SPHERE
Sustainable Performance of Healthy & Efficient Residential Environments
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Stuck in a Healthier Home: Ventilation Tips for the Housebound

You've been told to go home. And stay there. When faced with a pandemic against which we have no immunity, being in small groups at home is safer than being in crowds. Now that you're at home for a while, there are things you can do to make that environment safer, too.

Basics: Airflow in your home

Let's start with some basics. First, managing indoor air is different than managing outdoor air. Think about a campfire: it may be safe to burn outside, but inside, the house would fill with smoke if you didn't have a chimney. Although every home has some amount of air exchange with outdoors, ventilation (like fans) is needed to provide fresh air.

Second, indoor air mixes quickly, within rooms and between rooms. People in your home are sharing air.

Third, many homes have systems that connect all spaces – furnaces and central air conditioners. This means that simply closing a door doesn't fully isolate you from everyone else.

Contaminants indoors can cause health issues-- whether those contaminants are the novel coronavirus or more common things like a cold virus or particulate matter from cooking. We're going to share ways to get airborne contaminants out of the home. These are steps you can take to improve health while you are spending lots of time at home.

Idea #1: Increase your ventilation rate

Start by increasing ventilation to get contaminants out of the home. When people are at home all day, they naturally generate more contaminants like moisture or fumes from cooking and cleaning. Some of the descriptions, marked (P), are shown in photos at the very end of this document.

- Turn on exhaust fans, especially the range hood. This measure works only if the fans actually exhaust to the outdoors. Check whether each fan has a duct, and whether that duct goes outdoors (P1). Outlet vents on the roof (P2) or through the wall (P3) show where exhaust air leaves the home.

- Run ventilation systems that are connected to the furnace continuously when there are contaminants of concern in the home, even when not heating or air-conditioning. Not all homes have this type of system. If yours does, it will likely have a control at the furnace (P4).
- Run heat recovery ventilators (HRVs; P5) all the time. During periods when you want more ventilation, put the HRV on the highest flow option.
- Communicate with your neighbors about ventilation in multi-family buildings. Increasing exhaust ventilation only in your unit might bring your neighbors' air into your space. However, if everyone turns their fans on, the building as a whole becomes better ventilated.
    - If the building management controls a central shaft exhaust, individual apartment dwellers don't control the ventilation. Management may be able to turn the central fan to a higher setting.

Idea #2: Create a separated zone in your home

If a person in your home is ill, you can reduce the air connection between their space—we'll call it the "separated zone"— and the rest of the home. The goal is to decrease the pressure in that space compared to the rest of the home, and then vent the separated zone to outside. This idea is based on the simple principle that air flows from high pressure to low pressure. Here are some steps:

- Turn on any exhaust fans in the separated zone. This will lower the pressure in that zone.
- Add more exhaust ventilation to the room. Standard exhaust fans are often not enough, so you can mount a box fan in the window, blowing outward, and seal the rest of the window opening with plastic or cardboard.
- Do NOT increase exhaust ventilation, like bathroom and kitchen fans, in other parts of the home (except when you are cooking or bathing). That ventilation reduces pressure in the rest of the home, and air from the separated zone might travel back to the home.
- Close off central-air system supply registers and return grilles in the separated zone, so that air from that zone is not distributed through the whole house. Use tape, or tape plastic over the registers and grilles, in addition to closing the louvers.
    - You may need to consider alternative sources of heat or air conditioning for the separated zone. If you use portable space heaters, be careful to use only models that shut off if they tip over, and keep all flammable materials away from them.
    - If you do NOT have a central-air system, you don't have to do anything else. For example, heating from a central boiler is fine to condition the separated zone.

You also need to make sure anyone in the separated zone can get to the bathroom, and have other needs met. A master bedroom with connected bathroom may be the best choice for a separated zone in many homes since it provides toilet and water access and usually contains an exhaust fan.

NOTE: Air from the remainder of the home is likely to travel into the separated zone. If others in the home have been exposed, and you want to isolate a sensitive person from the remainder of the home, you CANNOT put the sensitive person in a separated zone created in this way.

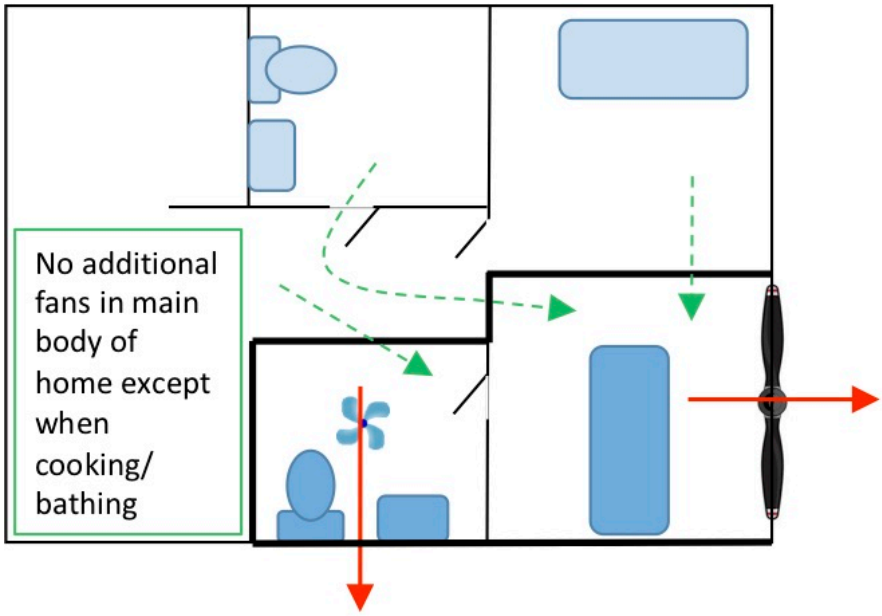

Figure: Creating a separated zone, marked by bold borders. Red arrows show air pushed to outdoors, controlled by fans. The large fan in the window exhausts from the separated zone to outside. Bathroom and any other exhaust fans in the zone should be on. Green arrows show how air will move from the rest of the home into the separated zone, drawn in by the low pressure in the zone.

Disclaimer: The separated zone reduces the probability of airborne transmission from the separated zone to the rest of the home. It cannot guarantee that you will not get sick. It also doesn't address transmission by contact with skin and surfaces. You should continue to follow all public health guidelines on hand-washing, disinfection, and distancing.

Idea #3: Plan for future health in your home

As you pay attention to airflow and contaminants, you might notice some aspects of your home that you can address when time and resources are available.

Make sure your fans are working well. Take a single piece of toilet paper and hold it up to the fan. (We know toilet paper is precious these days, but you can spare one piece!) If the fan cannot hold the toilet paper to its grille, then it is not moving much air. Do the fans vent to the outdoors? Fans that are noisy often don't move much air. Quiet fans may be more expensive, but also work better and last longer.

If you have big air leaks, seal them – it will make your home's air easier to control with fans. Managing a leaky home is like drinking through a straw with a hole in the side. You really have to work to move the fluid in the right direction.

Take the opportunity of being stuck inside to look around your home. Other organizations, not affiliated with SPHERE, provide many resources to learn more about Healthy Homes:

U.S. Housing and Urban Development | City of Fort Collins | National Center for Healthy Housing

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SPHERE is a multi-institution, transdisciplinary coalition whose mission is to promote human health and well-being in homes. SPHERE's academic members combine scientific expertise in human health, air and water contaminants, human behavior and community action, and the operation of realistic buildings. SPHERE associates include industry representatives, building contractors, community organizations and government agencies.

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Photos for Illustration

P1. Duct for a range hood. Without a duct, air does not leave the house.

P2. Exhaust fan vent (circled). A cap like this shows that the fan attached is exhausting to outdoors.

P3. Exhaust fan vents through the wall (circled). Each one could be connected to a fan with a duct, showing that the fan is venting outdoors. One of the vents might be for a dryer.

P4. If you have ventilation air intake at the furnace, it will look something like this. You will need to check your user's manual to change its settings.

P5. This is a common appearance of a heat recovery ventilator (HRV). You will have to check your user's manual to set it.