MERCOLA
Take Control of Your Health

The Importance of Reducing Indoor Pollution

Analysis by Dr. Joseph Mercola Fact Checked

STORY AT-A-GLANCE

- Ninety-two percent of the world's population breathe polluted air, and about 6.7 million deaths are attributed to air pollution each year; a toxic environment is responsible for 1 of every 4 deaths reported worldwide
- Indoor air pollution can be as dangerous, or more, than outdoor air pollution. Indoor air is often more contaminated to begin with, and most people spend over 90% of their time indoors
- The level of air pollution in your home can be two to five times higher than outside, and some of the pollutants you breathe can be as much as 100 times more concentrated indoors
- Two primary sources of indoor air pollution are the materials used to construct the building itself and everything in it, including your furniture, and chemical products you bring into your home
- Airtight modern buildings need to be properly ventilated to prevent or reduce the buildup of indoor air pollution. One of the easiest ways to improve your indoor air quality is to open your windows every day

This article was previously published January 31, 2018, and has been updated with new information.

According to the World Health Organization (WHO), 92% of the world population breathe polluted air,[1] and about 6.7 million deaths are attributed to air pollution each year.[2]

Overall, a toxic environment is responsible for at least 1 of every 4 deaths reported worldwide,[3] and air pollution is the greatest contributor to this risk. Your body is dependent on the air you breathe and poor air quality can cause serious damage to your lungs, heart and other organ systems.

According to WHO, air pollution is a major contributor to lung and respiratory infections, heart disease and cancer. What many fail to consider is that indoor air pollution may actually be as dangerous, or more, than outdoor air pollution.

For starters, indoor air is often more contaminated to begin with. If you're like most, you also spend far more time indoors than out. Sociological studies suggest Americans spend nearly 92% of their day indoors. Of the remaining 8%, only 2% is spent in the open outdoors; 6% is spent in transit between home and work.[4]

This means your indoor air quality is really important to your long-term health. Indeed, the Environmental Protection Agency (EPA) has noted that indoor air pollution is one of the top public health risks you face on a daily basis.[5] According to the EPA, the level of air pollution in your home can be two to five times higher than outside, and some of the pollutants you breathe can be as much as 100 times more concentrated indoors.[6]

Health Risks Associated With Air Pollution

In the short term, symptoms of exposure to indoor air pollution resemble symptoms you experience from an allergy or a cold, such as[7] worsening asthma; itchy, watery eyes; headaches; dizziness; fatigue and runny nose. These symptoms typically disappear once you leave the problem area. Chronic exposure to air pollution over a longer period of time, however, may result in more chronic and serious conditions, including:[8,9,10]

Bronchitis, asthma, emphysema, accelerated aging of lung tissue, lung tissue redness and swelling, wheezing and shortness of breath	Premature death

Cancer. According to research published this year, the greater your total pollution exposure, the higher your risk for cancer[11]	Poor sleep. Recent research[12] demonstrates two widespread pollutants — nitrogen dioxide (traffic-related air pollution) and PM2.5 (fine-particle pollution) — disrupt sleep and decrease sleep efficiency (a measure of the time spent actually sleeping as opposed to lying in bed awake). People with the highest PM2.5 and nitrogen dioxide exposure were 50 and 60% more likely to have low sleep efficiency over a five-year period compared to those with the lowest exposure, respectively
High blood pressure,[13] heart attack[14] and stroke	Decreased cognitive function[15]
Developmental delays in children	Reproductive problems

What Causes Air Pollution Indoors?

Two primary sources of indoor air pollution are a) the materials used to construct the building itself and everything in it, including your furniture, and b) chemical products you bring into your home. Common culprits include aerosols such as hair spray and room deodorizers. Many of these sources release volatile organic compounds (VOCs) that have both short-term and long-term health effects.

Paying careful attention to these two broad categories can go a long way toward improving your indoor air quality. When rebuilding or refurbishing your home, be sure to look for "green" materials that are free of toxic chemicals. This goes for everything from

furniture, upholstery and carpeting to wall construction materials and paint. At the end of this article, I'll provide a number of other remedial action items as well.

Modern buildings are also more airtight, for efficiency purposes, and need to be properly ventilated to prevent or reduce the buildup of indoor air pollution.[16] One of the easiest ways to improve your indoor air quality is to open your windows each day to get some cross ventilation going. Even if the air outside isn't pristine, it's likely to be better than what's built up inside your home.

Common Indoor Air Pollutants and Their Sources

So, what might you be breathing inside your home? The following table is a summary of some of the most common pollutants and toxic particles found in indoor air, and some of their most common sources.

Molds — Water damage, high humidity regions and humid areas of homes such as bathrooms and basements. Most common molds are Aspergillus, Stachybotrys and Penicillium; Aspergillus is a primary food for dust mites.
Bioaerosols (biocontaminants such as airborne bacteria and viruses) — Humans, pets, moist surfaces, humidifiers, ventilation systems, drip pans, cooling coils in air handling units (can cause Legionnaires' disease and "humidifier fever")
Combustion byproducts — Unvented kerosene and gas heaters, gas appliances, fireplaces, chimneys and furnaces, tobacco smoke, automobile exhaust from attached garages
Tobacco smoke — Cigarettes, cigars and pipes
Formaldehyde — Pressed wood products such as plywood and fiberboard, urea-formaldehyde foam insulation, mattresses, clothing, nail polish, permanent press textiles, glue and adhesives, stoves, fireplaces, automobile exhaust

Arsenic — Pressure-treated wood products used for decks and playground equipment are often treated with arsenic-containing pesticides
VOCs[17] such as benzene and toluene — Paints, solvents, wood preservatives, wood glue, aerosol sprays, household cleaners and disinfectants, copy machines/printers/faxes, carpets, moth repellents, air fresheners, dry cleaned clothes, hobby supplies, pesticides, stored fuels and car products
Flame retardant chemicals such as PCBs, PBDE, tris phosphate, TPHP and Firemaster 550 — Polyurethane foam cushions, carpeting, mattresses, children's items such as car seats, electronics, yoga mats, rubber exercise mats
Phthalates — Vinyl flooring, food packaging, shower curtains, wall coverings, adhesives, detergents, personal care products, toys, PVC pipe
Pesticides — Pest control poisons, garden and lawn chemicals
Asbestos — Deteriorating or damaged asbestos-containing insulation, fireproofing and/or acoustical materials
Heavy metals such as lead, mercury, cadmium and chromium — Paints, cars, tobacco smoke, soil and dust. Also major industrial air pollutants
Radon (a radioactive gas that comes from uranium) — Building materials such as granite, well water, soil, outdoor air, smoke detectors, certain clocks and watches. Hazardous levels of radon can be found in 1 in 15 American homes, and radon is the second leading cause of lung cancer in the U.S.

Strategies to Improve Your Indoor Air Quality

Most of us, regardless of where we live, can benefit from addressing our indoor air quality. If you've been putting this off, look through the list of action items below, and

commit to implementing one or more of them. If need be, schedule it in your calendar so you don't forget.

Not only will you reduce your risk of developing chronic health conditions, research shows improving air quality also benefits your mental health by reducing psychological stress.[18] Most of these strategies are very cost-effective in the short run and may help significantly reduce your health care costs long-term.

Use a high-quality air purifier — Not all filters work with the same efficiency to remove pollutants from your home and no one filter can remove all pollutants. See this article for an explanation of the different types of air filters to meet your specific needs.

Overall, photocatalytic oxidation (PCO) is one of the best technologies available. Rather than merely filtering the air, PCO actually cleans the air using ultraviolet light. Unlike filters, which simply trap pollutants, PCO transforms the pollutants into nontoxic substances. In addition to using them in your home, portable air purifiers are available to take with you when you work or travel.

Install a water filter — Chlorine becomes airborne during a shower, and combined with high humidity levels in the bathroom increases the amount of chlorine you inhale. Shop for a filter with NSF/ANSI 177: Shower Filtration Systems-Aesthetic Effects. These filters are tested by a third party to effectively remove chlorine.[19]

Add air purifying plants — Scientists from the National Aeronautics and Space Administration (NASA), University of Georgia and Pennsylvania State University have demonstrated that potted plants in your home can improve your air quality.[20] Plants remove pollutants by absorbing them through their leaves and roots, in much the same way they clean the outdoor air from the pollution given off by manufacturing plants, cars and heating systems.

The top 10 plants to improve air quality are[21] aloe, English ivy, rubber tree, peace lily, snake plant, bamboo palm, philodendron, spider plant, red-edge dracaena and

golden pathos. The following video by the American Chemical Society reviews the research and explains how houseplants may be used to reduce the pollutants found in your home.

Open your windows — One of the easiest ways to reduce the pollutants in your home is to open your windows. Opening windows on the opposing sides of your home will effectively create cross ventilation. Because most newer homes are energy efficient and have little leakage, even opening a window 15 minutes a day can improve your indoor air quality.

Take off your shoes — Taking off your shoes at the door will help prevent tracking dust and toxic particles into your home.

Remove harsh cleaning products and scented household products — Most cleaning products contain chemicals that contribute to poor indoor air quality. Ditto for air fresheners and scented candles. Research has linked once-weekly use of cleaning products with a 24 to 32% higher risk of progressive lung disease.[22]

Fortunately, there are plenty of safe and effective alternative options to commercial cleaners. Soap and water, or vinegar and baking soda, for example, can serve as inexpensive alternatives.[23] Consider trying some of these suggestions to clean your home using simple products you may already have in your cabinets:

- Borax — Acts as a whitener and will boost your detergent power. Add between one-fourth cup and 1 cup to your laundry, depending on the size of your load.
- Vinegar — A weak acid, this common liquid is a natural cleaning substance that also deodorizes. Consider adding between one-fourth cup and one-half cup to your laundry with your detergent and wash as usual. Don't mix the borax with vinegar in the same load as they neutralize each other. Vinegar is also a good general all-purpose cleaner for your kitchen and bathroom, and works great for cleaning mirrors and windows.

- Homemade scouring powder — Make your own safe scouring powder for soap scum in the bath by combining two parts baking soda, and one part each of borax and salt.

Avoid powders — Powders — be they cleansing scrubs, talcum or other personal care powders — can be problematic as they float and linger in the air after each use. Many powders are allergens due to their tiny size, and can cause respiratory problems.

Air out dry-cleaned clothes — Avoid hanging dry-cleaned clothing in your closet as soon as you bring them home. Instead, hang them outside for an entire day or two if possible. Better yet, see if there's an eco-friendly dry cleaner in your city that uses some of the newer dry cleaning technologies, such as liquid CO2.

Regularly service fuel burning appliances — A poorly maintained furnace, space heater, hot water heater, water softener, natural gas heater or stove and other fuel burning appliances may leak carbon dioxide or nitrogen dioxide. Have your appliances serviced per the manufacturer's recommendations to reduce potential indoor air pollution. You may also need to upgrade your furnace filters. Today, there are more elaborate filters capable of trapping more particulates.

Regularly clean your air conditioner — Your air conditioner may harbor dangerous bacteria. On several occasions, outbreaks of Legionnaires' disease have been traced back to contaminated air conditioner units. Most people don't even consider their uncared-for air conditioner might be toxic and sapping their health. The compressor might be outside your house, but inside, often in the attic or basement, is usually where the condensation occurs.

The pan that sits underneath the handler to collect it is connected to a drain tube. The pan can get clogged fairly frequently, which creates an extremely friendly environment for harmful bacteria to grow. The transition from cold to warm weather can also create water condensation that then sits there, turning stagnant. It may

even cause scaly buildup on metal pieces, indicating the accumulation of a potentially deadly bacteria.

Consider a heat recovery ventilator (HRV) — Because most newer homes are more airtight and therefore more energy efficient, air exchange with outdoor air is more difficult. Some builders are now installing HRV systems to help prevent condensation and mold growth and improve indoor air quality.[24]

If you can't afford to install an HRV, open your windows and run the bathroom and kitchen exhaust fans to vent your indoor air to the outside. You don't have to do this for more than 15 to 20 minutes each day and should do it summer and winter at times when the temperature outside is closest to your indoor temperature.

In humid locales, use a dehumidifier — Mold grows in damp and humid environments. Use a dehumidifier and air conditioner to keep the humidity indoors below 50%. Make sure to clean both units regularly.

Never smoke indoors — Ask smokers to go outside. Secondhand smoke from cigarettes, pipes and cigars contains over 200 known carcinogenic chemicals, endangering your health. The same applies to e-cigarettes and vaping devices.

Test your home for radon — Radon is a colorless, odorless gas linked to lung cancer. It may be trapped under your home during construction and can leak into your air system over time. Radon testing kits are a quick and cheap way to determine if radon is an issue in your home.

Invest in a HEPA filter vacuum cleaner — Standard bag or bagless vacuum cleaners are a major contributor to poor indoor air quality. A regular vacuum cleaner typically has about a 20-micron tolerance. Although that's tiny, far more microscopic particles flow right through the vacuum cleaner than it actually picks up.

Beware of cheaper knock-offs that profess to have "HEPA-like" filters — get the real deal. HEPA filters do a great job picking up tiny particles, but some are too small

even for a HEPA. These include VOCs. To filter these out, activated carbon filters are typically recommended.[25]

Avoid storing chemicals indoors — Avoid storing paints, adhesives, solvents, and other harsh chemicals in your house. If you must have them, keep them in a detached garage or shed.

Use nontoxic cookware — Avoid using cookware with nonstick coating, as these pots and pans can release toxins into the air when heated.

Sources and References

- [1] World Health Organization, September 2016
- [2] Our World in Data November 25, 2021
- [3] World Health Organization March 2016
- [4] J Expo Anal Environ Epidemiol. 2001 May-Jun;11(3):231-52
- [5, 7] EPA, Introduction to Indoor Air Quality
- [6] EPA, Why Indoor Air Quality Is Important to Schools
- [8] Spare the Air: Health Effects of Air Pollution
- [9] Harvard T.H. Chan School of Public Health, April 17, 2012
- [10] American Lung Association, Health Effects of Ozone and Particle Pollution
- [11] Cancer May 8, 2017, DOI: 10.1002/cncr.30709
- [12] Environ Pollut. 2020 Jul; 262: 114263
- [13] Time May 31, 2016
- [14] Environmental Science & Technology 2012; 46(8): 4291-4296
- [15] Environmental Health Perspectives 2011; 119:682-687
- [16] BBC News April 26, 2016
- [17] EPA, Volatile Organic Compounds' Impact on Indoor Air Quality
- [18] Newsweek June 2, 2016
- [19] NSF International, Shower Filtration Systems
- [20] Live Science July 29, 2013
- [21] Huffington Post July 29, 2015
- [22] Newsweek September 11, 2017
- [23] American Lung Association, Cleaning Supplies and Household Chemicals
- [24] National Post November 28, 2015
- [25] Particle Counting, Does Carbon Really Work?