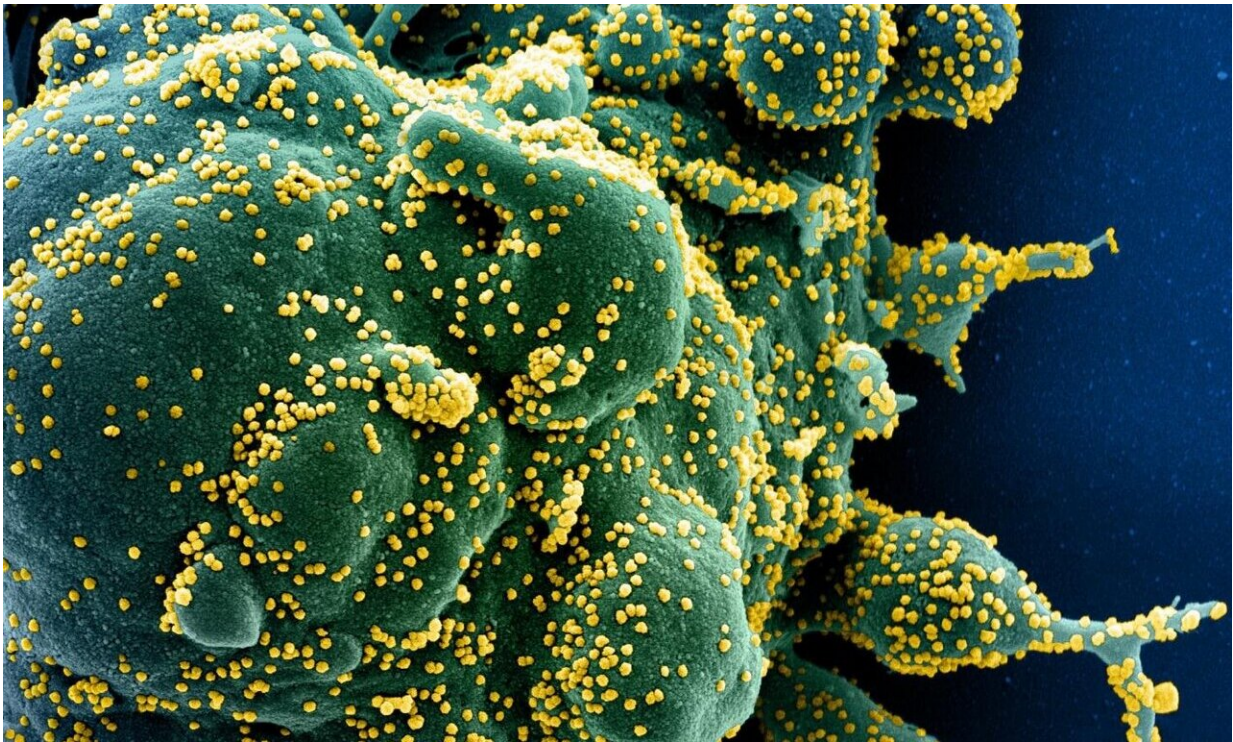


# Keeping indoor air clean can reduce the chance of spreading coronavirus

November 23 2020, by Shelly Miller

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Colorized scanning electron micrograph of an apoptotic cell (green) heavily infected with SARS-COV-2 virus particles (yellow), isolated from a patient sample. Image captured at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIH/NIAID

The vast majority of [SARS-CoV-2 transmission occurs indoors](#), mostly from the inhalation of airborne particles that contain the coronavirus.

But in spite of the obvious risks posed by being inside, according to the Centers for Disease Control and Prevention, [small household gatherings](#) are driving much of the [recent surge in cases](#).

The best way to prevent the virus from spreading in a home would be simply to keep infected people away. But this is hard to do when an estimated 40% of cases are asymptomatic and asymptomatic people can [still spread the coronavirus to others](#). Next safest is [to entertain outside](#), but if you can't, there are a few things you can do to reduce the risk of spreading the coronavirus.

First—and [most important](#) – always wear masks, make sure everyone stays at least 6 feet away from other people and don't spend too much time indoors. But in addition to these precautions, making sure the air inside is as clean as possible can also help. I am an [indoor air quality researcher](#) who studies how to reduce the [transmission of airborne infectious diseases](#). Using increased ventilation or running an [appropriately sized air cleaner or filter](#) can add an extra layer of protection.

## **Fresh air is safer air**

A safer home is one that constantly has lots of outside air replacing the stale air inside.

Homes are typically ventilated through open windows or doors, or from air leaking in through unintentional openings and cracks in the building itself. A typical air exchange rate for a home is around [0.5 air changes per hour](#). Because of the complicated way air moves, that translates into taking about two hours to replace two-thirds of the air inside an average home, and about six hours to replace all of it.

This slow air exchange is not good when you want to limit the spread of

an airborne virus. The higher the ventilation rate the better—so how much fresh air is ideal? While the exact exchange rate depends on the size of a room, as an example, a 10-by-10-foot room with three to four people inside should have at least [three air changes an hour](#). In a pandemic this should be higher, and the World Health Organization recently recommended [six air changes per hour](#).

Knowing the exact air exchange rate for your home isn't necessary; just know that more is better. Thankfully, increasing the ventilation of a house or apartment is easy.

Open as many windows as you can—the [larger the opening](#) the better. Open doors to the outside. Run the exhaust fans in your bathroom and above the stove—though only do this if the exhausts go to the outside and if you [also have a window or door open](#). Additionally, you can place fans in open windows and blow the inside air out to even further boost your air flow.

I live in Colorado, and the winter cold has arrived. I still think it is worth it to have windows open, but I open them only about halfway and turn on the heaters in my house. This wastes energy, but I keep the time I have to do this to a minimum, and once visitors leave, I keep the windows open for at least an hour to completely air out the house.

All of these things add up and increase ventilation.

## **Filtration as a backup**

If you are worried that your home ventilation is still too low, [air filtration](#) can offer another layer of safety. Much the way an N95 mask works, running air in your home through a filter with small openings can capture airborne particles that could contain the coronavirus.

There are two ways to filter air in a home: using a built-in system—like central heating, for example—or using stand-alone air cleaners.

In my home, we use both air cleaners and our heating system to filter the air. If you have central heating, make sure your [furnace filter](#) has a [minimum efficiency reporting value \(MERV\)](#) of at least 11. This value describes how effective a filter is at removing airborne particles and contaminants from the recirculated air. The standard on most furnaces is a MERV 8 filter and many furnaces are not capable of running with a more efficient filter, so make sure to check your filter and ask a technician before replacing it. But a MERV 8 filter is better than no filtration at all.

You can also use a stand-alone air cleaner to remove airborne particles, but how effective they are depends on the size of the room. The bigger the room, the more air needs to be cleaned, and stand-alone cleaners are only so powerful. My home has an open floor plan, so I can't use my air cleaner in the main living space, but it can be helpful in bedrooms or any other smaller enclosed spaces. If you consider buying an air cleaner, I worked with some colleagues at Harvard to build a tool that can be used to [determine how powerful an air cleaner you need](#) for different room sizes.

And don't forget to also consider how effective an air cleaner's filter is. Your best option is a cleaner that uses a [high-efficiency particulate air \(HEPA\) filter](#), as these remove more than 99.97% of all particle sizes.

If you decide to share your home with others in the coming months, remember that being outside is by far the safest. But if you must be inside, shorten the length of time your guests stay, wear masks and socially distance at all times. In addition to these precautions, keeping air flow high by opening windows as wide as possible, driving more air into your [home](#) with exhaust fans and using air cleaner and filters can help

further reduce the chance of spreading the [coronavirus](#).

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