

HOW TO PROTECT YOURSELF FROM BREATHING VOLCANIC ASH





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This document has been prepared by the International Volcanic Health Hazard Network (IVHHN) to help people reduce their exposure to volcanic ash. This guide explains how communities can protect themselves from volcanic ash and explains the effectiveness of different forms of respiratory protection and how to fit a facemask.

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1. REDUCE YOUR EXPOSURE TO ASH

Breathing volcanic ash can be a nuisance and cause discomfort, and may have more serious health effects for some people. You may wish to reduce your exposure to volcanic ash, or you may have been advised to do so.

The most effective way to reduce exposure, especially for people at particular risk (e.g., children and infants, older people and those with existing respiratory (lung) or cardiovascular (heart and blood vessels) disease) is to shelter somewhere which is not ashy, ideally inside a building where you can stay indoors for some time, if necessary. If you are very concerned about your health, take advice from a health professional.





❖ **Take steps to keep ash out of your indoor environment:**

- ❖ Close doors and windows, where possible.
- ❖ If possible, seal up large gaps and spaces to the outdoors. For example, you could use tape and plastic sheeting, or rolled-up towels.
- ❖ Try to set up a single entry/exit point for the building. Leave ashy clothes/shoes outside.
- ❖ Do not use any appliances (e.g., air conditioners) which suck in air from the outside.
- ❖ If the indoor environment is ashy, try to gently clean away the ash (e.g., using damp cloths).
- ❖ Don't use vacuum cleaners as they can blow out fine ash, back into the indoor space.

❖ **If you are staying indoors for a long time:**

- ❖ Make sure that the indoor environment does not get too hot. If it gets too hot, consider evacuating.
- ❖ Don't use cooking and heating stoves, or other appliances, which produce smoke.
- ❖ Do not smoke cigarettes or other products.
- ❖ Do not use un-flued gas heaters, or use outdoor appliances such as gas patio heaters or barbecues, due to the risk of carbon monoxide poisoning.

Outdoors, once the ash has settled, it is important to remove it through clean-up activities, using water to dampen it first. You should wear a facemask if you are cleaning up settled ash.

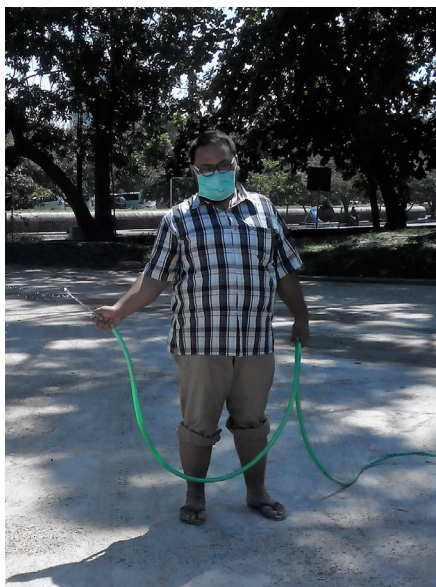


2. WHEN SHOULD I USE RESPIRATORY PROTECTION?

When there is ash, you may wish to use some sort of respiratory protection (e.g., a facemask), or you may be advised to do so by governmental or humanitarian agencies. Masks may be worn when:

- you are outdoors and there is ash in the air (either during ashfall or afterwards, when it may be remobilised by wind, vehicles and human activities);
- ash is being mobilised indoors or outdoors by activities such as removal/cleaning-up.

Masks can be worn during waking hours. It is not recommended to wear a facemask while sleeping as it will probably not stay fitted to your face, and it is harder to breathe with a facemask on.



3. WHO CAN WEAR RESPIRATORY PROTECTION?

People with existing respiratory or cardiovascular disease should talk to a health professional about whether facemasks are suitable. Care should be taken to ensure that it is not harder to breathe when using any form of respiratory protection.

Masks are not usually designed to fit children's faces (although some manufacturers are now producing small masks aimed at children but not infants). Exposure for children and infants should be reduced by staying in a non-ashy (indoor) environment wherever possible. If you do give a mask to a child, show the child how to fit it well, and be very careful it does not make breathing difficult.

Employers should ensure that people working in ashy conditions have effective facemasks, which have been properly fitted to each worker's face, according to any local legislation.





4. WHAT TYPES OF RESPIRATORY PROTECTION ARE MOST EFFECTIVE?

The following information will help you decide on which type of respiratory protection to use, but other factors, such as the cost and availability of the protective products, may also need to be taken into account.

When you wear respiratory protection, the effectiveness depends particularly on two factors:

- how effective the mask or material is at filtering particles (stopping the ash from passing through the material);
- the fit of the mask or material to the face (preventing particles from entering around the edges).





- ✦ The most effective respiratory protection for adults is to wear a well-fitting, industry-certified facemask such as a N95 mask (also called P2, FFP2 or DS2 in different parts of the world). The certification will be printed on the mask. Such masks are usually disposable.
- ✦ These are highly efficient at filtering ash and are usually designed to fit adult faces well, but may be too big for children.
- ✦ Due to their tight fit, they may feel uncomfortable.



N95 Mask

❖ Using highly effective masks can make breathing harder; if you have existing respiratory or cardiovascular disease, talk to a health professional about whether such masks are suitable for you.

❖ These masks come in many different shapes and sizes. Some fold out into a mask shape and some have a ready-made cup-shape. Some have a valve on the front to improve comfort by letting warm, humid air out. If fitted well to the face, all of these masks will be highly effective at filtering ash.

❖ Some non-certified facemasks state that they are designed to filter 'PM2.5' (small particles less than 2.5 micrometres in diameter), which is likely to be the most harmful fraction of the ash.

❖ These are probably highly efficient at filtering ash but are often not designed to fit well to the face and so may not be very effective.





Surgical mask

A standard, pleated surgical mask will be good at filtering ash as long as it fits well to the face. If it does not, it will provide less protection than an industry-certified facemask.



Simple healthcare mask

Simple healthcare masks (rectangular, non-pleated) do not filter ash well and also do not have ways to make a good seal to the face.



Scooter mask

Hard-cup (also called nuisance-dust), 'fashion' and scooter masks are less effective at filtering ash compared to industry-certified and surgical masks, and may not fit well to the face.



Cloth material

Cloth materials (e.g., bandanas, t-shirts, veils, handkerchiefs) worn over the nose and mouth are less effective at filtering ash than most masks, so will offer less protection and they also tend not to fit well.

- Increasing the number of layers of cloth improves the ability to filter ash but will still be less effective at filtering ash than most facemasks.
- Wetting materials does not improve the ability of masks or cloth to filter volcanic ash.

5. HOW SHOULD I PUT ON A FACEMASK?



Step 1

With clean hands, take the mask out of the packaging. Avoid contaminating the inside of the mask with ash.



Step 2

Open up any flaps and prepare the straps/loops for tying around the head or ears.



Step 3

Fit the mask over the nose and mouth. Fit the straps to the head, with the top strap above your ears, around the top of your head, and the lower strap below your ears



Step 4

Make sure the lower strap is below your ears, towards the bottom of your head. Tighten the straps/loops until the mask makes a seal around your face and is comfortable.



Step 5

With both hands, gently press the nose clip over the nose so that it fits well across the nose and onto the face below the eyes. Do not pinch the clip.

Press the edges of the mask onto your face (around the cheeks and chin).



Step 6

Once you have fitted the mask, cover the mask with both hands, being careful not to change the fit. If you are using a mask without a valve, breathe out sharply. If you are using a mask with a valve, cover the valve with your hand before breathing out, or breathe in sharply, instead. You should not be able to feel any air escaping or entering around the edges of the mask. Readjust the fit until the seal is tight.

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If the mask has non-adjustable straps, tie them snugly around your head.

If the mask has ear loops, you may need to use the loops to tighten the mask (you could tie a knot in the loops if the mask is loose on your face).

If you cannot get the mask to fit, try to find a different mask which fits your face better.



6. MAKE SURE YOUR CHOICE OF RESPIRATORY PROTECTION FITS TO YOUR FACE!

- ❖ A good facemask may have a flexible metal nose clip, adjustable straps and may also have foam around the edges to help with the seal to your face.
- ❖ When your facemask fits properly, there should be a good seal around your face so that you cannot feel any air coming in around the edges.
- ❖ Make sure that spectacle/goggle frames do not affect the seal between the facemask and your face.
- ❖ If you have facial hair, the facemask will not be as effective, because it cannot make a good seal to your face.
- ❖ You can improve the fit and effectiveness of a facemask by tying a layer of cloth over it, although you are likely to find this less comfortable and you should not tie the cloth so tight that it makes breathing harder.





7. FOR HOW LONG WILL A FACEMASK LAST?

- ❖ Disposable masks are designed for single use (so packaging will often state that they should be disposed of after 8 hours) but they can be worn until you notice that they are clogged and/or breathing becomes harder, or if you notice the mask starting to break. However, you may choose to replace them sooner for hygiene reasons and should check frequently for any degradation or growth of mould.
- ❖ Some industry-certified facemasks have a 'use-by' date printed on them. After this date, the manufacturer cannot guarantee the integrity of the mask materials.
- ❖ If supplies are limited, disposable masks can be stored for re-use in a clean bag or box to ensure that dust from the outside does not contaminate them. They should not be hung in a dusty environment.
- ❖ Some manufacturers now make non-disposable masks for community use. Often, these can be washed, for hygiene reasons, but washing will not remove particles from the filtering layer, so they must also be discarded when they become clogged and/or breathing becomes harder, or if you notice the mask starting to break.





For further information on the health hazards of volcanic ash and preparedness for ashfall, please download the IVHHN pamphlets available at:

<http://www.ivhnn.org/pamphlets.html>

The information given in this booklet is based upon guidelines from the World Health Organization, IVHHN, industrial regulators and mask manufacturers, and research conducted for the Health Interventions in Volcanic Eruptions Consortium (<http://community.dur.ac.uk/hive.consortium/>). The academic articles published on that research are free to download:

Mueller, W., Horwell, C.J., Apsley, A., Steinle, S., McPherson, S., Cherrie, J.W., Galea, K.S., 2018. The effectiveness of respiratory protection worn by communities to protect from volcanic ash inhalation; Part I: Filtration efficiency tests. *International Journal of Hygiene and Environmental Health*. <https://www.sciencedirect.com/science/article/pii/S1438463917308003>

Steinle, S., Sleenwenhoek, A., Mueller, W., Horwell, C.J., Apsley, A., Davies, A., Cherrie, J.W., Galea, K.S., 2018. The effectiveness of respiratory protection worn by communities to protect from volcanic ash inhalation; Part II: Total inward leakage tests. *International Journal of Hygiene and Environmental Health*. <https://www.sciencedirect.com/science/article/pii/S1438463917308027>