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Perceptions of seismic and volcanic risk and preparedness at São Miguel Island (Azores, Portugal)

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ABSTRACT

Hazard preparedness is vital when living in a risk area, as it helps to increase people's security by improving their capacity to overcome a disrupted scenario. Studies in the Azores have shown a lack of precautionary behavior, similar to findings in other risk areas. As part of a wider research project, this study aimed to assess seismic and volcanic risk perception of the participants, to know the current family protective practices and to examine the content of household emergency plans [HEPs]. Using a mixed methods approach, two semi-structured interviews were conducted with nineteen participants who represented their families. Participants with no current preparedness measures or with few preparedness measures were invited to construct a HEP. The content of the plans was analyzed. Results point to moderate seismic and volcanic risk perception, moderate seismic risk salience and low volcanic risk salience, lack of hazard knowledge and experience, and low preparedness levels. Good knowledge of the authorities' work to prepare and deal with a natural event and attributions of responsibility to experts were also noted. The content of the household emergency plans constructed was incomplete compared to authorities' instructions. In general, a lack of engagement in preparedness was found, despite moderate risk perception.

1. Introduction

In the first hours after a disaster, populations are by themselves in a disrupted scenario [1]. The limited options for escape on remote islands can aggravate the consequences of a disaster if people are not prepared. Thus, preparedness is vital to assure security and avoid major disturbance [2].

Research focused on individual and household preparedness identified predictors of earthquake preparedness [1,2] and addressed its relation with socioeconomic and demographic variables [3], risk perception [4], salience [5,6], experience [7], feelings of personal vulnerability [8], hazard knowledge [5], and others. Although seismic and volcanic household preparedness has been extensively studied, research as often focused on public and community emergency planning, leaving household emergency plans (HEP's) under-researched.

In the Azores, an archipelago vulnerable to multiple hazards, a few studies about risk perception showed that earthquakes and volcanic eruptions are perceived as uncontrollable, dreadful, devastating and the most serious natural hazards in the region, and that preparedness is absent [9–12]. Therefore, to understand household preparedness and perception of seismic and volcanic risk, a study was conducted in S. Miguel Island.

1.1. Preparedness

General recommendations indicate that families should prepare for about 72 h post disaster [1]. Preparedness is understood as the actions that improve the capacity to act during and after an event and that allow mitigating damages, improving survival, safety and coping after a disaster [2].

For Sutton and Tierney [2], household preparedness comprises planning and knowledge acquisition about evacuation and emergency actions. Household planning should address the resolution of probable problems during a disaster, the creation of 'what if' scenarios', discussion, and training. The authors highlight the importance of having a survival kit, a communication plan and engaging in mitigation actions [2].

Regarding earthquakes, for Russell et al. [1] and Solberg et al. [13] preparedness comprises three types of measures: (a) survival: to foster survival in case of an extreme event and preparing for post-event

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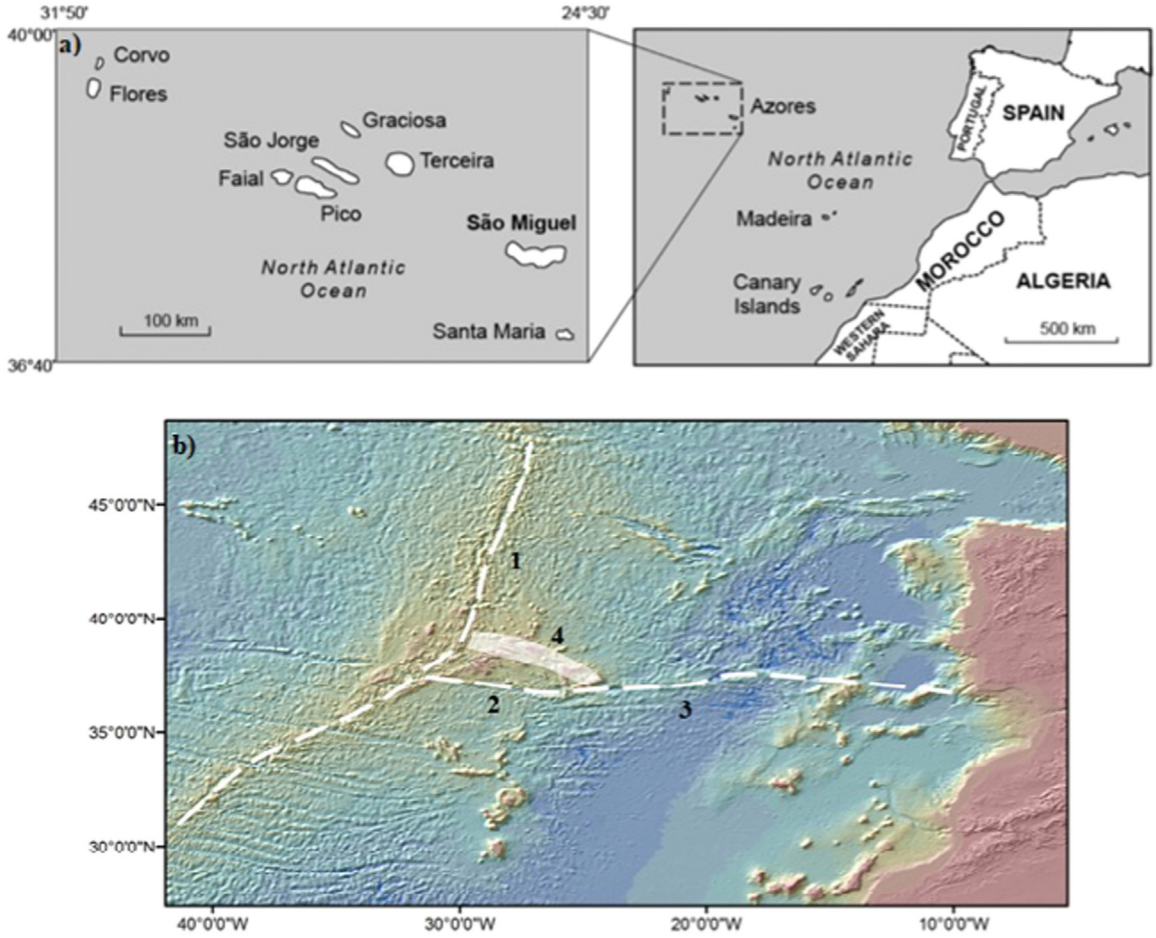

Fig. 1. a) Map of Azores location. Reprinted from [12]. Copyright [2015] by the Geological Society of London. b) Azores location: 1, Mid-Atlantic Ridge; 2, Azores-Gibraltar Fracture Zone; 3, Gloria Fault; 4, Terceira Rift. Adapted from [25] with permission.

scenarios (e.g. having a stock of supplies and education on first aid procedures); (b) mitigation: to attenuate potential damage by reducing the risk, (e.g. fixing furniture); and (c) planning: to foster survival, namely cognitive preparation, (e.g. getting instruction or purchasing insurance). The construction of a HEP should be considered a planning action. Regarding earthquakes, survival measures are more frequently adopted [1,13].

Social networks, attributions of responsibility and participation in community activities regarding earthquake preparedness seem to positively influence the adoption of measures [3,14]. Despite the efforts to promote it, household preparedness is still low [3,7]. Becker et al. [7], identified preparedness encouraging and discouraging beliefs. The encouraging beliefs include thoughts of imminence and probability of occurrence, concern for safety, usefulness of preparedness, positive self-efficacy and taking responsibility. The discouraging beliefs include denial, lack of control or trust in the efficacy of self-protective behaviors, normalization bias, low vulnerability perceptions and not assuming responsibility [7]. People can exonerate themselves from the responsibility to prepare or recover, attributing it to governments or experts. Hence, in those cases, preparedness will be lower [15].

1.2. Risk perception and associated variables

In spite of the mixed results, risk perception seems to influence positively the willingness to adopt preparedness for natural hazards [8,16], such as developing a HEP [17].

Cognitive biases, such as normalization bias and unrealistic optimistic bias [5,18], influence risk perception and people with unrealistic optimistic bias are more resistant to educational programs and to the adoption of seismic adjustments [15]. Risk perception is also influenced by experience [5], hazard frequency, salience [6,16], and hazard knowledge [16]. Experience with non-damaging events can produce the normalization bias hindering preparedness, but if the event is damaging, experience seems to positively influence risk perception and preparedness [5]. Experience is perhaps the most influential variable on volcanic perception and volcanic knowledge [5,7,19]. The lack of experience may be justified by the cycle of volcanic activity with long dormancy periods causing risk devaluation [16,20]. Dibben and Chester [10] interviewed 50 residents of São Miguel Island, finding that 32% considered an eruption unlikely because they had never experienced one. Concerning hazard frequency, most frequent events tend to be overestimated, such as non-damaging earthquakes, and less frequent events tend to be underestimated, such as volcanic eruptions or damaging earthquakes [21]. High hazard salience (or concern) seems to enhance risk perception and vice-versa, regardless of occurrence probability [6], and to foster preparedness and information seeking [4–6]. Hazard knowledge contributes to an adequate risk perception [22], but if superficial it may be insufficient for the formation of an adequate risk perception [23].

2. The study

The notion that preparedness has great implications for disaster's response and recovery phases, thus fostering community's resilience, has led to a major research, which includes this study, aiming to understand more deeply household preparedness in S. Miguel Island,