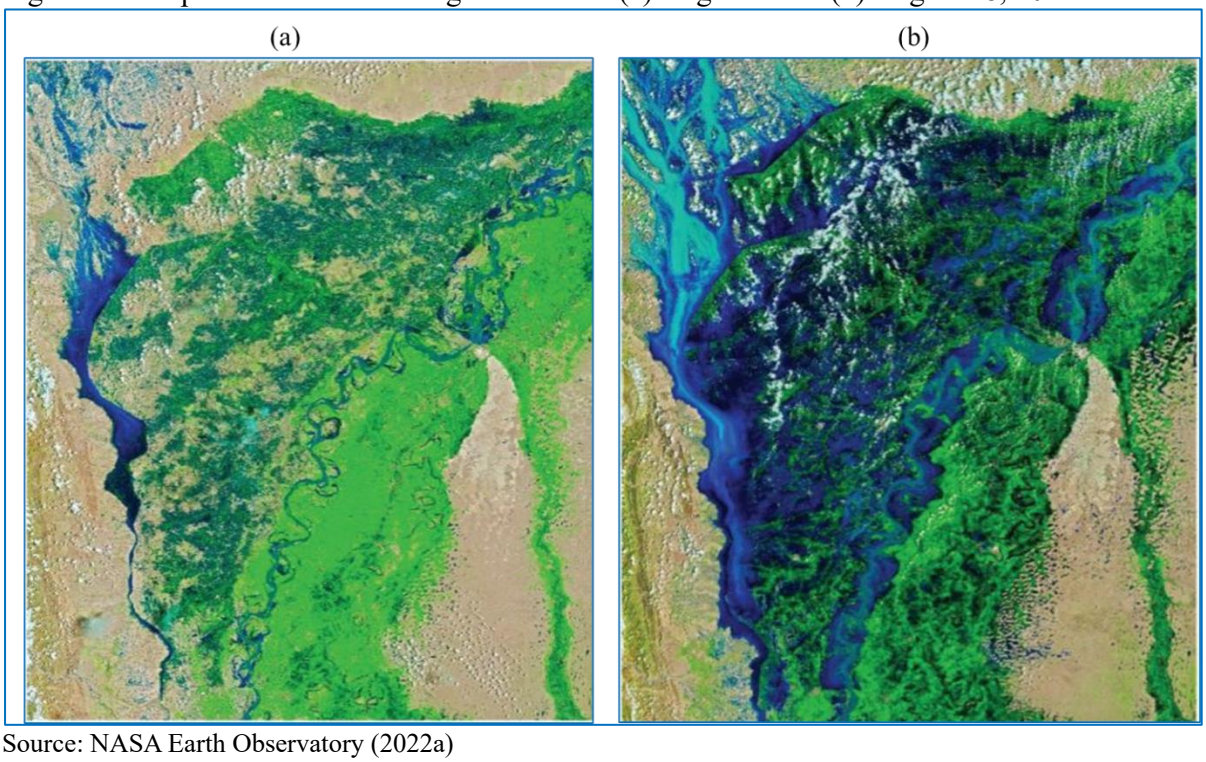
Climate change adversely impacted Pakistan, which is among the top ten most affected nations globally (Eckstein *et al.*, 2021). The country has observed changes in the climate, including temperature and precipitation, along with an increase in the intensity and frequency of coastal rains and tropical storms, melting glaciers that lead to floods from lakes created by glaciers, rising sea levels, a reduction in desertification, biodiversity, and droughts (Mbah et al., 2022). The rising intensity and frequency of tropical storms, coastline rains, and erosion of the coast in the coastal regions of Sindh and Balochistan are examples of climate effects. In Punjab and

Sindh's open spaces, heat waves and protracted riverine floods are frequent, which affects the area's economic and social development (Mako *et al.*, 2022).

During June and August 2022, Pakistan was impacted by a devastating calamity brought on by rainstorms and a sequence of flash, riverine, and urban flooding. According to the National Disaster Management Authority (NDMA), one (01) in seven (07) individuals has been impacted by the floods, or around 33 million people, including about 8 million who have been displaced. Children make up approximately one-third of the mortality from the floods, which have claimed more than 1,700 lives. Rain-induced floods, enhanced glacial melt, and subsequent landslides destroyed millions of dwellings and essential infrastructure, submerged entire villages, and eliminated livelihoods. Preliminary estimates indicate that the floods will directly contribute to an increase in the country's poverty rate of between 3.7 and 4.0 percentage points, adding around 8.4 and nine (09) million extra people to the number of those living in poverty. As of 11 October 2022, 94 or about half, of the country's districts had received the "calamity hit" label. Most people resided in the provinces of Balochistan, Punjab, Khyber Pakhtunkhwa (KPK) and Sindh. Disasters had struck 19 of the 25 poorest districts in the nation (Yamano *et al.*, 2024).

In the summertime of 2022, the nation experienced its most rainy August since 1961. Rainfall in Sindh and Balochistan was seven and six times above average. According to attribution studies, the five-day rainfall record in these two provinces—a measure of heavy rain—was around 75% stronger than what it might have been if the temperature hadn't warmed by 1.2°C. The National Aeronautics and Space Administration (NASA) documented flooding extent between August 4, 2022, and August 28, 2022, is shown in Figure 2. The high heat and dryness, which had previously only occurred about every 1,000 years and caused crop losses, energy shortages, and forest fires, ended just before the floods (NASA Earth Observatory, 2022b).

Figure 2: Comparison of the flooding extent from (a) August 4 and (b) August 28, 2022



Source: NASA Earth Observatory (2022a)

Considering the fact that reasons other than global warming are the primary sources of disaster consequences, the scale of floods is unprecedented. Pakistan tried to decrease disaster risks following the 2010 floods, which affected 20 million people. The nation had advanced much in formulating its long-term strategies thanks to the National Emergency Management Programme with the National Flood Prevention Plan IV. However, problems continued, such as a lack of financing and implementation for the strategies and a constrained capacity for absorption to incorporate risk evaluations in infrastructure development and planning for land use. Before the start of the monsoon season in 2022, the NDMA performed a detailed Monsoon Contingency Planning Exercise with the help of important international, national, provincial and local partners.

However, Pakistan's institutions and systems were not equipped to deal with the massive scale of the tragedy brought on by climate change. Inadequate urban planning, poor water supply administration, a lack of institutional support, and other structural concerns have all been made clear by the flooding of 2022, more for maintaining infrastructure, intricate governance, structural disparities, and lack of catastrophe risk mitigation capability. The impacts are still getting worse, with the occurrence of numerous devastations, for example, natural hazards and disasters, pandemics including COVID-19, energy crisis, rising inflation, and financial limitations. Underlying instability in politics and the economy contributes to the effects of catastrophes and reduces the effectiveness of recovery. To end the phase of poverty caused by natural disasters, a more resilient nation is essential.

Catastrophe resilience has been defined in a variety of ways by various research and reports. Scholars can analyse disaster resilience from many perspectives because these categories have some parallels and differences. Disaster resilience refers to a system's or community's capacity to survive the consequences of a stressful event or shock and to recover to resume regular operations by self-rebuilding (Coetzee *et al.*, 2016). Resilience, defined by the Asian Development Bank (ADB), is the capacity of nations, community organisations, families, and individuals to withstand, assimilate, recover from, and adapt in response to unprecedented natural disasters without endangering their continued social and financial interdependence. Disaster resilience was also defined by the Foreign Commonwealth & Development Office (FCDO), formerly the Department for International Development, as the capacity of households and communities to withstand shocks without harming further development. However, the DFID definition introduced the idea that lasting resilience will be attained by maintaining and improving living standards (Department for International Development, 2011). “Bounce back” is a new concept that Twigg contributed to the notion of catastrophe resilience. Disaster resilience is defined as any community's capacity to withstand the effects of major incidents while maintaining essential functions, and Twigg approved this description. A resilient community, he continued, would continue to operate as usual in the face of tragedies and would also heal and move forward afterwards (Twigg, 2009).

It is essential to make the disaster resilience an inclusive approach while also raising its standards to the required level. To increase overall resilience, action will be necessary to satisfy the needs and mitigation skills of vulnerable groups, such as women, children with disabilities, and the elderly (Sakoda & Sijapati, 2021). These previous studies confirm the need to understand the state of community resilience from all angles to establish the significance of maintaining inclusive resilience. This study aimed to measure community resilience, particularly on flood preparedness.

2. Literature review

The frequency of disasters has increased recently as a result of global environmental change as well as social and economic development, significantly lowering the well-being of community people (Ma *et al.*, 2023). Community resilience and its definitions must be operationalised into measures that satisfy a variety of measurement requirements, such as those pertaining to validity, reliability, usefulness, ease of use, and cost-effectiveness (Cutter, 2020). Resilience to a disaster is the volume of any system or community to effectively withstand any adverse event using its physical, social, economic, and environmental resources. The potential of such a system to pull through such shock and tragedy, which often comes with the community's residents' preparedness to absorb and adapt to the occurrence, is known as disaster resilience from a community perspective (Qasim *et al.*, 2016). In order to assist risk governance (disaster risk management, public policy, etc.), in the disaster risk management, the resilience assessment might be viewed as an emerging scientific field that needs substantial investigation (Parsons *et al.*, 2021).

The most consistent element in all definitions of disaster resilience is the ability of the communities. Community resilience is defined as any community's ability to effectively deal with the negative consequences of hazards so as not to compromise the safety and welfare of the community's food supply. The ability of a community to tolerate, bounce back, and cope with risks (Pasteur, 2011). Community resilience is the capacity to survive, recover from, and adapt to hazards. Community resilience is defined as any community's ability to effectively deal with the negative consequences of risks so that the community's economic well-being and safety are not compromised. So, Community resilience is the capacity to manage, heal from, and adapt to changing threats. Resilience was described, according to the Zurich Flood Resilient Alliance, as "the ability of a community to accomplish its growth and development goals while minimising its risk of flooding over time in a mutually reinforcing way" (Mochizuki *et al.*, 2017). Establishing a workable and practical framework for early warning to increase the upper threshold for community resilience depends on the participation of the local community (Lwin *et al.*, 2020). In this way, while there are several theories and concepts regarding resilience, many of them are difficult to operationalise or might only apply in specific situations. Estimating the extent of the vicinity level, where passive strength is typically needed, also illustrates its difficulties (Twigg, 2009).

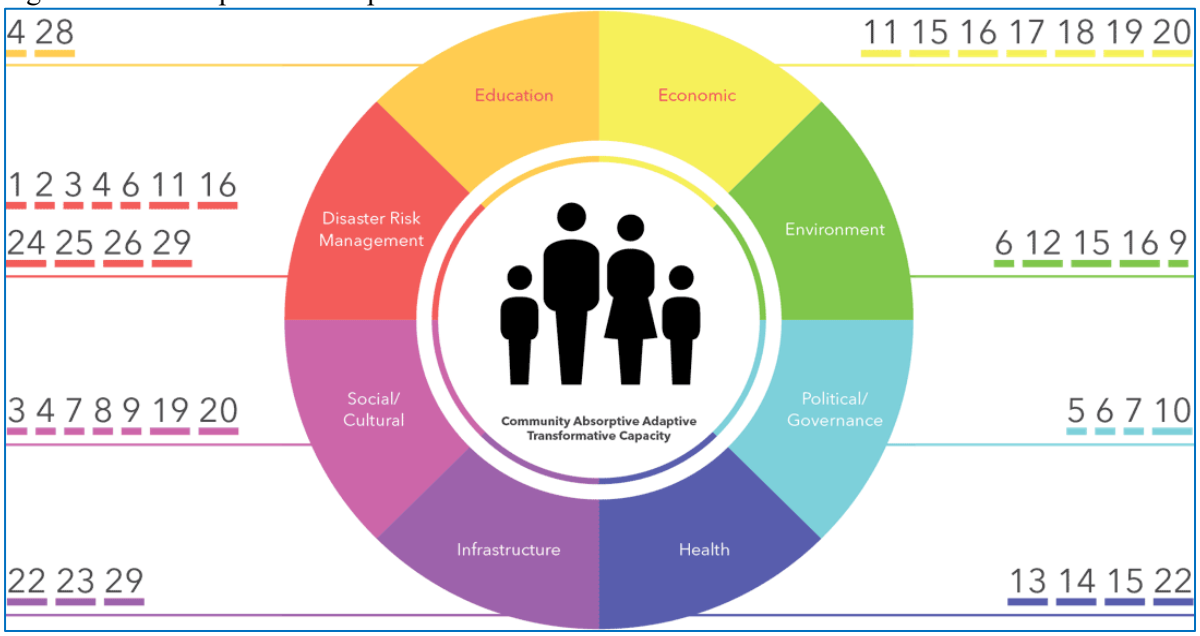
To make the right decisions at right time and continue advocacy and awareness at all levels, it is imperative to evaluate the resilience level of the community. The local-level measurement of community resilience will guarantee that all the vulnerabilities stakeholders are included (Zurich Flood Resilience Alliance, 2019). Various studies have been conducted to identify appropriate frameworks for evaluating community resilience. There are various models available for judging community resilience. Community Resilience Scorecard, Communities Enhancing Resilience Toolkit (CART), Conjoint Community Resiliency Assessment Measure (CCRAM), Community Disaster Resilience Indicators (CDRI), Community Disaster Resilience Framework for Iran, Community Disaster Resilience Index (CDRI), and others are on the list (Saja *et al.*, 2019). Finding a common framework for measuring resilience will become more difficult because populations in different places confront a range of threats and have diverse capacities (Lwin *et al.*, 2020). Community resilience has historically centred on the connections between many entities, such as physical, social, economic, and infrastructure (Joseph *et al.*, 2020).

The Analysis of the Resilience of a Community to Disaster (ARC-D) toolkit, which was created over the course of a 10-year project by GOAL, an international humanitarian and development organisation—is the subject of Clark-Ginsberg et al.'s (2020) research. Tegucigalpa, Honduras, is where the resilience-building toolbox was put into practice. 210 questions that were brought up in focus group talks make up the toolbox. The 30 components that make up the Questions are associated with the priorities of the Sendai Framework. Resilience levels vary from 1 to 5, with five denoting complete resilience and 1 representing low resilience. The authors concluded that GOAL International may make adjustments and increase resilience in the research scenario by using the ARC-D toolset (Jacinto *et al.*, 2023).

3. Analysis of the Resilience of the Communities to Disaster (ARC-D) Tool Kit

The Assessment of Resistance of Communities to Natural Disasters (ARC-D) toolkit created by GOAL was used in this study to assess community flood resistance (Clark-Ginsberg *et al.*, 2020). The disaster-resilient community's Twigg structure serves as a base for the creation of the ARC-D toolkit. Twigg, In his book Components of a Disaster-resilient Community, discussed the themes that must be prioritised for community resilience level assessment (Twigg, 2009). The data evaluation toolbox also assists in applying the findings for future development, as shown in (Table-1). The toolbox measures community resilience in a more realistic, functional, and accommodating manner (Clark-Ginsberg *et al.*, 2020). Additionally, the four significances of the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030 are aligned with the sub-components of the ARC-D toolset. To assess the degree of resilience, the subsequent study used actual questions for each of the sub-components (GOAL, 2015). The ARC-D Toolkit consists of 30 components based on eight parameters to measure Community Absorptive Adaptive Transformative Capacity. These parameters cover Education, Health, Politics/Governance, Infrastructure, Economy, Environment, Social/Cultural, and Disaster Risk Management (Figure 3).

Figure 3: The components and parameters covered in the ARC-D Toolkit



Each component has distinctive characteristics that determine how resilient the community is. Using the framework's questions, this study created a distinctive questionnaire. Gender was the

main consideration during surveys. For instance, the study made sure to emphasise gender and asked an additional question after asking the social protection question, such as how the women in the community as a whole access to the formal and informal social security platforms have that help reduce disaster risk and rehabilitation. In addition, numerous studies demonstrate that Pakistan's resilient recovery strategy for vulnerable floods in 2022 was evaluated using a collaborative and inclusive approach that brought together the government, the private sector, research organisations, academia, and the worldwide community around a shared image. However, assessing the level of resilience is crucial when it comes to creating the Disaster Risk Reduction (DRR) strategies and including DRR in the economic growth procedure in low-income and emerging nations. The ARC-D toolkit's community resilience assessment method can significantly aid in reducing the deficiencies in the process of planning and execution because the data scarcity is one of the primary problems in developing nations. The mechanisms through ARC-D Toolkit can immensely help minimise gaps in the preparation and execution process.

Table-1: ARC-D toolkit measuring components of resilience, formal questions, and scores

S. No.	Components	SFDRR Priority Areas
1.	Participatory risk assessment	Priority 1 Understanding disaster risk
2.	Scientific risk assessment	
3.	Dissemination of Disaster Risk Reduction (DRR) information	
4.	Education of children on DRR	
5.	DRR in development planning	Priority 2 Strengthening disaster risk governance to manage disaster risk
6.	DRR in land use planning	
7.	Community decision-making	
8.	Inclusion of vulnerable groups	
9.	Participation of women	
10.	Rights awareness and advocacy	
11.	Partnerships for DRR and recovery	
12.	Sustainable environmental management	Priority 3 Investing in disaster risk reduction for resilience
13.	Water security and management	
14.	Health access and awareness	
15.	Secure and sufficient food supply	
16.	Hazard-resistant livelihoods practices	
17.	Access to market	
18.	Access to financial services	
19.	Income and asset protection	
20.	Social protection	
21.	Social cohesion and conflict prevention	
22.	Critical infrastructure	
23.	Housing	
24.	Contingency and recovery planning	Priority 4 Enhancing the disaster preparedness for the effective response, and to "Build Back Better" in recovery, rehabilitation, and reconstruction
25.	Early Warning System	
26.	Capacity in preparedness, response and early recovery	
27.	Health services in emergencies	
28.	Education services in emergencies	
29.	Emergency infrastructure	
30.	Leadership and volunteerism in response and recovery	

Measurement Score					
Score	1	2	3	4	5
Description	Minimum resilience	Low resilience	Medium resilience	Approaching resilience	Resilience

Source: Clark-Ginsberg *et al.* (2020)

4. Materials and methods

4.1. Research strategy and techniques

First of all, the authors used the existing sources explore the research problem and identify the research gape of the study. A linear quantitative research approach was used in this research. Modest, established structure flows that are followed step by step assist in the linear investigation path in reducing the results and arriving at a conclusion. With a quantitative inquiry strategy, the study concentrates on straightforward research inquiries and uses methodically developed data collection instruments and analysis techniques to present findings (Nueman, 2014).

The study employed a quantitative approach to evaluate the degree of community flood resistance. The quantitative approach provided evidence based on facts supporting the resilience. The ARC-D toolkit has been cited in earlier research (Clark-Ginsberg *et al.*, 2020; Cutter, 2020; Jones *et al.*, 2021) as a critical resource for evaluating community resilience, this study concentrated on the resilient framework's components to create the questionnaire. Each question aligned with what makes a community resilient to disasters (Table-1). The questionnaire of the study used a five-point Likert scale measuring approach, thus making acquiring and analysing data using various statistical models easier. The survey form was translated into Urdu, which is a native language of the target area. The replies were gathered from the respondents by a team of data enumerators.

4.2. Identified area and sampling

The Southern Punjab region of the Punjab province of Pakistan was heavily devastated by the floods in 2022 as shown in the Figure 4. In several areas of the South Punjab, severe floods and heavy rainfall have damaged about 900,000 acres of land (Hasnain, 2022). According to the reports, the affected areas include Jampur, Fazilpur, Taunsa, Rojhan, and Wahwa. Hundreds of thousands of people have been forced homeless and had to wait for the aid and relief under the open sky.

The floods also affected 678 localities, namely 176 in Rajanpur District and 366 in Dera Ghazi Khan (D.G. Khan) District. According to reports, the affected localities were 16 in Mianwali District, 24 in Muzaffargarh District, 7 in Sialkot District, and 89 in Layyah District. In the Rajanpur district, exactly 47 Mouzas/villages remained flooded. According to various accounts, floods harmed a population of 673,970 people in the six districts indicated above, the majority of whom lived in Rajanpur and D.G. Khan, and affected an area of nearly 1.3 million acres, including an agricultural area spanning 744,998 acres (APP, 2022).

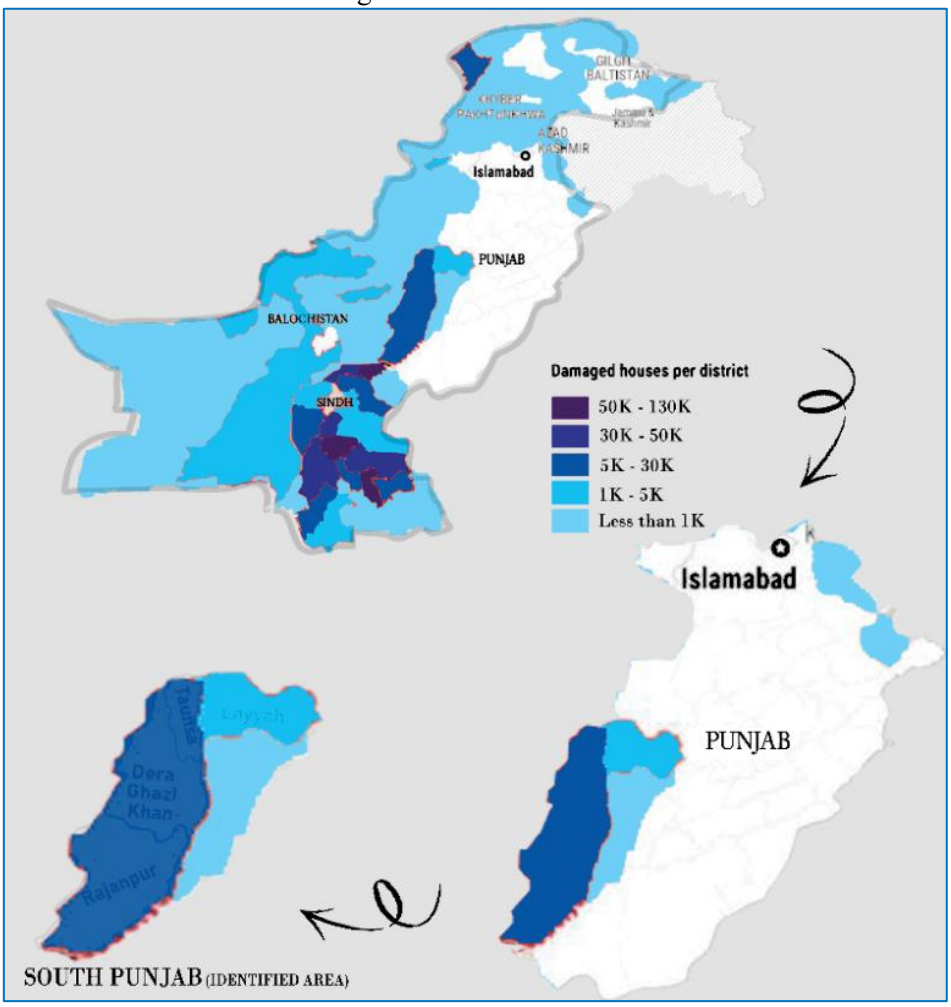
A basic method of indiscriminate sampling was used in this study to choose the sample size. This unsystematic sampling method is frequently employed in quantitative research because it provides accurate information (Nueman, 2014). Slovin's 1960 formula was used in the study to calculate the sample size (Tejada & Punzalan, 2012).

Equation (1) represents the Slovin's formula as follows:

$$n = N / (1 + N \times e^2) = 250 \quad (1)$$

Where *n* is the sample size, *N* is the total population (the population of the Southern Punjab), and *e* is the error margin. The sample size was calculated with a 95% assurance level, and the error margin is 5%.

Figure 4: Identified area



5. Findings of study

5.1. Socio-demographic data

The study's results were obtained from 250 respondents, of whom 60% were men and 40% were women. About 20% of the responders were beyond the age of 50. For this study, only respondents who were at least 18 years old were polled. One-quarter of the respondents (26%) lacked a formal education. Most of the respondents had some direct or indirect connection to agriculture as their primary occupation. Only 14%, who were primarily women, worked at home. Most of the female homemaker respondents also worked in other official and informal income-generating sectors, including construction, farming, sewing, healthcare, raising livestock, etc., even though homemaking is not a formal career. As a result, the study determined that the female household members who work as homemakers also contribute to the household's finances. Table-2 displays the respondents' sociodemographic profile in descriptive statistics.

Table-2: The sociodemographic condition of the respondent

Sociodemographic Characteristics		Male n = 100	Female n = 100	Chi-Square Test x^2	p-value
Age	18-30	34	22	13.2	0.29
	31-40	42	33		
	41-50	23	12		
	51-60	19	16		
	61 and above	27	13		
Education	No formal education	31	34	10.52	0.02
	Primary school	35	15		
	Secondary school	22	5		
	Higher secondary school	32	4		
	Graduate	26	2		
Occupation	Farmer	48	25	15.23	0.06
	Homemaker	3	34		
	Small scale entrepreneur	31	3		
	Educationist	7	3		
	Student	17	9		
	Unemployed	23	16		
	Retired	5	2		
	Others	11	6		
Marital Status	Married	86	48	2	0.57
	Single	61	46		
Monthly Household Income (PKR)	Below 15,000	56	35	7.51	0.59
	15,001 – 20,000	42	28		
	20,001 – 30,000	26	15		
	30,001 – 40,000	12	12		
	40,001 and above	11	6		
Monthly Household Expenditure (PK)	Below 15,000	52	33	9.89	0.35
	15,001 – 20,000	46	30		
	20,001 – 30,000	23	18		
	30,001 – 40,000	12	9		
	40,001 and above	13	6		
Household Size	1 – 5	67	44	19.6	0.0007
	6 – 10	49	32		
	11 – 15	22	14		
	16 – 20	8	5		

5.2. Community resilience level

This section addresses the findings of the community resilience scoring. Resilience varies significantly depending on gender. The methodology part of the paper previously covered the process of data analysis. Four SFDRR focus areas concerning the results were discussed. The above figure illustrates the variance in resilience levels between male and female respondents based on SFDRR priorities. The levels of resilience in each component for male and female respondents are different, as seen in Table-3.

The indications involve each aspect of risk comprehension, assessment, early intervention, and recovery. Additionally, it entails a thorough grasp of how to incorporate all stakeholders so that the degree of resilience may be investigated and evaluated. The study gathered responses using the measurement score from Table-1. The mean value primarily indicates the levels, the higher the value, the stronger the respondents' level of resilience. The mean values are added to

complete the score. These findings showed that while female community members of almost all age groups participated the least in risk assessment activities, they were more involved in response and recovery. Suppose the women are not given the chance to express their perspectives. In that case, the outcomes of risk assessment activity will not provide a complete representation of the catastrophic risks that exists in the vulnerable communities. The financial issues need to be resolved for both men and women. The problem has gotten worse due to the loss of farmland.

Table-3: Comparison of resilience levels among male and female respondents in each component

S. No.	Components	X		p-value
		Male	Female	
1.	Participatory risk assessment	2.56	1.23	0.045
2.	Scientific risk assessment	1.55	0.42	0.010
3.	Dissemination of Disaster Risk Reduction (DRR) information	2.7	1.6	0.066
4.	Education of children on DRR	3.5	1.6	0.097
5.	DRR in development planning	1.66	0.24	0.009
6.	DRR in land use planning	1.88	0.44	0.013
7.	Community decision-making	3.2	2.6	0.180
8.	Inclusion of vulnerable groups	2.4	1.2	0.039
9.	Participation of women	3.05	2	0.110
10.	Rights awareness and advocacy	1.73	0.89	0.019
11.	Partnerships for DRR and recovery	2.44	0.65	0.024
12.	Sustainable environmental management	3.6	1.22	0.071
13.	Water security and management	2.1	2.4	0.082
14.	Health access and awareness	1.86	1.78	0.044
15.	Secure and sufficient food supply	3.69	2.44	0.198
16.	Hazard-resistant livelihoods practices	1.6	0.7	0.014
17.	Access to market	3.2	1.3	0.066
18.	Access to financial services	3.8	2.1	0.160
19.	Income and asset protection	2.9	1.54	0.070
20.	Social protection	2.3	1.2	0.037
21.	Social cohesion and conflict prevention	3.4	2.2	0.149
22.	Critical infrastructure	3.4	1.5	0.085
23.	Housing	2.9	1.4	0.062
24.	Contingency and recovery planning	1.46	0.55	0.011
25.	Early warning system	1.6	1.1	0.021
26.	Capacity in preparedness, response and early recovery	1.25	0.98	0.014
27.	Health services in emergencies	2.6	1.3	0.049
28.	Education services in emergencies	1.88	1.64	0.040
29.	Emergency infrastructure	3.1	2.4	0.150
30.	Leadership and volunteerism in response and recovery	2.9	3.55	0.254
	Total score	76.21	44.17	

	Minimum value
	Maximum value

Male research participants in the study were somewhat aware of potential threats in their neighbourhood and were taking some immediate action to reduce those risks. These actions included joining various DRR committees at the local authority level, participating in various training and awareness-raising initiatives, sharing their needs on decision-making forums, etc. However, female respondents lacked knowledge and understanding regarding resilience. The cultural obstacles and social marginalisation further limited their access to programs related to

disaster risk reduction, which also increases their vulnerability to potential risks. The female community members are impeded from forming resilience due to several factors, including gender-based discrimination, the lack of access to resources, inadequate education, cultural beliefs and practices, etc.

6. Discussion

The study's findings showed that, from a gender perspective, there are inequalities in the degree of community disaster resilience. Men and women received different results in the resilience assessment framework's component tests. Women scored worse on most of the components. Investigating disaster risk is among the primary priorities for assessing resilience. Understanding disaster risk was found to be crucial to building resilience in a previous study (Drennan, 2018). To confirm successful growth, it is essential to identify the risks and implement interventions that mitigate them (Mochizuki *et al.*, 2014). Studies have also shown that identifying the risks will assist with finding the weaknesses and reducing them to develop resilience (Van der Vegt *et al.*, 2015). In this study, men were better informed about the dangers of disaster in their communities than women were. In contrast to the poor engagement of female members, male community members had the option to take part in simple scientific risk assessment activities. Additionally, there were differences in how disaster education was provided in institutions. Collectively, the female members scored short in terms of risk awareness. The risk mitigation mechanism is unlikely to be effective for a given group if that community is unaware of all the possible risks they might come across. Because they were aware of the risks, the male community members were able to withstand more than the females in the identified area. In light of this, the study investigates how the way gender is regarded influences resilience. This study suggests that focusing solely on gender or particular attributes, such as children, persons with disabilities, minorities, etc., might not be sufficient to give a comprehensive understanding of community resilience.

7. Conclusions

Various variables and conditions affect community resilience to disasters. In a small-scale study, it is not possible to guarantee the inclusion of many indicators. However, this study stressed a gender-based approach in addition to analysing the degree of catastrophe resilience of the communities. The study found that women are one of the most susceptible populations, and additional attention should be paid to the gender component (Khan et al., 2020). Gender perspective highlighted the value of research, such as those on risk perception, and suggested the fact that gender has a significant effect on risk perception (Gustafsod, 1998). Considering that, this study found that different approaches to resilience result from various perspectives on gender. Based just on gender or on subsets of the population (children, adults with disabilities, minorities, etc.), it may not be sufficient to provide a comprehensive understanding of community resilience, as indicated by this study. Therefore, specific methods and tools are needed for evaluating resilience that ensures the involvement of numerous groups and makes distinctions based on the various vulnerability drivers. Future studies need to emphasise intersectionality more. What will happen if a woman is disabled and old, as this research has previously shown that women are less resilient than men? Therefore, this study suggests a more complex question focusing on the community's intersectional traits.

Declaration of conflict of interest

The author(s) declared no potential conflicts of interest(s) with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

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Publisher's Note

IDEA PUBLISHERS (IDEA Publishers Group) stands neutral with regard to jurisdictional claims in the published maps and institutional affiliations.

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