What if a Laki-type eruption were to happen tomorrow?

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The eruptions of Eyjafjallajökull in 2010 and Grímsvötn in 2011 in Iceland not only alerted European governments to the risks posed by volcanic ash but also to those that could arise from so-called low-probability, high-impact sulfur-dominated volcanic events such as the 1783-1784 CE Laki eruption (Iceland).

Historical records show that the Laki eruption caused severe environmental stress and posed a health hazard far beyond the borders of Iceland [1]. Given the reasonable likelihood of such an event recurring, it is important to assess the scale on which a future eruption could impact society. We quantify the potential health effects caused by an increase in air pollution during a future Laki-type eruption using an advanced global aerosol model (GLOMAP) together with concentration-response functions derived from modern epidemiological studies.

The concentration of particulate matter with diameters smaller than 2.5 micrometers (PM2.5) is predicted to double across central, western and northern Europe during the first three months of the eruption. Over land areas of Europe, the current World Health Organization 24-hour air quality guideline for PM2.5 is exceeded on an additional 36 days on average (range 13-63 days) over the course of the eruption. Based on the changes in particulate air pollution we estimate that between 139,000 and 144,000 additional cardiopulmonary fatalities could occur in Europe depending on the meteorological conditions [2]. Such a volcanic air pollution event would therefore be a severe health hazard, increasing excess mortality in Europe on a scale that likely exceeds excess mortality due to seasonal influenza.

We will also discuss hazard mitigation and response strategies as well as the challenges encountered when aiming to quantify the potential health hazards posed by a long-lasting volcanic event in Iceland.

References:

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