Introducing the Healthy Housing Principles Certificate of Knowledge Exam and Reference Guide

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BPI Healthy Home Evaluator Professional Certification

Core BPI Certifications

Building Analyst

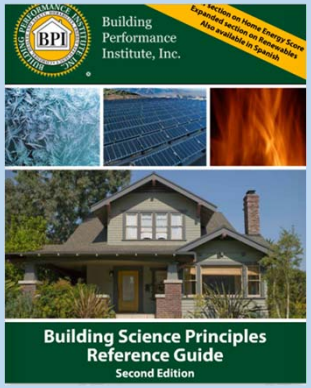
MF Building Analyst

QC Inspector

Energy Auditor

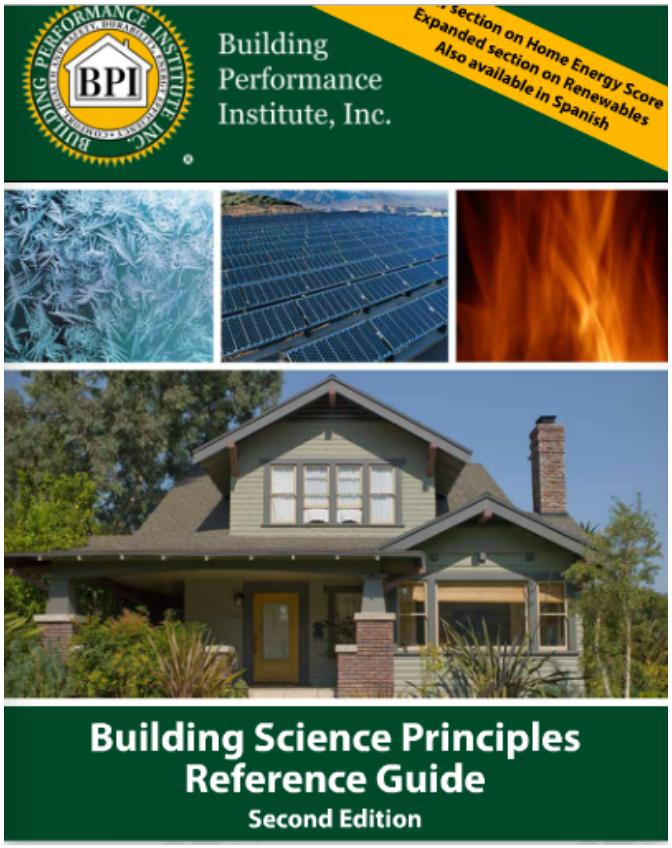
Certificates of Knowledge

Building Science Principles



Healthy Housing Principles

Announcing…


Building
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Building Science Principles
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Second Edition


Building
Performance
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Healthy Housing Principles
Reference Guide
First Edition

- Clean
- Dry
- Pest-Free
- Contaminant-Free
- Safe
- Ventilated
- Comfortable
- Maintained

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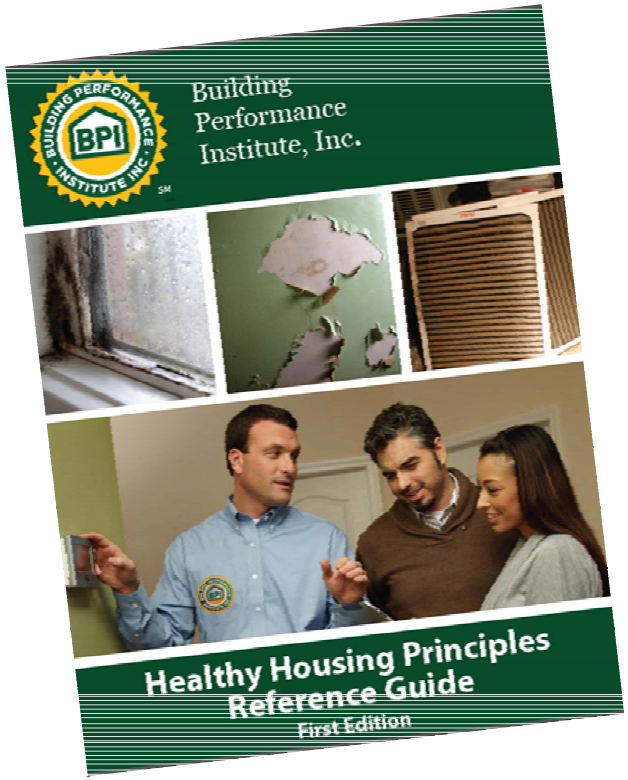
Healthy Housing Principles Reference Guide

First Edition

Pass the Healthy Housing Principles exam and Earn 8 CEUs



The HHP Certificate Exam is Open Book!

Healthy Housing Principles Target Audiences

- Weatherization Technicians
- HVAC Technicians/Office Staff
- Insulation/Air Sealing Technicians
- Home Performance Contractors
- Community Health Workers
- Public Health Workers
- In-Home Nurses
- Nurse Practitioners
- Utility Program Representatives
- Home Inspectors
- Realtors
- Parent Teacher Advocacy
- Students
    - Technical High School
    - Community College

The Reference Guide Covers the Eight Healthy Home Principles

KEEP IT CLEAN

KEEP IT DRY

KEEP IT PEST-FREE

KEEP IT CONTAMINANT-FREE

KEEP IT SAFE

KEEP IT VENTILATED

KEEP IT COMFORTABLE

KEEP IT MAINTAINED

Keep It Clean 1

In this chapter . . .

- The composition of household dust
- What is now meant by clean?
- Why people should avoid regular use of disinfectants
- Better, safer cleaning strategies

1

The reference guide describes why each principle is important

In addition to hosting almost 135,000 bacteria per square inch, dish sponges can house salmonella, E. coli and fecal matter.

Best Breeding Environment for Germs

Warm and moist environments tend to be a breeding ground for germs. NSF's analysis revealed that sponges and coffee machine reservoirs, which may not be cleaned as frequently as they should be, were in the top 10 germiest places in the home. In contrast, smooth, cold surfaces tended to harbor fewer germs. For example, NSF's analysis showed that wallets, money and computer keyboards harbor the fewest germs. Read the full executive summary and findings from NSF's 2011 Germ Study (see references for the link).

Based on this report, there are specific things and places in the kitchen that should be cleaned frequently. These include:

- cutting boards
- coffee makers
- refrigerators, especially areas in contact with uncooked and unwashed food
- kitchen sinks and counter tops

Other kitchen items that need frequent cleaning include the kitchen sink and counters, cutting boards, the coffee maker and the refrigerator. Remember, cleaning a counter surface with the bacteria-laden sponge just spreads the bacteria across the surface.

KEEP IT CLEAN

The goal of healthy cleaning is not to use strong chemical products everywhere, but to be smart about where they are used and target those items known to more often harbor the unhealthy germs. This means spot cleaning areas of the kitchen. Here are some tips for keeping these spots clean:

- Use disinfectant wipes on the faucet, refrigerator surfaces, and countertop
- Heat damp sponges in the microwave for a minute to kill bacteria
- Soak sponges in a quart of warm water with half a teaspoon of concentrated bleach
- Change dish towels a few times a week
- Wash your hands before and after touching or handling food
- Don't forget knobs, handles, and switches
- Countertops, handles, and light switches are a few less-than-obvious places for germs

You can clean these spots once a week with disinfecting wipes. It's ideal to use a new wipe for every spot instead of reusing the same one.

Don't forget to clean common things that everyone in the home comes in contact with like light switches, refrigerator and microwave handles, and stove knobs. All of these actually rank higher in dirtiness than bathroom doorknobs!

Makeup Bag

The nooks, crannies, and bristles of makeup applicators are prime real estate for germs, especially if you carry your makeup bag outside the house. Germs that live on your makeup applicators can cause skin and eye infections.

You may need to change how you store your makeup. Products should ideally be kept in a clean, dry space at room temperature. To keep makeup brushes clean, you can wash them once a week with regular soap and water or also use an alcohol spray on the brushes. Many doctors recommend replacing cosmetics every six months and throwing out eye makeup if you've had an eye infection.

Make-up brushes and other applicators should be cleaned regularly. Using the same tools every day without proper cleaning can lead to contamination with bacteria including staphylococcus, streptococcus and E. coli.

Keep It Clean - Learning Objectives

After reviewing this chapter, the reader should be able to:

- Explain why a clean home is important for the health of the occupants
- List five health issues related to an unclean home
- Recall strategies for reducing dust and particles in homes
- Describe simple steps to make a home clean and cleanable
- List five cleaning techniques that are safe and effective for keeping a healthy home

Important Terms:

Allergen	Anti-bacterial
Anti-microbial	Cleanable
Clutter	Dander
Disinfectant	Dust Mite
Hoarding	High Efficiency Particulate Air (HEPA)
Triclosan	Zoonotic Disease

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Keep It Dry 2

In this chapter . . .

- Health impacts of moisture
- Where moisture comes from
- The moisture cycle in homes
- Moisture control measures

1

It provides detailed, evidence-based explanations of home issues

Capillary action, also called capillary suction, is one of the unique properties of water. Water molecules have enough charge that they tend to bind to each other, as well as to surfaces. This charge is so strong that it even works against gravity. So when moisture comes in contact with an absorbent material, the water is drawn up into the material like a straw.

So the cardboard and books in direct contact with the damp basement floor have wicked the moisture from below into the paper. The same process occurs with wood, brick, block, and concrete walls. And this can occur whenever liquid water comes in contact with a surface.

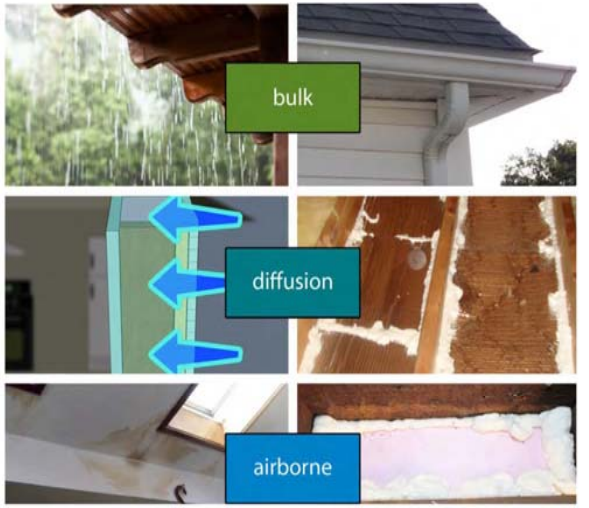
Vapor diffusion is when water vapor is transported through building materials as it moves from areas of high moisture concentration to areas with lower moisture concentrations.

Here is a real-world example of capillary action. This is a cinderblock wall in the corner of a basement. Rain/groundwater comes in contact with the base of the exterior of the wall, and then seeps into and is sucked up by the cinderblock until it reaches the interior of the wall, where it evaporates into the basement. When a wall like this remains chronically wet, and if there is dust or other debris on the wall, this can, over time, lead to mold growth. (National Center for Healthy Housing)

Because of moisture intrusion, framing materials adjacent and in contact with a block wall have now rotted and must be replaced. This is a good example of why it's so important that areas outside of a home slope away from foundation walls and/or water is diverted by an exterior drainage system.

A small amount of water leakage through a cinderblock wall can cause large interior damage as evidenced by the condition of this fiberglass batt.

KEEP IT DRY



Water can be transported into homes by three primary mechanisms: *bulk water intrusion*, *vapor diffusion*, *airborne infiltration*. The three keys to controlling moisture from entering homes are 1) eliminating bulk moisture from entering a building, 2) reducing or eliminating diffusion of water vapor, and 3) managing internal sources of moisture and airflow to avoid moisture transport.

BULK WATER **can be rainwater, water from a flood, groundwater seeping up into a basement or water from some kind of plumbing leak. Bulk water gets things wet and if allowed to keep flowing, saturates the materials leading to rapid deterioration, and eventually rot.**

WATER in VAPOR form **moves in the direction shown by the arrows (*middle, left*), from the outside environment, through the wall, to the inside of the home. Depending on how wet or dry conditions are between the outside and inside, this method of moisture transfer can lead to high water movement. Vapor diffusion always moves from areas of high moisture concentration to areas of lower moisture concentration.**

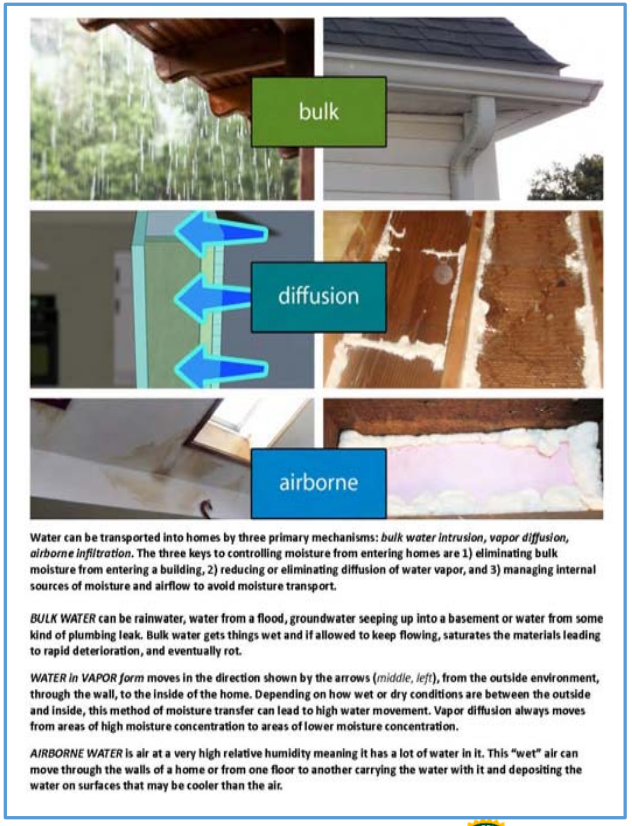
AIRBORNE WATER **is air at a very high relative humidity meaning it has a lot of water in it. This "wet" air can move through the walls of a home or from one floor to another carrying the water with it and depositing the water on surfaces that may be cooler than the air.**

Keep It Dry - Learning Objectives

KEEP IT DRY

After reviewing this chapter, the reader should be able to:

- Name three main health impacts associated with excess moisture
- Explain why too much moisture is a problem in the home
- List five issues in homes that lead to excess moisture and chronic dampness
- Explain how moisture can enter the home
- Describe simple steps to control moisture (or keep your home dry)



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Important Terms:

Bulk Moisture
Capillary Action
Condensation Temperature
Dew Point Temperature
Fungi or Mold
Ice Dam
Moisture Meter
Relative Humidity
Vapor Diffusion

Keep It Pest-Free 3

In this chapter . . .

- Pests' health effects on occupants
- How pests enter homes
- Integrated pest management (IPM)

1

The reference guide is full of valuable information you can apply immediately

KEEP IT PEST-FREE

(*left*) The adult house mouse can grow to be approximately 5 ½ to 7 inches in length including the tail; they have a round body shape. House mice have very large ears and tiny dark eyes, their fur can range in color from brown to grayish-black, and they will have a lighter colored underbelly.

(*right*) Deer mice also have big ears and white bellies, and their tails are usually hairless. Their backs are typically brown in color, but can also be black or grey. If you spot an adult deer mouse, its body will likely be anywhere from 3 to 4 inches long, with its tail adding an additional 2 to 5 inches.

Norway (or brown) rats are known to have keen senses of hearing, smell, touch, and taste. They have fairly poor vision, however, and are colorblind. They are capable of running, climbing, jumping and swimming. They primarily do damage to homes through their constant gnawing.(27)

Roof rats are more often found in the upper parts of buildings (hence the name). Like Norway rats, they damage homes and buildings by gnawing through things, but roof rats in particular are known vectors of disease (see the Introduction of this guide for more details on vectors). All the more important to keep them away from homes!(27)

Norway rats make burrows while roof rats prefer to nest higher up. If there are no Norway rats in an area, roof rats may be found in burrows instead. Burrows are just holes in the dirt under bushes and plants, that are anywhere from one to four inches wide, with smooth edges. Nests always have both an entrance and exit hole. On and around buildings, look for gnaw marks and holes in siding or other wood or plastic materials. Rats prefer to run along the same familiar path many times a day. This results in worn down paths in grass and dark greasy track marks along any walls.(28)

Next, look for droppings. These are found near food sources or along the way between nests and food sources. If the droppings appear moist and dark, they are fresh and a good sign that rats are in the area. See the Integrated Pest Management (IPM) section below for how to catch mice and rats.

The Norway rat is a moderately large, robust, grayish or brownish rodent with coarse fur and a long, sparsely haired, scaly tail. The tail is shorter than the combined length (approximately 80 percent) of the head and body.

Roof rats are long and thin rodents that have large eyes and ears, a pointed nose and a scaly tail. Roof rats have soft and smooth fur that is typically brown with intermixed spots of black. Their undersides are often white, gray or black.

Norway rats (*left*) prefer to live in burrows with an entrance and exit hole that is 1-4" in diameter, while roof rats (*right*) tend to build nests in higher locations. Rats can cause considerable physical damage to buildings in establishing their nests. Left unchecked, this can lead to additional structural damage if water penetrates into the openings caused by rats.

(*left*) Mouse feces indicate areas where mice are most active. Measuring approximately 3 to 6 mm in length, they are granular in shape and black in color. They have been described as looking like burned grains of rice. Mouse feces are commonly mistaken for cockroach or rat droppings.

(*right*) Rat droppings are shiny black and 1/2 - 3/4 of an inch long, whereas mice droppings are much smaller and smooth with pointed ends.

Keep It Pest-Free - Learning Objectives

KEEP IT PEST-FREE

After reviewing this chapter, the reader should be able to:

- List three common pests and their health impacts
- Identify three things to look for that indicate a pest is present in the home
- Describe simple steps one can take to control pests (or keep a home pest-free)
- Describe differences between traditional pest control vs Integrated Pest Management (IPM)

Important Terms:

Boric Acid	Brown-Banded Cockroach	Toxic
Norway Rat	Carrying Capacity	Poison
Deer Mouse	German Cockroach	Harborage
House Mouse	Pesticide	Roof Rat
Pesticide Label	Integrated Pest Management (IPM)	

Federal Insecticide Fungicide Rodenticide Act (FIFRA)

Keep It Contaminant-Free 4

In this chapter . . .

- What are contaminants?
- Where do contaminants come from and how do contaminants impact health?
- Effective strategies for eliminating contaminants

1

It provides information anyone can apply in their own home, even you!

While there may be a common misconception that pipes and cigars are somehow safer than cigarettes, in reality, these tobacco products carry many of the same health risks as cigarettes, both for those who smoke and those who breathe in their secondhand smoke.

COPD (shown in this x-ray) refers to a group of diseases that cause airflow blockage and breathing-related problems. COPD includes emphysema and chronic bronchitis. COPD is usually caused by cigarette smoking, though long-term exposure to other lung irritants, like secondhand smoke, can contribute. According to the CDC, as many as one out of four Americans with COPD never smoked cigarettes. However, smoking accounts for as many as eight out of 10 COPD-related deaths and 38% of the nearly 16 million U.S. adults diagnosed with COPD report being current smoking.(4)

KEEP IT CONTAMINANT-FREE

Tobacco smoke is a well-known carcinogen, but it is also known to cause strokes and coronary heart disease, chronic obstructive pulmonary disease (COPD), middle ear infections, pneumonia, and bronchitis. Smoking causes 90% of lung cancer deaths, causes 80% of COPD deaths, and increases the risk for death from all causes. The research further suggests that if no one smoked, a full third of the cancer cases in the U.S. wouldn't happen.(5)

Secondhand smoke, also known as environmental tobacco smoke, is the smoke that emanates into the air from the burning of tobacco products. It causes many of the same health problems in adults that is does in children. It is the second leading cause of death in non-smokers, after Radon.(4) In children, secondhand smoke is responsible for causing ear infections, asthma, asthma attacks, respiratory problems, respiratory infections, and a greater risk of sudden infant death syndrome. In 2000, the institute of Medicine published a comprehensive review of the research on how indoor pollutants contribute to asthma – its causation, prevalence, triggering, and severity. The report, Clearing the Air: Asthma and Indoor Air Exposures, was commissioned because the incidence and prevalence of asthma had increased dramatically in the 1980s and 1990s. The IOM report showed that exposure to second hand smoke was strongly associated with exacerbation of asthma symptoms in pre-school aged children.(6) A more recent review found the research is even stronger now.(7) To provide a healthy home for children, they should not be exposed to second hand smoke.(6)

Although secondhand smoke exposure among children has fallen over the past 15 years, children are still more heavily exposed to secondhand smoke than adults. About four out of 10 U.S. children aged 3–11 years (40.6%) are exposed to secondhand smoke.(4)

Exposure to secondhand smoke causes children who already have asthma to experience more frequent and severe attacks. Clear back in 2000, the Institute of Medicine found that exposure to second hand smoke was strongly associated with exacerbation of asthma symptoms in pre-school aged children.(6) The research evidence is even stronger today.(7)

Keep It Contaminant-Free - Learning Objectives

After reviewing this chapter, the reader should be able to:

- Explain why contaminants in homes are a health risk for occupants
- Describe how different contaminants enter the home environment
- List up to three common contaminants and their health impacts
- Describe simple strategies one can do to keep a home contaminant-free

Important Terms:

Bisphenols	Diacetyl
Electronic Cigarette Vapor	Environmental Tobacco Smoke
Fine Particulate	Flame Retardants
Formaldehyde	Off-Gassing (Out-Gassing)
Particulate Matter	Phthalates
Per- and Polyfluoroalkyl Substances (PFAS)	PM2.5
Secondhand Smoke	Thirdhand Smoke
Ultrafine Particulate	Volatile Organic Compound (VOC)

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Keep It Safe 5

In this chapter . . .

- Common home safety risks
- An unsafe home's effect on occupants
- Simple and smart strategies for preventing home injuries

1

The guide can help you explain complex information to your clients

KEEP IT SAFE

Storing cleaning products under the kitchen sink may be convenient, but precautions should be taken to ensure that these products cannot be accessed by children. Cleaning products are second on the list of most common poison exposures among children under six.

Consumer Product Labeling

The **Consumer Product Safety Commission** (CPSC), through the Federal Hazardous Substances Act, requires that all consumer products include product information and provide specific instructions for proper use. If the product contains chemical ingredients, the label must list the ingredients, directions for proper use and, more importantly, instructions for improper use and accidental exposure. "What Does that Label Mean?" below, provides guidance on how to read cleaning product labels. As a general rule, more powerful products contain more hazardous ingredients.

What Does that Label Mean?

The CPSC, via the Federal Hazardous Substances Act, sets requirements for the labels on consumer products. These are the four signal words to look for:

- CAUTION signals a low-level hazard.
- WARNING signals a moderate hazard.
- DANGER signals the product is extremely flammable, corrosive, or highly toxic.
- POISON is the strongest signal word. It is reserved for highly toxic substances.

You'll usually see DANGER–POISON. When labeled a poison, a product is required to have a skull and crossbones pictured on the label.

The label may also state the hazard such as "Flammable," "Combustible," "Vapor Harmful," "Causes Burns," "Absorbed Through Skin," or another description. Some labels include precautionary measures for handling, storage, and injury treatment. Occupants can use this information to determine which products to bring into the home, how to store and handle them, and what to do in the event of a preventable injury.

Most people think of the label on dish soap as simply being the brand name and the product's purpose, often along with a claim of cleaning quality or fresh spring smell. But the real label is on the back and, according to the Consumer Product Safety Commission, the label needs to include ingredients and important health and safety information. This information can be critical when a substance is accidentally consumed by a child.

Signal words on consumer product labels range from "Caution" (signifying a low-level hazard) to "Warning" to "Danger" and finally to "Poison" (reserved for highly toxic substances where consuming a small amount can be fatal).

Keep It Safe - Learning Objectives

After reviewing this chapter, the reader should be able to:

- Explain the difference between accidents and injury
- List three or more causes of preventable home injuries
- Describe three strategies for making homes safer
- Locate home safety resources

Important Terms:

Accident	American Society of Testing and Measurement
Cabinet Latch	Arc Fault Circuit Interrupter (AFCI)
Baby Gates	Anti-Tip Shelf Brackets or Straps
Circuit Breaker	Consumer Product Safety Commission (CPSC)
Corrosive	Extremely Flammable
Highly Toxic	Ground Fault Circuit Interrupter (GFCI)
Irritant	Poisoning
Preventable Injury	Receptacle Covers
Scalding	Signal Words
Stair Riser	Window Guard

Keep It Ventilated 6

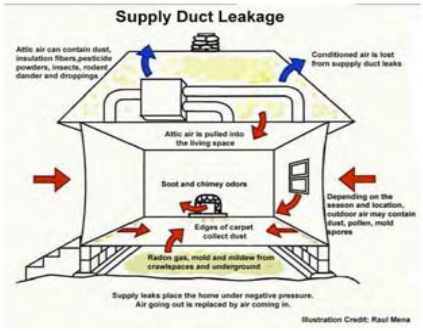
In this chapter . . .

- The health effects of poor ventilation
- Air leakage and circulation in homes
- Strategies for ventilation and air filtration in homes

1

It includes links to additional information for those who want to learn more

KEEP IT VENTILATED



This illustration depicts the potential consequences of leaks on the supply side of the duct system. The volume of air that leaks out into the attic creates negative pressure imbalance in the home causing the problems shown.

When the leaks are on the return side, the opposite happens. Instead of pulling air only from the living areas of the home, air is being pulled from wherever the ducts are located. Here again, it depends on whether they are in the attic or crawlspace or running through the walls of the living space. Think about what else is located where these ducts are located, and where the furnace itself is located. Wherever these systems are, that is the air that is used to support the distribution of air in the home.

Return ducts pulling air from the same space as the water heater can result in spillage. Instead of all of the combustion gases going up the flue and out of the home, some of them will get pulled into the duct system and be distributed into the living space of the home.

Duct leakage testing. A duct system can be tested for leakage using one of several methods to force air through the duct system under pressure and measure the airflow at different locations within the system. By comparing the pressures and flow rates, the test is able to determine the total amount of leakage and the location of any leaks in the system.

This duct appears to be sealed properly. Leaky ducts can be easily sealed using mastic and/or foil tape.

Local Exhaust (Spot) Ventilation

Bathrooms

Bathrooms are major sources of moisture and odors in homes. The excess moisture needs to be exhausted out of the home to reduce the potential for mold growth. Bathrooms are also one room where occupants often use stronger disinfectants and cleaners. An exhaust vent with a fan should be located in each bathroom in a home. Even though most homes have exhaust fans, a surprising number of occupants don't use them. When they go unused, they are more likely to operate poorly and become noisy. When they're noisy, residents won't use them at all. It's important that bath exhaust fans get used because they are very effective at expelling moisture and other contaminants. Home assessors should always check to see that they operate and ask if they are used. Just because they turn on does not mean that unit is actually drawing air from the room. It is important to check the flow of the fan.

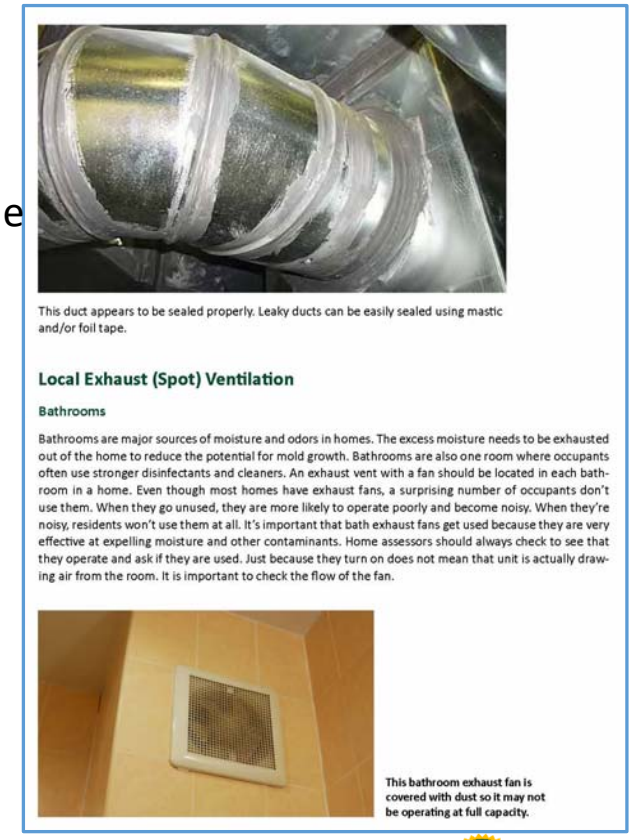
This bathroom exhaust fan is covered with dust so it may not be operating at full capacity.

Keep It Ventilated - Learning Objectives

KEEP IT VENTILATED

After reviewing this chapter, the reader should be able to:

- List five health impacts of poor ventilation
- Explain why ventilation is necessary for a healthy home
- Describe what factors lead to air movement around a home
- Explain four basic types of mechanical ventilation
- Describe simple steps you can take to improve ventilation/air quality in a home



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Important Terms:

Air Leakage Airflow Backdrafting Carbon Dioxide
Carbon Monoxide Circulation Clean Air Delivery Rate (CADR)
Combustion Combustion By-Products Dwelling Unit Ventilation
Energy Recovery Ventilation (ERV) Exfiltration Exhaust-only Ventilation
Heat Recovery Ventilation (HRV) Infiltration Loudness Thresholds
Mechanical Ventilation Minimum Efficiency Reporting Value (MERV)
Natural Draft Nitrogen Dioxide Spillage Stack Effect
Sone Spot Ventilation Supply-only Ventilation Ventilation Wind Effect

Keep It Comfortable 7

In this chapter . . .

- The importance of comfort to long-term health
- How air sealing and insulation can make homes healthier
- Why energy efficiency and home performance are healthy home principles

1

The guide provides basic explanations of the health impacts of housing

KEEP IT COMFORTABLE

Uncontrolled Temperature and Health

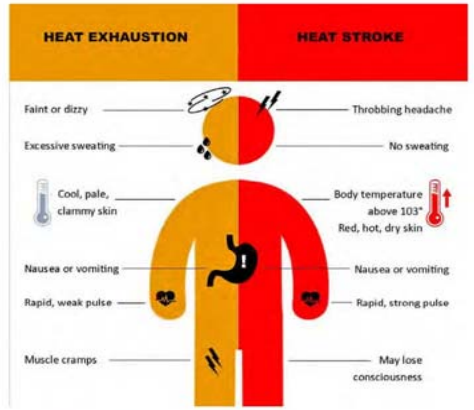
Extreme Heat Events

The health effects of extreme heat or **hyperthermia** are classified two ways. **Heat exhaustion** is caused by the loss of water and electrolytes through excessive sweating as the body tries to cool down. Symptoms of heat exhaustion include heavy sweating, cold skin, nausea, vomiting, muscle cramps, dizziness, headache, weakness, and fainting. Key signs of heat exhaustion are a **fever** below 104˚F and a fast, weak pulse. The person with these symptoms needs to move to a cool place, remove clothes and do things to cool down like applying wet cloths to the body, take a cool bath and sip water.

Heat stroke is a medical emergency. With heat stroke the body temperature has risen above 104˚F and the central nervous system starts to malfunction because the person's body has lost the ability to thermo-regulate. Symptoms of heat stroke include hot and dry skin (sweating has stopped), fast and strong pulse, headache, dizziness, nausea, confusion, and loss of consciousness. A person with signs and symptoms of heat stroke should be taken to the hospital immediately.

The longer you spend in the heat, the more serious the effects on your body can be. Increased body temperature can cause heavy sweating, clammy skin, dehydration, tiredness, headache, dizziness, nausea, cramps, and a quick, weak pulse. Heat can also trigger asthma symptoms because the combination of extremely high temperatures and elevated humidity severely restrict air movement, trapping pollutants that can irritate the airways

In the U.S., more than 600 people die from extreme heat each year.(4) According to the CDC, "extreme heat now causes more deaths in U.S. cities than all other weather events combined."(5) Extreme heat, also called a heat wave, is a period of several days to weeks of excessively hot weather, and when combined with high humidity, may lead to heat-related health effects. Older adults are more impacted by this. From 1999-2009, about 40% of heat-related deaths were older adults. This has to do with the body's two ways of cooling down: sweating (which cools us via evaporation) and increasing blood flow to the skin (radiant heat transfer). These two things may be impaired or cause complications in the elderly.



There are two types of major heat-related illness caused by excess heat exposure. Heat exhaustion and heat stroke are forms of hyperthermia in which the body temperature is elevated dramatically. Of the two, heat stroke is a dangerous medical emergency that can be fatal if not promptly and properly treated.

Keep It Comfortable - Learning Objectives

KEEP IT COMFORTABLE

After reviewing this chapter, the reader should be able to:

- List five health impacts of uncontrolled heating or cooling
- Describe what air sealing means
- Describe the concept of thermal control
- Explain how uncontrolled heating or cooling can happen in a home

Important Terms:

Air Sealing	Comfort
Conduction	Convection
Energy Efficiency	Heat Exhaustion
Heat Stroke	Hyperthermia
Hypothermia	Insulation
Pressure Boundary	Programmable Thermostat
Radiation	Temperature
Thermal Boundary	Weather stripping

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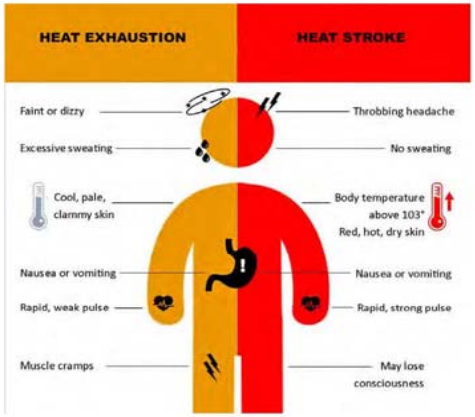


There are two types of major heat-related illness caused by excess heat exposure. Heat exhaustion and heat stroke are forms of hyperthermia in which the body temperature is elevated dramatically. Of the two, heat stroke is a dangerous medical emergency that can be fatal if not promptly and properly treated.

Keep It Maintained 8

In this chapter . . .

- What needs to be maintained—inside and outside of a home
- How maintenance supports up to three other principles of a healthy home
- Potential home contaminants that require maintenance
- Checklist for maintaining a home

1

It will be a resource every professional will want to have on their shelf

KEEP IT MAINTAINED

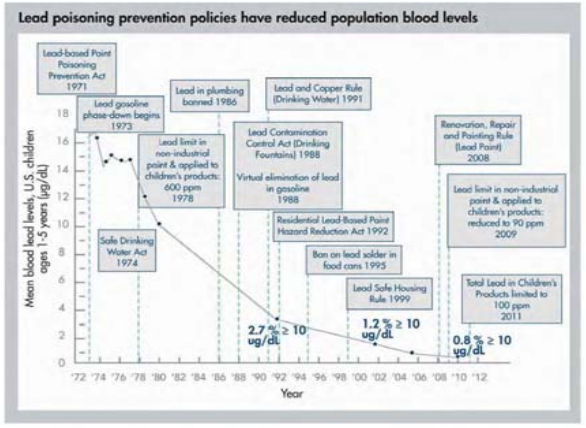
Lead paint is still present in millions of homes, sometimes under layers of newer paint. If the paint is in good shape, the lead paint is usually not a problem, but special attention should be given to operable surfaces where frequent use creates friction and causes wear and tear.

Painted cupboard doors are another surface prone to deterioration from friction. If they are old or antique, the paint may contain lead and likely should be checked.

Lead paint also has a particular characteristic that modern latex paints do not have: it is sweet-tasting. Thus, a teething toddler may pull himself up and chew on a windowsill. A child may pick up a lead paint flake, put it in her mouth out of curiosity, and decide it's tasty to suck on. Outside the home, children may play in the soil around an older home and then ingest the lead from the soil when they absentmindedly suck on their fingers.

In the 1960s, after environmental disasters in many communities, there was a growing recognition that environmental hazards were polluting the air, water, and land, and causing a tremendous impact on all living things, including humans. Lead was a known toxin, but the amount that humans had dispersed into the air and onto land had previously been ignored. The amounts of lead in housing, and coming from gasoline, were recognized as major environmental threats. In the 1970s the passage of a series of laws and regulations began that would require phasing out the use of lead in paint, gasoline, and plumbing components, and later from metal cans used for food. This started the 50-year process of phasing out and banning the use of lead in common products, with the goal of eliminating lead exposure and preventing future poisoning of children. The figure on page 5 was developed by the Global Alliance to Eliminate Lead Paint, and shows the timeline of the different laws and regulations and how they led to a gradual decline in the amount of lead found in the blood of those tested to represent the U.S. population.

Most children with elevated blood lead levels (BLL) today are contaminated through exposure to lead-laden dust and paint chips from deteriorating lead paint on interior surfaces. The hand-to-mouth exploratory behaviors in young children make them susceptible in an environment that is contaminated with lead dust or paint chips.



This shows the history and impact of U.S. policies addressing environmental lead hazards in order to lower the BLL in U.S children between 1971 and 2011. The y-axis represents the mean blood lead values in children. The x-axis indicates the year policies were initiated. Successive actions to ban the use of lead in specific products has reduced the mean lead level in U.S. children by 95%. Even so, there are still hundreds of thousands of children who are poisoned from lead exposure. Source: *Global Alliance to Eliminate Lead Paint*, 2016(2)

Keep It Maintained - Learning Objectives

After reviewing this chapter, the reader should be able to:

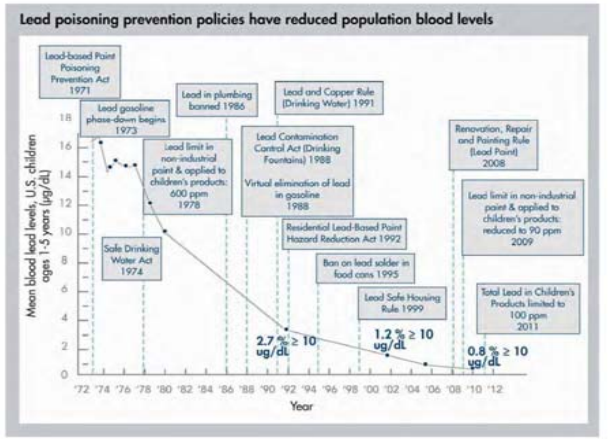
- Explain why regular maintenance is the key to a healthy home
- Recall five appliances, systems, or areas of a home that require regular maintenance
- List 5 possible health effects that can result from lack of maintenance
- Describe simple steps (or a checklist) you can follow to maintain your home

Important Terms:

Abatement	Active Sub-Slab System	Asbestos
Asbestosis	Clearance Standard	Elevated Blood Lead (EBL)
Friable	Lead-based Paint	Lead Disclosure Law
Vermiculite	Mesothelioma	Mercury
Methane	Picocurie	Passive Sub-Slab system
Radon	Sewer Gas	Lead Safe Work Practices
Renovation, Repair and Painting Rule		Sub-slab Depressurization

KEEP IT MAINTAINED

Most children with elevated blood lead levels (BLL) today are contaminated through exposure to lead-laden dust and paint chips from deteriorating lead paint on interior surfaces. The hand-to-mouth exploratory behaviors in young children make them susceptible in an environment that is contaminated with lead dust or paint chips.



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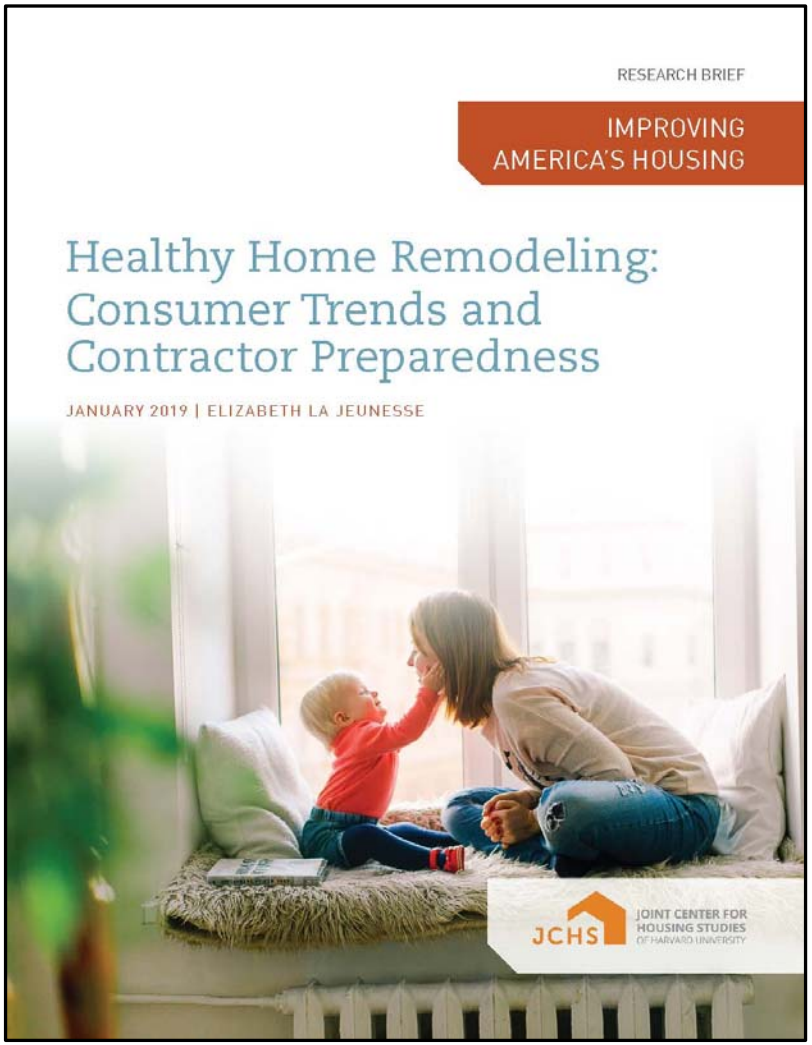
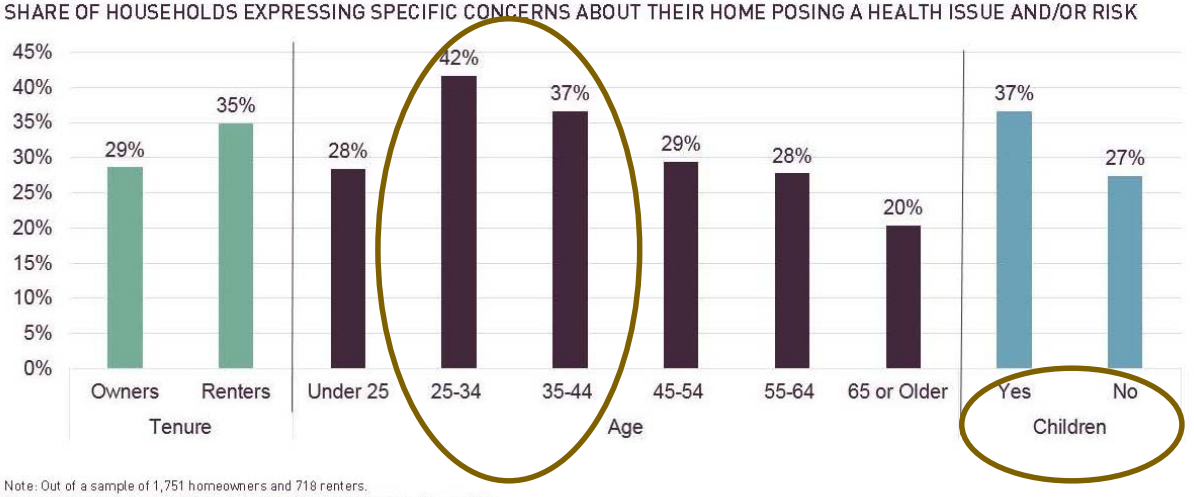


New report- Lots of households have healthy home concerns

FIGURE 2: HEALTHY HOUSING CONCERNS HIGHEST AMONG RENTERS, MILLENNIALS, FAMILIES WITH CHILDREN

SHARE OF HOUSEHOLDS EXPRESSING SPECIFIC CONCERNS ABOUT THEIR HOME POSING A HEALTH ISSUE AND/OR RISK



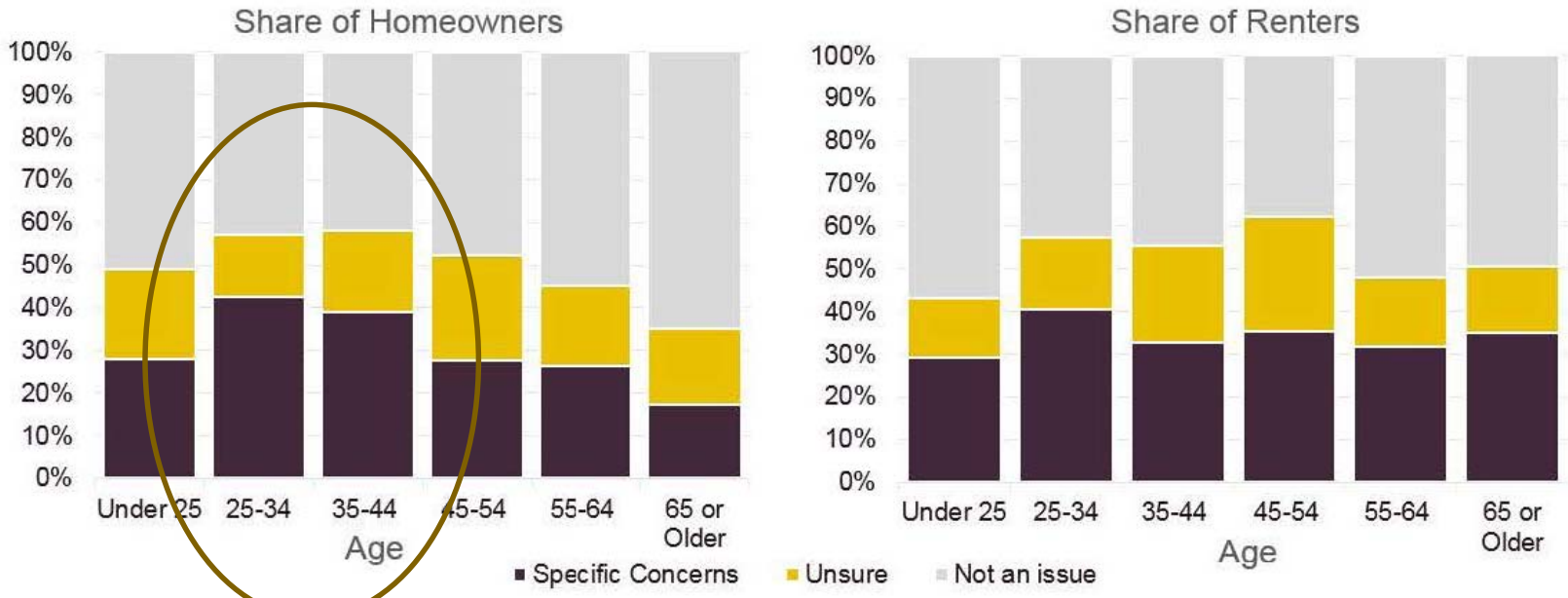
Note: Out of a sample of 1,751 homeowners and 718 renters.
Source: Farnsworth Group and Joint Center Healthy Homes Surveys, August 2018.

Healthy Home Remodeling: Consumer Trends and Contractor Preparedness, 2019. Elizabeth La Jeunesse, Joint Center for Housing Studies of Harvard University

New report- Lots of households have healthy home concerns, but especially younger homeowners

FIGURE 3: HEALTHY HOUSING CONCERNS ARE HIGHEST IN EARLY-MIDDLE AGES, ESPECIALLY AMONG OWNERS

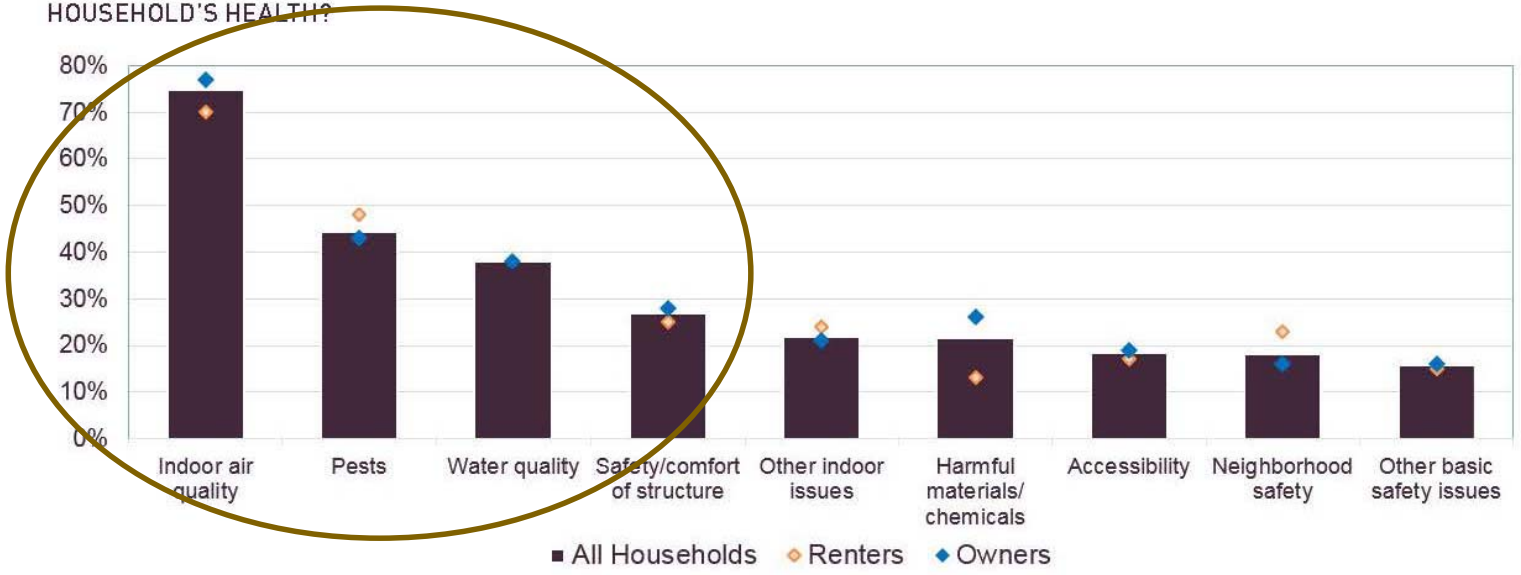
IN THE PAST FEW YEARS, HOW CONCERNED HAVE YOU BEEN ABOUT YOUR CURRENT HOME NEGATIVELY AFFECTING YOUR OR ANOTHER OCCUPANT'S HEALTH?



Healthy Home Remodeling: Consumer Trends and Contractor Preparedness, 2019.
Elizabeth La Jeunesse, Joint Center for Housing Studies of Harvard University

Indoor air quality, pests and safety are major concerns of those thinking about upgrading their home

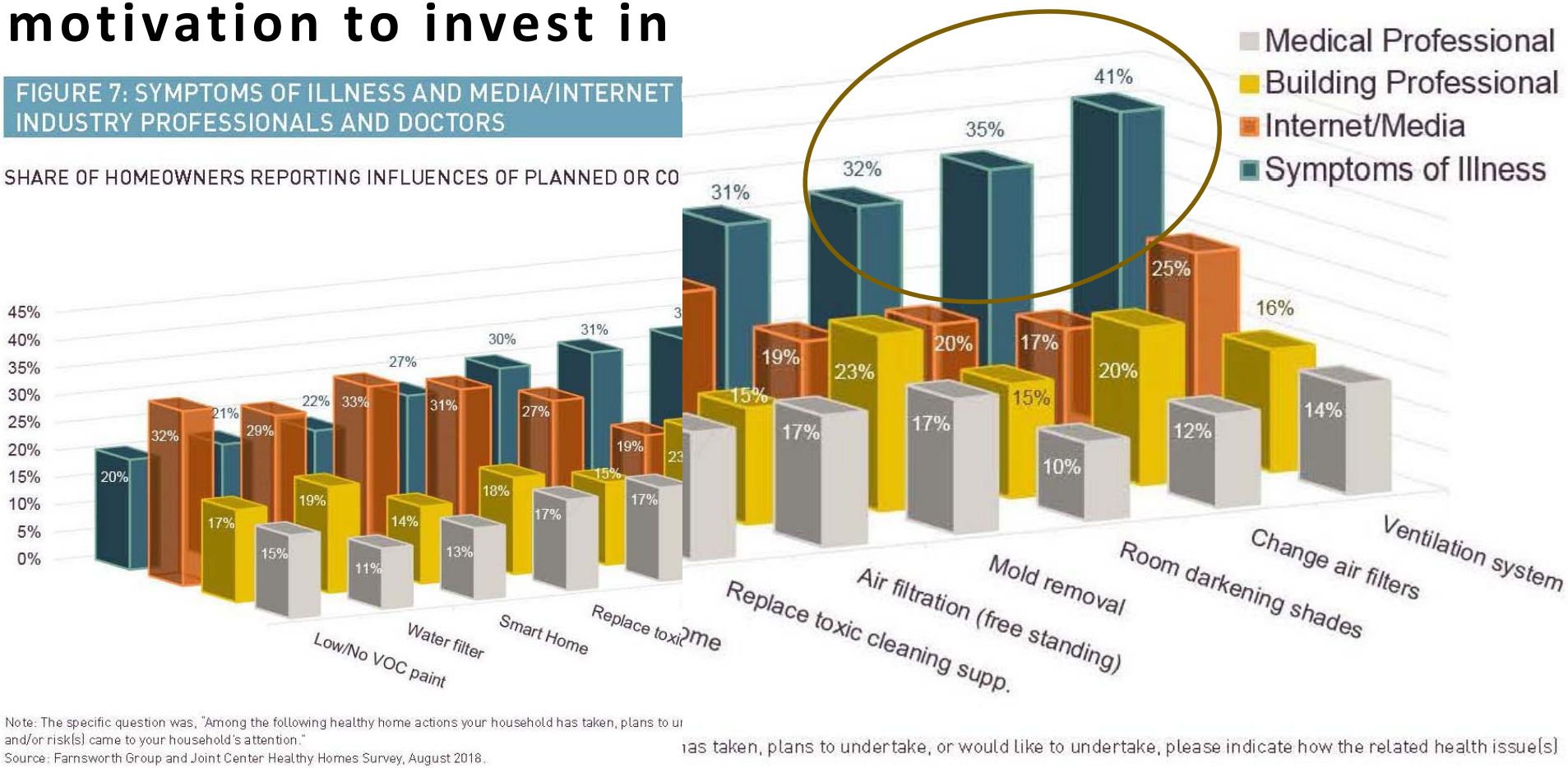
FIGURE 4: INDOOR AIR QUALITY, PESTS, AND WATER QUALITY ISSUES TOP LIST OF CONCERNS ABOUT THE IMPACT OF HOME ON HEALTH



Note: Out of a sample of 501 homeowners and 250 renters concerned about specific healthy housing issues.
Source: Farnsworth Group and Joint Center Healthy Homes Surveys, August 2018.

Healthy Home Remodeling: Consumer Trends and Contractor Preparedness, 2019.
Elizabeth La Jeunesse, Joint Center for Housing Studies of Harvard University

Health symptoms were a major driver for people's motivation to invest in



Healthy Home Remodeling: Co

Elizabeth La Jeunesse, Joint Center for Housing Studies of Harvard University

Because of SARS-CoV2 / COVID19 and shelter-in-place, now more than ever-

Homeowners are looking to invest in their homes:

- Better indoor air quality
- Performance in their home
  - Heating / cooling systems
  - Making their home quieter
  - Improving comfort

Omnibus Legislation on Improving the Nation's Infrastructure

SEC. 32302. WEATHERIZATION ASSISTANCE PROGRAM.

(a) REAUTHORIZATION OF WEATHERIZATION ASSISTANCE PROGRAM.—Section 422 of the Energy Conservation and Production Act (42 U.S.C. 6872) is amended by striking "appropriated—" and all that follows through "2012.." and inserting "appropriated $350,000,000 for each of fiscal years 2020 through 2024.".

"(4) The Secretary may amend the regulations prescribed under paragraph (1) to provide that the standards described in paragraph (2)(A) take into consideration improvements in the health and safety of occupants of dwelling units, and other non-energy benefits, from weatherization.".

"SEC. 414D. FINANCIAL ASSISTANCE FOR WAP ENHANCEMENT AND INNOVATION.

"(a) PURPOSES.—The purposes of this section are—

"(1) to expand the number of dwelling units that are occupied by low-income persons that receive weatherization assistance by making such dwelling units weatherization-ready;

What are the Healthy Home Business Opportunities?

Health Specialists
- Local Allergy and Asthma Treatment Centers
- Immunologists
- Ear, Nose and Throat Specialists
- Pulmonologists
- Pediatric Physicians
- General Practitioners
- Local Hospitals (Community Investment)

Care Givers
- In-home Nurses and Care Givers

Local Government
- Public Health Agencies
- Certified Lead Paint Abatement Contractor
- Licensed Mold Remediation Service Provider
- Become a Certified Radon Tester
- Federal/State Certification for Asbestos Remediation

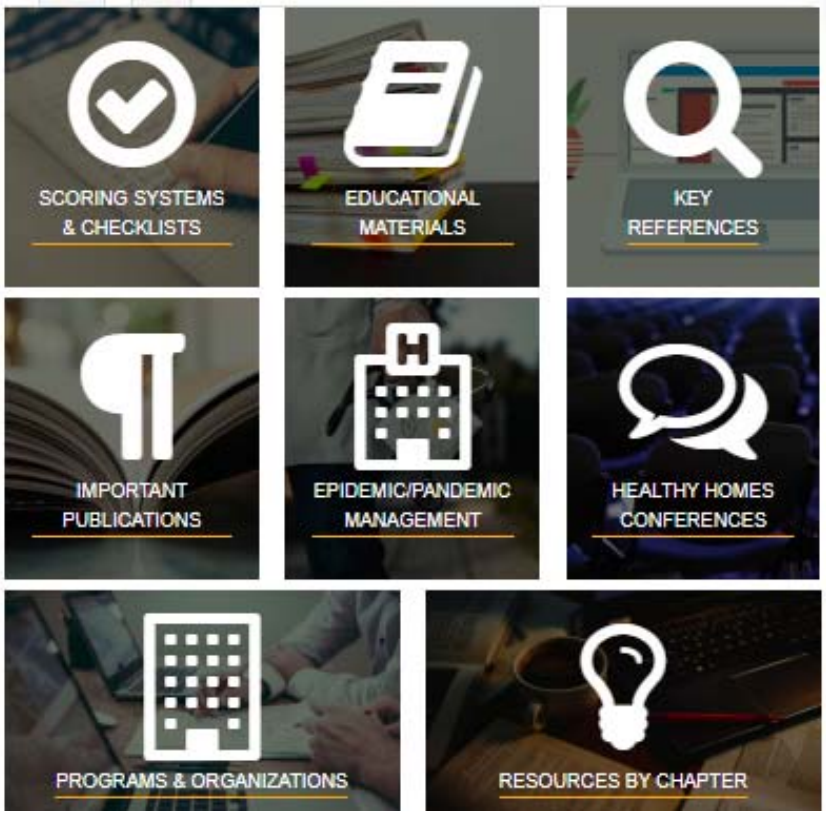
Educators
- Provide Information to Parent/Teacher Assns.
- Integrate healthy housing into CC curricula

Real Estate Professionals
- Realtors, Appraisers, and Inspectors
- Lenders

Shows
- Bridal Shows
- Pet Shows (differentiate from the home & garden crowd)

Media
- Provide Case Studies to Local TV, Radio and Newspapers
- Participate in Social Media Sites Relating to Health Issues
- Build a Strong Web Site with Credible Information
- Engage SEO/SEM and Lead Generation Consultants

Healthy Housing Principles Resources



More information go to bpi.org/HHP

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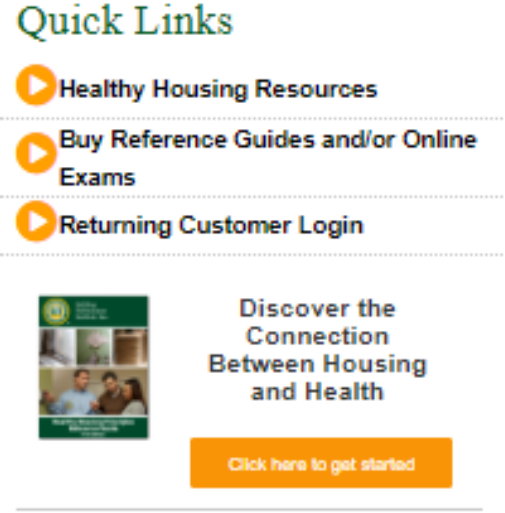

Download a PowerPoint PDF or view a video - bpi.org/hhp-presentations