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The Invisible Environment Fact Sheet Series

Indoor Air Quality: Dust and Molds

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Introduction

Every day we are exposed to any number of environmental pollutants that each poses a different level of risk towards our health and well-being. Some of these risks are completely unavoidable. Some we either don't consider to be harmful enough or we simply choose not to correct them because of the amount of effort it may take to do so. However, others are completely avoidable and controllable if we choose to make the correct decisions in reference to our lifestyles. Poor indoor air quality is one such risk that can be controlled and in many cases removed completely.

Current research has shown that people spend approximately 90 percent of their time indoors. There is also growing evidence that indicates that indoor air, not only within office buildings, but within our homes as well, can be more polluted than the air in the largest of our cities. What this boils down to is that, for many people, health risks due to air pollution may be greater indoors than outdoors. This also means that, unfortunately, those who would be affected adversely by air pollution are also the same people who spend most of their time indoors—the very young, the elderly, and those suffering from respiratory or cardiovascular disease.

The good news is that, with the proper education and making the correct choices, indoor air quality can be improved. This fact sheet examines common contaminants, their sources and what to be aware of in your home, the short and long term health effects, how to improve the air quality in your home, and future prevention.

Common Pollutants and Their Sources

The types of contaminants and the amounts that are suspended in the air determine air quality. Potential sources of indoor air quality fall into several categories. The pollutants that fall into these categories are noticeably part of our daily routines. They are as follows:

1. Combustion sources:
 - oil, gas, kerosene, coal, wood, and tobacco products
2. Building materials and furnishings:
 - deteriorated insulation that could potentially contain asbestos
 - wet or damp carpet
 - furniture or cabinetry made of certain pressed wood products
3. Household products:
 - cleaning products (furniture polish, air fresheners, etc.)
 - personal care products (hair spray, shoe polish, perfumes, etc.)
 - office and hobby products (paint, glue, markers, spray adhesives, etc.)
4. Household appliances and systems:
 - Unvented stoves, furnaces, or space heaters
 - central heating and cooling systems
 - humidification devices
5. Outdoor sources that make their way inside:
 - radon
 - pesticides
 - general outdoor air pollution

One of the most common sources of indoor contaminants occurs naturally, comes from living organisms, and is undeniably present in some form in the majority of households. This category of contaminants is commonly referred to as “house dust.” House dust is produced inside from several different sources:

1. The breakdown and release of plant and animal materials used in the home. These contaminants include such items as feathers, cotton, wool, and animal hairs. They come from clothing, carpets, and furniture.
2. The disintegrated stuffing material from mattresses, pillows, quilts, and upholstered furniture. Continued use causes fibers found in these items to weaken and eventually break down into small enough particles that can be inhaled.
3. Human skin scales, animal dander, insect parts from cockroaches and dust mites, saliva, molds and mildew, bacteria, and viruses are all released into the air as people go through their daily activities. Just walking across the floor—carpeted or bare wood—can stir up a myriad of pollutants into the air.
4. Other contaminants are considered to be deliberately introduced into the indoor environment. These include tobacco smoke, cosmetic and baby powders, powdered laundry detergents, and various aerosols.

While this information seems daunting, the good news is that current construction practices can trap pollutants that normally form inside the house along with those that are brought indoors through everyday traffic through improved air exchange rates. These systems improve the amount of outdoor air that replaces indoor air. In older systems, this replacement was limited and resulted in increased pollutant levels.

Dust Mites

Dust mites (*Dermatophagoides farinae*) are microscopic spiderlike insects found everywhere. They are thought to be the principal irritant found in house dust when inhaled by sensitive people. During warm weather, when the humidity is above 50 percent, they thrive and produce waste pellets. They live about 30 days and the female lays approximately one egg each day. In less than ideal conditions, they can go into dormancy. When they die, their bodies disintegrate into small fragments that can be stirred into the air and inhaled by people in that environment.

Molds in Our Environment

Molds play an important part in life cycles. They assist in the rotting of organic materials, playing a key role in the breakdown of leaves, wood, and other plants. Some molds are beneficial, such as penicillin and others that cure illnesses. Other molds are not so good and can cause illnesses and food to spoil.

Molds can live for years in dormancy. They produce spores to reproduce and all these spores need to thrive is moisture, warmth, still air, and a food source. When homes are clean and dry, these spores remain dormant and don't become problematic. When the humidity begins to increase (seasonally) or there is any leak or seepage in basements, the spores begin to bloom and grow. So, the ultimate prevention for mold is controlling moisture in the home.

Molds can also produce toxic substances. These are called mycotoxins and over 200 have been found in common molds. Although little information is really known about these toxins, they are known to affect human health. Take note that some molds only produce mycotoxins under certain environmental conditions, so just because mold is present does not mean that mycotoxins are present.

Molds are measured in particles per cubic meter (pcm), which translates into the number of spores in a one-meter cube of air. A mold count of 0–500 particles pcm is considered low, 500–1500 particles pcm is moderate, and a count of 1501 and greater is considered high. Mold problems are obviously higher in the summer than in the fall and winter.

Molds and Health

Molds affect people in different ways. Reactions include headaches, breathing difficulties, skin irritations, and the most common—allergic reactions. These effects may be immediate, but more often than not, they don't show up for years and are usually a result of continued exposure. The severity of the health effects is, in part, dependent upon the types of mold present in the environment, the level of sensitivity a person has, a person's age, and the length of exposure. People with weakened immune systems and allergies are especially susceptible.

Improving Indoor Air Quality and Prevention of Mold

Improving indoor air quality is important and can be done if people know what causes problems to begin with. Here are some tips:

- Unless the room is well ventilated, avoid the use of aerosols, adhesives, and cleaning products that may release small particles into the air.
- Clean the source producing any sort of pungent, sour odor and ventilate the area. Don't use deodorizers—you are not only masking the odor (not eliminating it) but adding more pollutants into the air.
- Use unscented cosmetic, toiletry, cleaning, and laundry products.
- Wear rubber gloves, long pants, long sleeved shirts, and a dust mask when conducting an activity that may stir up dust in the air.

- Properly maintain flues and chimneys of furnaces, hot water heaters, and fireplaces to keep smoke from entering the living areas of homes.
- Check and clean refrigeration equipment annually to be sure the air intake and exhaust systems are working correctly.
- Avoid stove fans and other filter systems that recirculate air rather than exhaust it to the outside of the home. If these systems cannot be avoided, then make sure you keep their filters very clean.

As stated above, the most efficient preventative for mold growth is to control moisture. There are several specific things to look out for and areas that tend to be problematic. Here are some tips to follow to avoid mold growth:

- Fix leaky plumbing as soon as it is detected.
- Watch out for wet spots and condensation.
- Reduce the moisture level in the house by increasing ventilation and circulation, repairing leaks, and improving insulation. Use a dehumidifier if necessary.
- Keep heating, ventilation, and air conditioning drip pans clean, flowing, and unobstructed.
- Make sure to vent clothes dryers to the outside.
- Indoor humidity should be below 60 percent. The ideal indoor humidity should be 30–50 percent.
- Clean and dry wet or damp spots as soon as possible—at least within 48 hours.
- Provide proper outside drainage—sloping the ground away from the foundation of the house.

Removing Contaminants and Mold

To remove and control air contaminants, follow the following tips:

- Filter the air in your home. There are mechanical filters available with disposable fiberglass filters. These should be changed monthly. The most effective mechanical filter is a high-efficiency particulate (HEPA) filter.
- Encase mattresses and box springs in airtight covers after vacuuming them.
- Replace comforters and pillows made with down feathers, kapok, and cotton with ones made with synthetic fibers such as Dacron and Orlon.

- Wash bedding weekly in hot water (130 degrees F to kill dust mites). Wash comforters and pillows regularly. Replace synthetic pillows every two or three years.
- Carpeting laid over concrete floors tends to have more dust mites because of increased humidity. Replace the carpeting with hardwood or linoleum.
- Wash scatter rugs and furniture covers regularly.
- Use high-quality vacuum bags and change them frequently. Wet-mop or wet-wipe hard surfaces such as floors, walls, and ceilings.

There are many different types of mold. Some are easy to clean up and remove; others are not. There are generally four methods for mold growth removal depending on the severity, type of mold, and what it is growing on. For more specific information, please see the EPA's web site at www.epa.gov/mold. Always protect yourself with gloves, full-body clothing, and a mask when dealing with mold growth.

- Method 1—Wet vacuum (mold spores may remain in some porous fabrics but will not grow if the material is completely dried). Steam cleaning is an alternative for carpets and some upholstered furniture.
- Method 2—Damp-wipe surfaces with plain water or with water and detergent solution (except use wood floor cleaner for wood); scrub as needed.
- Method 3—High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in plastic bags and seal.
- Method 4—Discard item completely. Remove item, seal in plastic bag, and dispose of properly. HEPA vacuum the area after it has dried.

Conclusion

Although dust and molds are natural and commonly found both indoors and outdoors, they can cause illness and allergic reactions for those who are sensitive. While total elimination of these invisible contaminants is unrealistic, there are many ways to control the amounts that are present. Simple housekeeping habits and home maintenance practices can make a difference.

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