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Census indicators as a tool to assess social vulnerability to ashfall events in Argentina: the case of Villa la Angostura during 2011 Cordón Caulle eruption

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Social vulnerability is defined by the socio-economic conditions previous to a catastrophic event. The June 2011 eruption of Puyehue-Cordón Caulle Volcanic Complex caused a strong impact in several towns located in the Nahuel Huapi region, particularly in Villa La Angostura (VLA), located ~50km downwind from the vent. Economic activities, transports, communication systems and services like water supply and energy supply were severely affected.

The methodological strategy consisted of to select a set of socioeconomic indicators provided by the 2010 National Census of Population and Housing were used to assess the social vulnerability of VLA in relation to the consequences of the Cordón Caulle eruption. This census was carried out eight months before the eruption, providing the information about previous social conditions.

Also, the spatial resolution used was the minimum spatial information unit called "radio censal". The selected indicators were analyzed in order to perform a vulnerability map, in which the most susceptible neighborhoods were identified. The results obtained were examined together with information about the response actions taken during the emergency. Government support provided to the population was directed mainly to the more vulnerable neighborhoods according to the map of vulnerability.

The application of this method allows Civil Protection agencies to anticipate especially vulnerable sites to ash fall impacts, considering housing conditions and drinking water supply system as main indicators. After the 2011 eruption revealed considerably high vulnerability in several aspects, a series of improvements were performed (e.g. in the drinking water supply and distribution systems). Finally, some of the analyzed variables, like roof materials and their sloping angles are key factors in the assessment of the vulnerability to eruptive events and other phenomena like heavy snowfalls in Northern Patagonia.