



Indoor Air Quality

While outdoor air pollution, including vog and smog, is often in the news, indoor air pollution can also be a significant problem. If your home or apartment has poor air quality, it may lead to serious health problems. Some air pollutants, such as carbon monoxide, can even kill you. This worksheet will provide the information you need to identify air pollution sources in your home, provide proper ventilation, and improve your indoor air quality.

Sources of indoor air pollution

Detecting indoor air pollution is tough because many harmful pollutants are invisible and odorless. The four major sources of indoor air pollution are

- combustion byproducts, such as smoke and carbon monoxide
- building materials, including carpets, wood products, and paints
- household products and chemicals, such as cleaning solvents, adhesives, and paint strippers
- biological contaminants such as mildew, animal dander, and dust mites.

Combustion byproducts

Airborne byproducts come from gas ranges, cooktops, water heaters, clothes dryers, and automobiles. Pollutants include carbon monoxide, nitrogen and sulfur oxides, formaldehyde, and tiny breathable particles. These should be vented to the outside to prevent accumulation indoors. Never use unvented gas stoves, clothes dryers, or water heaters.

Carbon monoxide (CO) is an odorless, colorless gas that can kill. Symptoms of exposure such as headache, dizziness, and nausea may be mistaken for other causes. A malfunctioning appliance or blocked flue pipe can result in fatal CO levels. Another dangerous source of CO is using a charcoal or gas barbeque grill indoors or

in an enclosed garage or carport. Carbon monoxide detectors that look and operate like smoke detectors are available. However, the detectors will not replace good maintenance of your appliances.

If you suspect that you have problems, call the dealer or a service professional for expert assistance. Be alert for backdrafting, when combustion gases are pulled back instead of being exhausted to the outside. Backdrafting is more likely in well sealed, energy-efficient homes and apartments, especially when you are using an exhaust fan.

Tobacco smoke contains a wide range of throat and lung irritants, as well as hazardous and cancer-causing chemicals. A smoky home environment puts everyone at risk, not just the smoker.

Building materials

Many common building products including pressed-wood products, carpets, and surface finishes can pollute indoor air. Some can release hazardous gases such as formaldehyde into the air, and others, such as asbestos and lead, produce fibers or dust. High temperature and humidity can worsen these problems.

Pressed-wood products contain formaldehyde, which is used in the glues that hold the materials together. Formaldehyde vapors will be released into the air, especially when a product is new. Sealing the surface of a wood product, especially the edges, will reduce emissions. Wood products that are formaldehyde-free or have low formaldehyde emissions are available.

New carpets can release volatile chemicals. All carpets can trap pollutants. A damp, dirty carpet is a breeding ground for biological pollutants. Carpets require regular vacuuming and cleaning.

Surface finishes can also cause indoor air pollution. Products that are oil-, solvent-, or alkyd-based release more harmful vapors than water-based products. Check the product label. If the instructions say to clean up with

soap and water, then the product is water-based. Provide extra ventilation when finishes are newly applied.

Until about 1980, asbestos was widely used in building materials. As long as the asbestos is intact and undisturbed, it is not likely to be a problem. However, when asbestos products get old, they crumble and disperse tiny fibers into the air. If you breathe asbestos particles over time, you are more likely to get respiratory problems. If you have crumbling asbestos in your home, call a professional environmental safety firm and have it removed safely.

Older homes and apartments may also contain lead-based paint. Lead dust can be released into the air as the paint wears or during renovations. See HAPPI-Home 7, *Lead in and around the home*, for more information.

Biological contaminants

Biological contaminants include animal hair, dander, saliva, and feces; insect residues; pollen; and dust mites, molds, and other fungi. They can cause odors, damage household materials, lead to allergic reactions, and cause infectious diseases and respiratory problems. Each person has a different sensitivity to these contaminants.

Biological pollutants cannot be eliminated completely. Their growth and quantities can be controlled by keeping surfaces clean and moisture levels low. Good ventilation and maintenance practices can control moisture and reduce the need for chemical products like pesticides and disinfectants, both of which could add other pollutants to the air. Regular vacuuming may help control dust, but some particles are so small that they pass through the filters and become airborne. Some vacuum cleaners have high-efficiency (HEPA) filters to trap more and smaller particles.

Household chemical products

Furniture waxes, paint strippers, adhesives, some cleaning products, disinfectants, degreasers, cosmetics, and hobby supplies contain potentially hazardous chemicals. Some products, such as those from spray cans, can release chemicals or particles into the air during use. Others can emit chemicals as they age, dry, or cure. See HAPPI-Home 4, *Managing hazardous household products*, for ways avoid problems from these types of products.

Ventilation and air filters

You can reduce air pollution risks by increasing the ventilation, or air flow, in your home or apartment. Ventilation is not usually a problem in Hawaii. However, many new houses and apartment buildings have tighter construction, which makes it easier for pollutants to build up to dangerous levels. Tight homes may also be susceptible to humidity problems. Use your nose and eyes to help evaluate indoor air quality. Be aware of persistent odors. Steamy windows indicate high levels of moisture in the home. If you need more ventilation in your home, consult an energy professional.

Air filters can also reduce the risks of indoor air pollution. Filters in air conditioning systems need to be inspected regularly and replaced or cleaned when dirty. Standard filters on air conditioners will remove only the largest dust particles. Other high-efficiency filters are more effective and will remove particles such as dust, smoke, pollen, and some microorganisms, but they are more expensive to purchase and maintain. Gases will generally go right through air filters. A reputable dealer or consumer organization can help you decide if you need an air filter and find a filter that will meet your needs.

Assessing your risks

The next step is to determine your contamination risks. Compare the items in the risk assessment table on page 3 with your management practices and rate your risk as low, moderate, or high for each category.

Additional information

Additional information on indoor air quality is available from the Healthy Indoor Air for America's Homes program at <http://www.montana.edu/wwwcxair/default.htm>.

For additional questions on local Hawaii indoor air quality issues, contact the Noise, Radiation and Indoor Air Quality Branch of the Hawaii Department of Health at the following numbers:

Hawaii: 974-4000 ext. 64700
 Maui: 984-2400 ext. 64700
 Kauai: 274-3141 ext. 64700
 Molokai and Lanai: 1-800-468-4644 ext. 64700
 Oahu: 586-4700

Risk Assessment Table for Indoor Air Quality

	Low risk	Moderate risk	High risk	Your risk
Combustion appliances, venting	All combustion appliances are vented directly to the outside	Unvented appliances are used only in open spaces with open window(s)	Gas appliances are frequently used in closed rooms	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Maintenance of combustion appliances and flues	Combustion appliances and flues are inspected and cleaned at least once a year	Combustion appliances and flues have been inspected only once or twice in the past five years	Combustion appliances and flues are not inspected, or inspection record is unknown	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Carbon monoxide detectors (only in homes with combustion appliances)	A carbon monoxide detector is properly installed; the battery is tested weekly (if applicable)	A detector is installed, but the battery is not tested regularly (if applicable)	No carbon monoxide detector is installed	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Tobacco smoking	Tobacco smoking is not permitted in the home	Smoking is permitted occasionally, but only in areas ventilated to the outside	Frequent smoking causes smoky indoor air	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
New building materials, paints, varnishes, and furnishings	Low- or no-emission products are selected; new items are sealed or given adequate ventilation	New furnishings, building materials, paints, and varnishes are given increased ventilation	There is no attempt to select low-emission products, and ventilation is inadequate	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Carpet	Low-VOC carpet is selected and aired before and during installation; carpet is well maintained	New carpet is installed without ventilation	Old carpet is poorly maintained	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Asbestos (homes built before 1980s)	If asbestos is present, it is safely encased and isolated; asbestos is checked regularly	Asbestos is present and intact but located in high-traffic areas	Asbestos-containing material is crumbling; people are exposed to the dust and fibers	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Dust control	House is cleaned regularly; no furry pets are kept in the home; little or no carpeting is in the home	Furry pets live in the home, but the house is cleaned regularly	Pet hair and dust are allowed to accumulate in living and sleeping areas; house is mostly carpeted; carpet is poorly maintained	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Household products and chemicals	Products with hazardous vapors are avoided or used with proper ventilation and safety precautions; hazardous products are not stored in the home	Products with hazardous vapors are used indoors with some ventilation; only short periods of exposure occur	Products with hazardous vapors are used indoors without ventilation; long periods of exposure occur; hazardous products are stored in the home	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Ventilation	House or apartment is well ventilated; exhaust fans are used in the kitchen and bathroom	House or apartment gives some uncontrolled ventilation	House or apartment is poorly ventilated; no kitchen/bath exhaust fans are used	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may be causing indoor air pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for indoor air pollution?	Set a target date for action
<p><i>Samples of action items:</i></p> <p><i>Haven't inspected clothes dryer vent and flue in three years</i></p>	<p><i>Inspect vent and flue and clean if necessary</i></p>	<p><i>By a week from today</i></p>



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