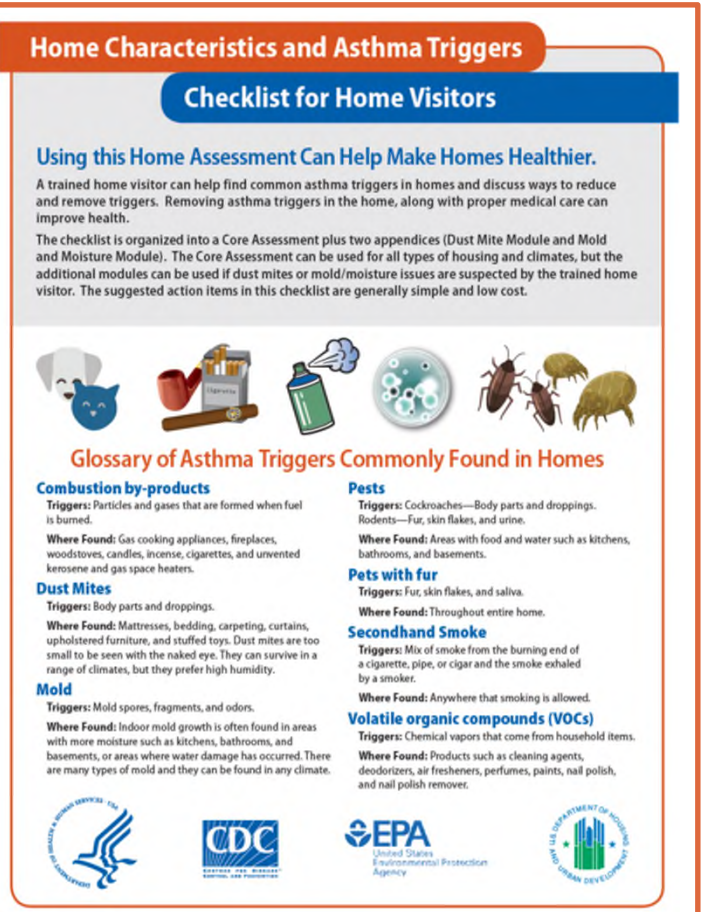
Home Characteristics and Asthma Triggers

Training for Home Visitors

This training covers some of the most common asthma triggers found inside homes. The training can guide users of this checklist to understand triggers.

Learning Objectives

- To understand how exposure to common asthma triggers occurs in homes.
- To help residents find ways to reduce and remove triggers in their homes.



Home Characteristics and Asthma Triggers

Checklist for Home Visitors

Using this Home Assessment Can Help Make Homes Healthier.

A trained home visitor can help find common asthma triggers in homes and discuss ways to reduce and remove triggers. Removing asthma triggers in the home, along with proper medical care can improve health.

The checklist is organized into a Core Assessment plus two appendices (Dust Mite Module and Mold and Moisture Module). The Core Assessment can be used for all types of housing and climates, but the additional modules can be used if dust mites or mold/moisture issues are suspected by the trained home visitor. The suggested action items in this checklist are generally simple and low cost.

Glossary of Asthma Triggers Commonly Found in Homes

Combustion by-products

Triggers: Particles and gases that are formed when fuel is burned.

Where Found: Gas cooking appliances, fireplaces, woodstoves, candles, incense, cigarettes, and unvented kerosene and gas space heaters.

Dust Mites

Triggers: Body parts and droppings.

Where Found: Mattresses, bedding, carpeting, curtains, upholstered furniture, and stuffed toys. Dust mites are too small to be seen with the naked eye. They can survive in a range of climates, but they prefer high humidity.

Mold

Triggers: Mold spores, fragments, and odors.

Where Found: Indoor mold growth is often found in areas with more moisture such as kitchens, bathrooms, and basements, or areas where water damage has occurred. There are many types of mold and they can be found in any climate.

Pests

Triggers: Cockroaches—Body parts and droppings. Rodents—Fur, skin flakes, and urine.

Where Found: Areas with food and water such as kitchens, bathrooms, and basements.

Pets with fur

Triggers: Fur, skin flakes, and saliva.

Where Found: Throughout entire home.

Secondhand Smoke

Triggers: Mix of smoke from the burning end of a cigarette, pipe, or cigar and the smoke exhaled by a smoker.

Where Found: Anywhere that smoking is allowed.

Volatile organic compounds (VOCs)

Triggers: Chemical vapors that come from household items.

Where Found: Products such as cleaning agents, deodorizers, air fresheners, perfumes, paints, nail polish, and nail polish remover.

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Outline of training

- Glossary
- Introduction (allergens, irritants, allergy, and particles)
- Building information
- Heating and cooling
- Cooking
- Smoking
- Pets
- VOCs
- Pests
- Moisture and Mold
- Dust mites

Allergy assessment

Skin Prick Test

Blood Sample

Question:
Are you allergic?

What are allergens and irritants?

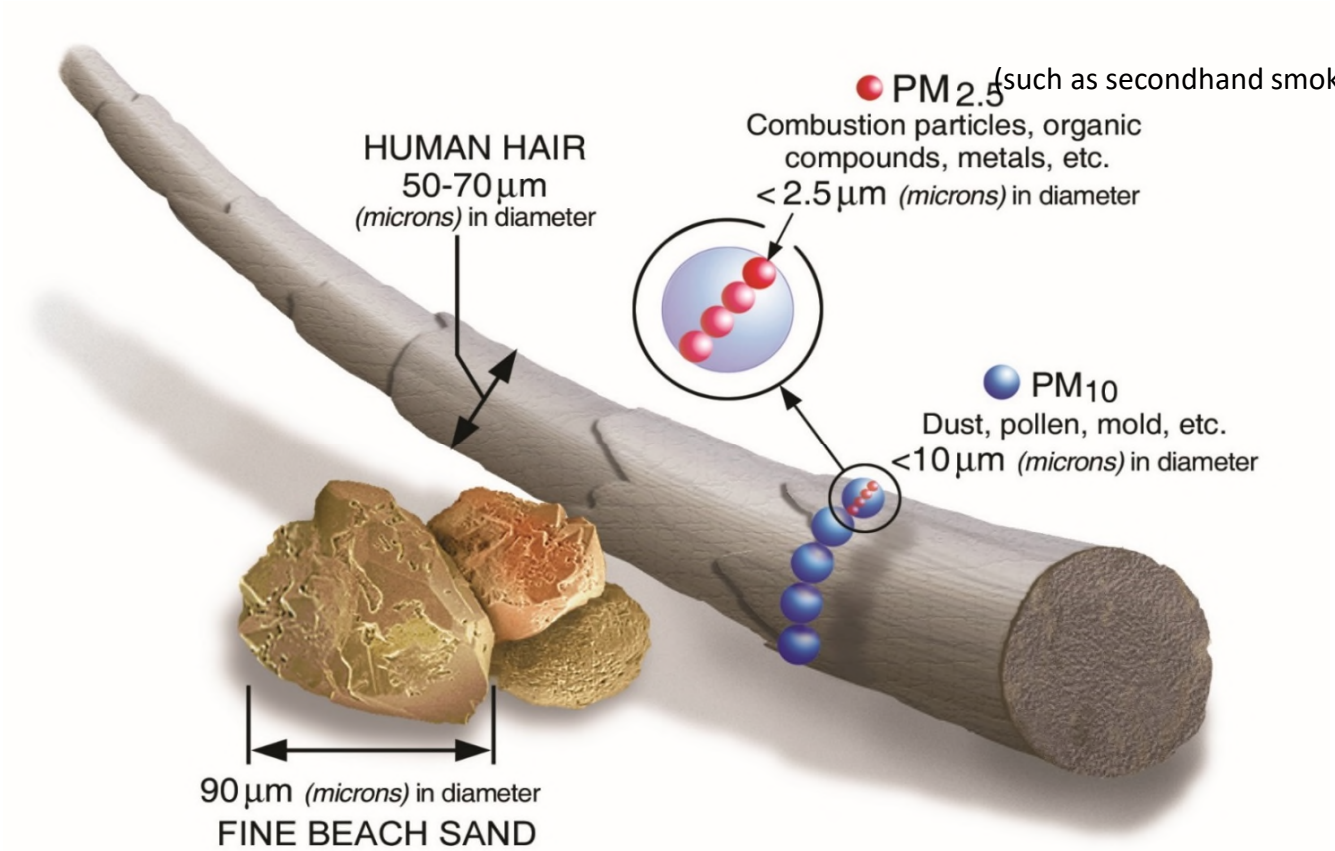
Allergens

- Affect people with specific sensitivity to a certain substance.
- Can be found on particles.
- Include dust mite droppings, mold spores, pet skin flakes (dander), cockroach droppings, and dried rodent urine.

Irritants

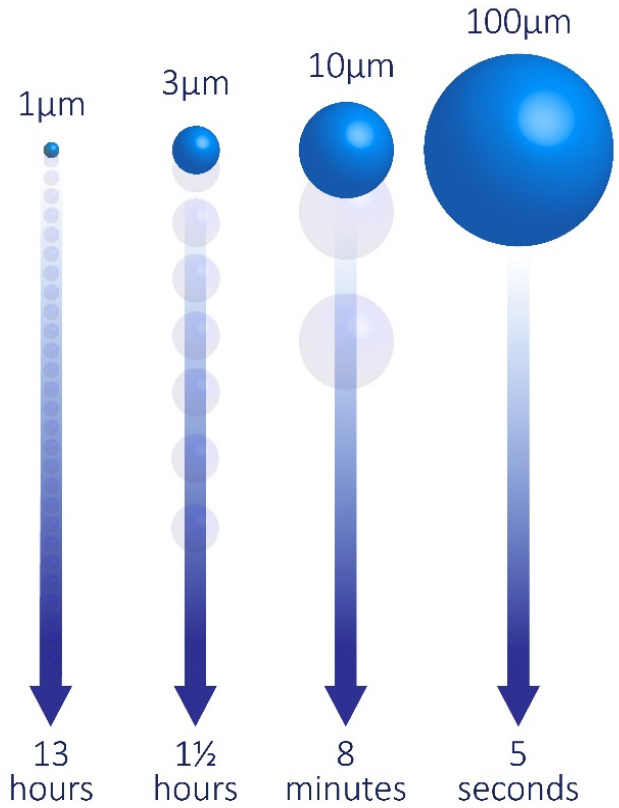
- Affect people with asthma even without a specific allergy.
- Can be found in particles, vapors, and gases.
- Include smoke, mold spores and odors, secondhand smoke, and cat urine odor.

Particle sizes



(such as secondhand smoke particles)

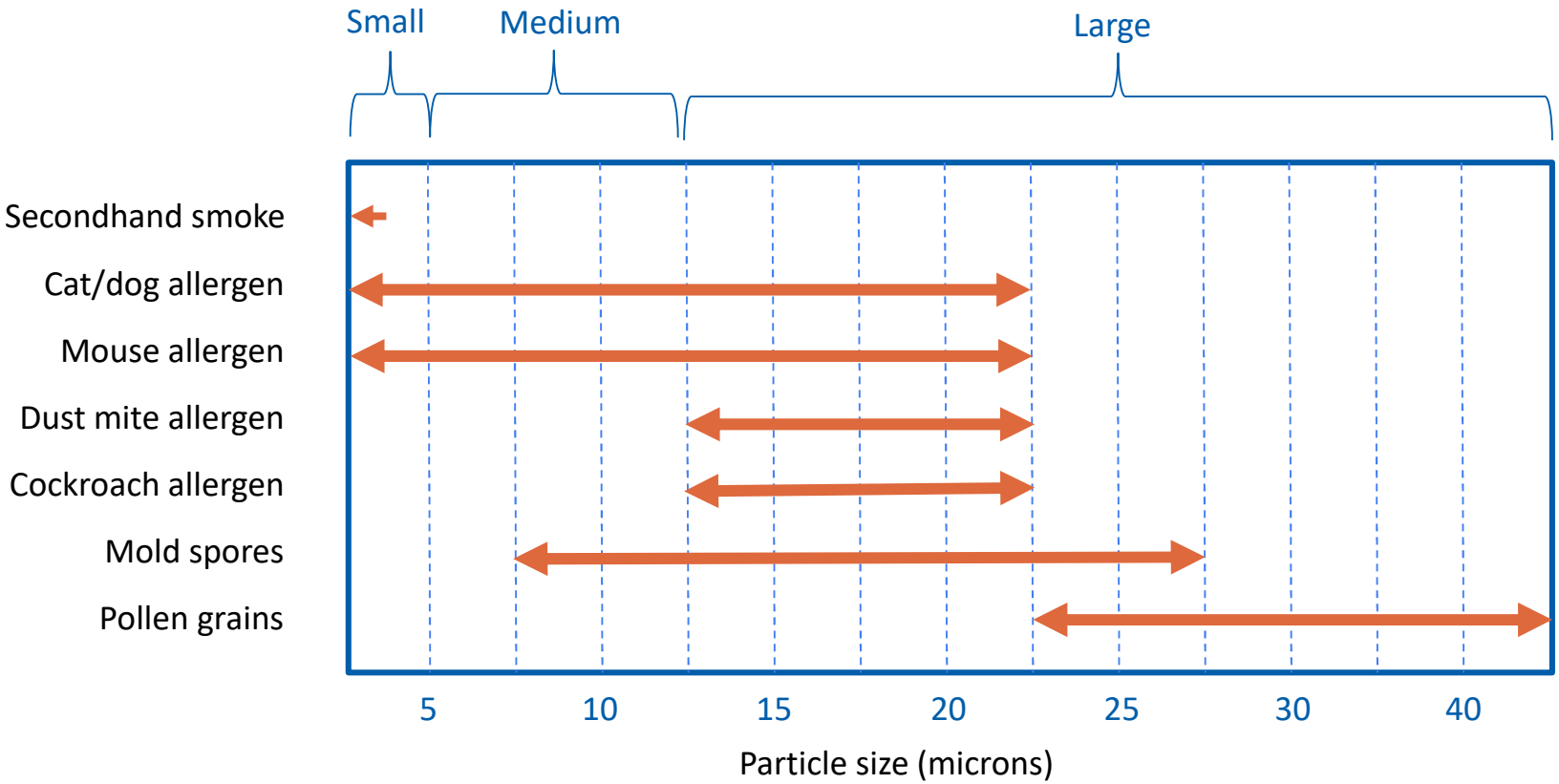
Small particles stay in the air for hours



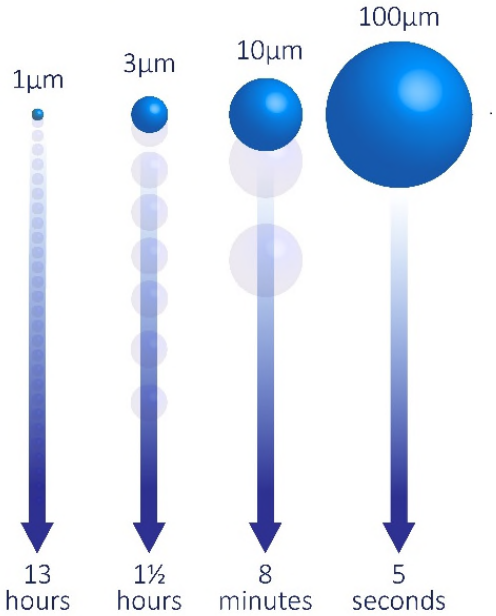
Large particles settle quickly

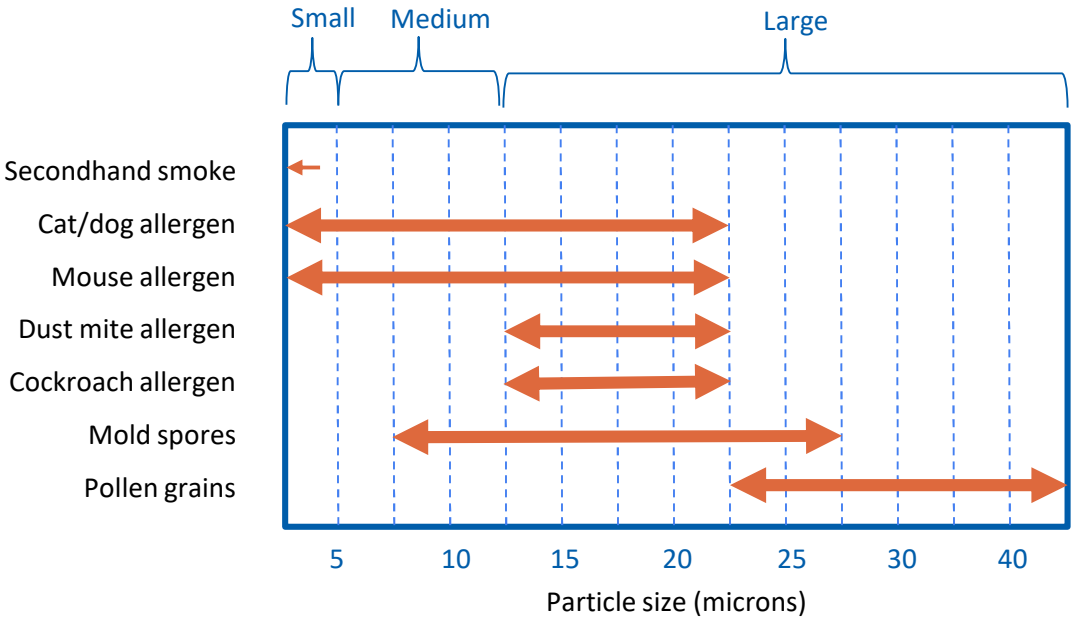
Time to settle from 5 feet

Size range of asthma trigger particles in air



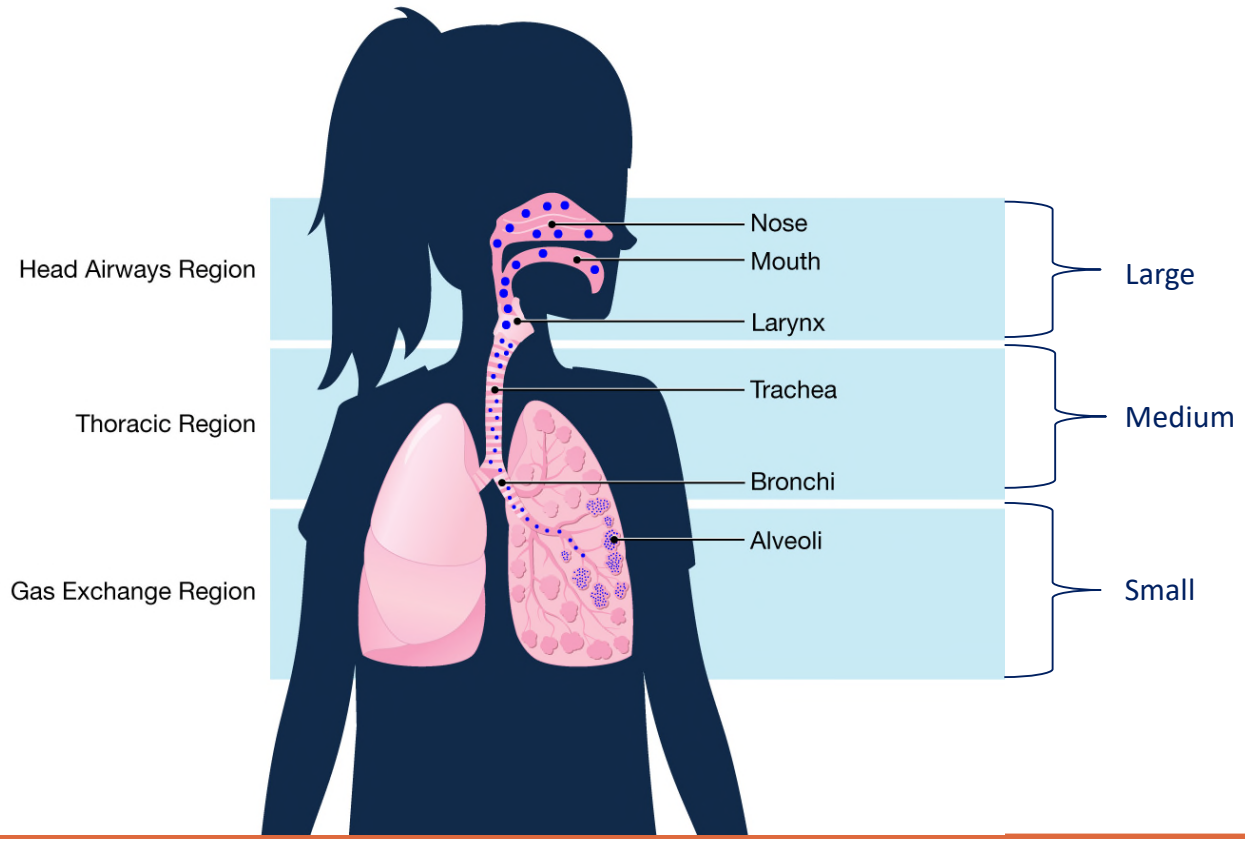
Why does particle size matter?





Size range of asthma trigger particles in air

Where do particles go in the airways?



BUILDING INFORMATION
AND
HOME INTERIOR

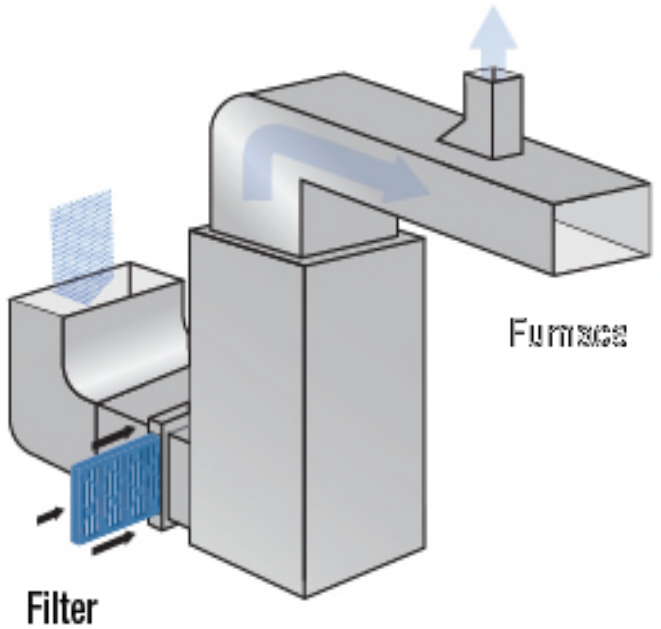
Building information

- **Type of home**
  - Single (detached)
  - Attached to other homes
  - Manufactured/Mobile home
- **Rental vs. owned**
- **Number of stories in building**

HEATING AND COOLING

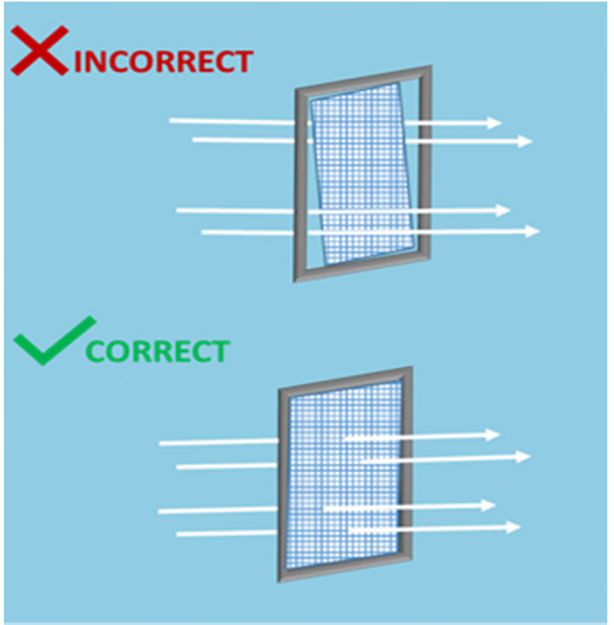
Heating, ventilation, and air conditioning (HVAC)

- Heating, ventilating, and air conditioning (HVAC) systems and some appliances can circulate pollutants.
- Indoor air pollutants can enter living areas from crawl spaces, basements, attics, and wall cavities.



HVAC maintenance and filters

- To help maintain indoor air quality, follow manufacturers' instructions for routine HVAC maintenance.
- Air filters that reduce indoor pollutants can be installed correctly by a professional.



- *Use correct size air filters.*
- *Align filter properly in HVAC system slot.*

Asthma triggers and heating

Ways people heat their homes

- Heating systems and appliances
- Insulation
- Closing windows and doors

Example of plastic sheeting used as insulation over a window

Heating

Checklist questions

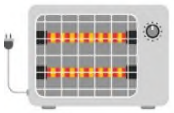
- During the winter, what is the primary way your home is heated?
- In addition to the main source of heat, do you use any other source(s)?

Potential action steps

- Properly ventilate the room where a fuel- or wood-burning appliance is used.
- Never use a gas cooking appliance as a heating source.
- Use proper fuel and follow instructions when using an unvented kerosene or gas space heater.

Radiator

Fireplace



Space Heater

Baseboard Heater

Fuel-burning heat sources

- Fireplaces, wood burning stoves, or other fuel-burning appliances can trigger asthma if not properly ventilated.
- *Caution:* Ventilate safely! Make sure the flue (chimney opening) is open to prevent backdraft (see figures).
- Be sure to have working smoke alarm(s) and CO detector(s).

- *Flue open*
- *Properly ventilated*

- *Flue closed*
- *Improperly ventilated*

** Check with a professional to inspect chimney every year.*

Cooling

Central A/C units

- Replace filters every 3 months or as recommended.
- Use filters with higher efficiency than standard, if specifications allow.
- Schedule annual inspection of HVAC system by a professional.
- Promptly repair damaged parts.

Window A/C units

- Keep drip pans clean and the drain lines flowing properly.
- Follow the manufacturer's instructions for cleaning or replacing filters.

Evaporative coolers (often used in very dry climates)

- Follow the manufacturer's instructions for cleaning.

Window A/C unit

Fan

Portable free-standing unit

Asthma triggers and cooling

- Excess cooling can create condensation, which can damage home furnishings and lead to mold, a common asthma trigger.
- If you see condensation or moisture on windows, walls, or pipes act quickly to dry the wet surface and reduce the moisture/water source.
- Condensation can be a sign of high humidity.

Cooking

- Cooking can create indoor air pollutants, such as gases and particles.
- Cooking can also increase moisture in the air.
- Use exhaust fans or range hoods that vent to the outside, or open windows when cooking.

✓

Exhaust duct

✗

No exhaust duct

Air Cleaners

- Eliminating sources of asthma triggers such as candles, cigarettes, perfumes, air fresheners, etc. is the best method for controlling indoor air quality.
- Ventilation and air cleaning help remove particles and gases.
- EPA has a consumer guide, and a more technical summary about using air cleaners at home (https://www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home).

SMOKING

Secondhand smoke exposure in the United States

58 million
1 in 4 nonsmokers (58 million people) in the US are still exposed to secondhand smoke (SHS).

2 in 5
About 2 in every 5 children (including 7 in 10 black children) are exposed to SHS.

1 in 3
More than 1 in 3 nonsmokers who live in rental housing are exposed to SHS.

"Separating smokers from non-smokers, cleaning the air, and ventilating buildings cannot eliminate exposure of nonsmokers to SHS…"

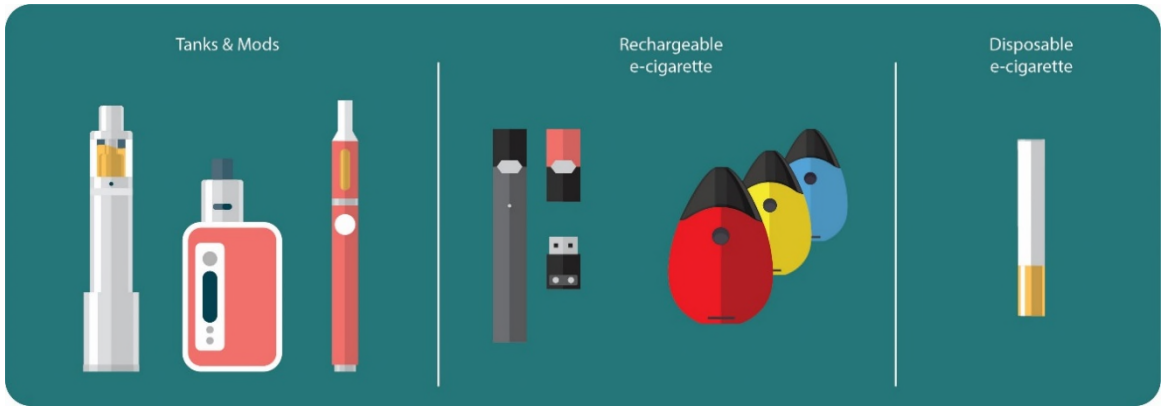
— Surgeon General, 2006

- Secondhand smoke (SHS) is a universal asthma trigger.
- There is no safe amount of SHS.
- Smoke-free policies benefit tenants and property owners.*

* To learn how to start a smoke-free policy, go to www.hud.gov/program_offices/healthy_homes/smokefree2

E-cigarettes

- E-cigarettes create an aerosol that can contain toxic chemicals.
- Risks that secondhand aerosol might trigger asthma symptoms are unknown.



Other concerns

- Dramatic increase in use of e-cigarettes by young people
- Possible path to traditional smoking among youth

PETS

Pets with fur: allergen characteristics

Cat and dog allergens

- Mainly skin flakes and saliva
- Found in a range of particle sizes
  - Small (<2.5 microns)
  - Medium (2.5-10 microns)
  - Large (>10 microns)
- Small particles can remain airborne for hours
- Easily carried on clothes to other places

**Allergen avoidance should focus on removing allergens from surfaces and air*

Pets with fur

Action steps to decrease exposures and symptoms

- Find a new home for the pet and thoroughly clean all surfaces

  OR

- For pets still in home
  - keep pet out of bedroom
  - wash furry pets
  - use air cleaner with HEPA filter
  - use allergen-proof mattress and pillow covers

Cat allergens in homes

10 out of 10
homes had
high levels

3 out of 10
homes had
high levels

Cat allergens in bedrooms

10 out of 10
bedrooms had
high levels

4 out of 10
bedrooms had
high levels

Changes that can affect pet allergen levels

- Changes by the residents (new furniture, new carpet, new pet).
- Changes in living situation (daycare, relative's home, vacation).

Other pets
Things to consider

- Other pets have allergens, too
- Pet food and water can attract and nourish bugs and rodents
- Litter boxes and cages can cause odors and mold growth that can irritate the lungs

PESTS

Types of pests

Pests: Allergen characteristics

Mouse and rat allergens

- Mainly urine (but also in dander).
- Airborne allergens on a range of microscopic particles (<10 and ≥10 microns).
- Can remain airborne for hours.

Cockroach allergens

- Mainly fecal pellets (but also in dried body parts).
- Airborne allergens on larger, but still microscopic particles (mainly >10 microns).
- Settle out of air quickly.

Things that affect pest allergen levels

- Changes within the home — new roommates, parties with a lot of food, new pet.
- Changes in the building — new holes, recent pesticide application in neighboring buildings.
- Changes in weather — cold temperatures can drive pests indoors.

Specific examples of things that attract pests

What is Integrated Pest Management (IPM)?

Integrated: Using multiple approaches that work together.

Pest: Unwanted rodents and bugs in the home.

Management: Effective methods with the least possible hazard to people, property, and the environment.

Integrated Pest Management (IPM)

Physical changes in home

- Cleaning
- Sealing cracks and holes

Education

- Clean up spills
- Eat only in dining area
- Use sealed food containers
- Dispose of trash frequently

Keep pesticides and traps away from children and pets

- Use gel bait application for insects (such as cockroaches).
- Use snap traps for mice and rats.
- Avoid spray pesticides, bombs, and foggers (these are asthma triggers).

Cockroach monitoring trap

Pests: Action steps

To decrease *exposure and symptoms*

- Clean or remove pest reservoirs to prevent exposure
- Use integrated pest management (IPM)

Other considerations

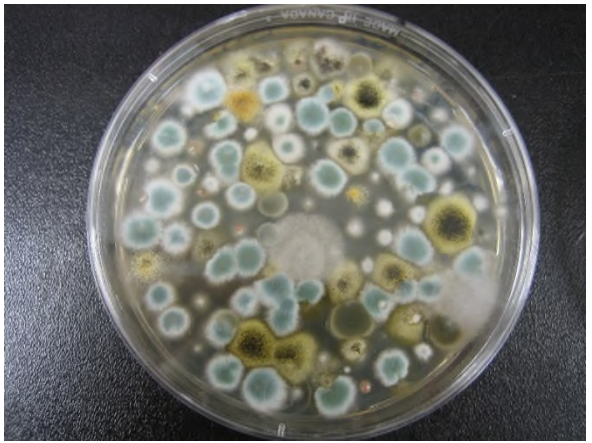
- In multi-family buildings, infestation can spread from other units and common areas.
- Building-wide approaches might be needed, with help from the landlord and other tenants.
- IPM is an ongoing process for homes that have pest problems. It is not a one-time fix.

MOLD

What is mold?

All types of mold are considered fungi

Mushrooms and puffballs are fungi



Typical types of mold in homes

Other signs of moisture

Rust

Water stains (but could be mold on the other side)

Algae

Where does mold grow?

Anywhere it has

- Water — from leaks, condensation on surfaces, etc.

and

- Sufficient nutrient — food, dust in carpet, paper in gypsum board or drywall, wood, etc.

Typical indoor locations for mold

- Bathroom tile
- Basement walls
- Window areas where moisture condenses
- Under leaky sinks
- Leaking or condensing pipes
- Walls behind furniture
- Drain pans inside air handling units
- Ductwork*
- Roof materials above ceiling tiles (due to roof leaks or insufficient insulation)

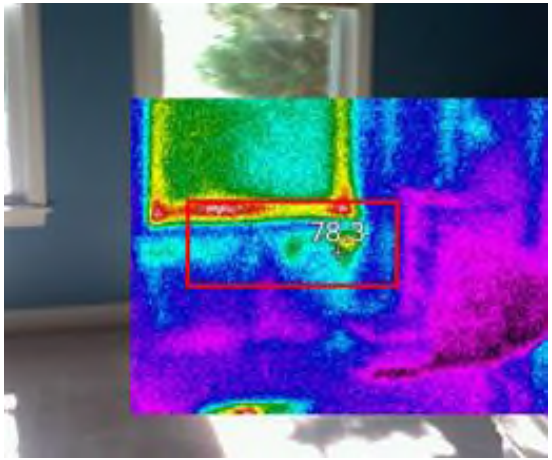
* For more information see EPA's Should You Have Your Ducts Cleaned? publication in slide "Additional Resources"

Mold growing on ceiling tile

Water leak under kitchen sink

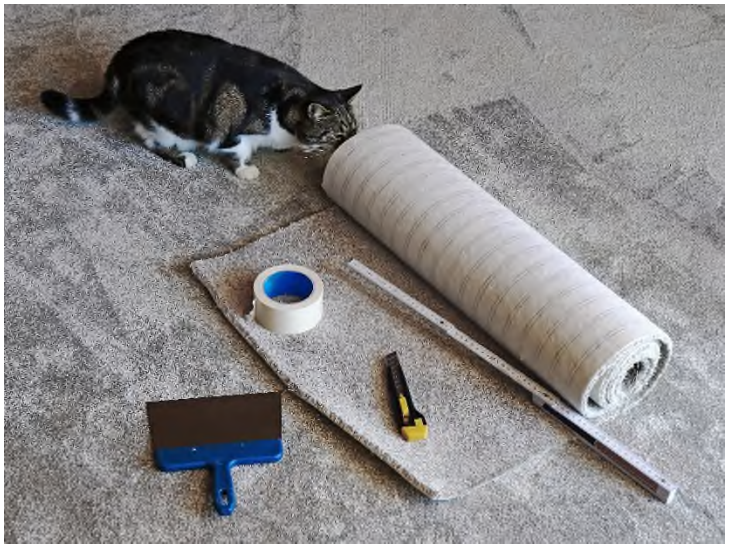
Condensation

- Surfaces can have different temperatures



- Colder surfaces in contact with warm air leads to condensation

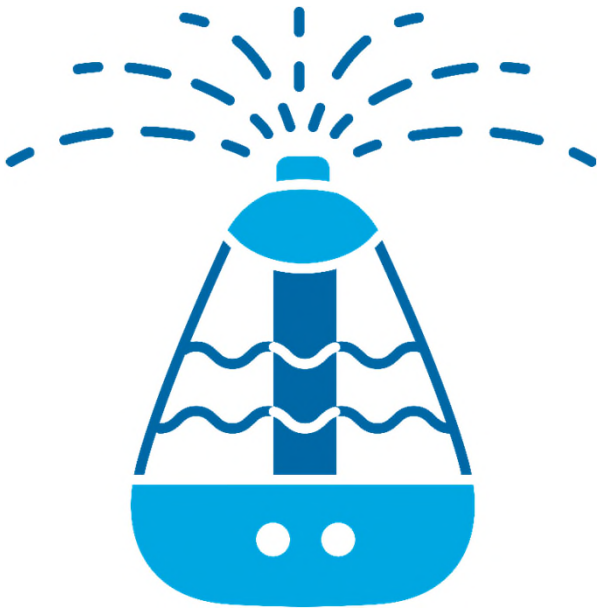
Other than water leaks and condensation, how can mold get into a home?



- Changes by the residents (new pillows, new carpet, old pillows, old carpet)
- Seasonal differences
- Pets

Humidifiers

- Some residents use humidifiers when air is very dry.
- Humidifier use can cause moisture on walls and ceilings.
- Keep humidity between 30%-50%.
- Keep moisture from building up on surfaces.
- Clean humidifier often.
- Follow manufacturer's instructions, to prevent growth of mold and other microbes.



Types of humidifiers

Warm mist (vaporizer)

Cool mist

How to reduce mold growth

- Fix any water or moisture problems.

- Control humidity levels and increase ventilation.

- Clean up areas that have mold growth.

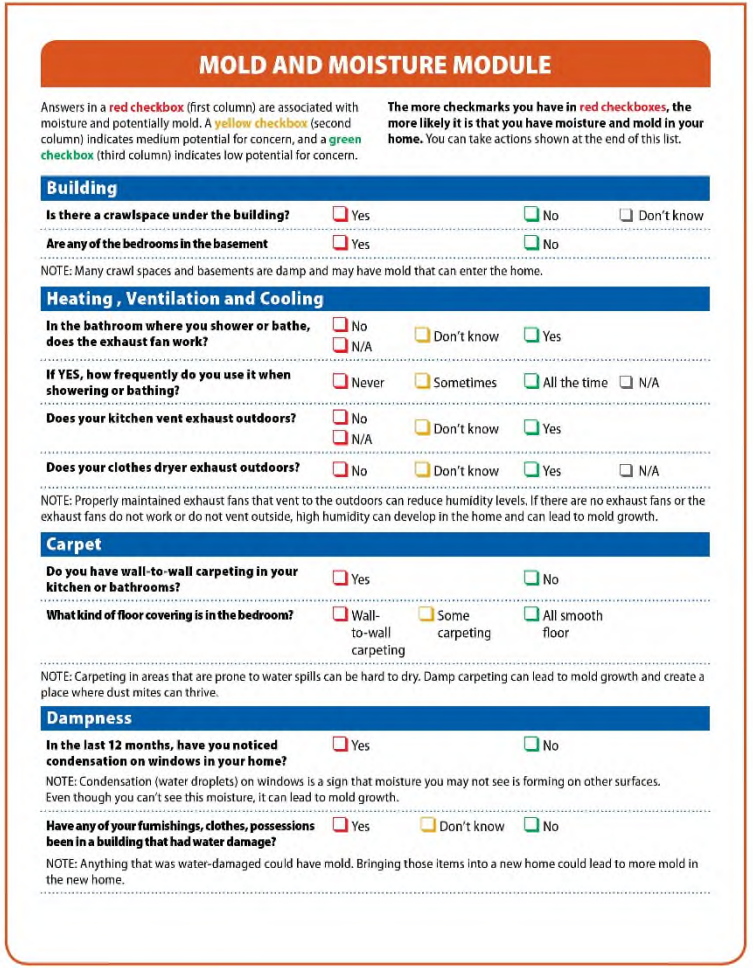
Dehumidifiers

- Basements and crawl spaces can be damp.
- Dehumidifiers can help reduce moisture.
- The indoor humidity should be kept between 30%-50%.

Cleaning mold

- If you have asthma, you probably shouldn't be doing this yourself.
- Ventilate area well.
- If larger than 10 square feet, consider getting professional help.
- Scrub with soapy water to remove mold growth. Dry quickly.
- **Clean and dry wet or damp spots within 48 hours.**

The goal of the Mold and Moisture Module is to find ways to reduce moisture and mold



MOLD AND MOISTURE MODULE

Answers in a **red checkbox** (first column) are associated with moisture and potentially mold. A **yellow checkbox** (second column) indicates medium potential for concern, and a **green checkbox** (third column) indicates low potential for concern.

The more checkmarks you have in red checkboxes, the more likely it is that you have moisture and mold in your home. You can take actions shown at the end of this list.

Building

Is there a crawlspace under the building?	❑ Yes	❑ No	❑ Don't know
Are any of the bedrooms in the basement	❑ Yes	❑ No	

NOTE: Many crawl spaces and basements are damp and may have mold that can enter the home.

Heating , Ventilation and Cooling

In the bathroom where you shower or bathe, does the exhaust fan work?	❑ No ❑ N/A	❑ Don't know	❑ Yes	
If YES, how frequently do you use it when showering or bathing?	❑ Never	❑ Sometimes	❑ All the time	❑ N/A
Does your kitchen vent exhaust outdoors?	❑ No ❑ N/A	❑ Don't know	❑ Yes	
Does your clothes dryer exhaust outdoors?	❑ No	❑ Don't know	❑ Yes	❑ N/A

NOTE: Properly maintained exhaust fans that vent to the outdoors can reduce humidity levels. If there are no exhaust fans or the exhaust fans do not work or do not vent outside, high humidity can develop in the home and can lead to mold growth.

Carpet

Do you have wall-to-wall carpeting in your kitchen or bathrooms?	❑ Yes	❑ No	
What kind of floor covering is in the bedroom?	❑ Wall-to-wall carpeting	❑ Some carpeting	❑ All smooth floor

NOTE: Carpeting in areas that are prone to water spills can be hard to dry. Damp carpeting can lead to mold growth and create a place where dust mites can thrive.

Dampness

In the last 12 months, have you noticed condensation on windows in your home?	❑ Yes	❑ No	

NOTE: Condensation (water droplets) on windows is a sign that moisture you may not see is forming on other surfaces. Even though you can't see this moisture, it can lead to mold growth.

Have any of your furnishings, clothes, possessions been in a building that had water damage?	❑ Yes	❑ Don't know	❑ No

NOTE: Anything that was water-damaged could have mold. Bringing those items into a new home could lead to more mold in the new home.

Mold growth on wooden studs after a hurricane

VOLATILE ORGANIC COMPOUNDS (VOCS)

Volatile organic compounds (VOCs)

Chemicals commonly found in many household products

- Wood preservatives
- Aerosol sprays
- Cleansers and disinfectants
- Moth repellents and air fresheners
- Fuels and automotive products
- Hobby and craft materials supplies
- Paints, paint strippers, and solvents
- Dry-cleaned clothing
- Pesticides
- Building materials and furnishings
- Glues, adhesives, permanent markers, and photo chemicals

VOCs can be irritating and harmful to all people with asthma

- Limit exposure by minimizing product use.
- Use products only when person with asthma is not present, or use alternative products.
- Follow manufacturer's instructions for use and storage.
- If using products, carefully follow manufacturer's instructions and make sure the area is well-ventilated.
- Never mix household care products unless directed on the label.
- Do not store opened containers of unused paints and similar materials.*
- Keep products out of reach of children and pets.
- When buying supplies and cleaners, favor those certified by programs such as Green Seal or EPA's Safer Choice.

* https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality

DUST MITES

Dust mites

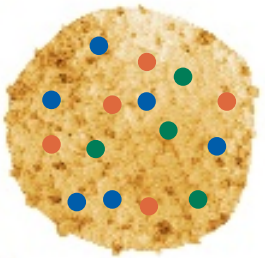
- Dust mites burrow into textile furniture and bedding.
- They are microscopic and cannot be easily seen.

What are dust mite allergens?

- Dust mite allergens are proteins found in fragments of body parts and droppings.
- Allergens are too small to be measured by microscope

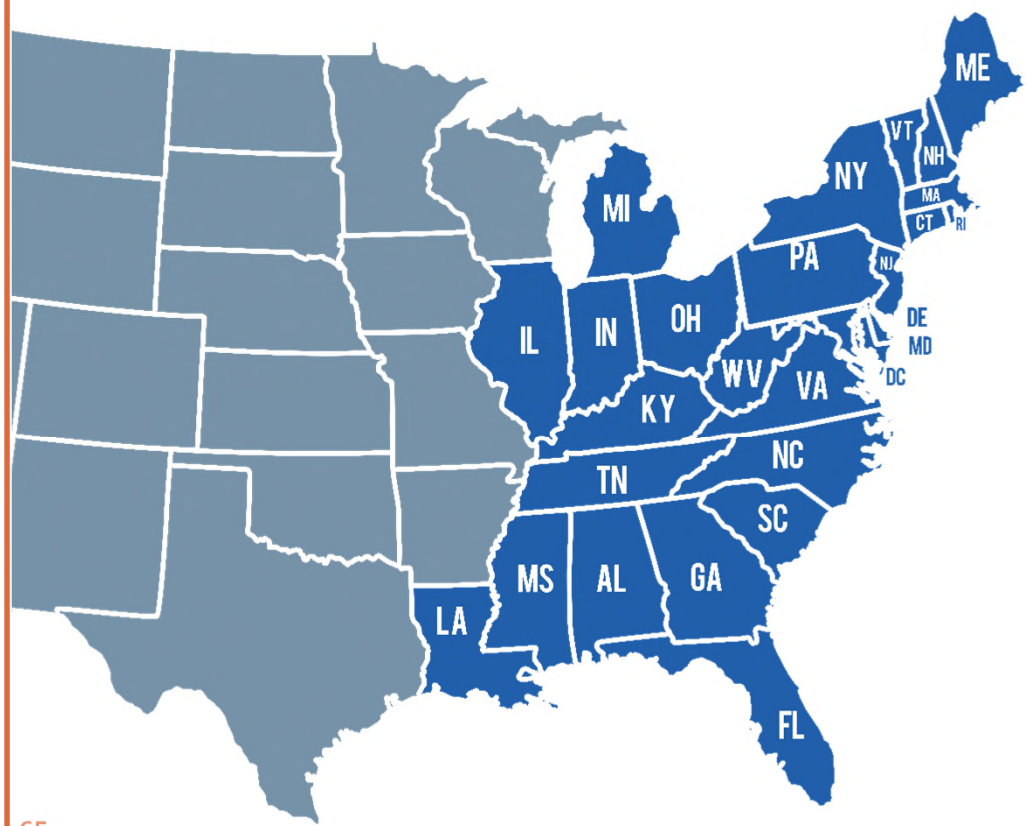
Dust mite
(200-300 microns)

Dust mite droppings
(about 10-40 microns)



Allergens
Der f 1, Der p 1, Blo t 5
(much less than 1 micron)

Dust mite distribution: the East Coast



Der f 1

Der p1

Blo t 5

Dust mite allergen characteristics

Dust mite allergen

- Mainly droppings (fecal pellets)
- Airborne particles > 10 microns
- Settle out of air quickly
- Mainly exposed by breathing near surfaces with dust mites
- Not easily transferred passively (e.g. from clothes to sofa)
- Mainly found in soft fabric furnishings

Therefore

Allergen avoidance often focuses on the surfaces rather than the air

- Wash bedding regularly
- Remove carpet if possible or vacuum regularly
- Use allergen-proof mattress and pillow covers

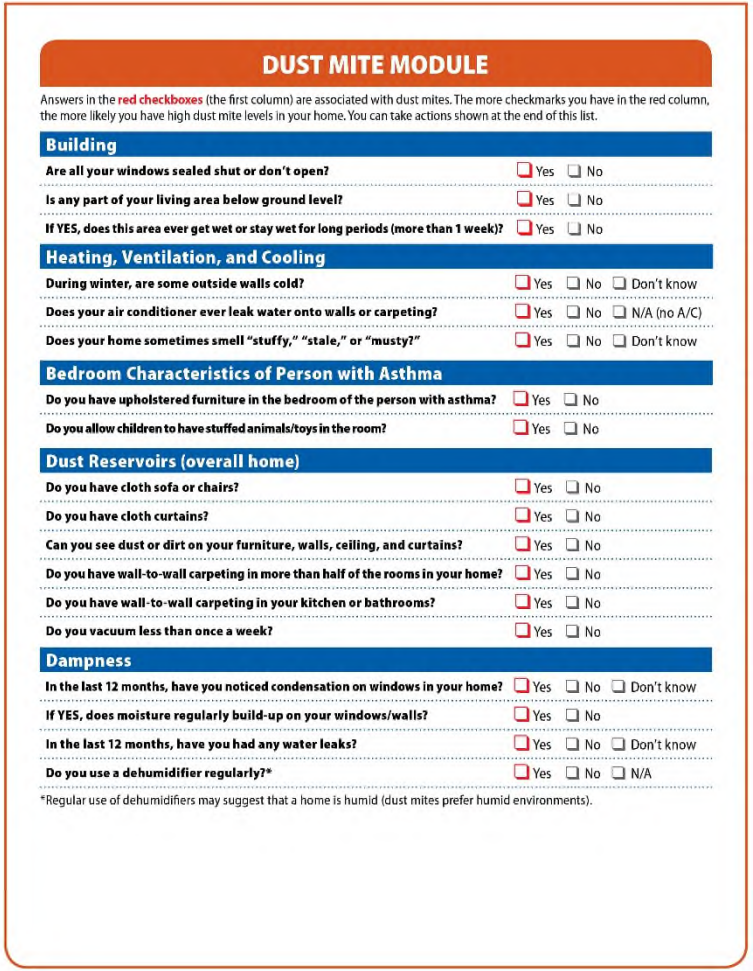
Dust mite intervention

- Removing the allergens is not the same as decreasing the dust mite population.
- Use a device (hygrometer) to measure relative humidity.
- Keep relative humidity 30%-50%* to help keep dust mite population low.

Measure humidity in several locations in home throughout the year.

* Less than 30% can dry out mucus membranes and promote respiratory infections.

The goal of the Dust Mite Module is to find ways to reduce exposures to dust mite allergens



DUST MITE MODULE

Answers in the red checkboxes (the first column) are associated with dust mites. The more checkmarks you have in the red column, the more likely you have high dust mite levels in your home. You can take actions shown at the end of this list.

Building

Are all your windows sealed shut or don't open?	❑ Yes	❑ No	
Is any part of your living area below ground level?	❑ Yes	❑ No	
If YES, does this area ever get wet or stay wet for long periods (more than 1 week)?	❑ Yes	❑ No	

Heating, Ventilation, and Cooling

During winter, are some outside walls cold?	❑ Yes	❑ No	❑ Don't know
Does your air conditioner ever leak water onto walls or carpeting?	❑ Yes	❑ No	❑ N/A (no A/C)
Does your home sometimes smell "stuffy," "stale," or "musty?"	❑ Yes	❑ No	❑ Don't know

Bedroom Characteristics of Person with Asthma

Do you have upholstered furniture in the bedroom of the person with asthma?	❑ Yes	❑ No
Do you allow children to have stuffed animals/toys in the room?	❑ Yes	❑ No

Dust Reservoirs (overall home)

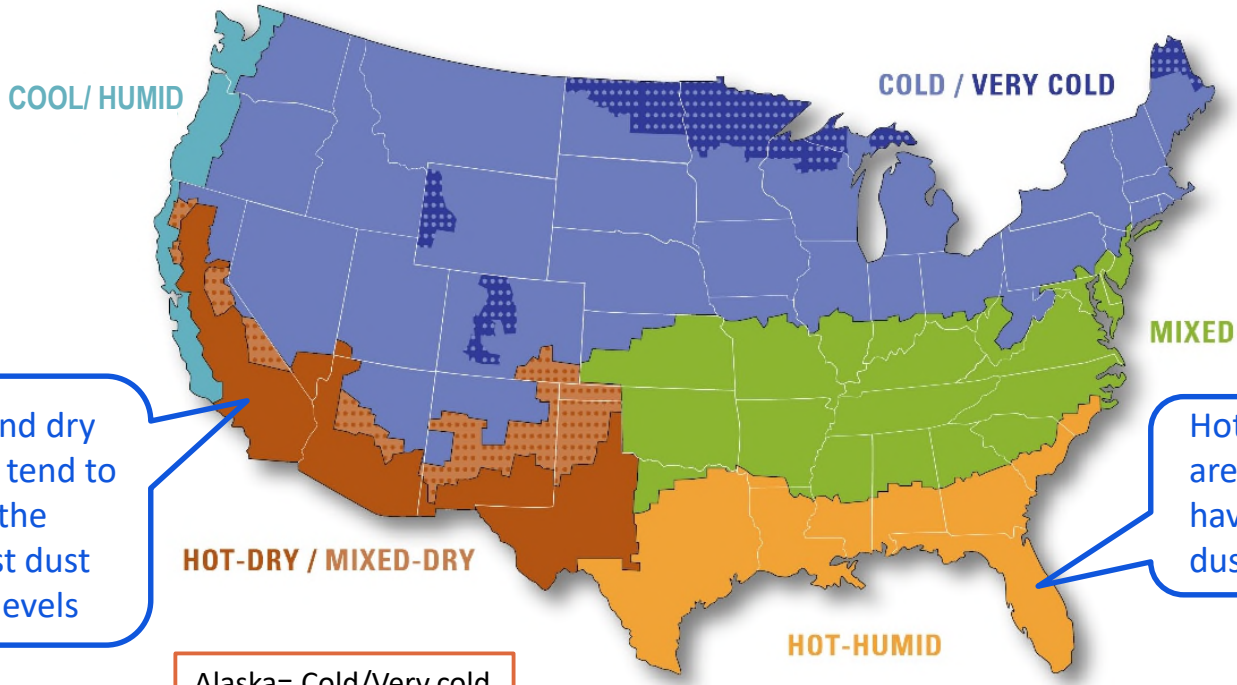
Do you have cloth sofa or chairs?	❑ Yes	❑ No
Do you have cloth curtains?	❑ Yes	❑ No
Can you see dust or dirt on your furniture, walls, ceiling, and curtains?	❑ Yes	❑ No
Do you have wall-to-wall carpeting in more than half of the rooms in your home?	❑ Yes	❑ No
Do you have wall-to-wall carpeting in your kitchen or bathrooms?	❑ Yes	❑ No
Do you vacuum less than once a week?	❑ Yes	❑ No

Dampness

In the last 12 months, have you noticed condensation on windows in your home?	❑ Yes	❑ No	❑ Don't know
If YES, does moisture regularly build-up on your windows/walls?	❑ Yes	❑ No	
In the last 12 months, have you had any water leaks?	❑ Yes	❑ No	❑ Don't know
Do you use a dehumidifier regularly?*	❑ Yes	❑ No	❑ N/A

*Regular use of dehumidifiers may suggest that a home is humid (dust mites prefer humid environments).

Where you live could affect dust mite avoidance strategies



Hot and dry areas tend to have the lowest dust mite levels

Hot and humid areas tend to have the highest dust mite levels

Alaska= Cold/Very cold
Hawaii = Hot-humid

ADDITIONAL RESOURCES

Additional Resources

Asthma

- CDC: www.cdc.gov/asthma/triggers.html
- EPA: www.epa.gov/asthma/asthma-triggers-gain-control
- HUD: www.hud.gov/program_offices/healthy_homes/healthyhomes/asthma
- **Particles**
- EPA's Air Cleaners in the Home: www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home
- **Renters**
- Tenant's right groups by state: https://www.hud.gov/topics/rental_assistance/tenantrights

Smoking

How to stop smoking

- Free Help Talk to a trained coach who can help you quit. Call 1-800-QUIT-NOW (1-800-784-8669)
- Go to www.smokefree.gov if someone you know smokes and wants to quit.
- How to set up a smoke-free policy for your home:

https://www.hud.gov/program_offices/healthy_homes/smokefree2

Additional resources (cont'd)

Moisture and mold

- A Brief Guide to Mold, Moisture and Your Home: www.epa.gov/mold/brief-guide-mold-moisture-and-your-home
- EPA's Should You Have Your Ducts Cleaned? www.epa.gov/indoor-air-quality-iaq/should-you-have-air-ducts-your-home-cleaned

Outdoor air

- www.epa.gov/airnow

BACK-UP SLIDES:
FOR HEATING, VENTILATION, AND AIR CONDITIONING SECTION

Reduce asthma triggers when heating and cooling

Reduce dust from HVAC systems

- Seal holes around room vents.
- Have a HVAC professional initially install a filter appropriate for the system, if possible. Replace filters every 3 months, or as needed.
- Read EPA's *"Should You Have the Air Ducts in Your Home Cleaned?"*

Reduce asthma triggers when heating your home

Fuel-burning appliances

- Vent fuel-burning appliances to the outdoors.
- Open windows or doors to ventilate rooms.
- People may not want to open windows and doors because of draft and heat loss.
- Consider how to find a solution that works for the resident.

CAUTION!

Prevent fire hazards by ventilating safely!

Make sure doors and shutters to appliances are firmly closed before you ventilate the space.

Reduce asthma triggers when heating and cooling your home

Non-fuel-burning appliances or fixtures

Can produce or react with indoor air pollutants, such as dust and other pollutants.

Radiators

Baseboard heater

Electric space heater

To help reduce indoor pollutants, a resident can

- Ventilate the room
- Keep appliances, vents, and surfaces uncluttered and free of dust
- Use air cleaners or filters when possible
- Read EPA's Air Cleaners and Air Filters in the Home

BACK-UP SLIDE:
SECONDHAND SMOKE

How to create a smoke-free policy

(Information for building owners and managers)

Get started

- Learn about policy
- Develop steps for action
- Identify community partnerships

Create and adopt policy

- Educate staff, board, and resident council about policy
- Develop and finalize policy with staff and residents
- Conduct outreach to residents – conduct listening sessions, distribute printed material, display posters in common areas, etc.
- Set clear, consistent, and fair enforcement procedures

Enforce policy

- Follow up on all complaints and non-compliance to ensure fair and consistent enforcement

BACK-UP SLIDE:
FURRY PETS

What is the “Pet protective effect?”

- Living in a home with a cat or dog may protect against allergy and asthma
- Perhaps living with more than one pet
- Early life exposure (less than age 2 years)

BACK-UP SLIDE:
PESTS

Pests: Common cockroaches

German cockroaches

0.5 inch
(four blocks)

American cockroaches

Egg cases

1.5 inch
(12 blocks)

How to stop cockroaches and other pests from entering

Block entry points

- Seal cracks with caulk and repair holes in the building's exterior
- Install door sweeps and weather-proof seals on doors (including garage doors)
- Weather-proof windows and place screens on windows and attic vents
- Prune branches and shrubs that touch the building

Keep away water and food

- Store food in sealed containers
- Clean regularly
- Throw trash away regularly
- Repair water leaks
- Place stoppers in all drains
- Wipe up spills quickly

Get rid of places they can hide

- Keep firewood and trash cans away from the building
- Remove clutter from basements and crawl spaces
- Clean gutters

BACK-UP SLIDE:
MOLD

Tips for cleaning mold after a disaster