



## Soufrière volcano, St Vincent: immediate health impact of the eruption and recommendations for the health sector response.

**Background** A large body of evidence on the health effects of volcanic emissions (ash and gases) now exists from experience of major eruptions worldwide, but the rarity of major eruptions means that, when they occur, there is a steep learning curve for all persons involved. This paper summarises the immediate health and related issues that are most relevant in response to the ash falls on St Vincent, and neighbouring islands, together with our recommendations.

Specific advice on health protection measures is available on the [IVHHN website](#). We summarise here some key points for urgent consideration.

**Immediate concerns** Very high levels of ash in the air will persist for days after each explosive eruption unless rainfall clears the air. Wet ash forms a compressed deposit on the ground when it can be readily removed using shovels. To get life back to normal and to minimise the population exposure it will be necessary to clear the ash on roads and around houses as soon as possible, which will only be possible after the ash has been wetted by rain or municipal water supplies: beware, large amounts are needed which could impair drinking water supply.

Out of the exclusion zone, ash removal from houses and buildings by their occupiers is also essential, by wetting down the ash. Ingress of fine ash may be prevented in hospitals (especially operating theatres) and schools by sealing windows with tape and keeping openings and doors closed, while leaving shoes outside (see [IVHHN](#) for more detail).

Traffic in towns should be kept to a minimum and restricted to low speed limits.

*Exposure to ash in the population may continue for weeks, after the eruptions end, due to the resuspension of dry deposits of ash by winds and human activity. Clearing away ash deposits improves living and working conditions AND reduces harm to health.*

### How dangerous is volcanic ash to breathe?

Ash produced in explosive eruptions comprises a high proportion of very fine particles known as PM<sub>2.5</sub> that are small enough to be breathed into the smallest air sacs of the lung, where they can affect the lung and the heart, and adversely affect people suffering from chronic diseases. Larger particles (PM<sub>10</sub>) irritate the airways and cause coughs and bronchitis symptoms even in fit people, but will exacerbate chronic conditions such as asthma and bronchitis, including pneumonia in children.

Fit people can tolerate quite high levels of ash in the air, even while being briefly exposed in visible clouds of ash. The most vulnerable are those people with pre-existing lung problems whose condition are worsened during periods of ash resuspension, when they should stay indoors and increase medication if needed. Children like to play outdoors in the ash but it is not recommended. Many individuals, including children, do not know they suffer from asthma and this condition may get much worse during ash exposures and require hospital admission.

About 20% of Caribbean children suffer from some form of asthma. Where possible, schools should be kept open as children's exposure to ash can be minimised by keeping them indoors and by ensuring ash in outdoor play areas is wetted down and cleared.

Outdoor workers will require respiratory protection, as will householders doing clean-up.



COVID patients should be treated in ash free environments, as inhaling the very fine ash may cause their respiratory problems to deteriorate.

#### How dangerous are volcanic gases?

A mixture of volcanic gases will be emitted from the volcanic vent as long as the eruption continues. The main gas of concern is sulphur dioxide which can induce respiratory problems at low concentration for kilometres downwind. The most vulnerable groups are children and adults with asthma situated downwind of the vent.

It is most likely that at La Soufrière the gas is dispersed into the atmosphere rather than flowing along the ground. However, the smell of gas is detectable at very low and insignificant concentrations in the air and it may cause anxiety. The population should be reassured by frequent communications on air quality, measured by a network of sulphur dioxide samplers kept in place for the duration of the eruption. Asthmatics should be advised to keep their medication with them.

#### How dangerous is eating vegetables or drinking water contaminated by ash?

Ash should be washed off vegetables before their consumption. Surface sources of drinking water may have some chemical contaminants leached from the settled ash and these could affect its taste, but the water is usually safe to drink. Livestock on the other hand may be affected if their troughs contain ash: the ash and the water should be checked for toxic chemicals, e.g., fluoride.

Livestock, e.g., ruminants, can also die from ingesting too much ash while attempting to eat grass, or from starvation if the fields are too heavily covered.

#### **Urgent recommendations.**

1. Establish a health surveillance system in hospitals and shelters, with special emphasis on the reporting of respiratory disorders (see IVHHN basic epidemiological protocol).
2. Establish ambient air monitoring for ash and gases in main inhabited areas and shelters.
3. Monitor farm animal health through veterinarians reporting.
4. Ash analysis for particle size and composition, toxic contaminants, crystalline silica and rechecking as the eruption continues.
5. Drinking water analysis – for chemical contaminants of surface water sources.
6. Distribute efficient, lightweight facemasks (e.g. N95) to outdoor occupational groups and householders doing clean-up.
7. Ash-build up on roofs. Ash deposits can build up with repeated eruptions or in large events. Ash should be removed from roofs when it is safe to do so to prevent them collapsing from the weight. Vulnerable, wide span buildings used as shelters, for example, should be checked for their risk of collapse.
8. A health survey team should make regular risk and impact assessments while the eruption continues and the results communicated to government and to the population by media outlets. As the programme continues, specific advice may need to be given to hospitals and health care professionals, as well as specific groups of vulnerable patients, e.g., pregnant women, children or the elderly.

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Version 1.3. Last updated 16 April 2021.