

Residents' risk perception of and response to SO₂ risk in east Iceland during the volcanic eruption in Bárðarbunga/Holuhraun 2014-2015

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Many Icelandic communities are exposed to volcanic eruptions every two to three years. In order to reduce risk and enhance resilience in communities exposed to volcanic hazards, involvement of local communities is essential during all phases of disaster management, from prevention and preparedness, to response and recovery. Preparedness plans for volcanic eruptions are in place for many of the volcanic hazards in Iceland especially evacuation of residents due to immediate threat from glacial outburst floods from sub-glacial eruptions. Some of the recent risks associated with volcanic eruptions have had a slow onset (volcanic gas) while others have had a sudden onset (volcanic ash). The risks are both linked to air quality in inhabited areas and dispersal are highly dependent on prevailing winds so timely forecast and modelling is needed in order to inform the population about the risk.

Without preparedness plans many communities in Iceland were exposed to an unanticipated volcanic gas risks from Sulphur Dioxide (SO₂) in 2014-2015 during an eruption in Bárðarbunga/Holuhraun. With no system in place to measure the highly toxic gas from the eruption, the Environmental Agency, The Department of Civil Protection and Emergency Management and the Directorate of Health set up a system with over 40 handheld gas detectors and online links to 7 detectors around Iceland to monitor the gas. The defined health limit of SO₂ is 350 µg/m³ for one hour, while 2600 µg/m³ for 15 minutes for working outdoors. Nevertheless, some communities in Iceland experienced much higher values and the highest measured concentration in communities during the eruption was 21.000 µg/m³. When the concentration of SO₂ reached the level of >1000 µg/m³ a warning was issued and SMS text messages were sent to all mobile phones in the affected area. In order to engage with residents during the eruption the Civil Protection and local authorities, Directorate of Health, scientist and specialists organized special community meetings in the affected areas in order to inform and advise the inhabitants about consequences and preparedness of the SO₂ risks.

Here, we present the results from a survey conducted in both urban and rural communities east of the eruption site in order to investigate residents' perception and understanding of the risk, the efficiency of information and communication from officials during the eruption as well as the potential health effects from the SO₂ pollution. In depth interviews were carried out with local authorities, Civil Protection officials and inhabitants in the SO₂ affected areas with the aim to investigate their mitigation measures, response, and exposure during the eruption. It is important to identify public risk perception and their understanding of the pollution, and recognize factors that influence their preparedness during periods of heavy pollution in order to increase the society's resilience to volcanic risk.