Climate Induced Natural Disasters: Assessment of Socio-Economic Impacts of 2022 Flash Floods in Sherqilla and Bubur Village, District Ghizer, Pakistan

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Abstract

Flash floods have become an increasing menace to mountainous communitises, particularly in the Hindu-Kush–Himalayan region, where climate change has intensified extreme precipitation and glacial melt. This paper examines the 2022 flash flood event in Punial valley, District Ghizer, northern Pakistan, within the broader context of climate-induced disasters in alpine environments. The primary objective is to evaluate the underlying causes, Impacts, dynamics, socio-economic consequences of 2022 flash floods on local livelihoods and infrastructure. A mix-methods approached was employed, combining quantitative data from a structured household survey (n=212) with qualitative insights from focus group discussions & key informant interviews. Results indicate that the principal drivers of 2022 were unprecedented monsoon rainfall, accelerated snow and glacial melt due to elevated temperatures, and the regions complex topography. These factors collectively caused extensive destruction of housing, roads, bridges, irrigation systems, and agriculture land severely disrupting livelihoods and exacerbating pre-existing vulnerabilities among marginalized groups, including landless farmers and women-headed households. The study further evaluates local and institutional response capacities, identifying critical gaps in early warning systems, evacuation planning and post-disaster shelter provision. Findings underscore an urgent need for community-based disaster risk reduction, improved early warning mechanisms, climate resilient infrastructure, and sustainable land-use planning to enhance adaptive capacity in Gilgit-Baltistan. The paper also integrates lessons from the 2022 & 2025 flood events, offering actionable recommendation aligned with Pakistan National Adaptation Plan. This research contributes to the growing literature on flash flood vulnerability and resilience in high-altitude regions and provides evidence- based guidance for policy makers and disaster management practitioners.

Keywords: Socio-Economic, Flash Floods, Disaster Risk Reduction, Early Warning System

Introduction

Flash flooding is among the most devastating forms of bulk displacement in the alpine environment (Badoux et al. 2016). A particularly prevalent source of such floods is debris accumulation from runoff after abrupt, severe downpours on steep, sparsely forested hillsides (Sweeney 1992). The hilly surroundings provide a plentiful supply of non-lithified soil resulting from aging, slope deterioration, and glacial events. The torrent of rubble destroys infrastructure and ecosystems in addition to taking lives. Climate change will significantly affect the incidence of massive shifts, notably fallen objects flows and flash floods (Gobiet et al. 2014). Higher temperatures are often associated with more rainfall, which increases the

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region that triggers outflow (Stoffel and Beniston 2006). Similarly, Tomczyk and Ewertowski (2017) carefully researched glacier-associated hazards, including debris falls, slides and flows, back-and-down wasting, and melting of solid ice, which have changed as glaciers have retreated through geomorphic processes.

Flash floods are not a new phenomenon; nonetheless, their frequency is growing. Until recent catastrophes, flash floods had not received as much attention as typical major riverine floods. The term “flash” itself indicates a sudden rapid hydrological response of a usually small catchment, where water levels may rise to their maximum within minutes of a few hours after the onset of the rain event. Flash floods are highly localized; they are restricted to basins of a few hundred square kilometers or less. They are also time-limited; response times do not exceed a few hours. Therefore, there is extremely little time left for warning (Collier 2007; Georgakakos 1987). Previously, some geomorphologists restricted this concept to ephemeral features in arid and semi-arid areas (Reid et al. 2005). However, it is now commonly acknowledged that flash floods may also refer to "flashy" flood hydrographs in humid-temperate and subtropical seasonal climates. Significant alterations in runoff output might have significant geomorphic ramifications (Bull and Kirkby 2002). The amount of silt transported, silt accumulation, and river flow flood hydrograph data are frequently used to evaluate the geomorphological effects of flash floods. There is a common correlation between flash floods and other natural calamities. Then, some of the damage they inflict may be attributed to the fact that they frequently result in debris flows, which are highly concentrated flows in locations where the silt load exceeds the water discharge (Iverson et al. 1997). The particle size of sediments swept at rates up to 20 m s-1 within narrow valleys or erosion gullies may range from clay to large blocks. The rainfall that produces flash floods often saturates entire hill slopes and subsequently may induce extensive slumps. By blocking valleys and impounding stream flow, the slumps create suitable conditions for the next floods.

The study holds both academic & practical significance. It provides empirical evidence on the impacts of flash floods in Punial valley, which can inform future research & support the design of targeted adaptation, disaster risk reduction, and community resilience in mountain community regions. Avoiding encroachments on natural flood routes is critical for reducing disaster risk and protecting lives. Developing protective walls can help safeguard vulnerable areas, while plantation along flood paths plays a critical role in stabilizing soil, reducing erosion, and minimizing the diversion of flood waters.

By examining the nature and scale, the study also makes significant contributions to disaster risk mitigation measures, thereby enhancing local communities' capacity to respond to future environmental risks. Moreover, the research results will be critical for supporting policy formulation, especially given that high-altitude areas face severe climatic conditions and are prone to disasters due to elevated temperatures. The knowledge generated by this research will serve as a foundation for future studies and practical interventions to mitigate the impacts of flash floods in Northern Pakistan.

The objectives achieved by the study include: (1) Assessing the socio-economic impacts caused by 2022 flash floods in the selected study sites. (2) Identifying and evaluating the challenges in preparedness and response mechanisms. (3) Assessing the current status of vulnerability and capacity of the affected population.

Literature Review

Pakistan's topography, geography, social institutions, and geostrategic position all play a role in disasters (Memon and Ahmed 2022). The land area of Pakistan is approximately 796,096 Square kilometers, and the population is around 241 million, as of 2023 (Dikshit and Dikshit 2025). Pakistan borders China, India, Iran, & Afghanistan, and has a long coastline along the Arabian Sea. Pakistan is located at latitudes 24 and 37 North and longitudes 62 and 75 East on the Indo-Australian tectonic plate (Zada et al. 2023), which is migrating northward and is more likely to collide with the Eurasian tectonic plate, increasing the likelihood of earthquakes in the area (Nijamir 2023). The Himalayan range in Pakistan receives 760-1270 mm of rainfall, with land regions receiving 200 mm (Murad and Saghir, 2024). Pakistan's annual flow is 136 MAF (Million Acre-Feet), but only 15 AMF (13%) is reserved for irrigation and electricity generation (Muhammad et al., 2024). The NDMA 207 identifies issues such as a fragile natural environment, poor livestock management and agricultural practices, a lack of early warning and forecasting systems, poverty, low awareness, limited rural outreach, and education and communication infrastructure.

Flooding is a typical occurrence in Pakistan, which has 56% of the Indus River basin and covers over 70% of the country's land (Atif et al., 2021). Since 1947, the nation has experienced 14 major floods. Floods have ravaged Punjab, KPK, Sindh, and Baluchistan, devastating the mountainous districts and the Northern region of Pakistan. The flooding of the River Kabul has affected the districts of Peshawar, Charsadda, Mardan, and Nowshera in Pakistan. Cloud bursts and flash floods have also been reported in Lahore (1996) and in Jhelum, Islamabad, and Rawalpindi (Sarwar et al., 2024). Furthermore, regarding GLOF danger, the entire region of Gilgit-Baltistan is identified as a "Very High" risk zone (Aslam et al., 2022).

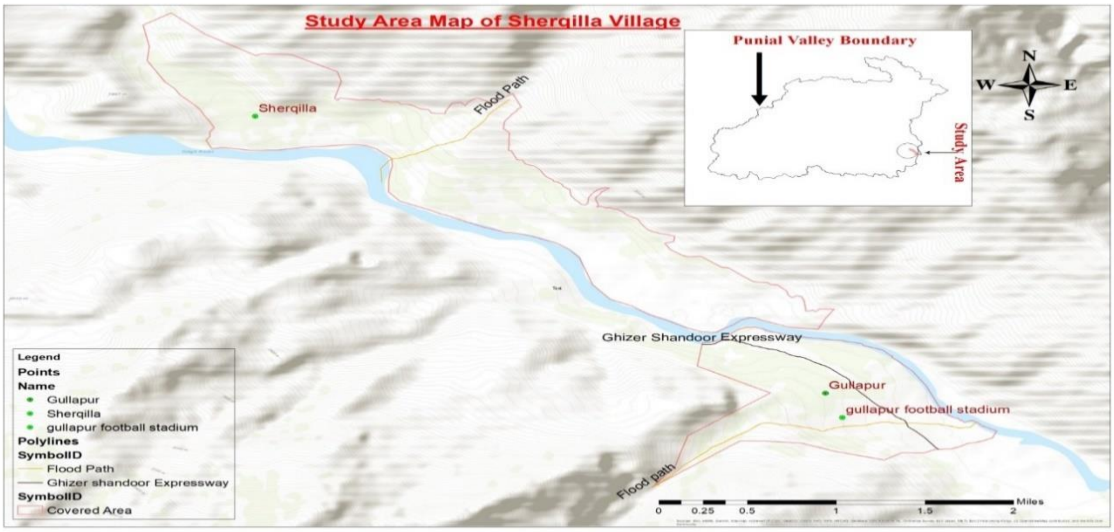
Dam breaches have also caused floods in Pakistan, such as the flash floods of 2005 and 2010. Big cities such as Lahore, Karachi, and Rawalpindi are also prone to flooding due to sewage and drainage systems (Iftikhar and Iqbal 2024). The present flash flood crisis has resulted in a total loss of $14 billion USD. According to the most recent data following the January-March 2011 evaluations, a total of 3 million households (HH) have been reported as impacted, with 1.9 million severely affected (Ullah & Khan 2025).

Methodology

Study Area

The study was conducted in Sherqilla village, one of the most populous villages in Tehsil Punial of District Ghizer (Islam et al., 2021), located at 36.09365, 74.045386, and home to 1,500 households and 12,000 people. It is approximately 40 kilometres west of Gilgit city. The majority of the populated region (7 km long, 1.5 km wide) is concentrated on debris fans and, to a lesser extent, on river terraces, particularly in the lower portions along the river (Karim et al., 2020). Derani Nala, a perennial creek that runs along the village's northwest edge, passes through some of the populated sections. The stream then flows into two valleys, Derani and Bilchar, with a catchment area of 163 km2, covered by glaciers, rock glaciers, and snowcapped summits. The torrent is prone to flash floods and has caused damage downstream. A Community-Based Flood Early Warning System (CBFEWS) has been erected to provide warnings (Khan et al., 2025).

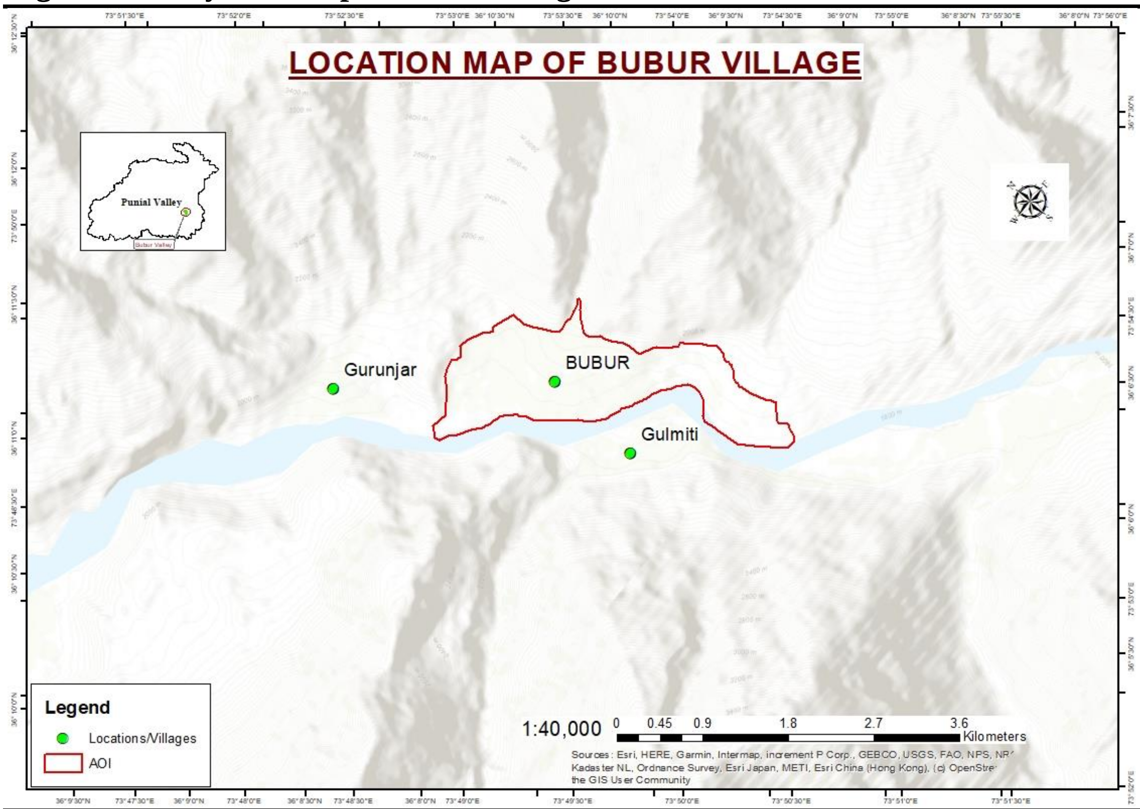
Figure 1: Study area map of Sherqilla village and boundary of Punial Valley, Ghizer



Source: GIS based map which shows Sherqilla village (AOI) and its surrounding areas.

Bubur village is situated in a mountainous area with latitude of 36.144998 and longitude of 73.859399 and it possess heterogeneous and special climate conditions. The village is a blend of both temperate and alpine climatic conditions depending on the height and its position. The Bubur village climate is generally not extreme during summer. Although where temperature reach 15 to 25°C in the summer season with approximately 120 to 140 precipitation per month during spring and early summer (Sadiq et al., 2024).

Figure 2: Study area map of Bubur village



Source: GIS based map which shows Bubur village by using Google Earth Pro and Arc map.

Data Collection

Primary data were collected through structured household survey, focus group discussions, and key informant interviews from both valleys. For this purpose, the self-designed questionnaire was developed to capture accurate information on key social and economic aspects such as, income loss, infrastructure damage, displacements and changes in employment patterns.

The data was collected from the 212 inhabitants of both valleys, of which 100 (47.2%) from Sherqilla village and 112 (58.8%) from Bubur village. The sample distribution reflects variations in population size and flood intensity to ensure representation of the affected communities.

Secondary data was collected from Gilgit-Baltistan Disaster Management Authority Department and related NGO's. These sources provided supporting information on flood extent, damages and institutional response measures.

Data Analysis

Quantitative Data Analysis

In this research, quantitative data was analyzed by using MS Excel and SPSS. Descriptive and inferential statistical techniques were applied to examine socio-economic impacts and to identify key patterns and relationships.

Qualitative Data Analysis

In this study, qualitative data was analyzed by using thematic analysis. To interpret community perceptions, experiences and institutional responses to the flood impacts, responses were categorized into themes.

GIS Based Spatial Analysis

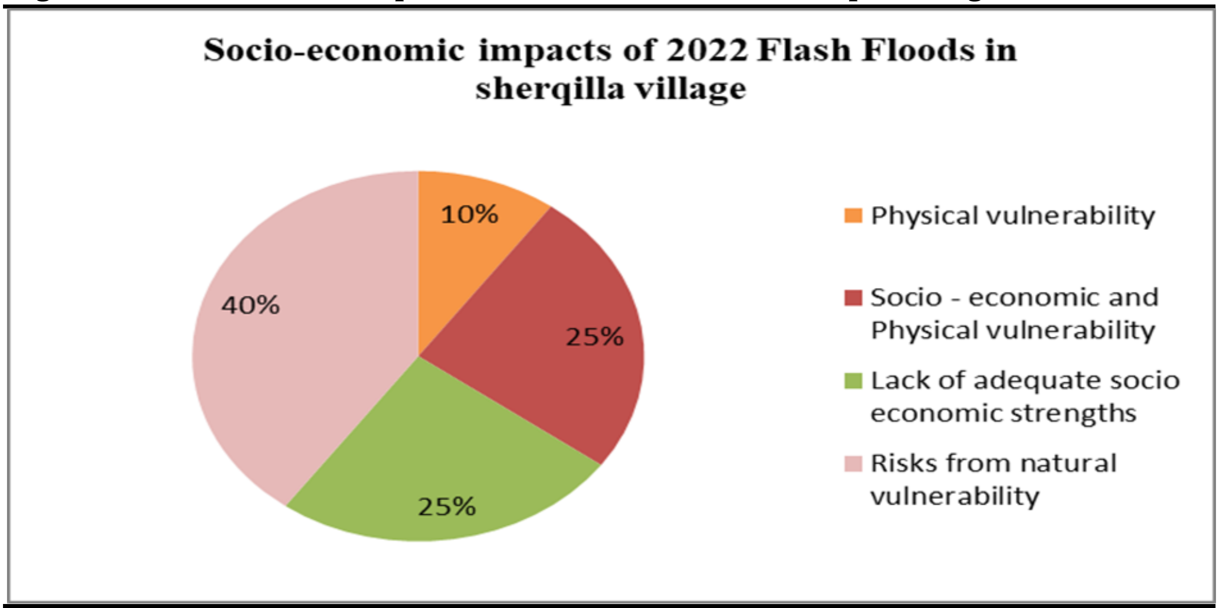
GIS based analysis also carried out in ArcGIS by using a 30m DEM data in this research to map flood affected areas, along with damaged infrastructure and agricultural land. Vulnerability data of household were also overlaid to assess high risk areas.

Results

Socio-Economic Impacts of 2022 flash flood in Sherqilla and Bubur village

In Sherqilla, the vulnerability of the society in socio-economic aspects is a predisposing factor to negative effects of flash flood disasters. Based on the data, 10% respondents were found to be highly physically vulnerable meaning that they are directly at risk of becoming the effected person as a result of floods. Also, a quarter of the respondents pointed to insufficient socio-economic resilience, including a stable financial condition and resource accessibility, which only adds to their level of vulnerability. They are further compounded by the vulnerability due to nature which intrudes on 40% of the population, thereby highlighting how the community is exposed to environmental dangers. In addition, the overall vulnerability is high due to the combined effect of socio-economic and physical vulnerabilities, which consider 25% of the respondents. The nature of this multi-dimensional vulnerability environment has led to the need to adopt holistic approaches that will focus on not only the socio- economic dimensions but also the physical dimensions of resilience of the community to flash floods in the future.

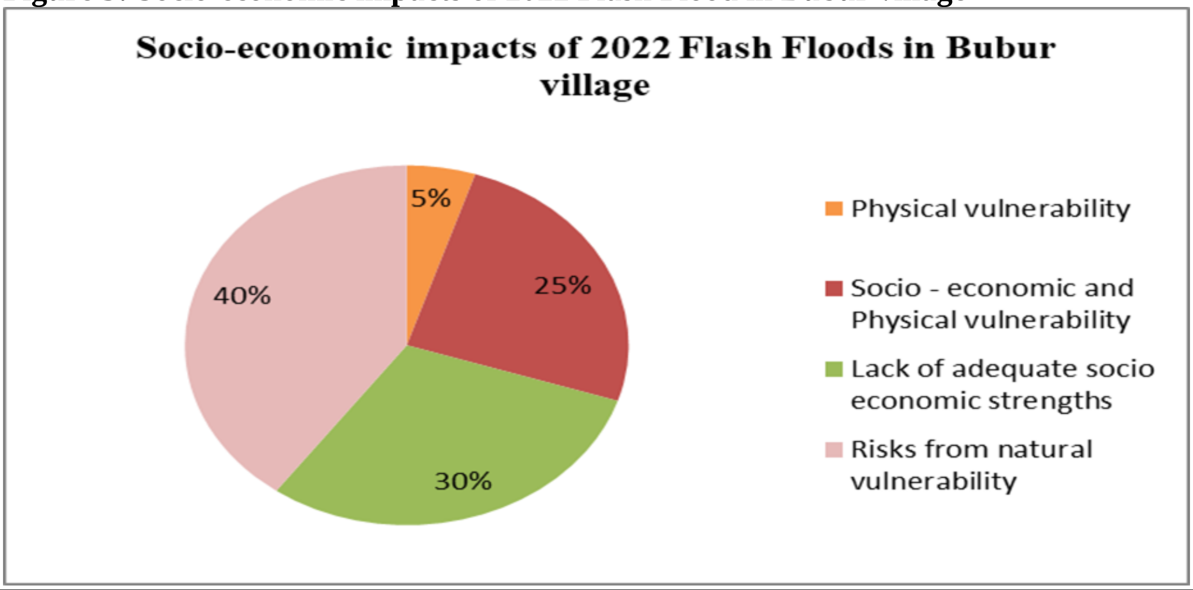
Figure 3: Socio-economic impacts of 2022 Flash flood in Sherqilla village



Source: This graph has been developed on the basis of primary data collected from the study area.

While in Bubur Village, the Socio-economic factors significantly enhance the communities overall vulnerable to flash flood disasters. It has shown that 5% of the respondents have experienced physical vulnerability, which shows the vulnerability of an individual based on the age, health and physical disability. A less significant 30 percent of the population lacks adequate socio-economic capabilities such as low income, level of education, inaccessibility of necessary services, a factor which compromises their efforts to prepare against and recover disasters. Moreover, 40% are put at risk by natural factors, i.e., living in flood prone regions or unsteady soils. The problems are worsened by the fact that 25% of the population experiences a combination of socio-economic and physical vulnerabilities, which result in an overall high vulnerability in the village. Such a blend of conditions highlights the necessity of the combined methods of disaster risk reduction considering the socio-economic and physical vulnerabilities to make the community more resilient to flash floods.

Figure 3: Socio-economic impacts of 2022 Flash Flood in Bubur village



Source: On the basis of data collected from the study area, the graph has been made.

In 2022, the monsoon resulted in severe damages of private properties in various districts across GB, based on the information by GBDMA. This information shows the dire consequences of intense rainfall and related natural disasters, as it badly affects the homes, businesses and the infrastructure, resulting in significant economic and social consequences in the area.
In the table 2, GBDMA report on flash floods shows widespread destruction, such as a great number of deaths and serious damage to properties. It reports homes destruction, in part and completely, loss of livestock, and confusion of cattle sheds, trees, and stores. The report highlights significant consequences on communities in terms of their livelihoods and day to day living and the firm's attention to the mandatory recovery and support interventions.

Table 2: Assessment amount involved as per format of GBDMA

Deaths (NBW)	7×600000	4200000
Injured	1×150000	150000
Injured	2×40000	80000
Pakka Fully	32×300000	9600000
Kacha Fully	16×100000	1600000
Pakka Partially	32×100000	3200000
Kacha Partially	5×60000	3000000
Cattle shed Fully	49×70000	3430000
Cattle shed Partially	37×50000	1850000
Goat, ships etc.	666×20000	1320000
Cows, Buffalo etc.	19×30000	570000
Land damages	1010×20000	20200000
Fruit Trees	2791×9000	25119000
Non fruit trees	8987×40000	35948000
Shops Fully	1×400000	4000000
Shops Partially	2×200000	400000
Total in PKR		10,8367000

Source: Assessment of GBDMA financial assistance granted for overall infrastructure restoration for the 2022 flood affected communities (GBDMA, 2022).

Table 3: Deaths reported during 2022 flash flood across GB

Flood affected areas in GB	**Sherqilla**	**Bubur**	**Darel**	**Tangir**
Deaths	07	10	01	04
Total deaths	22			

Source: (GBDMA, 2022)

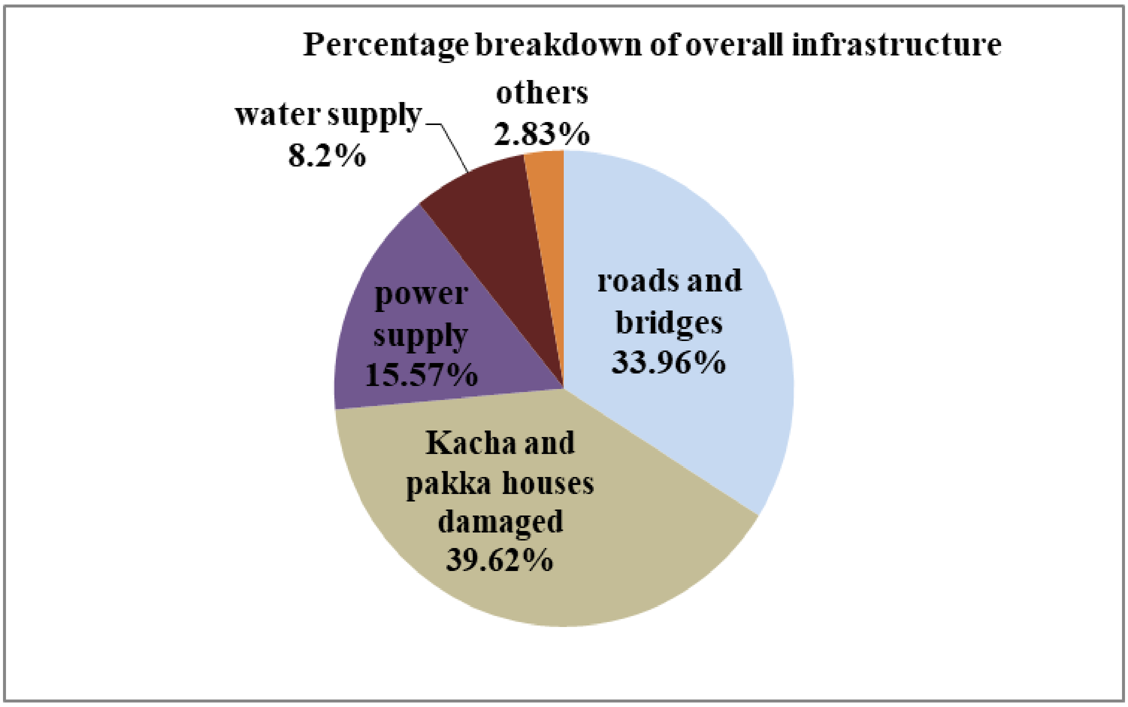
Observed Impacts during the 2022 flash flood

The possible effects of flash flooding within the community are varied and catastrophic as they may touch on various facets of day to day living and the environment. Respondents were able to identify the following significant impacts in Sherqilla village: Displacement of Communities (20%): Flash flooding may cause settlement of inhabitants to resettle by leaving their homes and visiting a place of temporary refuge. Property Damage (25%): A huge percentage of the respondents emphasized the massive destruction of the property which comprised homes and businesses by the flood water. Transportation (21%): Flooding usually leads to the disruption of transportation systems causing individuals to have a hard time travelling and goods transported which can affect the economy in a wide manner. Environmental Damage (19%): The considerable affect experienced was the damage to the environment as the floods created erosion, pollution and destruction of nature habitats. All these Impacts (15%): There were also respondents who identified all these impacts, and in this case, the respondents highlighted on the holistic and multiple nature of flash flood effects on the community. Although flash flooding in Bubur village has great potential effects such as population displacement (23) and property damage (37). It, also, brings huge transport havoc (23%), and environmental harm (5%). An integrative strategy that fully employs all these problems is required as noted by 12 % of the respondents.

Infrastructure affected by the 2022 flash flood

The infrastructure that was most affected including: roads and bridges: 33.96 % of the infrastructure damage was as a result of roads and bridges. These vital transportation links were badly get disrupted and curtailed communities could not get in or out and delayed the emergency response efforts as houses: residential and commercial structures were struck the worst with 39.62% of the damage were house including kacha houses and pakka houses. There was also a huge amount of destruction and/or inhospitable homes, displacing households and exposing them to vulnerability and power supply: 15.57% of the damage impacted power supply in the region, causing extended power outages, which made recovery a little more difficult and disrupted daily living of residents while 8.02% of water supply infrastructure was damaged by the floods, which accelerated the issue of accessing clean water by the people who were also affected by the disaster, further heightening the public health risks after the disaster. Other Infrastructure: 2.83% of the devastation was also credited to other vulnerable infrastructure elements like telecommunications and smaller stature amenities, which were obligatory to uphold a sense of equilibrium within the community.

Figure 4: Percentage breakdown of overall infrastructure affected by 2022 floods in the selected sites



Source: to show the size and distribution of flood-related consequences, a percentage breakdown of entire infrastructure affected during 2022 floods, the pie chart has been generated using data acquired from the sites.

A total of 212 respondents were involved during 2022 flash flood in the selected study sites. Out of the total respondents 53% respondents belonged to Bubur village as compared to 47% respondents who belonged to Sherqilla village. This distribution shows a marginally more representation by Bubur which implies that more than half of the respondents belonged to this area. The near equal representation of the two villages makes the collection quite representative and the sample of the two communities is included in the analysis.

Communities encountered challenges during 2022 Flash Flood

The questionnaire-based survey outcomes of the 2022 flash flood in Sherqilla and Bubur village bring several challenges in mind of people in terms of preparedness in case of 2022 flash flood. The primary issues identified by the respondents of the Sherqilla included: a total of 9% of the residents raised the lack of Early warning systems as one of the major challenges. Such a deficiency in the advanced systems of notifications stood in the way of a prompt preparation and reaction to the approaching flash floods. General 15 % of the sample had admitted to ignoring the first warnings regarding the flash flood. This implies a possible problem either in the credibility the warnings or effectiveness or a lack of awareness and understanding of the residents of the gravity of the situation. The majority, 62%, reported the lack of evacuation schedule as the major issue. This denotes a great lapse in the disaster preparedness planning of the community where people were not briefed nor trained how to evacuate safely and effectively during the disaster which is the flood. The general percentage of 8% of those interviewed cited the challenges of having all the above-mentioned problems that led to an increased burden, the absence of early warning systems, non-observance of warning signs, and the absence of evacuation schedules, which increased the burden during the flood.6% of the interviewers, said the lack of accommodation was a problem. This is lack of adequate shelter to the displaced by the flood which increases the effects on the affected individuals and families.

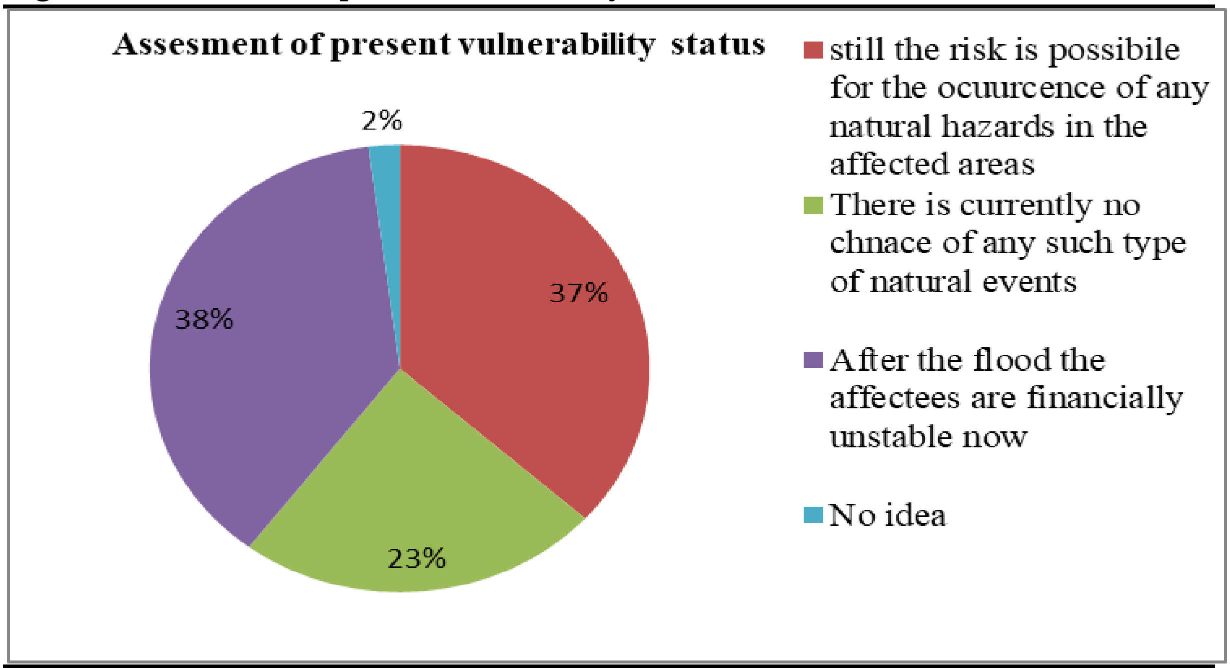
When interviewed in Bubur village, 21% mentioned that the biggest challenge was the absence of early warning systems. This means that there is a disparity between the infrastructure required to give residents early warning of imminent flash floods, which may have a major impact on their preparedness and response capability. 24% of the respondents acknowledged ignoring initial warnings. This is an aspect of behavioral problem in which despite the presence of warnings, there is no process of being taken seriously. Such indifference or confidence in the warnings may result in slow reactions and more of a weakened position. Lack of evacuation schedule was the most mentioned challenge by 40% of the respondents. This reveals a dire lack of well-ordered evacuation plans and procedures which are important in the safety of the residents during a flood. Lack of a distinct, drilled evacuation plan may result in disorder and enhance danger in the case of an emergency event. 15% of the respondents claimed that they experienced all of the challenges mentioned above. The lack of accommodation was identified as one of the repeated preparedness challenges among this segment of the population by 12% of the respondents who subjected them to a secondary effect during the flash flood**.**

Assessment of the Present Vulnerability

Upon evaluation of the present circumstances of the vulnerability capacity of the affected people, different views are to be found on how future risks as well as economic stability should be determined after the occurrence of natural hazards. By the data, 36.7 percent of interviewees were responded that the threat of natural hazard, e.g., flash floods, floods, GLOF events, cloud bursts etc., still exist in the concerned locations. In the meantime, 23.6% believe that at present, there are no opportunities of such events. Also, quite a high number of 37.7% point out that the affected people are no longer economically stable thanks to the flash floods, which shows the long-term effects of these disasters. Only a fractional number, 2% had no opinion on the issue.

This information shows that the community has not yet gotten over the consequences of the floods and is uncertain about the future risks.

Figure 5: Assessment of present vulnerability status



Source: The graph shows present vulnerability status after being hit by 2022 flash flood.

Discussion

The socio-economic effects reported in this paper align with previous research on the effects of floods in mountainous areas. The comprehensive exploration of the consequences of the Sherqilla and Bubur village conducted by this research, in addition to authorizing the previous research findings, provides a deeper understanding of the specific impact of disasters on the area. The extensive agricultural production and the destruction of essential infrastructure specify the exceptionally vulnerable condition of these populations, which have been intensively explored in the literature on disasters. Also, the analysis of how local communities reacted to the disaster in the study is part of the emerging discussion on Aboriginal adaptation strategies. Although the importance of local knowledge in disaster resilience is noted in the existing literature, this study underscores the need to place greater weight on how this theory is integrated into formal systems of disaster management. Though beneficial, the local adaptation initiatives recorded in Sherqilla and Bubur village were not adequate to address the extensive damage from the flash floods, suggesting an entrapment of existing disaster preparedness and response strategies.

According to Manzoor et al., (2022), the socio-economic impacts of flash floods on the agriculture sector is categorized into six key areas including emergency livestock evacuation, protection of livestock into flood free areas, severe damage to crop and pasture productivity especially in the flash effected regions, reduced agriculture output due to disrupted cultivation, destruction of farm irrigation system, loss of beneficial organisms and increase risk of animal disease like liver fluke. Apart from that, agriculture is the largest sector of Pakistan’s economy, employing 43% of the population (Liu et al., 2020).

According to the respondents, several critical key challenges in preparedness during the 2022 flood were identified in the selected sites. The absence of reliable early warning systems hindered timely alerts. Ignoring initial warnings reduced the effectiveness of any existing alert mechanisms. The lack of a structured evacuation schedule was the most significant issue, affecting a large portion of the population.

The lack of housing alternatives left many individuals without safe temporary homes, and a significant number of the population faced multiple problems at once, worsening their condition. The central objective of the flood forecasting and warning system, as outlined by Jain et al., (2018), is to ensure that flood alerts and warnings are available to the public and stakeholders in a timely manner. The PMD tracks the monsoon weather cycle, which generates above the Arabian Sea or on the eastern side of the Bay of Bengal. During the first stage, hydrological data is considered, and floods are predicted. The third stage is the response, during which measures are taken to minimize damage and ensure people's safety. There are various gaps that should be addressed in the 2022 flooded Bubur village, as the respondents have discussed. A major share highlighted the need for improved early warning systems and stronger communication and coordination among local authorities, emergency services, and the community. Also, the introduction of a more advanced automated weather station is perceived as paramount for more precise weather forecasts and enhanced preparedness. A number of respondents support a holistic approach that involves all of these enhancements to reduce future risks and build community resilience. Although Sherqilla village responders highlighted the importance of greater disaster preparedness, 40% supported better protection through the creation of an Early Warning System, and 13% supported automated weather stations. On another note, 28% emphasized the need to improve communication and coordination, whereas 10% emphasized the need to improve community engagement. There was consensus among 9% that combined these actions to achieve a holistic approach to reducing future flash flood risks.

The evaluation of the present state of vulnerability and capacity in the affected areas habitually identifies persistent difficulties and ambiguities. Most of the population affected by the flood is still struggling economically, underscoring the tragedy's long-lasting economic effects. Moreover, the possibility of further natural disasters haunts the community; with most fearing that flash floods may occur again.

However, 23% of respondents believe there is no immediate threat of future disasters, showing a divergence in risk perception. A smaller portion of the community expressed no opinion, suggesting some uncertainty or disengagement. Overall, the data paint a picture of a community still in recovery, with financial instability and concerns about future hazards shaping their outlook.

Ali et al., (2015) The hazard identification and assessment process shows that flash floods are the result of the study and have profound theoretical implications, particularly within the frameworks of vulnerability and resilience theory, and disaster risk reduction. Major hydrometeorological hazards in the study area include GLOF events, cloudburst floods, and river floods. According to the area's historical background and geographical location, heavy rainfall is the primary driver of flash floods, while river floods are mostly triggered by higher summer temperatures.

Conclusion

The paper gives a detailed analysis of the flash floods that destroyed the Punial valley in 2022. Also, the study examines the multifaceted causes of these floods, their nature and magnitude, and the socio-economic effects they may have on local communities. Highlighted are the impacts of climate change, GLOF events, snowmelt, deforestation, and poor land management practices on the severity of these floods. The paper also examines the current preparedness and response approaches in the area, which have revealed major challenges and gaps that must be addressed to improve community resilience against future catastrophes. The next sections present the key findings of this study and their Significance.

The 2022 flash flood in the Sherqilla and Bubur village has left an enduring impact on the socio-economic lives of the affected communities. Agricultural production, the main source of livelihood for most inhabitants, has been severely disrupted, and the widespread destruction of key infrastructure, such as roads and irrigation facilities, has further weakened the economic sustainability of the affected areas. The flood not only disrupted the immediate livelihoods of the region's residents but also posed long-term challenges to the recovery and resilience of their economies. The research indicates the frailty of such communities, worsened by poor disaster preparedness and response systems. The negative effects of the flood were also exacerbated by the lack of effective early warning mechanisms and resilient infrastructure. This scenario highlights the urgency of developing comprehensive disaster risk reduction plans tailored to the susceptibility of mountainous areas such as Gilgit-Baltistan. Besides, the study illuminates the significance of local adaptation tactics for formal disaster management schemes, as indigenous responses were critical for short-term effects but limited in reducing overall impacts; therefore, closer support and integration of institutional actions are essential.

Recommendations

The presence of miscellaneous factors in the present study suggests that the research recommends:

- To remedy and avert flash floods within the susceptible areas such as Sherqilla and Bubur village, a multi-faceted intervention strategy is necessary, which incorporates inclusion of the community and use of cutting-edge techniques as well as environmental conservation.
- Improve early warning mechanisms so as to give quick alerts and be better equipped to respond in case of occurrence of flash floods in the future.
- Should be Introduced a regular program of glacier monitoring, emphasized on observing the potential danger of GLOF and also set up a GLOF danger dealing framework in a high-altitude area such as Sherqilla and Bubur village.
- Promote community engagement in disaster preparedness and response planning to make sure local demands and views are incorporated in the disaster risk reduction plan.
- Pakistan once again experienced one of the worst floods in 2025, including Mansehra, Swat (KPK), Gilgit –Baltistan, etc.; to reduce the impacts of future floods and safeguard vulnerable mountain communities, provincial and district-level initiatives must be aligned with the national adaptation plan.

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