

Healthy Homes: Indoor Air Quality

Managing Asthma Triggers in the Home

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Asthma, a serious lung disease, is a leading cause of long-term illness in children. In Kentucky, 10.6% of children 11 years old and younger, 13.6% of middle school students, 11.8% of high school students and 18.6% of adults have asthma. While asthma can affect anyone at any age, it is more common among black people. In Kentucky, 13.9% of black people have asthma compared to 8.2% of white people. Additionally, black people are twice as likely to die from asthma-related illness as white people. (KY DPH, Asthma Management Program website, accessed 7/25/23)

The health consequences of asthma nationally include:

- In 2016, 3,518 people died from asthma,
- In 2016, there were 188,965 hospitalizations with asthma listed as the primary cause, or 58.5 per 100,000 people,
- In 2018, 2.2 million children aged 5 to 17 missed more than 7.9 million school days,
- In 2018, there were 10.9 million missed work days because of asthma among employed adults ages 18 and older, and 62.8 million missed days of housework among unemployed adults,
- From 2008 to 2013, asthma accounted for \$81.9 billion each year in total economic cost in the United States:
 - Health-care costs – \$50.3 billion per year,
 - Mortality – \$29.0 billion per year,
 - Missed school and work days – \$3.0 billion per year (American Lung Association, Asthma Trends and Burden website, lung.org, accessed 7/25/23)



Important Points to Know About Asthma

- Asthma triggers are substances or conditions that aggravate existing asthma, can lead to an asthma attack, or may increase the risk of asthma development.
- Allergens and irritants in homes may trigger asthma attacks.
- Potential triggers include secondhand tobacco smoke and other combustion byproducts, dust and dust mites, pets, mold and other biologicals, cockroaches and other pests, pollen, chemicals and volatile organic compounds (VOCs), and ozone.
- People should avoid the triggers to which they are sensitive.
- Tests by an allergist or immunologist can help identify the triggers for specific persons.
- By controlling the environment, people may reduce their risk of an asthma attack or making their asthma worse, and they could possibly avoid the onset of asthma.
- The National Academy of Sciences report on asthma recommends reduction and/or removal of house dust mites, cat dander, cockroaches, fungi, and molds, and avoiding exposure to secondhand smoke.

The National Academy of Sciences has found that there is a link between the development of asthma in children and indoor exposure to house dust mites and environmental tobacco smoke (preschool children). They also indicate that there is a causal relationship between worsening asthma and pet (cat and dog) dander, cockroaches, house dust mites, environmental tobacco smoke (secondhand smoke),

fungi and molds, the common cold, and nitrogen dioxide and nitrogen oxides.

Allergens and irritants in homes may trigger asthma attacks. By controlling their environment, people may reduce their risk of an asthma attack, prevent asthma from getting worse, and perhaps avoid the onset of asthma entirely. A discussion of common household triggers and potential management methods to reduce the triggers in the home follows.

HOUSE DUST

Dust contains more than 5,000 ingredients, including fibers, dander, soil, bacteria, molds, smoke residues, pesticides, dust mite allergens, and insect body parts.

Action!

- Use smooth, easy-to-clean surfaces and washable items.
- Put collectibles under glass.
- Damp clean to remove dust without it becoming airborne.
- Change air handling system filters and vacuum cleaner bags regularly and as required by the manufacturer.
- Use vacuums with filters that catch and retain the dust or a central vacuum system.
- Leave shoes at the door.
- Use commercial-type mats (three to six walking steps in size) on the inside and outside of exterior doors to reduce a large amount of the pollutants carried inside.
- Remove old carpet and pads that may have deeply imbedded dust, pollen, and other irritants.

In a limited of 20 children with asthma, the number of days that medication was needed dropped considerably after one month of controlled cleaning.

What are Dust Mites?

Dust mites are microscopic creatures and a major irritant in house dust. They live in warm, humid places, feed on fungi growing on skin scales from people and pets, and don't survive easily at a relative humidity of less than 50%. They prefer soft furnishings such as mattresses, pillows, carpets, fabric-covered furniture, bedcovers, clothes, and stuffed toys.

DUST MITES

Most of us live with dust mites and they cause little problem. For some, however, particles from dust mites cause allergic reactions and asthma. Controlling house dust mites is not easy!

Action!

- Cover mattresses, box springs, and pillows with covers labeled for dust mite control.
- Wash all bedding weekly in hot water (above 130 degrees F).
- Use hard surfaces in the bedroom, including floors, furnishings, and window treatments.
- Reduce the home's relative humidity to lower than 50%.
- Use a dehumidifier and/or air conditioner to reduce humidity and keep it clean.
- Install smooth surface flooring such as vinyl on concrete floors. Carpet laid over concrete tends to have more dust mites because of the increased moisture levels in the carpet.
- Avoid comforters, and replace pillows and quilts every two years.
- Remove clutter and stuffed toys; keep toys off the bed.

- Select toys you can wash. Some toys you can place in a freezer overnight to kill dust mites.
- Select vacuum cleaners carefully, and use them often! They should effectively capture dust particles and trap them inside rather than disturb particles. Vacuuming may help remove some dead mite fragments, droppings, and their food source – skin scales.
- If dust or dust mites are a trigger for you, wear a quality dust mask or have someone else vacuum and dust furniture.

PETS

Animal skin flakes, urine, and saliva can be asthma triggers. Cats and rodents are more likely to be triggers than dogs.

Animal dander gets on clothing and on hands that have had direct contact with pets, and it can be carried into the air, where it can be inhaled or land on skin and eyes.

Action!

- If a pet is a trigger, keep it out of the bedroom and sleeping areas and keep the door closed.
- Keep pets away from fabric-covered furniture, carpets, and stuffed toys.
- Washing pets may temporarily reduce asthma trigger levels, but there is little evidence it will reduce symptoms. In severe cases it's best to select another type of pet, such as a fish.
- Consider keeping pets outdoors or finding a new home for pets. Triggers from pets can stay in the home for several months after a pet is gone.

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Rid a Small Area of Mold

Correct the problem and clean as follows:

1. Work in a well-ventilated area.
2. Wear gloves, protective clothing, and a full mask, or hire a professional to reduce risks.
3. Using a general-purpose cleaner, clean the mold from hard surfaces trying not to spread the spores.
4. Follow with a disinfectant (about 1/4 cup household bleach in 1 gallon of water). Keep the area wet for 15 to 30 minutes. (Do not mix cleaners.)
5. Disinfectants may not kill mold spores. Concentrations as high as 1 1/2 cups of bleach per gallon of water are recommended for surfaces you cannot thoroughly clean.
6. Thoroughly dry the area.
7. Carefully discard small amounts of wet or moldy absorbent materials such as ceiling tiles, soft furnishings, and carpet. Wrap items in plastic and seal tightly to avoid spreading spores.

MOLDS

Molds are microscopic fungi that live on plant or animal matter. Warm and humid conditions encourage growth. Molds are naturally occurring and are found both indoors and outdoors. They can grow on almost any substance, including wood, paper, wallboard, carpet, and foods if moisture is present.

To discourage mold growth in the home, decrease the humidity, increase light and air circulation, and

thoroughly clean surfaces. Remember, molds tend to grow in places where there is moisture, warmth, a food source, darkness, and little air circulation.

Certain molds may be toxic to some people. Mold should be handled with respect because of the potential health risk. Hire a professional to clean up mold if you choose to reduce the risk of your exposure while cleaning. Household members, especially infants and sensitive persons, should not be present during cleanup.

Action!

- Avoid outside areas likely to have mold such as compost piles, cut grass, and wooded areas. Avoid standing water.
- When mold exposure is unavoidable, sensitive persons should wear a tight-fitting face mask.
- Don't allow water to stand or seep inside or out. Stop all unplanned moisture sources and leaks, keep all surfaces dry, and fix leaks. Clean out downspouts and gutters. Use downspouts to move water at least 6 feet from your foundation. Slope away soil at the foundation for drainage; seal foundation cracks.
- Control inside moisture. Keep the humidity levels between 35 and 50%. Use dehumidifiers if necessary.
- Correct any water or humidity problem. Fix leaky plumbing and cracks and leaks in basements. Check damp areas of the home that could have mold growing. Be alert to potential hidden mold behind walls, under floors, above ceiling tile, or on and behind shower walls.
- Use exhaust vents to move moisture from showers, clothes dryers, and cooking areas to outside.
- Keep drip pans in air conditioners, refrigerators, and dehumidifiers clean, emptied, and dry.
- Avoid placing carpet on basement floors that may wick moisture.

If mold is present, clean it up immediately! (Mold can begin growing within 24 to 48 hours after a water problem occurs.)

Using a general cleaner, clean the mold from hard surfaces. Contain or trap the mold rather than scattering the mold spores into the air. Follow with a disinfectant, keeping the area wet for 15 to 30 minutes. Use commercial products or a solution of water and household bleach (typically 1/4 cup bleach in 1 gallon of water). Read and follow specific label directions. (Do not mix cleaners.) Then thoroughly dry the area.

INSECT AND RODENT PESTS

Exposure to household pests (such as cockroaches and rodents) can trigger asthma in some individuals. Cockroach allergies and exposure to insects are an important cause of asthma-related illnesses and hospitalization. Many people with asthma are allergic to the dried droppings and castoff skins of cockroaches. A study reported in the New England Journal of Medicine indicated that children who were allergic to and exposed to cockroach allergens were hospitalized 3.3 times more than children who were allergic and not exposed.

Action!

- Keep all food and garbage in sealed air-tight containers.
- Human food, pet food, and water will attract roaches.
- Control water leaks. Caulk and seal openings around water pipes and other cracks where pests may enter.
- Dispose of cardboard boxes and clutter.

POLLEN

Typical pollen allergen sources include grasses, ragweed, and pine, birch, and oak trees. Investigate the neighborhood and plant pollination cycles in the area

to avoid or minimize exposure to the triggers. Pollens are easily transported by the wind and enter the home through doors, windows, and other openings.

Action!

- Use quality doors, windows and screens, caulking, and weather stripping.
- Keep doors and windows closed and use air conditioning during peak pollen seasons.
- After spending time outdoors during pollen season, shower and change clothes to avoid spreading pollen indoors.
- Place mats both inside and outside all entrance doors to avoid tracking dust and pollen into the house.
- Wet clean or damp mop floors and damp wipe other smooth surfaces where pollen can settle.
- Vacuum with an efficient vacuum that uses a HEPA filter. Use appropriately sized air cleaners and filters and change them regularly.

COMBUSTION BYPRODUCTS

Combustion products such as soot and smoke and gases such as nitrogen dioxide can cause breathing problems in children with asthma. Nitrogen oxides are a potential pollutant from inadequately vented gas ranges, gas pilot lights, gas and kerosene heaters, and other products. People with chronic respiratory disease are more sensitive to nitrogen oxides and sulfur dioxide.

Action!

- Reduce exposure to combustion pollutants.
- Avoid areas that have combustion appliances.
- Use exhaust fans when cooking to exhaust the pollutants.

- Have combustion equipment serviced yearly.
- Provide adequate exhaust and intake ventilation to combustion equipment.
- Avoid or limit the use of wood-burning stoves, kerosene heaters, fireplaces, and candles.

SECONDHAND SMOKE

Environmental tobacco smoke (ETS) contains more than 4,000 chemicals, some of which are respiratory irritants. ETS, or secondhand smoke, may aggravate symptoms in asthmatic children and may be a risk factor for new cases of asthma in children.

The CDC reports that 43% of children ages 2 months to 11 years live in a home with at least one smoker. Their studies show that children whose parents smoke are twice as likely to develop asthma and acute respiratory illnesses as children of nonsmoking parents. Children whose mothers smoked during pregnancy tend to be born with smaller airways, increasing their chances of developing asthma.

Action!

- Choose not to smoke in your home or car, and don't allow others to do so. Smoke outside or not at all. Smoking in one room still exposes others to smoke as it circulates through the air-handling and ventilation system. Total removal of tobacco smoke gases and particles through general ventilation is not feasible. Improved ventilation may decrease the odor but cannot eliminate the risks from the tobacco smoke.

OTHER POTENTIAL ASTHMA TRIGGERS

There are many other asthma triggers. Personal care products and perfumes may be triggers for some. VOCs such as formaldehyde can be another asthma

trigger. VOCs are chemicals that can evaporate and are found in such things as paints, adhesives, pesticides, solvents, and cleaners. Formaldehyde is found in particle board, plywood, paints, and glues.

To reduce exposure to VOCs, buy only what you need. Read labels on products. Choose unscented products and keep container lids tight. Select water-based products and nonaerosol products when choices are available.

Ozone is associated with aggravating asthma. It increases the risk of harmful respiratory effects – especially in children. Ozone, an ingredient in smog, can be produced by some types of air-cleaning devices.

People with asthma symptoms should work with their own physician and health-care professionals in determining specific pollutants that trigger asthma, how to reduce exposure, and how to manage their asthma.

AIR CLEANERS AND FILTERS

Air cleaners use mechanical filters, electronic devices, chemicals (sorbents), or some combination of these. The typical filter in most heating, ventilation, and air-conditioning (HVAC systems) is a simple, flat mechanical filter made of fibers. Some HVAC systems may be upgraded by adding another mechanical filter to trap additional pollutants, by changing the traditional filter to a newer pleated style or High Efficiency Particle Air (HEPA)-type filter, or by adding an additional air-cleaning device. Cleaning performance is affected by percentage of particles removed as they move through the device, amount of air handled, total volume of air to be cleaned, performance when loaded with particles, and maintenance. Check with your professional heating and cooling service and with the manufacturer of your existing equipment to be sure any changes will not affect your HVAC system's performance.

SUMMARY

Indoor air pollutants can trigger asthma attacks and may lead to its onset. Total elimination of triggers may be unrealistic. The methods chosen to reduce or eliminate triggers depend on the pollutant source, extent of asthma triggers for that individual, medical recommendations, and feasibility of control. After following medical recommendations, steps to manage pollutants, in order of effectiveness, include:

- Identifying the source and reducing the pollutants at the source.
- Ventilating – mixing or diluting pollutants with fresh outside air and exhausting pollutants.
- Using air cleaners after source control and ventilation.

ADDITIONAL INFORMATION

Not all asthma triggers are listed in this publication. Consult a health professional for more information about asthma, potential triggers, and how to manage specific problems. The information in this publication is not a substitute for professional medical help or advice.

FOR MORE INFORMATION:

American Academy of Allergy, Asthma & Immunology

www.aaaai.org
(414) 272-6071

Centers for Disease Control and Prevention

www.cdc.gov & search for air pollution
(800) 232-4636

Asthma and Allergy Foundation of America National Headquarters

www.aafa.org
(800) 727-8462

American Lung Association (National)

www.lung.org
(800) 586-4872

American Lung Association of Kentucky

www.lung.org/kentucky/
(502) 242-1066 or (800) 586-4872

Healthy Indoor Air for America's Homes

healthyindoorair.org
(406) 994-3451

National Allergy and Asthma Network/Mothers of Asthmatics

allergyasthmanetworking.org
(800) 878-4403

National Institutes of Health - National Institute of Allergy and Infectious Diseases

www.niaid.nih.gov
(301) 496-5717 or (866) 284-4107

U.S. Environmental Protection Agency (EPA) - Indoor Air Quality Information

www.epa.gov/indoor-air-quality-iag
(800) 438-4318 – EPA Indoor Air Hotline

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American Lung Association, Asthma Trends and Burden website, <https://www.lung.org/research/trends-in-lung-disease/asthma-trends-brief/trends-and-burden>, accessed 7/25/23

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