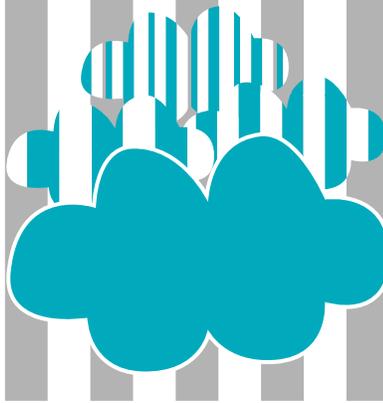


# It's in the Air!



*“Because we spend so much time indoors, our health is dependent on having good quality air to breathe in our homes.”*

We spend about 90 percent of our time indoors—even more during the winter time or if we are infirm. Although we often think of air pollution in terms of the air outdoors, the air inside our homes is probably more contaminated than the air outside—even for people living in large cities. Because we spend so much time indoors, our health is dependent on having good quality air to breathe in our homes.

Some people experience allergic or asthmatic reactions to the contaminants in the air in their homes and need to be aware of how to reduce their exposure to these contaminants. Some cleaning techniques can actually contribute to the contamination of our indoor air while other techniques are important for maintaining good indoor air quality

## Indoor Air Contaminants

Often when we think of indoor air quality, we may think of gases in the air such as radon or carbon monoxide. These are two contaminants that can affect our health, however, there are other types of contaminants besides gases. Particulates are another type of contaminant—these are particles so small that they “float” in the air.

When we see a shaft of sunlight, we can see dust particles suspended in the air. These are some of the larger particulates and they will settle out onto the surfaces in the room. Smaller particulates are not visible to the naked eye and some of these stay suspended indefinitely.

Although we may think of all these particles as dust, some of them are biological in origin. They come from plant and animal material. Some of the biological contaminants

are pollen from plants, mold spores, animal dander, insect parts, human skin cells, bacteria, and viruses.

It is the biological contaminants that are most likely to cause allergic reactions in the people exposed to them. People with allergies may be sensitive to dust mites, mold, pollen, or their pets—most often cats. These people experience such symptoms as sneezing; runny nose; watery, itching eyes; wheezing and difficulty breathing; skin rash and itching; headache, eye and throat irritation; nausea; dizziness; and fatigue.

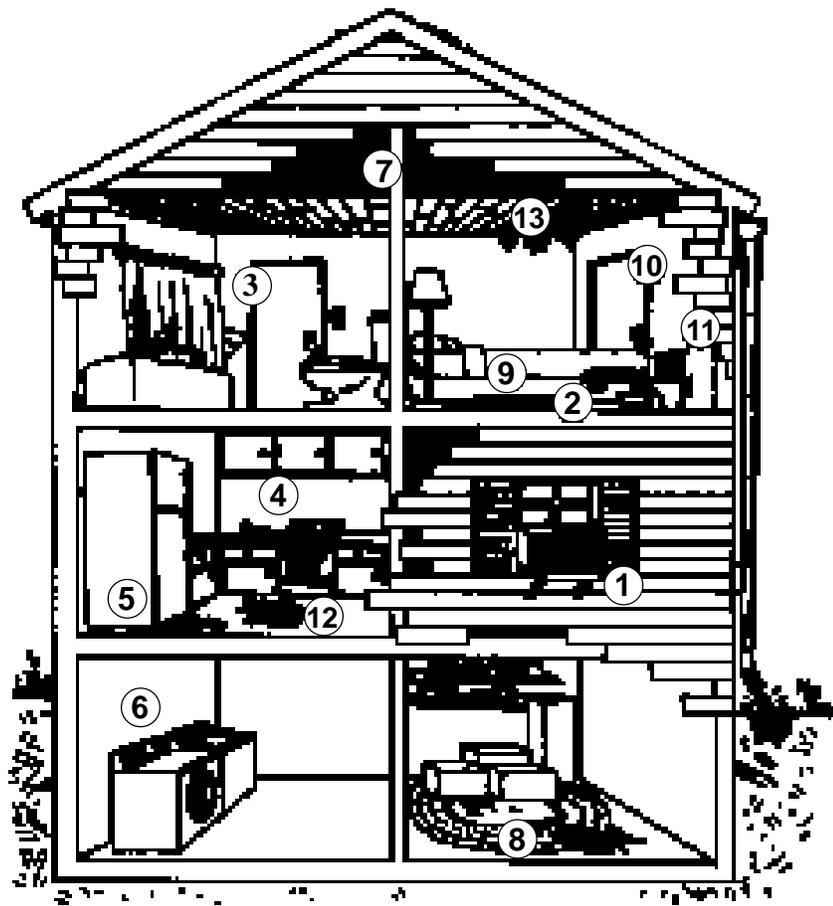
The most severe reaction to allergens is an asthma attack which can be life threatening. The American Lung Association reports that there are nearly 10 million people in the U.S. with asthma. The number of persons with asthma has been consistently increasing over the last fifteen years. Dust mites have been identified as the single most important trigger for asthma attacks.

The diagram on the following page shows some of the places where biological contaminants may be found in the home.

Many of the places where biological pollutants are found have high humidity levels or moisture associated with them:

- Rooms with humidifiers or unvented combustion space heaters.
- Bathrooms, kitchens, laundry rooms, basements, crawlspaces, and places with water leaks or water damage.
- Places where water collects, such as dehumidifiers, refrigerator collection pans, and air conditioning coils, promote the growth of mold and bacteria.
- Areas where there is poor ventilation and cold walls, such as unventilated attics and

“...it [mold] generates mold spores that float through the air, land on other surfaces, and, if the conditions are right, form new colonies.”



### Where Biological Pollutants May Be Found in the Home

- |   |  |
|---|--|
| 1. Dirty air conditioners                 | 8. Carpet on damp basement floor                             |
| 2. Dirty humidifiers and or dehumidifiers | 9. Bedding   |
| 3. Bathroom without vents or windows      | 10. Closet on outside wall                                   |
| 4. Kitchen without vents or windows       | 11. Dirty heating/air conditioning system                    |
| 5. Dirty refrigerator drip pans           | 12. Dogs or cats   |
| 6. Laundry room with unvented dryer       | 13. Water damage (around windows, the roof, or the basement) |
| 7. Unventilated attic                     |  |

Source: *Biological Pollutants in Your Home*. Consumer Product Safety Commission and the American Lung Association, 1990

closets, may have mold growth due to condensation.

- Dirty heating and air conditioning systems can spread biological pollutants throughout the house.
- Dogs and cats are the source of allergens for some people.
- Dust mites thrive in bedding, carpeting, and upholstery, especially when humidity levels are high.

### Mold and Mildew

Mold grows on organic materials such as paper, textiles, grease, dirt, and soap scum. It requires moisture or high humidity. When a mold colony has been established, such as on

a bathroom wall, it generates mold spores that float through the air, land on other surfaces, and, if the conditions are right, form new colonies.

Mold can also grow in standing water, such as in the reservoirs of humidifiers or dehumidifiers. Mist from humidifiers can spread the mold through the house.

Common places to find mold growing are

- Bathrooms where there is no ventilation from an exhaust fan or a window.
- Basements where walls and floors are cool and humidity levels are high.
- Underneath carpeting laid on concrete floors.

- Crawlspace.
- Laundry rooms if the dryer is not vented to the outside.
- Kitchens if large amounts of water are used for cooking without adequate ventilation from an exhaust fan.

Mold can often, but not always, be seen growing on surfaces or textiles and can often be detected by its musty odor. It is the mold spores in the air that cause allergic reactions in sensitive people.

- Mold should be cleaned from surfaces with a disinfectant and the moisture problem should be corrected or the humidity levels should be lowered. If a humidifier is being used and there is visible condensation on windows or walls, use of the humidifier should be discontinued.
- Using exhaust fans in the kitchen during cooking and in the bathroom after bathing and showering helps lower humidity levels.
- Basements may need to be ventilated or a dehumidifier may be needed to lower humidity levels.
- Surfaces that are kept clean and dry are not likely to have mold growth.

### **Dust mites**

Dust mites are microscopic animals found in dust. They need a food source of dead human skin cells and high humidity levels.

Dust mites often thrive in

- Soft furnishings such as bedding, carpeting, and upholstery.
- Stuffed animals in the bedroom.
- Items stored under the bed.

When these textiles are disturbed, such as during vacuuming, making beds, or walking across carpeting, the dust mite parts become airborne. Cleaning the surfaces where dust mite particles accumulate can reduce their concentrations in the air.

People who are sensitive to dust mites may need to replace carpeting in their homes with hard surfaced flooring and use area rugs that can be removed and cleaned.

Although it is important to vacuum often, filter bags on vacuum cleaners allow small particles to go back into the air and may actually raise dust levels in the air.

Vacuums with high efficiency filters and central vacuum systems reduce the airborne dust generated by vacuum cleaning. Allergic

people may need to leave the house during vacuum cleaning or to wear a dust mask.

Humidity levels can be lowered using the same methods as for controlling mold.

- Because bedding provides the optimal environment for dust mites to thrive, wash bedding often with hot water (at least 130 degrees).
- Use plastic coverings on mattresses and pillows.
- Remove stuffed animals and items stored under the bed. And store them in another room.

### **Pollen**

Pollen is plant material that is usually generated by outdoor plants. It enters the house through open doors and windows, through cracks, on shoes and clothing, or can be brought in by pets.

Persons sensitive to pollen may need to

- Keep doors and windows closed during warm weather.
- Use an air conditioner to stay comfortable.
- Do not dry sheets or air bedding out-of-doors when pollen levels are high.

### **Pets**

Persons allergic to pets are sensitive to the animal dander and saliva attached to dander and hair that is shed by their pets. The animal dander and hair accumulate most heavily in places where the animal sleeps such as on upholstered surfaces and carpeting.

When these surfaces are disturbed—as when walking on the carpeting—the particles become airborne.

Allergies to pets may be relieved by

- Removing pets from the home or keeping pets out of bedrooms.
- Wash pets weekly to reduce the allergen level.
- Use of vinyl or hardwood floors instead of carpets to reduce allergen accumulation.
- Wet clean hard surfaces or vacuum clean with a high efficiency filter vacuum or central vacuum system to remove allergens.

### **Bacteria and viruses**

Bacteria and viruses can cause diseases. Infectious diseases are generally passed from person to person through physical contact. They can also contaminate some surfaces, for example bathroom surfaces, and be passed to another person coming in contact with those surfaces.

*“Dust mites are microscopic animals found in dust.”*

*“Cleaning hard surfaces with a soap or detergent solution regularly helps to prevent the growth of biological contaminants.”*

Some bacteria and viruses circulate through indoor ventilation systems, particularly if there is a moisture problem in the system. They can also circulate from humidifiers that are not clean.

## **Cleaning Strategies that Reduce Particulate Contamination**

### **Wet cleaning**

Molds grow on surfaces that have accumulations of dirt, grease, and soap scum on them. Bacteria and viruses can also live for a short time on hard surfaces.

- Cleaning hard surfaces with a soap or detergent solution regularly helps to prevent the growth of biological contaminants. If mold has been found growing on hard surfaces or there is a risk of contamination from disease organisms, surfaces can be cleaned with a disinfectant. Disinfectants are chemical formulations that kill organisms.

A common and inexpensive disinfectant is chlorine bleach. Other types of disinfectants can be found in the cleaning section, and they are specifically labelled as disinfectants. If a disinfectant is needed, read the label to make the right choice and follow the label directions for disinfecting.

- Disturbing the particles on hard surfaces causes them to become airborne. Sweeping or dusting can actually cause higher concentrations of particulate contamination in the air.

Wet cleaning hard surfaces can help reduce the level of particulates that become airborne during the cleaning process. The cleaning procedure used should be appropriate for the type of material.

- Clean portable humidifiers regularly. Without regular cleaning and maintenance, microorganisms can grow in the humidifier's tank and possibly become airborne. These microorganisms have the potential to cause respiratory problems.

Owners should clean humidifiers frequently following the manufacturer's cleaning directions as some units may require special maintenance steps. In general, clean and dry small humidifiers daily. In addition, sanitize small humidifiers every week and larger humidifiers every two weeks.

Empty leftover water and fill with a weak chlorine bleach or peroxide solution (one teaspoon bleach per gallon of water). Let the solution “soak” for 20 minutes, swishing it around the sides every few minutes. Rinse with water and remove any scale or mineral deposits using a soft brush or towel and a vinegar solution.

- Refrigerator drip pans and dehumidifiers should be cleaned and disinfected regularly to prevent the growth of microorganisms.

### **Vacuum cleaning**

Vacuum cleaning can be an important strategy in reducing the level of dust mites, animal dander, and pollen. However, vacuuming surfaces disturbs the particles on the surface and causes the smallest ones to become airborne.

Research has shown increases in the level of airborne dust concentrations from 35 to 98 percent after vacuuming. As dust from the surfaces passes through the vacuum cleaner, the filter bag retains only the larger particles and allows the smaller ones to pass into the room air.

Good vacuum-cleaning technique can help reduce the amount of fine particles discharged into the air. The procedure should begin at an edge of the carpet (a doorway, for instance) with the wand of a canister model always working towards uncleaned carpet and the canister behind on cleaned carpet.

- An upright cleaner or horizontally discharging canister cleaner, rather than a cleaner with a downward discharge, reduces disturbing settled dirt particles with the air discharge.
- Some vacuum cleaners are designed with high efficiency (HEPA) filters that remove at least 99.97 percent of the smallest particles in the discharge air. These are more expensive than most filters.
- A central vacuum system with the motor, suction blower, and filter bag located in the basement or garage may solve the problems of portable cleaners. There is no air discharge in the room being vacuumed.

The filter housing may be much larger, allowing high efficiency filtration of the vacuum cleaner discharge air with enough air flow to suck imbedded dirt off a carpet. If the unit is located in a detached garage, the small particles in the discharge air will not reenter the living space.

## Air-cleaning devices

Air-cleaning devices are available with claims of lowering contaminant levels in the home.

According to the Environmental Protection Agency (EPA), "Some controversy exists about whether air cleaners can reduce the allergic reactions produced by larger particles such as pollen, house dust allergens, some molds, and animal dander. Most of these particles are found where they settle on surfaces in the home, rather than in the air. They cannot be removed by an air cleaner unless disturbed and resuspended in the air."

Reducing the levels of these contaminants using the techniques discussed is important before considering an air cleaner.

Air cleaners are available in portable tabletop size, as room-size consoles, and as part of the central heating and air-conditioning system in the home. No universally accepted standards exist for comparing the effectiveness of air-cleaning devices.

In general, cleaners that are part of the whole-house air-handling system are probably more effective in lowering the level of contaminants throughout the house than are smaller cleaners. Consumers should carefully assess any air cleaner being considered before purchasing.

### Duct cleaning

There is currently no conclusive proof that air-duct cleaning is effective in reducing or preventing indoor air problems. The mere presence of dust in air ducts does not mean they need cleaning.

Duct cleaning may be appropriate if an investigation indicates any of the following problems:

- Debris in the ducts that restricts air flow.
- Ducts infested with vermin.
- Visible mold, fungi, or other biological contaminants in the ducts.
- Visible particles spewing from the supply registers.

Other maintenance on the ductwork may help reduce or prevent contamination problems.

- Water leaks into ducts should be stopped to prevent mold and bacteria growth.
- Insulation of the ductwork can reduce condensation problems in ducts that result in contaminant growth.
- Changing the system's filters regularly or switching to a higher efficiency filter may reduce particle contamination.

Duct cleaning can actually increase indoor contamination levels if the procedures are done improperly or carelessly. A competent trained professional should be selected using standard good consumer practices to check them out.

### Summary

Although we have all heard that "cleanliness is next to godliness," there are health reasons for keeping our homes clean. Particles in the air can cause health problems for people with allergies or asthma. Larger particles settle out on surfaces but can become airborne when disturbed. Cleaning surfaces using the strategies discussed above reduces the concentration of particles in the air.

Wet cleaning is effective in reducing airborne particulate levels when hard surfaces are cleaned. Wet cleaning and sanitizing is necessary for removing mold growth. Vacuum cleaning is necessary to reduce particulates on soft surfaces such as carpeting but can result in higher concentrations of airborne particulates unless good cleaning techniques or higher efficiency vacuums are used.

Other methods of reducing contaminant levels may be necessary for persons with health problems such as removing pets or carpeting from the home, encasing bedding in plastic, and frequent laundering of bedding in hot water.

Some types of air cleaners may lower the concentration of particulates in the air but other strategies should be used before investing in air-cleaning equipment.

Duct cleaning is effective only in some circumstances.

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- Residential Air-Cleaning Devices: A Summary of Available Information*. Environmental Protection Agency.
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*"Some controversy exists about whether air cleaners can reduce the allergic reactions produced by larger particles such as pollen, house dust allergens, some molds, and animal dander..."*

# Group Lesson Questionnaire

## At the beginning of the lesson

Ask participants to raise their hands if any of the following five questions are true. Please record below the number of persons raising their hands to each question.

- How many of you have someone with hay fever in your family? \_\_\_\_\_
- How many have a family member with asthma? \_\_\_\_\_
- How many have a family member allergic to pets, dust mites, mold, or pollen? \_\_\_\_\_
- How many think people have more allergies these days than in past times? \_\_\_\_\_
- How many of you who have family members with allergies use some strategies to reduce the allergen levels? \_\_\_\_\_

## At the end of the lesson

Ask participants to raise their hands if they would answer "yes" to any of the following questions. Record the number of yes answers.

- If you have a family member with allergies or asthma, do you plan to make any changes in your cleaning strategies to help reduce the allergen level? \_\_\_\_\_
- What changes do you plan to make? Ask a few of those who raise their hands what they plan to do and record the comments here.
- Do you plan to pass this information along to someone you know who might need it? \_\_\_\_\_  
If yes, who do you plan to give it to? Record their responses here.

## After the lesson

Please fill in the following information and tear off or copy this page. Return this questionnaire, with the marked responses, to Marilyn Bode, Extension Housing Specialist, 215 Justin Hall, Clothing, Textiles, and Interior Decorating, Kansas State University, Manhattan, KS 66506.

- Number of participants in each age group? \_\_\_\_\_ 18-24 years \_\_\_\_\_ 25-40 \_\_\_\_\_ 41-55  
\_\_\_\_\_ 56-65 \_\_\_\_\_ 66-75 \_\_\_\_\_ 76-88 \_\_\_\_\_ 89 or older
- Number of participants of each sex? \_\_\_\_\_ Male \_\_\_\_\_ Female
- Type of group (FCE, youth group, civic group, etc.): \_\_\_\_\_
- County: \_\_\_\_\_
- Date of program: \_\_\_\_\_
- Your name and telephone number:

Name \_\_\_\_\_ Telephone (\_\_\_\_) \_\_\_\_\_



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*Developed in consultation with the Kansas Association for Family and Community Education Educational Committee.*