

Perceived impacts of natural disasters in the Serrana Region of Rio de Janeiro, as reported by members of support organisations

*Avaliação da sustentabilidade e resiliência socioambiental
Percepção dos impactos ocasionados por desastres
naturais na Região Serrana fluminense, segundo
membros de entidades de apoio aos afetados*

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ABSTRACT

This study sought to identify, from the perspectives of representatives of associations supporting disaster-affected individuals, the impacts of natural disasters on municipalities in the Mountain Region of Rio de Janeiro and the response mechanisms employed. Qualitative analysis of questionnaire responses from these representatives revealed impacts across health, education, leisure, safety, and the economy. Notable issues included mental health problems in adults and children, difficulties in providing adequate shelter and housing – both for directly affected and at-risk populations – economic

losses, and a pervasive sense of insecurity regarding the risk of further events. Representatives emphasised that public authorities should respond effectively through urban planning, disaster prevention, and the strengthening of health and education services to adequately support affected populations in the short, medium, and long term.

Keywords: Human well-being. Extreme events. Public policies. Risks.

RESUMO

Buscou-se identificar, por meio da percepção de representantes de associações de afetados por desastres, os impactos causados pelos desastres naturais à população dos municípios da Região Serrana do Rio de Janeiro, bem como os mecanismos de resposta a esses eventos. A análise qualitativa das respostas dos questionários aplicados aos representantes de entidades permitiu que fossem identificados impactos de diferentes magnitudes sobre a saúde, educação, lazer, segurança e economia. Destacaram-se, nesse conjunto, os problemas de saúde mental observados em adultos e crianças, os desafios na busca de abrigos e moradias adequadas para as populações afetadas e residentes em áreas de risco, danos econômicos e a insegurança da população diante do risco de novas ocorrências. Segundo os representantes, o poder público precisa agir de maneira eficaz, adotando ações de planejamento urbano e prevenção contra desastres, bem como promover a estruturação dos serviços de saúde e educação para atendimento da população afetada no curto, médio e longo prazos.

Palavras-chave: Riscos. Eventos extremos. Bem-estar humano. Políticas públicas.

1 INTRODUCTION

The occurrence of extreme natural disasters has been increasing, generating ever greater impacts that disproportionately affect the poorest and most vulnerable groups, both biophysically and socially (Canil et al., 2020). In its Sustainable Development Goals (SDGs), the United Nations (UN) highlights the need to adopt measures to reduce climate change and its impacts (SDG 13), thereby ensuring population well-being (UN, 2015).

Natural disasters, often intensified by climate change, can result from various natural phenomena. These include geological (such as earthquakes, volcanic activity, and mass movements), hydrological (such as flash floods, regular floods, waterlogging, and landslides), meteorological (such as storms, cyclones, and gales), climatological (such as extreme temperatures, droughts, dry spells, wildfires, and frosts), or biological origins. All these events harm both natural and built environments in the affected regions (Freitas, 2014).

According to data from the World Meteorological Organisation (WMO), between 1970 and 2021, a total of 11,778 disasters attributable to climatic, meteorological and water-related events were reported worldwide, causing 2,087,229 deaths and US\$4.3 trillion in economic losses (WMO, 2023).

In Brazil, the *Atlas Digital de Desastres* (Brazil, 2024) recorded 41,791 disasters from 2010 to 2023. Droughts and dry spells accounted for 41.5% of these, most frequently in the Northeast region, which reported 67% of such events. Within the Northeast, 79% of all disasters were of these types. In contrast, the South and Southeast regions experienced primarily rainfall-related events, including heavy rains, flash floods, river floods, inundations, and landslides – accounting for 52% and 55% of occurrences in those regions, respectively.

Among the main impacts of these disasters are mortality and the incidence of communicable and non-communicable diseases, as highlighted by the World Health Organisation (WHO). The organisation estimates an additional 250,000 deaths per year between 2030 and 2050 due to climate change (WHO, 2021).

Beyond mortality, extreme events produce diverse economic, social, and environmental impacts. Their consequences, documented in studies focused on Brazil (Alpino *et al.*, 2022; Freitas, 2020; Freitas *et al.*, 2023) and internationally (McGill *et al.*, 2023; Shi, 2021; Unesco, 2020), extend to specific areas: education (including school closures, reduced attendance, and mobility challenges); (Alves, 2021; Marchezini; Muñoz; Trajber, 2018), food and nutritional security (Alpino *et al.*, 2022), economic costs (Freitas, 2020), and financial stability in middle- and low-income countries (Alalmaee, 2024).

Research shows that disasters harm public health both immediately and over time. Among the most significant effects are mental health disorders in children, adolescents, and adults (Muslu; Manav; Nazik, 2025; Spencer; Thompson, 2024). Studies also show that gender inequalities worsen in disaster-affected regions, as women and female-headed households experience greater impacts (Llorente-Marrón *et al.*, 2020).

The Mountain Region of Rio de Janeiro is highly susceptible to extreme events because of its rugged terrain and high-altitude tropical climate. Interactions between orography and local weather cause heavy rainfall in windward areas (Silva and Oscar Júnior, 2022). Urban population density and the presence of communities in at-risk areas increase the risk of rainfall events. This vulnerability was evident in recent events, such as the major disaster in 2011 with over 900 deaths, and record rainfall in 2022 in Petrópolis, which led to fatalities, material losses, and destruction (Ottero *et al.*, 2018).

Data from Datasus (2024) show that in the state of Rio de Janeiro, between 2010 and 2022, most deaths (61.6%) caused by natural disasters such as floods, landslides, flash floods and mass movements occurred in municipalities in the Mountain Region: Nova Friburgo (22.9%), Petrópolis (20.4%) and Teresópolis (18.3%).

Given the severity of these impacts, disasters in the municipalities of the Mountain Region have been the focus of several studies, mainly addressing economic and health-related consequences (Ottero *et al.*, 2018; Santos *et al.*, 2024; Silva *et al.*, 2020;). However, analyses that consider other dimensions – economic, social, and additional aspects of population life – are still needed. To achieve this, it is essential to understand public perceptions of disaster impacts and mitigation policies (Ma *et al.*, 2025; Vieira; Schmidt; Moura, 2019).

This study aims to identify, from the perspective of representatives of associations supporting disaster-affected people, the impacts of natural disasters and the mechanisms used to respond to them. These representatives live in vulnerable areas and mediate between public authorities and civil society, playing a vital role in developing effective, inclusive public policies. This research forms part of the first author's Master's Dissertation, with contributions from co-authors.

2 METHODOLOGY

2.1 STUDY AREA

The Mountain Region of the state of Rio de Janeiro comprises 13 municipalities: Bom Jardim, Cantagalo, Carmo, Cordeiro, Duas Barras, Macuco, Nova Friburgo, Santa Maria Madalena, São José do Vale do Rio Preto, São Sebastião do Alto, Sumidouro, Teresópolis, and Trajano de Moraes (Figure 1).

This study also includes Petrópolis (RJ), which was part of the Mountain Region until 2018. The Fundação Centro Estadual de Estatísticas, Pesquisas e Formação de Servidores Públicos do Rio de Janeiro (Ceperj) recently reclassified Petrópolis into the Metropolitan Region (SEMPDEC, 2021).

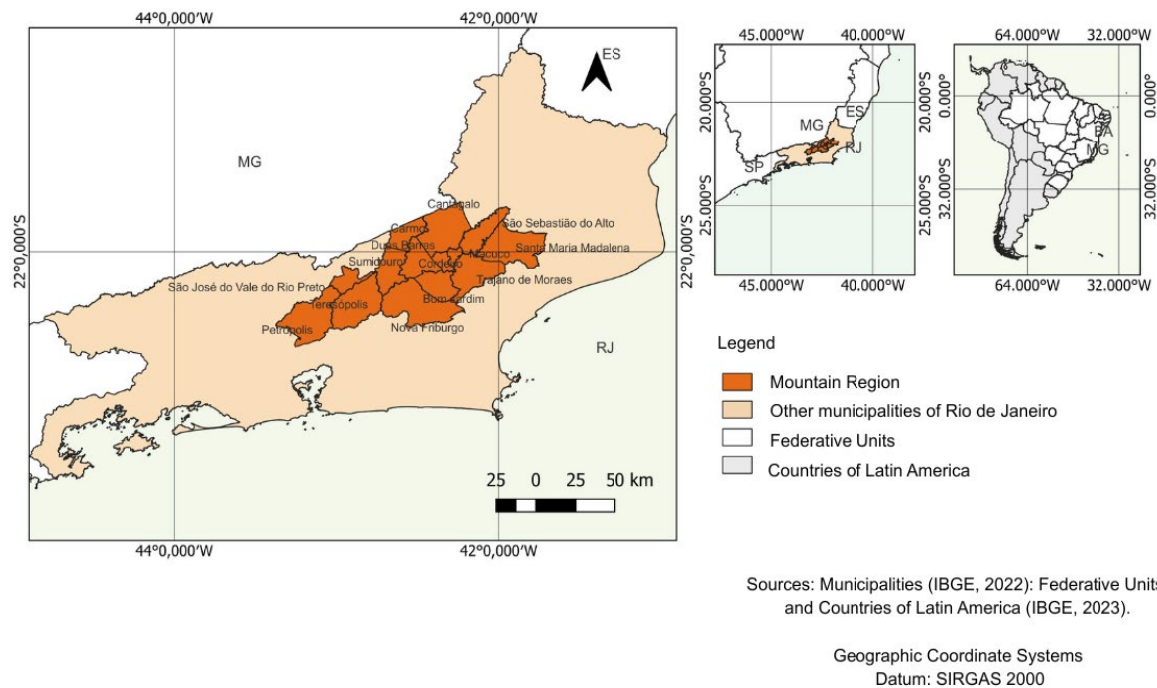


Figure 1 – Location of the Mountain Region, State of Rio de Janeiro, Brazil

Source: Author's own elaboration

In total, the fourteen municipalities are home to 801,381 inhabitants, representing approximately 5% of the state's population (IBGE, 2023). Factors such as the region's natural, geological, and hydrometeorological characteristics, combined with rapid, disorderly growth in environmentally protected areas, such as riverbanks and hillsides, have increased the vulnerability of part of the population to such events (Brazil, 2023).

2.2 METHOD

To understand how association representatives perceive disaster impacts and the response mechanisms, data were collected using a semi-structured questionnaire with 18 open-ended questions. The questionnaire was designed for clarity and objectivity, avoiding ambiguity and facilitating straightforward, clear responses. This allowed respondents to express their perceptions of disasters and government actions.

Overall, the aim was to understand residents' main post-event demands; the principal impacts observed; how the local community organises assistance for those affected, including the role of non-governmental organisations in this process; the main challenges faced; and long-term initiatives for risk reduction and area recovery.

The questions addressed the domains of health, education, cultural values (leisure), security and livelihoods (economy) in the post-disaster context, dimensions considered essential for safeguarding individual freedoms, capabilities and overall well-being (Sen, 2000).

Sampling was purposeful, aiming to select participants who could provide relevant insights and perceptions (Campos; Saidel, 2022). As a qualitative study, the research sought a broad understanding of the investigated problem in its various dimensions. Numerical criteria did not define or represent the sample (Minayo, 1992).

To select the research participants, a preliminary search of social networks was conducted to identify organisations involved in supporting communities affected by natural disasters. After identification, the contact details of these organisations and their representatives were gathered for initial communication. Representatives were contacted and invited to participate in the study. When they agreed, they were asked which method was most suitable for receiving the questionnaire: email (Word, PDF, or Forms) or WhatsApp. These alternatives aimed to facilitate participation, allowing respondents to choose the format that best suited their availability.

Following the initial contact, questionnaires were sent to eleven organisations. All responded (100% response rate); however, three completed questionnaires (27.3%) were excluded from the analysis due to incomplete or insufficiently detailed answers. Thus, the analyses in this study considered responses from eight participants across seven institutions (Table 1).

The distribution of the questionnaires to the eleven institutions and the receipt of responses occurred between December 2023 and January 2024.

Table 1 – Interviewee code, information about the entities, and main area of activity

| <i>Code</i> | <i>Definition/objectives of the entities Municipality</i> | <i>Main area of activity</i> |
|---------------------|--|--------------------------------|
| Interviewee A | Represents a Non-Governmental Organisation (NGO) dedicated to environmental education, specifically targeting the control and reduction of environmental damage in Nova Friburgo. | Nova Friburgo |
| Interviewee B | Works to secure decent housing and social rent for populations impacted by disasters in the Mountain Region, particularly Petrópolis. | Mountain Region/ Petrópolis |
| Interviewee C | Defines entity as one that advocates for the rights of affected populations and monitors public actions and resource allocation throughout Brazil. | Brazil |
| Interviewee D | A Non-Governmental Organisation (NGO) established by local residents and supporters of disaster victims in the city. | Petrópolis |
| Interviewee E | A Non-Governmental Organisation (NGO) formed by disaster victims to advocate for equal rights. | Teresópolis |
| Interviewee F | A Non-Governmental Organisation (NGO) that implements sustainable and ongoing community initiatives. | Petrópolis |
| Interviewee G and H | Organisation founded by Cefet/RJ professors and the Rio de Janeiro Public Prosecutor's Office in 2022 to develop initiatives promoting safety for residents in mountainous areas prone to landslides and floods. | Petrópolis |

Source: Author's own elaboration

The interviews were tabulated in Excel and analysed using Bardin's (2011) framework for content analysis.

3 RESULTS AND DISCUSSION

Of the respondents, 62.5% were female and 37.5% male, with a mean age of 49 years. Most of these participants had been living in Petrópolis, Teresópolis, and Nova Friburgo for more than two decades (87.5%), while 12.5% had resided in the area for less than ten years. During this period, all respondents experienced at least one environmental disaster, and some faced multiple such events throughout their lives in these municipalities.

In addition to their varied professional occupations, which include positions such as civil servants, teachers and assistants, these individuals also play active roles within their communities. Engaged in environmental issues and risk-mitigation efforts, they work to raise awareness and implement preventive measures for natural disasters. As active members of their local communities, their experience and commitment help address the environmental and safety challenges faced by the Mountain Region of Rio de Janeiro.

Their perspectives and experiences offer insights into local perceptions and understanding of climate change and its impacts, as well as the measures considered necessary to confront these challenges.

3.1 IMMEDIATE DEMANDS AND OBSERVED IMPACTS FOLLOWING EXTREME EVENTS ACROSS THE DIMENSIONS OF HEALTH, EDUCATION, LEISURE, SAFETY, AND LIVELIHOODS

When asked about the main needs of residents after extreme natural events, seven participants mentioned immediate demands for essential goods and services, such as water, food, hygiene, and cleaning products, as well as the need for temporary shelters and social rent schemes. According to Brazil (2024), temporary shelters offer emergency and provisional accommodation that may last days, weeks or even several months; if their use extends beyond two months, other strategies should be adopted, such as temporary accommodation in family or individual units, social rent, or transfer to a care service within the Unified Social Assistance System (Suas).

The main demands reported in the research were, in general, the typical needs observed in post-disaster contexts. These are initially met through humanitarian actions aimed at providing rapid assistance to victims, including rescue operations, distribution of essential goods and provision of shelters. Effective humanitarian logistics, therefore, contributes to reducing the impacts and suffering of affected populations (Thomas; Kopczak, 2007). In Brazil, however, Costa *et al.* (2015) found that there are still losses and waste of scarce resources in post-disaster actions, indicating the need for improved coordination, training and procedures.

In addition to these immediate demands, respondents were asked to report the main impacts suffered by disaster-affected populations. Representatives highlighted multiple impacts, including the loss of material goods, destruction, loss of loved ones and pets, and the lack of financial means to rebuild their lives.

One respondent stated: *“Losses of people, animals, homes, and a little of each person’s history”* (Interviewee A), which indicates intangible impacts, such as loss of identity, as residents lose part of their personal history alongside their material possessions. This highlights the need for psychological support for those affected, who face emotional problems of varying types and intensities. Three respondents noted the need for psychological support and emotional care for victims, as expressed by Interviewee B: *“Priority must be given to feelings after the tragedy.”*

According to Beniakar (2009), prolonged exposure to natural disaster events can lead to emotional and/or psychological imbalance, creating a cycle of mutually reinforcing symptoms. In such circumstances, the inability to process multiple losses, combined with grief, causes significant psychological suffering among those affected.

Similarly, research indicates increased demand for mental health support services during environmental disasters (Uddin, 2024). Rafaloski *et al.* (2020) reported that after the catastrophic event in Blumenau in 2008, there was a significant rise in demand for mental health services, as well as an increase in new diagnoses among the affected population. Care units reported increased use of medications to treat sleep disorders, anxiety and depression.

According to the *Practical Guide to Mental Health in Disaster Situations* (Rodríguez *et al.*, 2009), during catastrophic events, individuals are often suddenly confronted with harsh realities that may trigger crises and lead to a loss of emotional stability. This can result in a range of emotional responses such as pain, panic, generalised anxiety, sadness, and disillusionment. In more severe cases, these reactions can develop into mental disorders (Rodríguez *et al.*, 2009).

Regarding healthcare assistance in the post-disaster period, respondents reported that, alongside health professionals, community members and volunteers also participated in response efforts. According to respondents, community action was quick and significant. One stated: *"In 2011, during the first response, while the neighbourhood was isolated, we set up an improvised infirmary in a resident's home, with a nurse, first-aid materials and caregivers"* (Interviewee C).

Volunteer action was also highlighted. Many donations were received at support and collection points. According to Interviewee B: *"Most neighbourhoods had a UBS or PSF healthcare unit where teams provided support, and volunteers always arrived quickly to help. Supplies also arrived through donations; I myself received many supplies and medications at our support point, where professionals cared for families. This happened in most places."* And: *"Here in my city, everything was centralised in the local gymnasium. In some places, aid arrived by helicopter."*

As for the challenges faced by health teams, respondents pointed to access problems, a shortage of health professionals, and inadequate materials for serving the affected population. *"Lack of appropriate vehicles to reach affected areas and lack of medication."* (Interviewee D). *"Access to the places was extremely difficult. Everything was very complicated, and in some areas, only helicopters could reach them."* (Interviewee E). *"Access to affected locations, limited basic infrastructure, and restricted and inadequate supplies to meet the peak demand."* (Interviewee F). *"There was no health team in the neighbourhood."* (Interviewee C). *"There are no adequate temporary shelters. We do not have enough permanent health professionals."* (Interviewee G).

The impact of these events on healthcare professionals was also reported by one of the interviewees:

The greatest difficulty was dealing with the loss of people from within their own field, patients and individuals they had been helping for years, who had either died in the landslide or lost family members. There was a complete lack of psychological support, as we saw health workers having to assist the families in their local area while also having to take care of their own relatives. Without the necessary first-aid equipment, they often had to resort to nearby support points and relied on help from volunteers because there were not enough personnel available. (Interviewee B)

It is observed that, in addition to material damage to facilities dedicated to health services, disasters affect healthcare workers, who require follow-up by specialised professionals as well as training to work under extreme conditions such as these, as reported in other studies (Freitas *et al.*, 2020; Manfrini *et al.*, 2023; Santos *et al.*, 2024).

Despite the problems faced by the health service due to extreme events, the interviewees indicated that they were unaware of, or that there were none, long-term initiatives to strengthen the health system.

This perception aligns with the findings of Silva *et al.* (2020), who, from the perspective of healthcare professionals, sought to identify the vulnerabilities and restructuring policies of the health sector in the municipality of Nova Friburgo, Rio de Janeiro, in the context of natural disasters. According to the results, the health sector in the municipality is vulnerable and does not effectively participate in municipal risk management plans, hindering the adoption of effective actions in the face of disasters.

It is evident that the impacts on the mental health of the population were the most frequently mentioned by the interviewees, in addition to the lack of care and follow-up by health professionals for those affected.

In another dimension, the study sought to understand the effects of extreme events on education. According to the interviewees, in many schools, classes were suspended and sometimes not resumed. As alternatives to address the problem, three interviewees mentioned transferring students to other neighbourhoods, shelters, schools, or suitable locations to continue classes, and one respondent mentioned adopting remote learning.

In this dimension, respondents highlighted several major challenges faced by the sector. Most of them (five out of eight interviewees) cited challenges such as the disruption of family structures among students, the need to adapt to the new context, keeping up with the learning schedule despite the trauma, and the use of school facilities as shelters. A reflection of this is seen in the words of Interviewee B, who stated that the difficulties were:

Returning to normal life without the people who were gone; trying to teach content when the children only wanted to talk about what they saw, heard and witnessed. The absence of staff, teachers, classmates who died in the tragedy and having to talk about it, with no psychological support whatsoever.

It is evident that mitigating the impacts on education depends not only on the recovery of infrastructure and school units but also on psychosocial support for students, staff and families, indicating that health issues are directly related to the educational impacts reported in the study.

Regarding government action to support schools in addressing educational issues in this post-disaster context, most interviewees (four) stated they were unaware of such government involvement, and three were unable to answer. One respondent highlighted the *“lack of effective and robust action by public authorities to re-establish normal pedagogical activities”* (Interviewee C). They also reported that most assistance related to the education sector came from NGOs and volunteers.

According to Unesco (2020), individuals displaced by climate change must have their right to education protected, respected and guaranteed in a systematic, holistic and comprehensive manner.

Finally, five interviewees reported not recognising any long-term recovery strategy implemented to improve the resilience of the city's educational system, emphasising that, in the municipality of Petrópolis, many children did not even return to school in 2022.

Regarding the impacts of disasters on leisure activities and outdoor engagement, the responses indicated that six interviewees either did not know how to answer (three) or did not identify major changes (three). They emphasised that, even before these disasters occurred, opportunities for collective leisure and outdoor activities were already limited. For two interviewees, these activities worsened, as they were often carried out in neighbourhood streets that were subsequently destroyed.

Regarding residents' sense of safety regarding the likelihood of new environmental disasters, most interviewees (70%) disagreed that residents feel secure living in areas of risk. This sense of insecurity among people living in hazardous areas has been reported in other studies (Rosa et al., 2018). However, it is often not sufficient to prompt abandonment of their homes. This may occur due to functional factors when residents have nowhere else to go and remain in the place without paying rent; symbolic factors associated with a sense of belonging to the location; and temporal factors related to the length of residence, which creates strong social ties (Alves et al., 2015).

Housing (including shelters and safe dwellings) was mentioned by the interviewees as a persistent issue faced by residents in at-risk areas and by those affected by disasters, given the minimal or non-existent expectation of meeting this demand.

According to data from the National Confederation of Municipalities (CNM), Brazil's housing deficit reached approximately 5.9 million homes in 2019, most of which are located in urban areas. Of this total, more than 25% live in inadequate, unhealthy conditions, highlighting the urgent need for investment in new housing. Additionally, estimates from 2022 show that more than 10 million people live in at-risk areas in Brazil, while most municipalities face shortages in basic infrastructure, including access to piped water, bathrooms, windows, and sanitation, among other essential needs (CNM, 2023).

Some interviewees also emphasised the government's ineffective intervention in these situations, as reflected in the statement from one community leader: *"Unfortunately, families remain in limbo for many years, fighting for rights that should be guaranteed by law. All become hostages of a miserable and always uncertain social rent. This is the greatest impact; we remain at the mercy of the government."* (Interviewee E)

Another participant offered a similar account, stating: *"Inadequate and violent actions by public authorities... abandonment."* (Interviewee C)

To explore the economic aspects of the affected microregions, several questions were asked. However, few answers provided clear information on the economic impacts of the disasters. In many cases, interviewees reported insufficient knowledge to provide a response, while in others, answers were brief and not suitable for more extensive analysis. Nevertheless, some insights were possible. Two interviewees observed that many businesses, especially small enterprises, closed down following the disasters, arguing that larger companies generally show greater resilience and have better access to government subsidies.

Furthermore, five interviewees emphasised that the limited measures adopted to support the cities' economic recovery were ineffective. They noted initiatives such as credit for micro-entrepreneurs, incomplete structural works, tourism events, loans, credit letters, and account subsidies. According to them, these actions were insufficient to promote genuine economic recovery. Representatives from organisations in Petrópolis and Teresópolis reported that their municipalities remain in financially precarious conditions and have not fully recovered.

Given the frequency of disasters and their impacts across all dimensions discussed, interviewees believe that public authorities should adopt measures to enhance the city's resilience to future disasters. However, according to the responses, very little has been implemented. Four interviewees stated that no such investment exists, while three reported minimal investment in road repairs, flood prevention, and debris removal. One participant highlighted this by stating: *"Very little. Not even the planned construction work is complete, and in some neighbourhoods, the debris from the tragedy has not yet been removed. Some areas remain as they were on the day of the disaster."* (Interviewee B)

Regarding public authorities, interviewees stated: *"If there had been greater concern and interest from politicians, everything could have been avoided."* (Interviewee A). *"Public authorities are not prepared to respond, provide assistance, rebuild, or mitigate risks... the priority is economic 'development' to the detriment of social development. Much of the population is vulnerable. Many deaths could have been avoided."* (Interviewee C). *"There must be joint action by the state, municipal, and federal governments, without focusing solely on partisan politics. They must stop seeing the population as voters and start seeing them as lives that need help."* (Interviewee B)

In this context, it is important to highlight that Federal Law 12.608/2012 established the National Policy on Civil Protection and Defence (PNPDEC), which states that it is the duty of the federal government

to adopt preventive measures to reduce environmental disaster risks. The CNM also recommends prioritising assistance to families living in at-risk areas through humane resettlement strategies, ensuring participation and greater agility in the transfer of necessary resources.

In the event of an environmental disaster, municipalities may request financial assistance from the federal government when deemed necessary. However, resource allocation is not always based on actual demand or need but can instead depend on political alignment between the parties involved. Political actors may compromise the fairness of the process, harm affected communities, and favour allies, even in the context of natural disasters (Henrique; Batista, 2020).

Additionally, respondents highlighted the community's lack of awareness of the true scale of the global climate crisis and the increasing frequency of tragedies. Limited social participation and the election of representatives with little commitment to developing effective solutions contribute to a vicious cycle. This, in turn, places excessive responsibility on non-governmental organisations and volunteer initiatives while reflecting public authorities' inaction.

Beyond housing policies, interviewees also mentioned other measures to mitigate the climate crisis, including the establishment of emergency and warning systems and river drainage. For instance: *"The need for a reliable emergency and warning system, and for the creation of shelters in case of heavy rainfall, along with monitoring of concentrated rainfall volumes and paying attention to official alerts."* (Interviewee F). And: *"What could be done to avoid future disasters because we know they will happen; first and foremost is river drainage."* (Interviewee D)

There was a strong consensus regarding the role of NGOs. Six out of eight interviewees provided positive assessments of their performance, emphasising their importance and effectiveness:

Without NGOs and social movements, the 2022 tragedy would have been far worse. Without the network they built with the many volunteer doctors, families affected by the socioenvironmental disasters in Petrópolis would have been left almost entirely without assistance, as the municipal government was completely overwhelmed in the initial moments. I say this because volunteers from the institution I founded and preside over helped many families and entire communities. (Interviewee B)

Generally, Paul (2006) notes that NGOs play a crucial role in emergencies due to their independence from government structures, which allows them to mobilise resources and materials more flexibly and to address shortcomings identified during state-coordinated operations.

Five of the eight interviewees also shared broader reflections on the topic, expressing their feelings and perceptions of future scenarios. *"Without NGOs and individuals with empathy, we would not be here today..."* (Interviewee D).

I have a clear opinion on all this. I am a victim of one of the biggest natural disasters in the country, which struck the Mountain Region of the state of Rio de Janeiro on January 12, 2011. We are still fighting, shouting, and asking for help for the families who are still waiting for their long-awaited homes. I see a public authority completely absent in every aspect... even though housing is guaranteed by law. (Interviewee E)

I admit my scepticism regarding transformations that could improve resilience, reduce risks, or result in infrastructure that improves physical conditions. As long as representatives of this kind remain in power, I see no reason for optimism, and I find it very difficult in the short or medium term to break the vicious cycle of public ignorance, social detachment from the issues affecting residents, and the election of representatives who are not committed to the interests of their constituents or to

solutions for social problems. Breaking any of these links will be very difficult. Some of us may act on certain links, but these will be palliative measures while the cycle itself remains unbroken. (Interviewee H)

In summary, the lessons learned reveal that interviewees consistently highlighted common points, notably the persistent absence of effective public-sector action to prevent and mitigate the impacts of extreme climatic events, as well as the indispensable role of volunteers. They also emphasised the multiple losses endured, extending beyond material losses, and underscored the psychological impacts of the tragedies, which negatively affected various aspects of people's lives.

4 FINAL CONSIDERATIONS

The study identified the main impacts of extreme natural events in the Mountain Region of Rio de Janeiro on health, education, leisure, safety, and the economy, as perceived by representatives of organisations working on behalf of affected communities.

Within this set of impacts, particular emphasis was placed on the mental health problems observed among adults and children, conditions that are characteristic of post-disaster situations and may persist if adequate follow-up by health professionals is not ensured, and on the challenges related to accessing shelters and adequate housing for affected populations and those residing in at-risk areas.

With regard to education, in addition to the negative impacts reported, such as the suspension of classes, low attendance, and difficulties in accessing educational facilities, the respondents highlighted the absence and/or ineffectiveness of public actions aimed at rehabilitating and restructuring the educational system, a factor that hinders its resilience in the face of future disasters.

Likewise, the interviewees perceived that the policies adopted to support the economic recovery of the affected regions were insufficient to mitigate the impacts experienced, thereby contributing to increased vulnerability among the affected population. This vulnerability becomes even more evident in the widespread perception that communities do not feel safe, believing that they remain exposed to the risk of recurrent disasters.

The impact on leisure opportunities and outdoor activities was the only theme on which interviewees presented more divergent views. Nonetheless, respondents emphasised that such opportunities were already limited prior to the disasters, indicating the need for public policies that promote leisure provision and, consequently, maintain the population's well-being.

Community solidarity and the role of non-governmental organisations were recognised as essential elements in disaster response, providing vital support to the affected communities. This support was perceived as particularly important given the widespread frustration with the lack of adequate public assistance, which was described as absent, inefficient, or ineffective across all dimensions assessed, despite being essential.

According to the respondents, public authorities must act effectively by adopting urban planning measures and disaster prevention strategies, while also improving the organisation and capacity of health and education services to ensure adequate support for the affected population in the short, medium, and long term.

STATEMENT ON THE USE OF ARTIFICIAL INTELLIGENCE

The authors declare that no generative AI or AI-assisted technologies were used in the creation, writing, or editing of this manuscript.

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