

Healthy Home, Healthy Body. Are Our Homes Making Us Ill?



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Indoor Environment, Air Quality and Health

The quality of a given indoor environment is affected by ambient air quality, ventilation, building materials, furnishings and consumers products, in addition to occupants' behavior including tobacco smoking. Since indoor air may be 2-5 times more polluted than outside air, according to the U.S. Environmental Protection Agency

(EPA), this raises great health concerns due to the fact that most individuals spend more than 90% of their time indoors. The term "Indoor Air Quality" (IAQ) refers to the environmental characteristics inside buildings that may affect human health, comfort, work or school performance. Exposure to particulate matter, dust and sand particles, chemicals, combustion products and dampness, in addition to molds, indoor allergens and other biological agents can lead to poor indoor air quality which has been linked to classic symptoms such as eye, nose and throat irritation, cough, chest tightness, headaches, dizziness and fatigue. The long term effects of chronic exposure however is especially important as poor indoor air quality has been associated with allergies, asthma and other respiratory diseases, in addition to heart disease, neurological conditions and even cancer.

Biological Indoor Pollutants

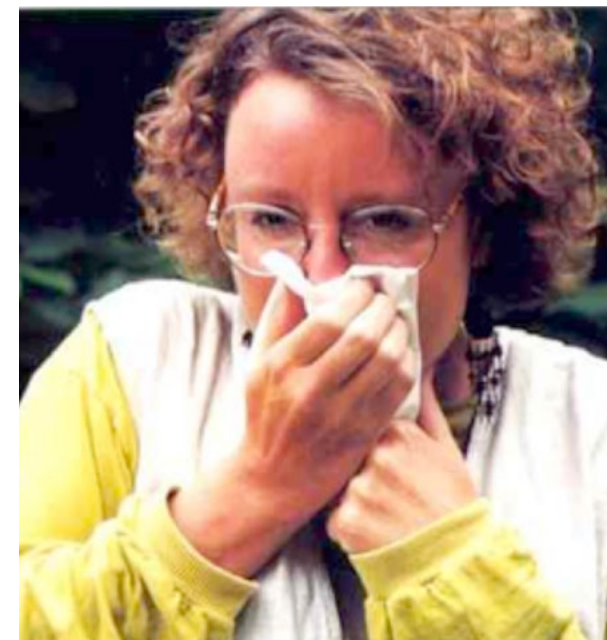
Biological air pollutants are found to some degree in every home, school, and workplace. Sources include outdoor air and human occupants who shed viruses and bacteria, animal occupants (mites, insects and pets) that secrete or shed allergens, and indoor surfaces and water reservoirs where fungi and bacteria can grow. A number of factors allow biological agents to grow or multiply and become airborne. Especially important is high relative humidity and dampness which encourage house dust

mite populations to increase and promotes fungal or mold growth. Components of mechanical heating, ventilating, and air conditioning (HVAC) systems may also serve as reservoirs or sites of microbial amplification.

Health Problems

Biological agents in indoor air are known to cause three types of human disease: **infections**, where pathogens invade human tissues; **hypersensitivity diseases**, where specific activation of the immune system causes disease; and **toxicosis**, where biologically produced chemical toxins cause direct toxic effects. Poor indoor air quality and microbial or particulate contamination in buildings has been implicated as the cause of a group of nonspecific symptoms known as "**sick building syndrome**". Some pollutants in the air are especially harmful for children, elderly people, and those with health problem and adverse health effects from indoor air pollutants may be experienced soon after exposure or, possibly, years later.

A major concern associated with exposure to biological pollutants is allergic reactions, which range from rhinitis, nasal congestion, conjunctival inflammation, and urticaria to cough, chest tightness, shortness of breath and asthma. Notable triggers for these diseases are allergens derived from house dust mites, cockroaches, pets (cats, dogs, birds, rodents), molds, and protein-containing furnishings, including feathers, kapok, etc. In occupational settings, more unusual allergens (e.g., bacterial enzymes, algae) have caused respiratory and asthma epidemics.



Allergies, Asthma and Indoor Air Quality

Millions of people suffer from allergies and their complications, and their prevalence is increasing dramatically worldwide. Approximately 20%-35% of the world's adult population and up to 45% of children are affected by some form of allergy. Respiratory allergies in particular have a significant impact on the quality of life of patients and their families. Common allergic conditions include those affecting the nose, eyes and sinuses (**Allergic Rhinitis, Conjunctivitis and Sinusitis**), and the airways (**Allergic cough and Allergic Asthma**).

Both outdoor (pollen, molds) and indoor (dust mite, pet dander, molds) allergy-causing proteins (allergens) may be responsible for respiratory allergy. In conjunction with poor indoor air quality and pollution, allergy symptoms have become more common and sometimes difficult to control with medical treatment. This has now been recognized worldwide as a major co-factor for the increasing rates of allergic conditions.

Along with medical treatment prescribed by your physician or allergy specialist, improving your indoor air quality and controlling allergen exposure should result in significant reduction of symptoms and better control of your allergies.



Chemical and Particle Pollution

In addition to biological pollutants, another major cause of poor indoor air quality is **gases and particles** released into the air by pollution sources. Inadequate ventilation and air exchange greatly enhances this problem by increasing their concentration in the breathable zone.

Sources of chemical pollutants (gases and vapors) include emissions from products used in the home, school or office (e.g., office equipment; furniture, wall and floor coverings; pesticides; and cleaning and consumer

products), accidental spills of chemicals, products used during construction activities such as adhesives and paints and their emitted gases such as formaldehyde and volatile organic compounds (VOC's) in addition to products of combustion such as carbon monoxide and nitrogen dioxide.

“Particulate matter,” also known as **particle pollution or PM**, is a complex mixture of extremely small particles and liquid droplets. These tiny particles are composed of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. PM is solid or liquid, non-biological substances that are light enough to be suspended in the air for prolonged periods.

Particle pollutants can be drawn into the building from outside or can be produced by activities that occur in buildings such as construction, sanding wood or drywall, printing, copying, and operating equipment. **The size of particles is directly linked to their potential for causing**



health problems. Particles less than 10 micrometers in diameter (PM10) or less than 2.5 micrometers (PM2.5) are small enough to enter the lungs and ultrafine particles less than 0.1 microns can even get into the blood stream, potentially causing serious health problems.

Common Indoor Pollutants and Potential Sources

Pollutant	Sources
Environmental Tobacco Smoke	Lighted cigarettes, cigars, pipes
Combustion contaminants	Furnaces, generators, gas and kerosene space heaters, tobacco products, outdoor air, vehicles
Biological Contaminants	Wet or damp materials, cooling towers, humidifiers, cooling coils or drain pans, damp duct insulation or filters, condensation, re-entrained sanitary exhaust, bird droppings, cockroaches or rodents, dust mites on upholstered furniture or carpeting body odors
Volatile Organic Compounds (VOCs)	Paints, stains, varnishes, solvents, pesticides, adhesives, wood preservatives, waxes, polishes, lubricants, sealants, dyes, air fresheners, fuels, plastics, copy machines, printers, tobacco products, perfumes, dry cleaned clothing
Formaldehyde	Particle board, plywood, cabinetry, furniture, fabrics.
Soil gases (radon, sewer gas, VOCs, methane)	Soil and rock (radon), sewer drain leak, dry drain traps, leaking underground storage tanks, land fill
Pesticides	Termiticides, insecticides, rodenticides, fungicides, disinfectants, herbicides
Particles and Fibers	Printing, paper handling, smoking and other combustion, outdoor sources, deterioration of materials, construction/renovation, vacuuming, insulation

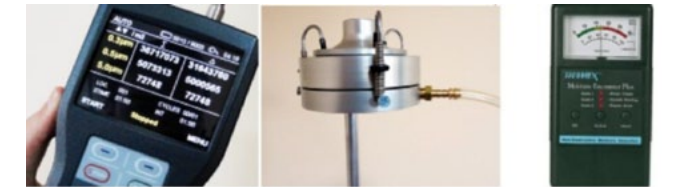
Indoor Air Quality Evaluation and Remediation

Given its potential adverse health effects, it is fundamental to improve the quality of air in one’s personal environment, be it home, work or school. In addition to indoor sources, indoor air quality is greatly affected by outdoor environmental sources of air pollution. Since the quality of outdoor air is not readily controllable on an individual level, attempting to protect our indoor environment and purifying as much as possible the air we breathe is a sensible decision and a healthy objective.

Identifying the type and source of indoor air pollution, measuring it quantitatively, removing its sources, and eliminating or reducing its levels or concentration is an essential step towards improving indoor air quality.

Environmental Control Measures

As your Physician or Allergy Specialist may instruct you, reducing exposure to the actual triggers is a fundamental component in the overall strategy of treating allergic disease. Studies have shown strong evidence for the role of indoor allergen exposure such as dust mite in triggering the development and persistence of respiratory allergy. House dust mites and their products are present on a daily basis, year-round and contain allergens responsible for allergy symptoms in susceptible individuals. It is therefore vital to control and reduce exposure to house dust mites and their particles if you are allergic to them. Your physician or allergy specialist can perform specialized skin or blood allergy tests to identify if and which allergens are responsible for your symptoms.

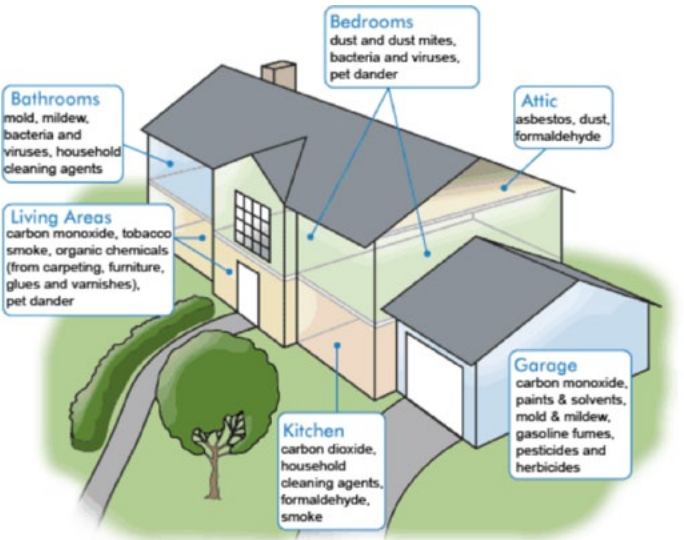


House Dust and Dust Mites

“House dust” contains a variety of elements including animal dander, indoor molds, fibers, organic and food particles, insect parts, and debris from mites and insects. “**House Dust mite**” is a special type of mite (thousands of mite species exist) that lives in house dust but it is **not an insect**.

Although It has long been recognized that dust from carpets and bedroom furnishings is an important trigger

of allergies and asthma, it was not until 1967, that European investigators indentified the house dust mite (*Dermatophagoides pteronyssinus*) as a highly allergenic fraction of house dust. Other closely related species of house dust mites have since been identified and are found in all almost all homes and regions of the world. It is now possible to identify house dust mites and measure their allergen level, as quantification has important risk implications for sensitization as well as symptoms.



Dust Mites, Their Allergens and Bedding

A person’s bed is said to be the dust mite’s palace. Dust mites need three things to survive: body’s heat, moisture and food from shed skin. All three conditions are present in mattresses, pillows, bed sheets and blankets. Hundreds of thousands of dust mites live in and on them along with the millions of their allergens found in their waste products. People are most vulnerable to the allergen at night, in bed. When we sleep we have our faces resting on a pillow, our bodies on a mattress, and we are “immersed” in bed mite territory; we are taking in dust mite allergen with every breath.

House Dust Mites are tiny, eight legged microscopic creatures that measure about 0.4 millimeters long and are invisible to the naked eye. They primarily live on dead skin cells regularly shed from humans and depend on humidity and high temperature to survive. Dust mites don’t carry diseases and are harmless to people unless they are allergic to their secretions. **Ironically, it is not the dust mite that most people are allergic to; it is their fecal pellet** which is produced by a house dust mite at a rate of about 20 pellets per day.

Dust Mite Allergen Control Methods

House Dust Mite control methods have to be comprehensive in order to be effective and as such effective control of house dust mite infestation depends on the use of three methods:

1. Removal of sources or conditions that promote dust mite growth
2. Physical Barriers such as mattress, pillow and other bedding encasings
3. Chemical methods that kill the dust mite or denatures the protein.

For mite allergic individuals, it is recommended that home relative humidity be lower than 50%. In addition to reducing indoor relative humidity, removing sources of house dust mite growth such as stuffed animals, thick carpeting and upholstery furniture from the bedroom is necessary for optimum results. Vacuum cleaning, while important, is not effective alone in reducing dust mites and allergen levels. However in conjunction with chemical acaricides, it can have effective short-term remedial strategies.



Things you can do to keep dust mite levels low in your bedroom

Enclose mattresses, duvets, comforters and pillows in dust-proof covers. These covers may be washed every few months.

Wash bedclothes in hot water (more than 55 degrees Celsius) once a week. If you can't wash in hot water, use a commercial product formulated to kill dust mites in cold water.

Air pillows and bedding in sunlight for a few hours each week.

Clean non-carpeted floors with a wet or electrostatic mop rather than using a vacuum cleaner.

Clean carpets weekly with a vacuum cleaner that has a suitable filter such as a HEPA (High Efficiency Particulate Air) filter. However, even this type of filter briefly increases the amount of house dust mite allergen in the air after vacuuming. It's therefore best if the allergic person does not vacuum and does not enter the room for 20 minutes after it has been vacuumed by someone else.

Get a ducted vacuum cleaner, if practical and affordable, with an exhaust pipe opening to the outside of the house.

Dust surfaces with a damp or electrostatic cloth 2–3 times weekly.

Remove fluffy, stuffed toys from your child's bedroom. Although putting this type of toy in the freezer overnight once a fortnight can kill mites contained in the toy, this does not remove the allergen. Washing these toys in hot water once a week is the best approach.

Remove soft, upholstered furniture from the bedroom.

Select furniture that is upholstered in vinyl or leather rather than cloth.

Ensure good ventilation throughout your house to avoid moist air build-up, which occurs with cooking, bathing, showering and, more simply, as a result of people breathing inside the house.

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