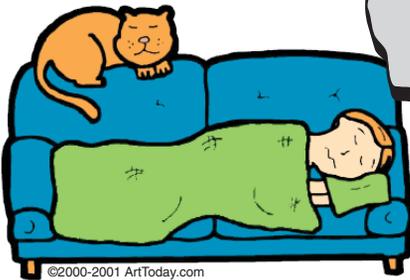


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Do You Need to Clear the Air?

INDOOR AIR QUALITY AND YOUR FAMILY'S HEALTH

Acting on indoor air quality problems is all about feeling better. Coughing and sneezing may be familiar reactions to the plants and dust outdoors, but we can experience these same allergic reactions because of air pollutants in our homes. Indoor air pollution may be just as bad as outdoor air pollution—or worse. Indoor air pollutants can cause problems ranging from mild annoyances to severe illnesses and even death. By checking your home for sources of indoor air pollution, you can partially or wholly eliminate health problems that may be causing distress for family members.

In the early 1970s, researchers measuring industrial air pollution found in some cases that indoor home air pollution levels were higher than those outdoors.¹ Ironically, the techniques invented to increase a home's energy efficiency have some-

times been major contributors to hazardous indoor pollution. Some cheaper, more effective textiles and building products have been found to emit potentially irritating gases. Almost airtight homes limit the exchange between outdoor and indoor air, trapping indoor pollutants. In addition, we've adopted a service and information economy, in which most of us spend more than 90 percent of our time indoors. These factors have made indoor air quality a matter of importance and concern.

Many types of indoor air pollution may exist in our homes. Improved air filters, efforts by household product manufacturers to decrease product emissions into the air, and improvements made in the building industry will make a difference for families living in houses built in the future. However, we need to focus on existing problems for families living in houses built during this past century—particularly

families occupying older structures.

Symptoms of indoor air pollution, physiological as well as psychological, may include allergic reactions, bacterial and viral infections, or (in extreme cases) damaged organs and tissues.

Irreversible damage to liver, lungs, central nervous system,

WARNING SIGNS OF EXPOSURE TO INDOOR AIR POLLUTANTS:

- headache
- irritation to eyes, nose, and throat
- dry mucous membranes and skin
- respiratory and airway infections
- coughing, wheezing, sneezing, hoarseness, difficult breathing
- nausea
- dizziness
- watery eyes, runny nose
- fatigue
- severe joint pain
- skin rashes
- insomnia
- anxiety
- depression
- unspecified hyperactivity

Asthma information

- asthma is more common in boys than in girls
- asthma narrows or blocks the airways
- common triggers of asthma attacks include cold air, exercise, and allergens
- symptoms may include wheezing, chronic cough, shortness of breath, and tightness in the chest

Asthma and Allergy Foundation of America, "What you should know about childhood asthma," Online: www.aafa.org (4/19/01).



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digestive tract, and immune system are linked to some indoor environmental contaminants.² Increasing numbers of children have asthma, which may be caused or aggravated by exposure to indoor air contaminants. Asthma, a chronic inflammation in the airways of the lungs, causes wheezing and shortness of breath. It is now the most common chronic illness among children and the leading cause of school absences.

Many factors have been linked to the onset of asthma. Although genetic factors can increase a child's risk for asthma, environment and lifestyle seem to be major contributors. The current tendency for families to spend more time indoors increases exposure to household pollutants. Smoking or exposure to tobacco smoke, lack of exercise, and obesity are also associated with asthma.³

The potentially serious health problems that indoor air pollution can cause suggest that we check our homes for the several categories of pollutants that may be in an

"unhealthy house."

LIVING POLLUTANTS

Some triggers of asthma, allergies, and other indoor pollution-related problems are biological contaminants in the home, including dust mites, molds and mildews, animal dander (hair, feathers, skin cells), and cockroaches. Allergies caused by these pollutants may lead to asthma over time.⁴ Older homes and poorly kept homes are prime residences for some of these allergens.

Mold and mildew are particularly common in humid areas. Leaking roofs, windows, walls, foundations, and other water damage near a home's plumbing fixtures are hosts for allergic, toxic, and opportunistic molds. Also, nearly 40 percent of asthmatic children are allergic to cockroach droppings and body parts. Dust mites, visible only through a microscope, are found in dust and thrive on dead human skin cells. They live in textiles,

such as older carpets, upholstered furniture, beds, pillows, linens, and stuffed animals. When these textiles are disturbed—during sitting, sleeping, walking, or cleaning—dust particles become airborne and problems occur, especially in homes with dirty or no air conditioning, dehumidifiers, or ventilation systems.⁵

Controlling or eliminating the sources of indoor air pollution can diminish many symptoms. Housecleaning is most effective. Dusting, vacuuming, washing bedding each week in hot water, getting rid of plants and stuffed animals, and finding new homes for pets are effective ways to control indoor pollution. Improved air-filtration systems for use in furnaces, air conditioners, vacuum cleaners, and air filters can help control biological exposures. HEPA (high-efficiency particulate-arresting) air filters on air purifiers and vacuum cleaners effectively remove 95-99.97 percent of all pollen, mold spores, animal hair and dander, dust mites, bacteria, smoke particles, and dust from the air they process. Vacuum cleaners with multi-stage filtration systems and double-wall disposable inner bags are helpful,



especially if the bag is changed when half full. If possible, a central vacuum system, which removes collected material but doesn't require that someone be exposed to the collected allergens in a vacuum bag, should be installed in the home. Carpets should be vacuumed twice a week, upholstery and mattresses twice a month, and carpets and upholstery should be cleaned by certified professionals twice a year. If pets must remain in the home, their areas should be cleaned and vacuumed daily to weekly. Hard surfaces should be cleaned and disinfected daily to weekly, depending on location and use.⁶ Electrostatic filters (which attract dust and particles) on furnaces are also effective. The use of impermeable fabric mattress and pillow casings (which do not allow dust, particles, or dust mites through) and electrostatic filters over vents will reduce exposure to biological pollutants.

LEAD DUST

Children living in older

Essential vacuum cleaner features

- strong suction (higher ANSI* number=stronger suction)
- good mechanical action—strong brushes
- a HEPA filter to remove spores, pollen, dust mites, etc.
 - double-wall or 'hypoallergenic' disposable bag
 - Carpet & Rug Institute (CRI) effective soil removal tag

*American National Standards Institute

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homes are at high risk for ingesting lead-contaminated dust or paint chips. Lead was used in house paint until 1978 as a pigment and drying agent. Before 1950, paint contained as much as 50 percent lead. Today, an estimated 74 percent of homes in the United States have some lead-based paint. Lead was also used for years in plumbing and fixture melding. Many homes with older plumbing have lead traces in the water that are consumed through cooking and drinking.

Small amounts of lead dust can accumulate in the body over time; its effects are irreversible. In young children (ages 0-6), lead build-up in the body attacks the central nervous system and can cause delayed development, specifically manifested in reading and learning problems, lower IQ, hyperactivity, and discipline problems. Large doses of lead can cause high blood pressure, anemia, and kidney and reproductive disorders in both children and adults. Untreated lead toxicity can cause convulsions, coma, and death.

Lead paint in good condition, left alone, should not pose a hazard. The danger

is in peeling and cracked paint, which should be tested for lead with kits available at home centers or through professional detection services. Good housekeeping and sanitation practices, such as damp mopping and frequent washing of children's hands and toys, are helpful. Lead paint is best removed from a home by a professional.⁷

FORMALDEHYDE AND OTHER VOLATILE ORGANIC COMPOUNDS

Formaldehyde, a preservative and adhesive, is used widely in the building and home-furnishing industries. Particleboard products are the major contributors of formaldehyde emissions in the home environment. Formaldehyde is also found in carpet, plywood, laminated furniture, cabinets, and some permanent-press fabrics. Although formaldehyde is commonly used, there are many volatile organic compounds (VOC) with similar irritating effects on some people. They are used in paints, varnishes, carpets, low-priced furniture, and many other products and emit gases that can form ozone and other inflammatory or toxic gases.

High humidity and temperatures increase these emissions. Good ventilation in the home is important when new sources of formaldehyde or other VOC are brought into

The Unhealthy House

the house. Formaldehyde emissions generally decrease as products age.⁸

The indoor air environment in churches, schools, and other public buildings may be uncomfortable for those who are sensitive to formaldehyde and VOC product emissions. These buildings are often closed for many days, allowing build-up of product emissions, particularly from carpets and textile wallboards used to enhance acoustics. When people enter buildings that have been closed up, the humidity levels in the building increase, and so do formaldehyde and VOC emissions. Then emissions from dry-cleaned or permanent-press clothing, along with perfume (in which formaldehyde is used as a preservative) can make a toxic indoor air environment for some. Common complaints from those sensitive to formaldehyde and VOC are headaches, watery eyes, or burning eyes, nose, or throat. The solution to the presence of product emissions in seldom-used buildings is to air them out before they are used.

Products low in formaldehyde and other volatile organic compounds are often labeled as such. The Carpet & Rug Institute attaches a CRI “green tag” to floor coverings with low amounts of volatile organic compounds.

RADON GAS

Radon is an odorless

radioactive gas created from the natural breakdown of uranium in the soil and rock beneath a house. Some areas have high amounts of radon; others have little or none. Radon is a health concern because it continues to decay into solid radioactive elements, which the Environmental Protection Agency estimates may be a factor in thousands of cancer cases and related deaths each year. Radioactive products of radon attach to dust in the air and are inhaled by home residents. Radon can also contaminate groundwater and be inhaled with steam from bathroom showers.

Today, radon-resistant features are being included in the construction of new homes. Houses are being built with vents that allow radon gas beneath the foundation to be released into the atmosphere. Energy-efficient homes built during the 1950s-1990s were not built with radon-venting features. As a result, radon gas can seep through cracks in the foundation and build up inside the house. An estimated one out of every fifteen homes in the United States has radon levels above the Environmental Protection Agency’s recommended action level. Houses built before the 1950s generally are not at risk because they tend to be poorly insulated.

The local or state public health department can tell you whether radon levels are a concern in your area and, if they

ATTIC

1. Dirty air conditioner
2. Unventilated attic
3. Water damage (mold and mildew)
4. Insulation (formaldehyde)

BEDROOM

5. Dirty humidifiers or dehumidifiers
6. Bedding (flame retardant finishes or dust mites)
7. Closet on outside wall (mold and mildew)
8. Pressed board furniture (formaldehyde)
9. Moth repellents
10. Dry-cleaned clothing
11. New paint
12. People viruses and bacteria

BATHROOM

13. No vents or windows
14. Air fresheners
15. Vaporized water chemicals
16. Scouring cleaners

LIVING ROOM / FAMILY ROOM

17. Dirty heating / air conditioning system
18. Dogs, cats, or birds (animal dander)
19. Dust mites
20. Tobacco smoke
21. Carpets
22. Pressed wood sub-flooring
23. Draperies (formaldehyde)
24. Fireplace (combustion gases)
25. Flowers or plants (pollen, mold)

KITCHEN

26. No vents or windows
27. Dirty refrigerator drip pans
28. Household chemicals
29. Asbestos floor tiles
30. Pressed wood cabinets
31. Unvented gas stove
32. Cockroach parts
33. Continuous cleaning oven fumes

UTILITY / LAUNDRY / FURNACE ROOM

34. Unvented clothes dryer
35. Asbestos pipe wrap
36. Detergents, spot cleaners

GARAGE / STORAGE

37. Stored fuels
38. Car exhaust
39. Paint supplies
40. Pesticides
41. Car brakes (asbestos fibers)
42. Lawn mower exhaust

BASEMENT

43. Paneling
44. Wood stove
45. Radon

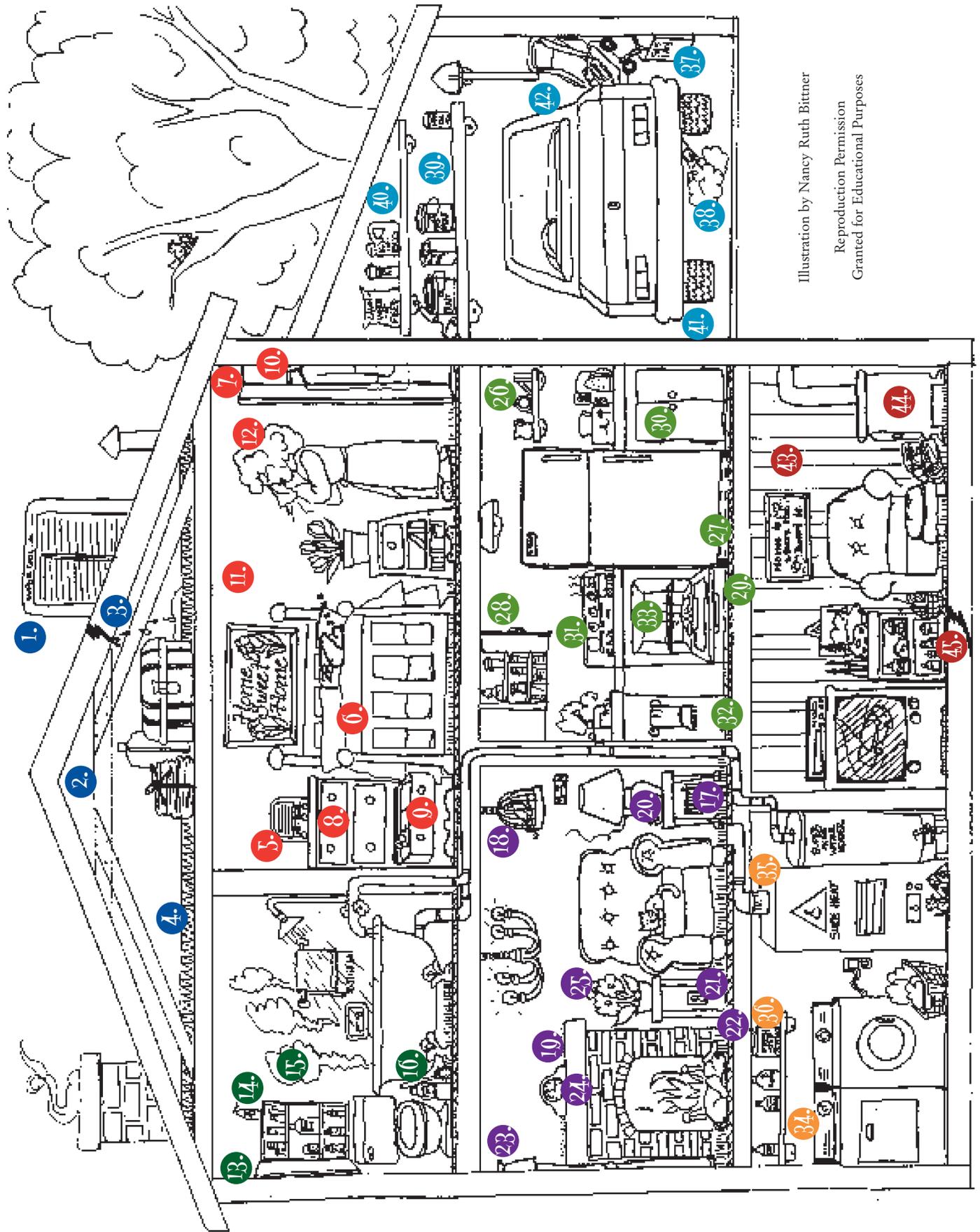


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are, whom the department would recommend to test your home. Radon levels in a house can be monitored, either with a do-it-yourself home detection kit that is sent to a laboratory for analysis, or by hiring a radon monitoring service. Radon levels vary over time; therefore, long-term testing is important. Efforts to lower radon gas levels include sealing cracks in foundation floors and walls and the removal of any ground water that might enter a basement.⁹

ENVIRONMENTAL TOBACCO SMOKE

Environmental tobacco smoke (ETS) can contaminate air throughout the house, regardless of where the smoking occurs. ETS is a complex mixture of more than 4,700 compounds, including both gases and particles, forty-three of which are known to cause cancer. ETS is responsible for approximately three thousand lung cancer deaths in non-smokers each year. Tobacco smoke is a serious health risk for infants and children, whose respiratory systems are still developing. ETS makes asthma worse and is responsible for high rates of lower respiratory irritation, infections, and reduced lung function. Maternal smoking during pregnancy increases the risk of

asthma for the unborn child. ETS has also been associated with Sudden Infant Death Syndrome (SIDS). Children should not be exposed to environmental tobacco smoke. HEPA-filtered air is a must in smoke-filled environments.¹⁰

ASBESTOS

Asbestos, a naturally occurring mineral fiber, has been used for hundreds of years in many ways. From the Industrial Revolution until the 1970s, when the dangers of asbestos began to be recognized, asbestos was used extensively in thousands of household products. Asbestos was added to flooring, ceiling spackle, roofing, siding, pipes, ducts, walls, gaskets, soundproofing, and appliances for strength, acoustical insulation, fireproofing, or thermal properties.

Several potentially fatal diseases are caused by exposure to asbestos. Symptoms from asbestos exposure are sometimes not noticed until 20 to 30 years after the initial exposure. Further, the combination of asbestos with environmental tobacco smoke can increase the risk of some cancers one hundred-fold. The greatest potential for asbestos exposure is in homes built before the 1980s or in homes that have

older household products.

Asbestos products in good condition are usually best left alone. Covering, painting, or repairing some deteriorating asbestos products is possible. Asbestos removal is dangerous and should be completed by a trained professional. Federal regulations concerning asbestos removal do not always apply to private homes; therefore, you should guard against risking the health of family members during remodeling and asbestos-removal projects. Families in older, substandard housing can be at high risk when exposed to deteriorating asbestos products in their environment.¹¹

HOUSEHOLD PRODUCTS

In order to make the home a healthy and functional place, families need to be wise in their choice and use of household products. Pesticides, cleaners, solvents, preservatives, repellants, fresheners, and fuels are all products that can cause undesirable health problems if used improperly. Families should read and heed the warnings on product labels. Household products should be used only for their intended purpose, in well-ventilated areas, and according to manufacturers' directions.¹²

CONCLUSIONS

Sources of indoor air pollution may exist in any home.



Understanding the risks associated with indoor air quality problems and correctly acting upon them can mitigate or control them. Families should identify possible sources of indoor air pollutants and seek health care when poor indoor air quality may be causing problems. Because health-care professionals are not usually experts on indoor air quality, families should become aware of indoor air quality problems and how to treat the “unhealthy house.” Source elimination, proper ventilation, air filtration, and cleanliness are crucial steps in resolving many indoor air concerns. Misinformation and lack of information are the greatest threats to a family facing the hazards of poor indoor air quality.

Numerous government, nonprofit, and commercial agencies produce valuable information on indoor air quality. Much of it is available on the Internet (see

the accompanying box). The Cooperative Extension Service, in particular, has developed a strong educational program on indoor air quality. The challenge is to make effective air filters and other items more affordable and accessible to those who need them the most, as well as convincing families that their use will improve their health and living environment. A thorough understanding of the issues surrounding indoor air quality, coupled with a family’s management of household cleaning and products, can make a significant difference for families and children who may be at risk. mf

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11. J. Laquatra, “Environmental contamination: Asbestos,” *Encyclopedia of Housing*, W. Van Vliet, Ed. (Thousand Oaks, CA: Sage 1988) 144; Consumer Information Center (note 5, above).
12. Consumer Product Safety Commission (note 2, above); American Lung Association (note 10, above); Consumer Information Center (note 5, above).

internet sites—indoor air quality, cleaning the unhealthy house

- Allergy and Asthma Network/Mothers of Asthmatics, Inc. <www.podi.com/health/aaema>
- American Lung Association <www.lungusa.org/air/air_indoor_redux2.html>
- Consumer Product Safety Commission <www.cpsc.gov/cpscpub/pubs/iaq>
- Environmental Protection Agency <www.epa.gov/iaq>
- Federal Consumer Information Center <www.pueblo.gsa.gov/cic_text/housing/indoorair-hazards>
- Montana State University Extension Service <www.montan.edu/wwwcxair>
- National Allergy Supply Co. <www.nationalallergy.com>
- National Asthma Education and Prevention Program of the National Heart, Lung, and Blood Institute <www.nhlbi.nih.gov/nhlbi/nhlbi.htm>
- Soap and Detergent Association <www.sdahq.org>