

EXCESS MORTALITY IN EUROPE FOLLOWING A FUTURE LAKI-STYLE ICELANDIC ERUPTION

Anja Schmidt, *University of Leeds, UK*

Bart Ostro, *Centre for Research in Environmental Epidemiology (CREAL), Barcelona, Spain*

Kenneth S. Carslaw, *University of Leeds, UK*

Marjorie Wilson, *University of Leeds, UK*

Thorvaldur Thordarson, *University of Edinburgh, UK*

Graham W. Mann, *University of Leeds, UK*

Background and Aims: Historical records show that the 1783–1784 Laki eruption in Iceland significantly increased air pollution and posed a health hazard far beyond the borders of Iceland. Given the reasonable likelihood of a recurrence of such an event, it is important to assess its potential impact on public health. We quantified the potential health effects caused by a future Laki-style eruption similar in magnitude to earlier eruptions.

Methods: We combined estimates of air pollution impacts of a potential eruption using advanced global aerosol models and concentration–response functions from the air pollution epidemiology literature. Since the eruption might impact air quality for up to a year, we estimated the mortality impacts from both short- and long-term exposure to fine particles (PM_{2.5} or particulate matter less than 2.5 microns in diameter).

Results: Averaged over the first three months of the eruption, European-mean PM_{2.5} concentrations would more than double from current levels. In addition, mean annual concentrations would increase by more than 50 percent. Based on current epidemiological studies, these changes are associated with an additional 139,000 cardiopulmonary deaths (95% confidence interval = 51,000 - 224,000).

Conclusions: Based on our models, a volcanic air pollution event similar in magnitude to those recorded in earlier times, could be a severe health hazard, increasing excess mortality in Europe on a scale that likely exceeds excess mortality due to seasonal influenza. Moreover, the death toll of such an eruption would be larger than that of all but five of the world's earthquakes since 1900.