# VULNERABILITY AND RESILIENCE AMONG FLASH FLOOD-AFFECTED COMMUNITIES IN KOCHI

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**ABSTRACT :**
The world is experiencing enormous climate changes, which are increasing the frequency of natural disasters. Flooding and other weather-related calamities are common in Kerala the southern state of India, increasing vulnerability and reducing people's well-being.This study analyses the effects of frequent flooding on people's lives, resilience, and community spirit and whether, following a disastrous flood, some survivors adjust effectively, demonstrating a growth trajectory and resilience, while others do not. The ability to bounce back and move on after experiencing a challenging event was measured among 120 families using the Brief Resilience Scale (Smith et al., 2008) and Communities Advancing Resilience Toolkit-CART (Pfefferbaum et al., 2013) using a sequential mixed methodology. Case studies, in-depth interviews, and focus group discussions were analyzed and presented thematically.Floods have a substantial impact on people's lives, despite the fact that community resilience is significantly greater than individual resilience. The examination of protective and risk factors for flood-affected populations revealed a critical need to incorporate policymaking to lessen the psychological impact of catastrophes. The findings provide new information to policymakers and development experts, paving the way for interventions that will improve living conditions, community capacity building, and empowerment of those who live in flood-prone areas, increasing both individual and community resilience.
**Keywords: Resilience, vulnerability, flash flood, community**

**INTRODUCTION :**
Floods are one of the most prevalent natural disasters, and their frequency and severity are increasing globally. Flash floods are among the most common types of floods in India. They are often linked with short, high-intensity rainstorms, have a short response time, and have the ability to severely influence and devastate communities in many climatic situations worldwide (Penna and Zoccatelli, 2013).One of the major causes of flash floods in India is the brief but intense and frequent monsoon rains. The rate of people affected by flash floods is approximately two times higher than the rate of people affected by normal floods, and the disparity is even more pronounced in terms of mortality, with 109 fatalities per million people exposed to flash floods compared to 6 deaths per million people exposed to typical floods (Cred Crunch, 2018). Kerala, the southernmost state in India, surrounded by the Arabian Sea in the west and the Western Ghats in the east, features an ideal climate where the monsoon comes twice a year. The southwest monsoon, from June to August, is the main rainy season, and the northeast monsoon, also known as the retreating monsoon, comes around October and November. The biggest flooding to hit Kerala since 1924 occurred in August 2018. Over 400 people lost their lives as a result of the devastating flood and associated landslides, which affected 5.4 million people. The Kerala government commissioned a post-disaster evaluation, which estimated the economic damage at more than $3.8 million (Hunt & Menon, 2020).
The impact of flooding has an adverse impact on people's lives. Life's physical, economic, psychological, and social components are all significantly impacted. Living with negative consequences, tough conditions, and traumatic memories impairs survivors' ability to cope with and recover from their experiences (Joseph et al., 2020). The concept of resilience is crucial and it is a continual process in which people adapt to hardship by reflecting on and learning from their experiences over time and under varying conditions.
Some people can heal from the heinous acts that have occurred, while others cannot. The level of resilience of survivors, as well as several other demographic characteristics, may have an impact on disaster consequences. As a result, knowing catastrophe survivors' resilience capacities in the post-

disaster phase is critical, particularly in community resilience and collective action (Rahana et al, 2021; Chisty, et al, 2021; An, S et al, 2017. Individuals and communities must be resilient in order to respond to unfavourable conditions using available resources, withstand them, and recover from them.Research studies in the field of disaster risk reduction currently place a greater emphasis on resilience than on vulnerability (Ali & George, 2022). Building resilience has been demonstrated to be a solid theoretical foundation for catastrophe management (Thomas & Rony, 2022). Disaster management relies heavily on resilience building (Panigrahi& Sar, 2021; Joseph et al., 2020; Anil et al., 2020). Resilience is crucial in overcoming adversity, as it allows individuals to find purpose and use new coping mechanisms. It helps individuals recover quickly and avoid stagnation. Social cohesion and resilience are key factors in reducing the likelihood of poor mental health after floods. Survivors demonstrate their qualities, receive support, and progress, stabilizing over time as resources become more accessible (Zhong, M et.al, 2020; Li et al., 2012: Lowe, 2015).

Community resilience refers to a community's ability to manage challenging circumstances effectively. It is crucial in disaster management, as communities with higher social, physical, and human capital are better equipped (Greene et al., 2015). The concept of individual resilience is well-developed, but community resilience is expanding due to natural catastrophes. Survivors demonstrate resilience, receive support, and progress, stabilizing over time (Madsen &O'Mullan, 2016; Obuobi-Donkor et.al 2022). Households struggle to grow and flourish despite the obstacles they face as a result of the floods. The purpose of this research is to discover how disaster survivors react instantly to a natural disaster and develop resilience over time. Understanding the context of survivors' lived experiences can help to alleviate suffering, encourage resilience, and plan interventions.

**METHODS :**

The quantitative data and qualitative information were collected concurrently in a quantitative-dominant, qualitative mixed study design. This sequential exploratory strategy aided the study in assessing how vulnerability and resilience are perceived in local contexts, investigating locally-specific flood impacts, and identifying characteristics that influence household individual and community resilience in the face of this calamity in the two urban communities of Kochi, Kerala. A cross-sectional survey of 120 households was supplemented by qualitative information from 6 Key Informant Interviews (KIIs), two Focus Group Discussions (FGDs), and 12 case studies. For selecting the sample for the household survey simple random technique was used and for qualitative enquiries purposive sampling method employed and get an in-depth understanding of the lived experience of flood disasters. A semi-structured interview guide was used by the author to conduct all face-to-face interviews, and each participant gave their informed consent after being briefed about the study and promised complete confidentiality. All practicable steps were taken to take ethical considerations into account. A structured questionnaire was designed which consisted of socio-demographic characteristics, the Brief Resilience scale (BRS), and the Communities Advancing Resilience Toolkit (CART) for examining Individual and Community Resilience. The qualitative data was presented on the basis of codes and themes for data analysis in this investigation. Finally, grouping the themes and creating sub-themes resulted in four main themes and several sub-themes. Case studies were examined through thematic analysis, content analysis, and cross-case study analysis.

**RESULTS AND DISCUSSION :**

It is exceedingly tough to get back on your feet after a severe flood. The psychological and emotional harm is frequently greater than the physical harm. Returning to the previous state is a genuinely challenging procedure. This study aims to expose flood-affected people's experiences and resilience in the aftermath of the tragedy.

**Table 1 Socio-demographic characteristics and vulnerability of flood**

| Economic status | Below poverty Line | 61% |
|---|---|---|
| | Above Poverty Line | 39% |

| | | |
|---|---|---|
| Education status | Illiterate | 7.5% |
| | Primary and Secondary | 70% |
| | Senior Secondary | 10.8% |
| | Graduate | 11.7% |
| Employment status | Unemployed | 40% |
| | Daily wage worker | 35% |
| | Self-employed | 4.2% |
| | Private sector | 15% |
| | Government sector | 5% |
| Flood exposure | High | 54.2% |
| | Moderate | 39.2% |
| | Low | 6.7% |
| Vulnerability and risk | High | 66% |
| | Moderate | 24% |
| | Low | 10% |

The majority of the participants (61%) were from low-income households, and a household head or an adult member (>18 years) who consented to participate was interviewed, the respondent's mean age was 47.11(SD= 13.7) years. The least majority of the respondents claimed to have graduated and senior secondary education (11.7.1% and 10.8%, respectively), and those who could not read and answer constituted 7.5%. Most were from owned houses (88.3%) %) compared to a small minority who lived in squatter slums (11.7%) and 40% of them were unemployed. About 54.2% were directly affected by the flood and 66% were more vulnerable.

**Table 2 Resilience of the respondents**

| Level of Individual Resilience | Percent |
|---|---|
| Very high | 45.9 |
| Medium | 40.0 |
| Low | 14.2 |
| **Community resilience** | |
| Very high | 35.8 |
| High | 54.2 |
| Medium | 10.0 |

The mean Resilience of people affected by flash floods was determined to be 2.36, with a standard deviation of 0.776. The study shows that Community Resilience is higher than Individual resilience. The mean Resilience was determined to be 3.26, with a standard deviation of 0.628. Surprisingly, there is no low community resilience among the respondents.

**Table 3 The mutual effects of resilience, and socio-economic factors among flood-affected families**

| Variables | | r-value |
|---|---|---|
| Individual Resilience | Community Resilience | .498[**] |
| Age | Individual Resilience | -.255** |
| Age | Community Resilience | -.209[**] |
| **Community resilience Individual resilience** | **Socio-economic status** | **Mean and SD** |
| Gender | Male | 96.7 (14.9), 3.12 (.713) |
| | Female | 91.67(14.5), 2.52(.773) |
| Vulnerable areas | High-risk | 87.15(13.4), 2.38(.606) |
| | low-risk | 98.37(13.9),2.93(.872) |

The adaptive capacity of communities and households is critical in flood risk management. The relationships between the study variables were all significant. Individual resilience had a moderate positive correlation with Community resilience (r = .498**) with a statistical significance at .01 level (p value<.01). The relationship was rather near moderate but a highly significant one. Individual and community resilience were negatively correlated with Age (r = -.255**,-.209) with a statistical significance at .01 level (p value<.01).  Gender has an influence on the resilience of households affected by floods. The independent t-test conducted between gender and individual as well as community resilience scores of disaster-affected people confirms that there is a substantial deviation in the resilience score of males (M=96.7, SD=14.9) and females (M=91.6, SD=14.5) (t(df=118) = 3.503; p<0.5 in the case of community resilience. In the same way, the mean score of individual resilience indicated a significant difference between males (M=3.12, S. D= .713) and females (M= 2.93, S.D =.872) (t(df=118) = 3.503; p<.05 in their individual resilience.

According to Joerin et al. (2012), families that are situated near waterways, such as rivers and canals, are less resilient to natural catastrophes. While these households may learn from past experiences related to climate change, their resilience is not increased. Most of the severely flood-affected residents reside in the municipality as the households are located in the vicinity of natural hazards (rivers, canals, etc) and have low Individual (High-risk =2.93, S.D=.606) compared to the less vulnerable municipality (low risk= 2.93(S.D)=.872) (t(df=118) = 3.971; p<.05).Same way the mean Score of Community Resilience among Residents of low-risk community was M=98.37, S. D= 13.906) compared to (M=87.15 (S. D= 13.426)(t(df=118) = 1.548; .124>p the most vulnerable community

## THE FLOOD'S IMPACT ON FAMILIES WAS DISCOVERED THROUGH QUALITATIVE INTERVIEWS

The following sections explore the main theoretical concepts that emerged from the data to outline protective and risk factors. According to the findings of this study, four factors influenced victims' resilience, yielding codes, subthemes, and four primary themes.  The themes and subthemes are detailed further below supporting quotes from participants.

**Table 4 Risk and protective factors of flood affected families**

**Risks and protective factors**

| Risks | Protective factors |
| --- | --- |
| Anxiety | Optimism |
| Livelihood challenges | Hope |
| Loss of assets | Social support |
| Academic challenges | Self-efficacy |
| Belief system | Coping strategies |
| Financial issues | Resilience |
| Emotional attachment | NGOs |
| | Supportive members |

## LIVELIHOOD CHALLENGES :

Anxiety over losing assets was heightened by the poor economy, which also made it more difficult to replace livestock, crops, and even valuable records and study materials. The theme of livelihood challenges is an aggregation of sub-themes such as; damage to adequate resources necessary for survival, financial challenges, location of the house, and emotional attachment.
The following are some illustrative comments from participants:

*"Sometimes, we also lose books and other necessary items of children, and this cause problem in their education"*

*Since we reside in the vicinity of Periyar river, every year we move to flood relief camps and some sort of destruction will happen to our house, which creates a need for annual repairs*

*"The presence of African Snail is the most intruding aftereffect of the flood that we continue to deal with on a daily basis. Because of this, I have a hard time cultivating vegetable…*

The unsanitary conditions and scarcity of safe drinking water are even more concerning to survivors of floods' lives. The emotional link to their homes and the locations of river basins also made marriage offers difficult.

*"Because of contamination of wells, often we find it difficult to fetch clean drinking water and damage in sanitation facilities make things further worse"*

*"The actual cleaning took several weeks and it requires a lot of people to complete cleaning in a short span of time. The offensive odor is something that is quite challenging to control. Even after thoroughly cleaning the entire house with phenol, the stink was not removed completely"*

*Due to the deplorable conditions of this location, there are never any marriage proposals made in this region, and no one has the courage to do so either".*

## COPING STRATEGIES :

Developing coping mechanisms in the event of a tragedy is one of the most important aspects of developing resilience. Individuals utilize a range of coping strategies to lessen the extent of the harm that floods create. Disaster victims employed coping mechanisms in the form of behavioural, cognitive, emotional, or religious approaches. A small number of them exhibited maladaptive behaviour that compromised their wellness.

*"Earlier, I cried and got angry often during these hard times and this helped me a lot in ventilating my emotions"*

*"Through the course of all of these years, we have gained the knowledge necessary to successfully navigate this circumstance on both a physical and emotional level".*

*"God is constantly by my side, I have no need to be fearful of what lies in front of me. If God is with me, then why should I be concerned about anything?"*

The respondent also stated that he had never considered looking for another employment or a place to live because he was so dissatisfied with his current circumstances.

*The flood has caused damage to my residence. I had not gone to watch it till recently... I'm just going to stay in the relief camp….It is my fate…. To be honest, I hadn't considered looking for a new home elsewhere... don't know about the Government assistance….*

## COMMUNITY SPIRIT AND SOCIAL SUPPORT :

Community sentiment and collective action refer to people banding together to assist their community members in overcoming challenging situations. It comprises disaster victims actively participating in activities ranging from search and rescue to reconstruction (Ali & George, 2021). Disaster preparedness, prevention, and recovery have all been connected to higher levels of extraordinary social participation, such as sentiments of trust, close-knit community links, and membership in volunteer organizations. Collective programmes and activities increase the availability of social support, involvement, and reciprocity to help people reconstruct their lives and nurture a positive mindset (Panigrahi&Suar, 2021).

*People around us were very helpful. We helped each other and we received support from a lot of organizations as well as from the government".*

*We have a strong connection to this location on an emotional level. First and foremost, the entire colony constitutes members of my family and we are all related to one other through blood. Leaving this place means abandoning the whole family and thus even if we live in a flood-prone area, we don't care about it".*

*"People were assisting the needy regardless of religion or caste, considering the need.""“Back in the day, residents of the areas surrounding the camps brought "Pothichoru" in order for the camps to function”*

During a tragedy, social support is extremely important. Participants in the study also received several sorts of support, such as material, emotional, and informational help. They believed that they had excellent people around them, such as family, friends, and peers, who helped them whenever they needed it.

## RESILIENCE :

Positive attitudes and optimism towards their circumstances were observed. It assisted them in coping well throughout trauma because they recognized disaster occurrences were less harsh on them and it was possible to overcome its problems. Individuals exhibited resilience when attempting to achieve their goals or dealing with unpleasant situations.

*“Through the course of all of these years, we have gained the knowledge necessary to successfully navigate this circumstance on both a physical and emotional level”.*

*“Once, our house was completely immersed in water and we had no choice but to start everything from the very beginning. Because I am a versatile electrician who can perform a number of different tasks, I am readily able to repair the damages.”*

*"I am happy that we are still alive and feel that everyone will be alright."I am optimistic that we will be able to properly address these concerns.*

## DISCUSSION :

In the context of a global increase in natural disasters, and particularly in a country like India with a high population density and catastrophe proneness, the effects of recurrent disasters on families are critical. This investigation delves into the lived experiences of flood survivors as they grow through hardship and investigates the drivers of resilience.Floods have a huge impact on people's lives, affecting their physical, financial, psychological, and economic well-being. Survivors have unfavourable consequences, tough surroundings, and painful memories, limiting their ability to rehabilitate (Joseph et al., 2020).

Resilience refers to a person's ability to successfully adjust to a new environment and manage problems in an acceptable manner, regardless of the risks and difficulties that may exist in that context (Selimbasic, 2021).The participants' positive attitudes and resilience were substantial and surprising.People adapt to adversity over time and in a variety of circumstances, reflecting on and learning from their experiences as a result of interactions between the person, the circumstance, and the environment (Masten, 2001; Boon, H.J.,2014).

Resilience and social cohesion were important factors in predicting poor mental health in the aftermath of floods (Greene et al., 2015). According to another study, resilience is a good outcome after a natural disaster in which survivors display their own traits, and receive assistance from one another and outside organizations, and this leads to growth. As additional resources become available, this growth will level off over time (Panigrahi& Sugar, 2021; Mayer B.,2019).

Participants had a positive perspective about their situations, which helped them deal with difficult situations. Community support and collective action were also beneficial.For example, the Rebuild Kerala Initiative (RKI) has launched a campaign called "NammalNamukkayi." by combining their collective expertise, experience, and ideas. This was done in order to improve community resilience to catastrophes (Kerala State Disaster Management Authority, 2023).

The flood drew people together, generating a stronger sense of community than existed earlier. Respondents emphasized the importance of interpersonal interaction and the reciprocal exchange of survival goods in establishing reciprocity and togetherness among community members. Reciprocity, connectivity, and togetherness assisted participants in re-evaluating the circumstance in a favourable way and increasing their ability to overcome adversity.Flood victims not only healed but also learned the meaning of life and became more robust.

**IMPLICATION AND CONCLUSION :**

Resilience and social cohesion were significant factors in the likelihood of having poor mental health after floods. Increasing community resilience through actions that improve civic involvement and modifying land use should be evaluated as potentially inexpensive and effective defences against preventable mental suffering caused by growing climate volatility.A multi-disciplinary team must deliver comprehensive training focused solely on the physical and mental health safety of emergency preparedness and response. An intervention model for the target group should aim for a holistic solution to withstand and overcome adversities caused by flash floods, in which the government, local self-government, NGOs, voluntary groups, mental health professionals, and health workers collaborate to support and assist households.Ultimately, investing in resilience-building initiatives can result in a faster recovery from disasters, a more effective disaster response, and a better quality of life for individuals affected by them, protecting and strengthening communities' psychological health and well-being.

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