

# Housing and Our Health

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# Learning Objectives

- Identify the major health issues that can arise from our housing (asthma, lung cancer, respiratory and skin irritation, central nervous system issues, death)
- Identify the housing problems that have health effects (CO, VOCs, Mold, Household cleaning products/pesticides, Radon, Secondhand Smoke)
- Understand how to recognize, correct, and avoid indoor air hazards.
- Describe the basics of how air flows through a home.
- Describe how to avoid radon issues in a home, and how to avoid CO in a home, and how to avoid mold in a home.
- Understand a successful model for reducing children's asthma as an illustration of the earlier principles

# The Relationship Between Health and Housing

Laura Oatman

Minnesota Department of Health

# Potential Health Effects

- Asthma cause & exacerbation
- Lung Cancer (radon, secondhand smoke (SHS) are known to cause cancer in humans)
- Irritation of eyes, nose, throat, skin
- Central nervous system such as headache
- Death (CO, radon, SHS)

# Minnesota Numbers

- Currently have asthma (2006 data)
  - Approximately 304,000 adults (7.8%)
  - Approximately 80,000 children (6.6%)
- CO Poisoning
  - 73 deaths for years 1999 – 2004 (2,631 total in US)
  - Unintentional, non–fire-related
- Lung cancer
  - More than 2,250 Minnesotans die each year (1999 – 2003); most are smoking-related
  - 564 radon-related lung cancer deaths each year (US EPA estimate); smokers at greatest risk

# Carbon Monoxide

- Health Effects
  - Central nervous system (flu-like symptoms of headache, nausea, dizziness)
  - Death
  - Men and adults  $\geq 65$  years were more likely to die from CO poisoning (CDC data)
- Sources
  - Produced by incomplete combustion in fuel-burning devices
- Builder/Occupant options
  - Exposure to CO can be prevented with basic precautions, including proper installation and maintenance of fuel-burning appliances
  - CO detectors should be placed on every level of a home
  - Educate the public regarding the dangers of CO

# Formaldehyde & VOCs

- Volatile Organic Compounds: easily evaporate at room temperature
- Health Effects
  - Short term
    - Eye, nose & throat irritation
    - Headaches, nausea, vomiting, dizziness
    - Trigger asthma attacks
  - Long term
    - Cancer
    - Damage to kidneys, liver, nervous system

# Formaldehyde & VOCs continued

- Sources
  - New carpet, furniture, plastic, electronics
  - Recent paint or adhesive use
  - Chemicals stored home & attached garage
- Builder/Occupant options
  - Eliminate products with high VOCs levels
  - Buy Environmentally Preferable Products
  - Ventilation: open doors & windows, use fans
  - Climate control: increases temperature & humidity increases VOC release
  - Sealants may prevent VOCs release

# Cleaning & Personal Care Products (including air fresheners)

- Health Effects
  - Contain VOCs
  - Strong odors can trigger asthma attacks
  - Eye, nose & throat irritation
  - Headaches
- Sources
  - Household cleaners
  - Personal care such as fragrances and other scented products
- Builder/Occupant options
  - Eliminate source instead of using air fresheners
  - Use environmentally preferable products

# Mold

## ■ Health Effects

- nasal and sinus congestion
- cough
- wheeze/breathing difficulties/trigger asthma attacks
- sore throat
- skin and eye irritation
- upper respiratory infections (including sinus)

## ■ Sources

- Excess moisture from plumbing & building leaks, flooding, condensation, poor site drainage

## ■ Builder/Occupant options

- Fix the leak / source of moisture
- Clean up the mold (dead mold can cause health problems)

# Pesticides

- Health Effects: depends on pesticide
  - Poisonings especially children
  - Eye & skin irritation
  - Damage nervous & reproductive systems
  - Cancer
- Sources
  - Improper use & storage

# Pesticides

## continued

- Builder/Occupant options
  - Use Integrated Pest Management
  - Determine pest present & at what level
  - Pest prevention methods
    - Use before pesticides
    - Eliminate food, water & shelter
      - Store food in sealed containers
      - Seal cracks and openings

# Radon

- Health Effects
  - Increased risk for lung cancer
  - Number 1 cause of lung cancer for non-smokers
- Sources
  - Soil gas – primary source
  - Water and building materials – not usually a MN problem
- Builder/Occupant options
  - Radon Resistant New Construction techniques
  - Sub-slab depressurization system – existing homes

# Secondhand Smoke

- Health Effects
  - Increased risk for lung cancer
  - Cause of asthma in pre-school aged children
  - Triggers asthma attack in sensitive individuals
  - Irritation of eyes, nose, throat and lungs
- Sources
  - Burning tip of cigarettes and other tobacco products
- Builder/Occupant options
  - Ban smoking inside home

# Emerging Issues in the News

## ■ Phthalates

- Chemicals used as plasticizers that provide flexibility & durability
- Endocrine disruptors: developmental abnormalities; most sensitive is the immature male reproductive system
- Building materials, food packaging, vinyl products such as flooring & shower curtains

## ■ Ozone air cleaners

- Avoid use of ozone generators, air cleaners that intentionally produce ozone, in the home
- Ozone (O<sub>3</sub>) irritates eyes, nose, throat and lungs and can trigger asthma attacks
- If possible, remove source of problem
- Use other types of air cleaners such as High Efficiency Particulate Air (HEPA) cleaner

- Next:

**Vicki Carey**  
City of Minneapolis  
Regulatory Services

We'll have a question and answer session at the end of the presentation.

# The Plan is not Foolproof

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# **The Plan is not Foolproof: A Guide to Recognizing, Correcting and Avoiding Indoor Air Hazards**

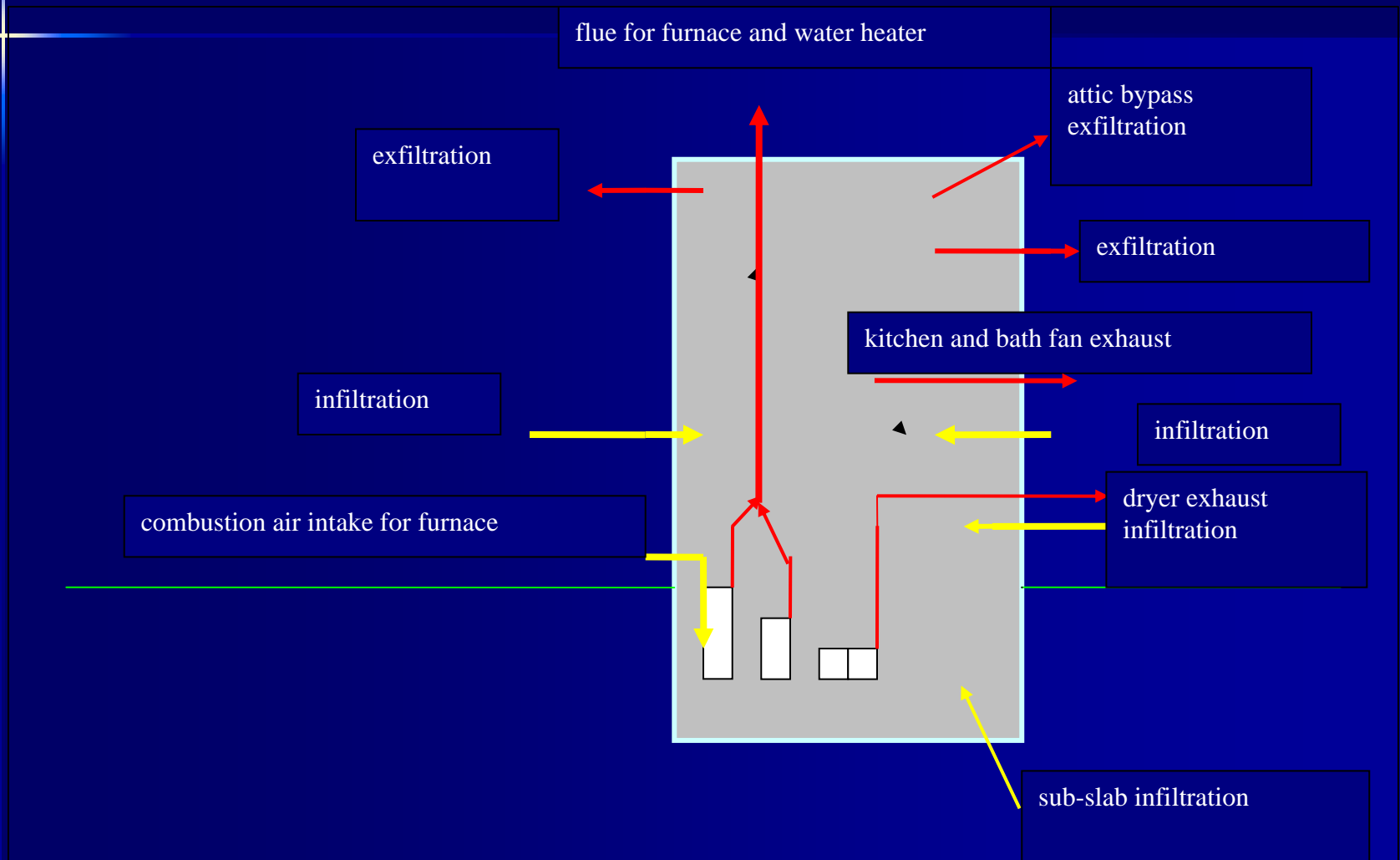
Basic Air Flow in a Typical Residential Structure

Simple Steps You Can Take to Pull Radon Into Your House

Easy Ways to Manufacture Carbon Monoxide

How to Make a 1000 Square Foot Petri Dish

# Basic Air Flow

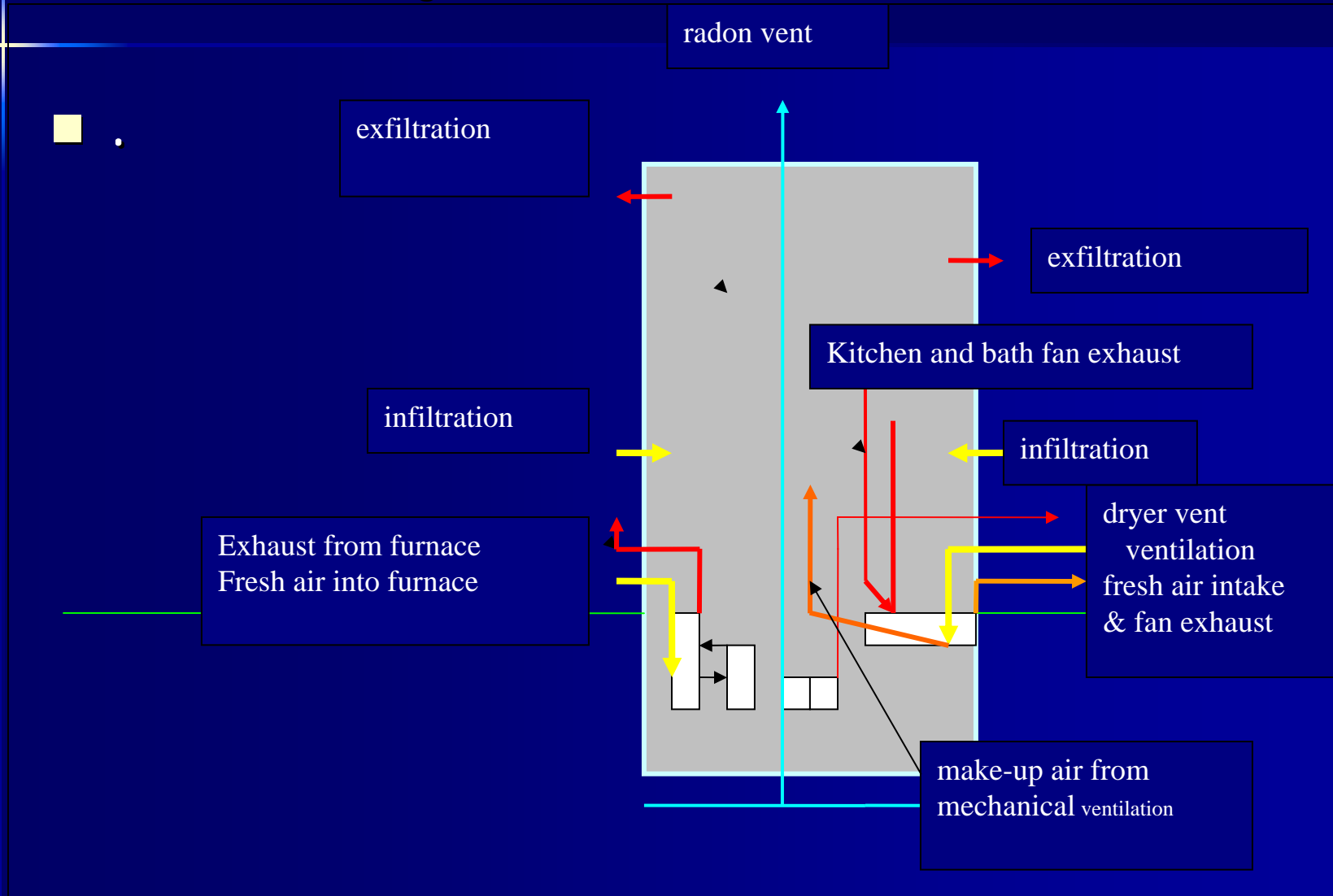


# Good, Better and Best:

Sealed combustion heating system with integrated water heater

Balanced mechanical ventilation system with air to air heat exchanger

Under slab radon mitigation ventilation



## Key to format:

- \* Indicates problem
- Underline indicates what to look for and how to check problems
- *Italics indicates solutions*

## Simple Steps to Pull Radon into your Home:

- \*KEEP YOUR BASEMENT DEPRESSURIZED BY:

Allowing attic bypasses to let warm air escape into the attic

Do NOT provide any make up air to the return side of your furnace.

Have an **inadequate** combustion air supply to the mechanical area.

Install or replace mechanical equipment with atmospherically vented equipment.

## Simple Steps to Pull Radon into your Home:

(continued)

- Determine if the basement has a strong potential for negative pressure
- Look for cracks in the foundation or slab
- *For an existing structure sealing cracks in the foundation and slab and preventing a negative pressure in the basement will help avoid pulling radon into the house.*
  - Weatherization*
  - Combustion air*
  - Ventilation*
    - Balanced*
    - Positive Pressure*

## *Best Practices for Remodeling and New Construction to Prevent Radon Migration into the Home from Green Communities Criteria*

- ***Green Communities 7-12 Basements and Concrete Slabs-Radon: New Construction***  
*(mandatory for new construction)*

*In EPA Zone 1 areas, install passive radon-resistant features below the slab along with a vertical vent pipe with junction box available, in case an active system should prove to be necessary*

For more information:

- [www.epa.gov/iaq/radon/zonemap](http://www.epa.gov/iaq/radon/zonemap)
- [www.epa.gov/iaq/radon/pubs/index.html](http://www.epa.gov/iaq/radon/pubs/index.html) (rehab info)
- [www.epa.gov/iaq/radon/pubs](http://www.epa.gov/iaq/radon/pubs) (Building Radon Out - publication #EPA/402-K-01-002)

## Easy Ways to Manufacture Carbon Monoxide

### Basic Science of Combustion:

- $\text{CH}_4 + \text{O}_2 + \text{heat} = \text{H}_2\text{O} + \text{CO}_2$
- fuel + air + heat >> water vapor and carbon dioxide
- fuel + not enough air + heat >> water vapor and carbon dioxide  
and carbon monoxide
- fuel + carbon dioxide + heat >> water vapor + carbon monoxide
- Note: this is a simplified version of the science of combustion

## Attached Garages and the Internal Combustion Engine Impingement: Flame Against Cold Metal=CO Production

- \*Start a cold engine in your garage.
- To demonstrate air leakage between the house and garage:  
Have an energy audit with a blower door test and spray something benign with a strong odor in the garage while the house is depressurized.  
Then sniff around inside the house in the part next to or over the garage...especially at penetrations such as outlets.
- *Attempt to get a perfect air seal between the house and garage.*
- *Use a timer ( to make this as energy un-intensive as possible) to preheat your car engine with a tank heater. A couple of hours should help.*
- *Remove car from garage as quickly as possible. Never let car idle in garage.*

*Best Practices for New Construction / Remodeling and  
Avoiding Carbon Monoxide from Green Communities  
Criteria*

- *Green Communities 7-13 Garage Isolation  
(mandatory)*

*Provide a continuous air barrier between the conditioned (living space) and the garage to prevent the migration of any contaminants into the living space.*

*In single family houses with attached garages, install a CO alarm inside the house on the wall that is attached to the garage or is outside the sleeping area.*

## Carbon Monoxide Production Re-burn Products of Combustion through Miss-use of Fossil Fuel

- \*Heat with your gas oven. Keep it on high for hours.  
Use an unvented space heater.
- When entering a home where the oven or an unvented space heater has been used for heating there will be:
  - Humidity
  - Irritation to throats, eyes and nose
  - Lethargy
  - Headaches
- *Client education must be clear and strongly stated. It may be necessary to remove the appliance in favor of an electric one.*

## Carbon Monoxide Production Re-burn Products of Combustion through Back Drafting

- \*Create a negative pressure in the basement or have a blockage in the flue
- If the heating system and/or the hot water heater are atmospherically vented  
:  
Turn on all exhaust fans and the dryer. Hold a lit match near the diverter/hood opening and blow it out. Watch which way the smoke goes. It SHOULD go up the chimney.  
If not, use a mirror to check if you can see light or the sky through the flue. It's possible a bird or squirrel has become trapped inside.
- *If the flue is blocked by a bird or squirrel, trim branches away from the house to make access to the roof more difficult*  
*Have a screened cap put over the top of the flue. The cap must be manufactured and approved for the vent you have and installed to code.*
- *If blockage is not an issue, increasing the size of the combustion air to the mechanical room may help. To test if this would work, open a window near the heating system a few inches and recheck the draft. If opening a window solves the problem, install a larger combustion air intake.*

## Carbon Monoxide Production Re-burn the Products of Combustion through use of a Faulty Furnace

\*Continue using an old rusty furnace and never get it checked. A crack in the heat exchanger will allow the products of combustion into the house rather than sending them up the chimney.

\*There are several ways to hasten the demise of the furnace:

Water in the basement will promote rust.

Chemicals such as bleach will deteriorate metal. Don't leave bleach bottles uncapped and don't use bleach routinely to wash the floor.

Make sure the dryer exhaust is not near the combustion air intake or the make-up air intake.

Overheating the heat exchanger will promote cracking. This can be done by decreasing the air flow across the heat exchanger. Not changing the filter or using a filter with a lot of resistance when the furnace fan is not designed for it, blocking return air vents or incorrectly sized duct work will all decrease the air flow.

## Carbon Monoxide Production Re-burn the Products of Combustion through use of a Faulty Furnace (continued)

- Signs the heat exchanger is cracked are:
  - stains on the wall at supply registers
  - a lot of humidity
  - irritation to throats, eyes and nose
  - lethargy
  - headaches
- *A functioning CO detector will alert occupants to a furnace failure after the CO2 has reached a concentration high enough to cause the furnace to begin making CO.*
- *Visually inspect the furnace for signs of deterioration.*
- *As a furnace approaches the time when the warranty will expire, it becomes increasingly important to have a regular safety check.*

## Carbon Monoxide Production Starve a Combustion Appliance for Air

- \*Seal off the combustion air intake to get rid of the cold draft in the basement.
- Inspect inside the combustion air intake for blockage.
- *Both client education and a quick fix should be used. Put the end of the intake into a tall bucket or cylinder to create a cold air trap. Make sure the diameter of the bucket or cylinder is at least two inches larger than the intake. Also there should be a gap at the bottom of the intake of at least 2 inches for the air to flow freely when there is a negative pressure. If you have a great length of the intake you can gently bend it and attach it in a 'U' shape to itself to create a cold air trap.*

*Best Practices for New Construction / Remodeling and  
Avoiding Carbon Monoxide from Green Communities  
Criteria*

- *Green Communities 7-8b Water Heaters – Minimizing CO  
(optional)*

*Specify direct vented or combustion sealed water heaters if the  
heater is located in a conditioned space*

## How to Create a 1000 Square Foot Petri Dish: The Basics on Indoor Humidity

- Air change rate + moisture generation = indoor humidity levels
- Typical older homes (pre 1980) test at 2 to 4 air changes per hour using a blower door test.
- Minimum recommended air change rate is .35 per hour.

**The ventilation rate may not safeguard against excessive humidity and possible mold growth if the occupants:**

- \*Don't use or don't have kitchen or bathroom exhaust fans.
- If fans do exist, determine if the fans work. Turn on the fan and put a square of toilet paper up against it. The paper should be held in place by the power of the fan. (obviously if you have a balometer use that) Note if excessive noise comes from the fan and may be a reason it's not used.
- *Use client education plus clean and maintain existing fans or install new fans*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-5a Exhaust fans – Bathroom: New Construction (mandatory)*

*Install Energy Star-labeled ([www.energystar.gov](http://www.energystar.gov)) bathroom fans that exhausts to the outdoors and are equipped with a humidistat sensor or timer or operate continuously.*

*The cfm for intermittent bath fans should be at least 50 cfm. 20 cfm is called for if operating continuously, per ASHRAE 62.2*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7 -5b Exhaust Fans –  
Kitchen: New Construction  
(mandatory – except for moderate rehab)*

*Install Energy Star-labeled ([www.energystar.gov](http://www.energystar.gov)) power vented fans or range hoods that exhaust to the exterior.*

*If continuous, the cfm for intermittent kitchen fans should be at least 100 cfm – or 5 air changes per hour, based on kitchen volume, per ASHRAE 62.2.*

## Interior Humidity Production

The ventilation rate may not safeguard against excessive humidity and possible mold growth if the occupants:

- \*Fill the house with water vapor and water sources to evaporate by having:
  - excessive amounts of plants, aquariums, pets and/or people in the house
  - over-use of a humidifier
  - uncorrected plumbing issues such as broken or leaking pipes
  - the basement as a place to store firewood
  - boiling water on the stove for many hours each day
  - the clothes dryer vented into the house
- In a house filled with water vapor, there is bound to be mold. Any place there is either a cold spot (insulation void) or a lack of air movement (behind a couch) you'll probably find it. It will be throughout the house in vulnerable locations.

## Interior Humidity Production

In any case the ventilation rate may not safeguard against excessive humidity and possible mold growth if the occupants:  
(continued)

- *Educate the occupants on ways to minimize moisture production and the connection between humidity levels and indoor air quality.*
- *Encourage the occupants to modify behaviors.*
- *Turn off humidifiers. A house with excessive air changes per hour will be very dry, but rather than adding water vapor by use of a humidifier...consider the dryness as an indication air sealing (and maybe insulation) is needed.*  
*The level of indoor humidity increases with air tightness in a house because the moisture produced in the house is trapped inside.*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-14 Clothes Dryer Exhaust (mandatory)*

*Clothes dryers must be exhausted directly to the outdoors.*

*For dryer exhaust use rigid vent, minimize the length of the vent and seal the connections of vent with foil tape. Avoid using flex vent because it inhibits air flow and collects particles and moisture.*

## Intrusion of Exterior Humidity

The ventilation rate may not safeguard against excessive humidity and possible mold growth if the occupants:

- \*Allow water from the exterior to come into the house.
- Check to see that the grade around the house moves water away from the foundation.
- Make sure the downspouts from roof gutters do not pour water next to the foundation.
- *If re-grading is necessary near the house and the space between structures is limited, incorporating a swale may be part of the solution. Using the swale to bring the rain water to a rain garden is an ideal method.*
- *Downspouts may need to be extended away from the building. Or use a rain barrel to capture the roof run off and make sure the overflow directs any excess rain away from the foundation or, better yet to a rain garden. Be careful not to run the water towards a neighboring structure.*

## Intrusion of Exterior Humidity

The ventilation rate may not safeguard against excessive humidity and possible mold growth if the occupants:

(continued)

- \*Allow water from the exterior to come into the house.
- Roof leaks and windows leaks may be due to damage, age or a lack of attention to details during construction. Builders, managers and occupants must all take responsibility for addressing any leaks that occur in a timely manner
- *Once a leak is discovered and repaired it may be necessary to be aggressive in drying any wet areas with fans and dehumidifiers to prevent mold growth.*
- \*Have a dirt crawl space with out a vapor retarder.
- Make a visual inspection of the crawl space to check for the vapor retarder.
- *If there is not a vapor retarder or if the existing one is damaged; install one.*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

■ *Green communities 7-11a Basements and Concrete Slabs – Vapor Barrier*

*(mandatory)*

*Provide vapor barrier under all slabs. For concrete floors either in basements or the on-grade slab, install a capillary break of 4 inches of clean or washed gravel (.05 inch or greater) placed over soil. Cover all gravel with 6 millimeter polyethylene – over lapping joints by 1 foot or more.*

*On interior below grade walls, avoid materials that could trap moisture inside the wall system such as vinyl wallpaper.*

## *Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-12 Water Drainage (mandatory)*

*Foundation walls should be carefully waterproofed on the exterior to avoid moisture migration.*

*Install a coating on footings to prevent moisture from wicking up through them*

*Moisture retarders on the exterior of the foundation should not leach chemicals into the soil.*

*If poured concrete walls are used, release agents used to free forms from concrete should not be comprised of used motor oil or other toxic material.*

## *Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-12 Water Drainage (CONTINUED)  
(mandatory)*

*Divert water drainage away from building by directing gutters and downspouts to flow onto splash blocks or a proper drainage system.*

*If possible, water should infiltrate on site at least 12 feet from any building foundation.*

*Slope new and rebuilt walkways, stairs, patios and thresholds away from the buildings.*

*Best Practices include a grade of 0.5 inch per foot away from buildings*

*Note: MN code requires 6" in the first 10' where possible (R401.3) otherwise a minimum slope of 5% to a swale or to a drain (Vicki)*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

■ *Green Communities 7-12 Water Drainage (CONTINUED)  
(mandatory)*

*Properly flash all roof penetrations.*

*When feasible, extend eaves 18 inches to 2 feet to keep water off windows.*

*Install pan flashing on windows and exterior doors.*

*Apply window pan flashing over building paper at sill and corner patches.*

## What if the occupants have an overly tight house?

- \*Be over zealous in tightening the house.  
Or maybe the house was already too tight?
- Use all your senses. Use your nose for noticing stuffiness. Use the sensations of your skin to sense dampness. Use your eyes to determine the general construction type and age. Look for condensation and mold. Check if the windows are operable and note if there is metal interlocking weather stripping. Check for back drafting of mechanical systems. Sometimes a draft will correct itself a few seconds after the appliance comes on. Even if the draft does correct itself, if it takes more than a few seconds, the house may be too tight.

## What if the occupants have an overly tight house?

(continued)

- *If your observations confirm that you may be in an overly tight house, have a blower door test done. They are usually available through a utility subsidized energy audit.*
- *If the test measures less than .35 air changes per hour, you need a balanced mechanical ventilation system.*
- *If the test measures a low number, but above .35 air changes per hour, the health and safety of the house might be improved with upgrades to the exhaust fans and the passive combustion air. Consider adding a small fresh air intake ducted to the return side of the furnace to create a positive pressure in the house.*

## *Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-16 Ventilation  
(mandatory – except for moderate rehab)*

*Install a ventilation system for the dwelling unit that provides 15 cubic feet per minute of fresh air per occupant.*

*Natural ventilation is acceptable in 'paradise' climates defined under ASHRAE 62.2 Exception to 4.1.*

*Consider: Specifying a mechanical whole-house ventilation system per ASHRAE 62.2 and the EPA Energy Star with Indoor Air Package Specifications*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-7 HVAC Sizing (mandatory)*

*Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America Manual, parts J and S, to prevent short cycling of heating or air conditioning and ensure adequate dehumidification.*

*Consult [www.acca.org](http://www.acca.org) for info on Manual J software*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-9 Cold Water Pipe Insulation (mandatory)*  
*Insulate exposed cold water pipes in climates and building conditions susceptible to moisture condensation*
- *Green communities 7-8a Mold Prevention (mandatory)*  
*Use tankless hot water heaters or install conventional hot water heaters in rooms with drains or catch pans piped to the exterior of the dwelling and with non-water sensitive floor coverings.*

*Best Practices for New Construction / Remodeling and Preventing Humidity Problems from Green Communities Criteria*

- *Green Communities 7-10a & b  
Materials in Wet Areas-Surfaces  
(mandatory)*

*In wet areas, use materials that have smooth, durable, cleanable surfaces.*

*Do NOT use mold-propagating materials such as vinyl wallpaper and unsealed grout.*

*Tub and Shower Enclosures*

*Use one piece fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board, fiberglass re-enforced board or cement plaster*

- Next:

Lisa Smestad  
Environmental Services  
City of Minneapolis

We'll have a question and answer session at the end of the presentation.

# **What is a Healthy Home?**

Environmental Action for  
Children's Health

# What is a Healthy Home?



# Home



# Environmental Action for Children's Health

- HUD Round XI  
Healthy Homes
  - City of Minneapolis
  - St. Paul Ramsey  
County Department  
of Public Health
  - Pediatric Home  
Services
  - Greater Minneapolis  
Daycare Association



# ASTHMA SYMPTOMS AND QUALITY OF LIFE SURVEY

- When you think about the last **FOUR** weeks how often has:
- **All of the time****Most of the time****Some of the time****A little of the time****None of the time**
- Your child complained of being short of breath
- Exertion (such as running) made your child breathless
- Your child coughed at night
- Your child been woken up by wheezing or coughingYour child stayed indoors because of wheezing or coughing
- Your child's education suffered due to his/her asthma (during school)
- Your child's asthma interfered with his/her life
- Asthma limited your child's activities
- Taking his/her inhaler or other treatments interrupted your child's life
- You had to made adjustments to family life because of your child's asthma

# Assessments

- Housing Assessment
- Assessment of knowldege before and after
- Assessment of health improvement-validated
- Assessment of program



# General Findings: Single Family and Multi Unit Residences

- Most commonly identified problems
  - Pets      -Smoking      -Cleanliness
- Most commonly provided products
  - Vacuum   -Air cleaner   -Bed encasements
- Most common structural modifications
  - Sheet rock   -Caulking      -Ventilation

# Personal Choice

- Furnishings
- Carpets or bare floors
- Solid wood or particle board
- Sheetrock or plaster



# Moisture

- Humidifiers
- Bathrooms
- Cooking
- Condensation
- Infiltration
- Gutters
- Grading
- Drying laundry
- Exhaust in shower
- Cooking
- Aquariums
- Occupancy
- Trash
- Cleanliness
- Temperature



# Lead Based Paint



# Environmental Hazards

- Lead
- Asbestos
- Slip trip and fall
- Electrical
- Carbon monoxide
- Mold
- Pesticides
- Radon
- Lighting
- Handrails



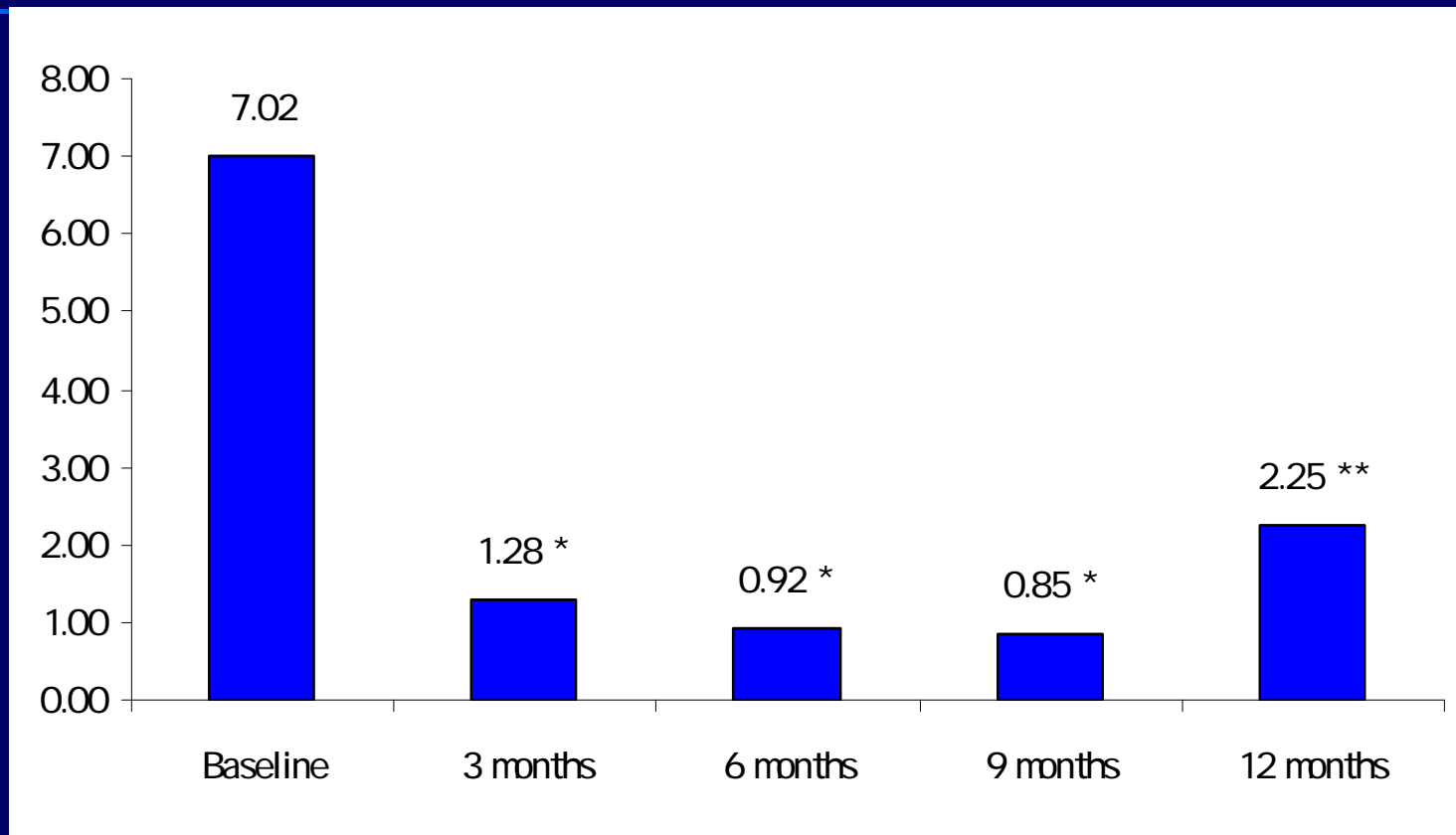
# Air



# Modification Costs

- Average cost of products: \$ 300-400
- Products provided through the program include:
  - Allergen vacuum cleaners
  - HEPA air cleaners
  - Allergen pillow encasements
  - Allergen mattress covers
  - CO and/or smoke detectors
  - Fire extinguishers
  - Dehumidifiers

# Change in Mean Number of Days of School Missed Due to Asthma

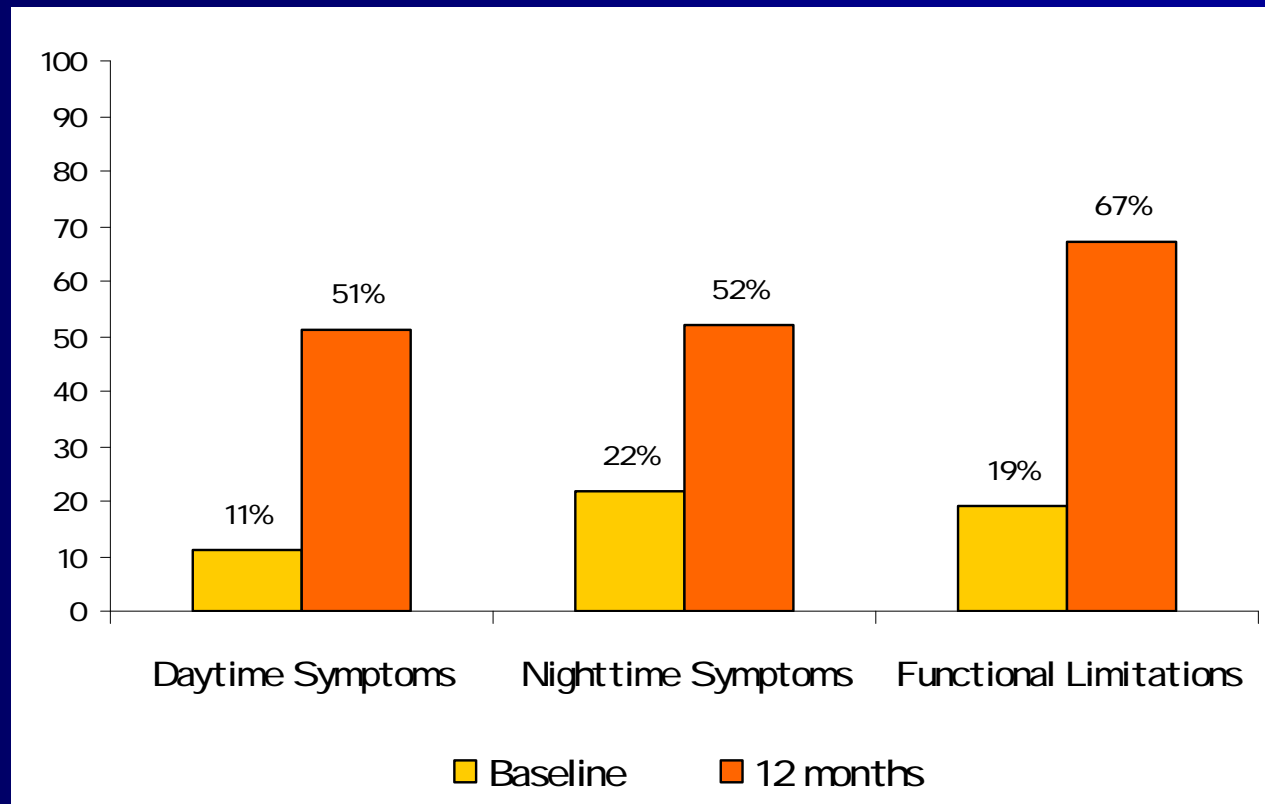


(\* significant declines from baseline  $p \leq 0.05$ ;  
\*\* significant decline from baseline  $p \leq 0.10$ )

# Other Impacts

- Education about cleaning and general housekeeping from cleaning service
- Education and outreach of health professional
- Smoking behavior recommendations
- Empowerment of residents
- Resident-initiated home improvement projects

# Symptom Improvement % Scoring $\geq 75$



# One Family's Experience

- Single mom with 2 children living in North Minneapolis
- In 3-months prior to visit the 8-year old girl with asthma had:
  - 2 ER visits
  - 1 hospitalization
  - 6 missed school days
  - 3 burst prednisone cycles
  - numerous missed clinic visits

# Home Assessment

- 1 Bedroom (one bed)-1 Bath-Living room-Kitchen
- Belongings piled on floor in every room (no dressers)
- No ventilation/exhaust in bathroom
- Grease accumulation on kitchen stove
- Broom being used to sweep carpet (the household chore assignment of the child with asthma)

# Environmental Action Plan

- Teach mom about grease removal to decrease possibility of cockroaches
- Refer to Catholic Charities for additional beds and dressers;
- Bed and pillow encasements after new beds arrive
- HEPA vacuum cleaner with education about chores for the child with asthma
- Air cleaner for the bedroom
- Identification of transportation to medical appointments as part of family's insurance benefit
- Landlord responsibility for bathroom ventilation

# 3-Month Follow-Up

- NO ER visits, NO hospitalizations, 2 school days missed, 1 burst prednisone cycle; 1 clinic visit SUCCESSfully attended
- All products still in the home
  - Vacuum used once a week by mom
  - Air cleaner runs continually
- Client satisfaction—high

# Physician Impressions

- "The EACH/HUD grant provides an essential service to low income children with asthma and their families. These children would not get in-home products to help control their asthma any other way."
- "The extra teaching and support to manage their asthma is fabulous."

# Comments from Parents

- "We love the air cleaner. Can we get more for different rooms?"
- "I need additional vacuum bags, I love to vacuum now."

# Conclusion

- The experiences to date suggest that the EACH program has demonstrated a positive influence on the home environment of children with asthma.



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Environmental Action For Children's  
Health, because every child  
deserves a healthy home.



HUD Healthy Homes  
Demonstration Grant Round  
XI

# Questions?

- Internet resource list provided

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