

RUTGERS

Edward J. Bloustein School
of Planning and Public Policy



Improving Air Quality in Your Home

Rutgers Center for Green Building

December 2018

Acknowledgements: Development of this material was funded by: HUD Healthy Homes Program Grant NJLHH-0202-09; HUD Healthy Homes Technical Studies Grant # NJHHU0019-13; NSF Grant AGS-1645786; American Planning Association's Plan4Health Initiative, supported through the CDC, Division of Community Health #DP14-1418; and a grant from Valley National Bank.

Disclaimer: The information provided is for reference as voluntary guidelines for improving indoor air quality. The mention of a particular product, business or manufacturer does not constitute an endorsement, expressed or implied.

Table of Contents

What is Indoor Air Quality (IAQ)?	4
What Affects IAQ?.....	4
What is Particulate Matter?.....	5
Household Cleaning	5
Other Household Activities	7
IAQ During Heat Waves	8
Air Quality Flags	8
References	9
Appendix: Healthy Home Literacy Toolkit	10

Improving Indoor Air Quality in Your Home

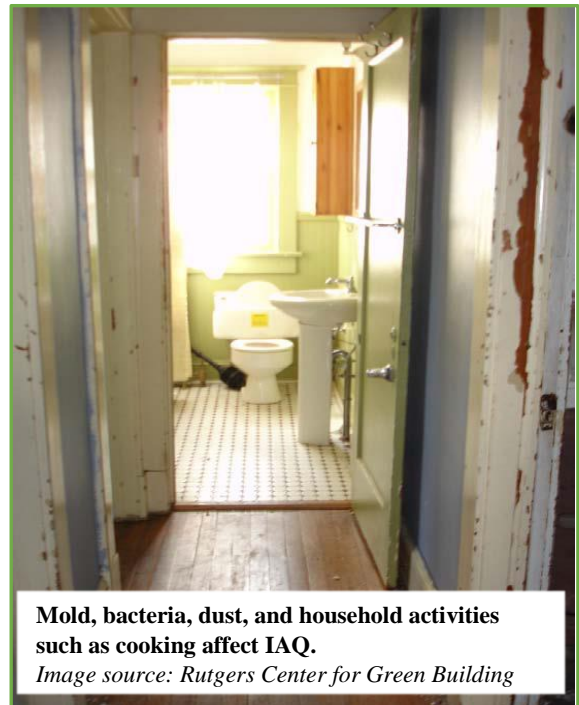
What is Indoor Air Quality (IAQ)?

Indoor air quality, or IAQ, is the quality of the air around you, including the air within and around the buildings and structures where you live, work and visit. IAQ is an important determinant of health and comfort. Because we spend most of our time indoors (e.g., 80-90%), IAQ within the home is especially important. This guide presents some suggestions that you can follow to improve IAQ in your home.

What Affects IAQ?

Several things affect IAQ inside buildings including mold, bacteria, dust, and harmful gases released by household appliances and activities. Particulate matter includes particles and droplets found in the air such as dust and dirt and smoke. Harmful gases are called Volatile Organic Compounds, or VOCs. They are emitted by chemicals in common household products like paints, lacquers, pesticides, air fresheners, hairspray, nail polish, glue and adhesives, and permanent markers. IAQ is also affected by human activities such as smoking, burning candles or incense, and cooking with a gas stove.

While it may not be possible to control all determinants of IAQ, there are several measures you can take to significantly improve IAQ in your home.



Mold, bacteria, dust, and household activities such as cooking affect IAQ.

Image source: Rutgers Center for Green Building



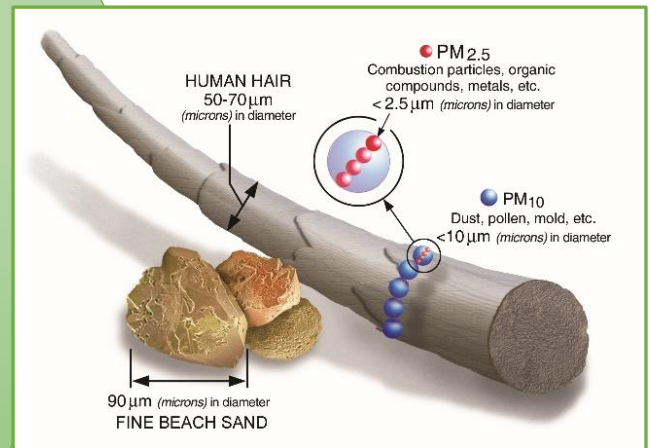
Natural Cleaning Products

Image source: Rutgers Center for Green Building

What is Particulate Matter?

Particulate matter, or PM, is composed of all the solids and liquid particles found in the air, many of which affect IAQ. These include dust, dirt, soot or smoke. Larger PM can be seen with the naked eye while other PM is so small, it can only be seen under a microscope.

PM inside the home can cause coughing, headaches, or difficulty breathing.



Particulate Matter Size

Image source: US EPA

Household Cleaning

1. **When cleaning your floors, use a microfiber cloth mop.** This captures more dust and dirt than traditional fibers and brooms and lowers particulate matter in the air. In a study done by Rutgers University, participants tested different cleaning products, including microfiber cloth mops. The study found that the microfiber cloths led to lowered particulate matter in the participants' homes. All participants that used the mops were satisfied, with most participants reporting they were very satisfied.



Microfiber mop

Image source: Rutgers Center for Green Building



Image source: Rutgers Center for Green Building

You can even use these natural products to clean up pet accidents and deodorize pet items. See the Home Health Literacy Toolkit at the end of this guide for easy cleaning solution recipes. You will only need four ingredients: salt, lemon, baking soda, and white distilled vinegar.

- 2. When vacuuming, make sure to use a vacuum with a High Efficiency Particulate Air (HEPA) filter.** HEPA filters help remove PM and VOCs from the air. A HEPA filter may be especially helpful if you have pets, which release hair, allergens and dander. The latter is a food source for dust mites.
- 3. Use an air cleaner with a carbon filter.** This EPA Guide provides help with selecting an air cleaner: <https://www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home>
- 4. Keep a doormat at the entrance of your home.** When we walk outside, our shoes collect dirt and many different chemicals, which can be harmful when we bring them into the home. Using a doormat reduces the amount of pollutants that enter your home.
- 5. Keep a shoe rack by the entrance of your home and encourage people to wear slippers or clean socks inside** to minimize the dirt and pollutants tracked through your home.
- 6. Natural cleaning products can improve your IAQ and save you money.** In a study by Rutgers University, participants tested baking soda and vinegar as cleaning products. The study found that using vinegar and baking soda lowered particulate matter and improved IAQ in the home. Participants in the study were also very satisfied with using these natural products as cleaners and deodorizers. All who used baking soda and vinegar reported being satisfied, and most reported being very satisfied with vinegar.
- 7. Keep the air filters in your AC unit and kitchen fan clean.** Kitchen fans are designed to reduce smoke and moisture while cooking. To make sure they are in good working condition, it is a good idea to inspect and clean them (if washable) or replace them on a regular basis to maintain air flow.

Other Household Activities

- 1. Limit the amount of smoke that enters your home.** A study conducted by Rutgers University found that households where smoking was reported had 3-10 more PM than households that did not. The study also found that homes with smoking had significantly higher levels of benzene both indoors and outdoors. Burning candles and incense also increases the amount of PM in your home. To improve your health and comfort, avoid all forms of smoking indoors.
- 2. Avoid using synthetic air fresheners or laundry products as these may contain harmful chemicals.** One study found that plug-in air fresheners produced 20 different VOCs that were not included on the label. To keep your home smelling good naturally, use natural cleaning products like the ones listed in the Home Health Literacy Toolkit. These natural ingredients such as baking soda, vinegar and lemon juice can also be used for laundry instead of synthetic products.
- 3. Keep a healthy level of humidity in your home.** High levels of moisture in the home can lead to mold and dust mites, which exacerbate asthma and other respiratory illnesses. The following practices can help you control the humidity level:
 - Use an exhaust fan or open a window when cooking or bathing
 - Don't overwater houseplants – this might lead to mold and mildew growth in the soil
 - Fix leaky plumbing as soon as possible
 - Empty drip pans in your dehumidifier or air conditioner
- 4. Open your windows regularly to let in fresh air!** Especially when you are doing activities that degrade IAQ such as smoking, burning candles or incense, and cooking with a gas stove. Check air quality resources (see Air Quality Flags section) first to check outdoor air quality.
- 5. When making renovations to your home, avoid construction products that contain high levels of VOCs.** Paints, sealants, manufactured wood products, adhesives, and some furnishings and carpets often release VOCs. When purchasing these products, make sure to check their VOC concentration, and if possible, buy less toxic alternatives. For example, some paints come in latex (water) based formulas, which are generally less toxic than oil-based paints. Many low or zero VOC products are readily available – to learn more about which meet these standards, visit greenseal.org and greenguard.org.
- 6. Reduce the amount of products with formaldehyde in your home.** Formaldehyde, a known carcinogen, can be found in many building materials and products and can negatively impact your health. You can find out how to reduce exposure to formaldehyde through resources such as the [US EPA website](http://www.epa.gov).



Humidity in the home can lead to mold.

Image source: Rutgers Center for Green Building

IAQ During Heat Waves

During heat waves, higher temperatures lead to increased demand for energy in urban and residential areas, which worsens air quality both indoors and outdoors. As a result, the air contains higher concentrations of PM during heat waves. In addition to keeping you cool, the following practices can help maintain good IAQ in your home:

1. Use an adjustable fan
2. Avoid cooking, including using the oven or stove
3. Avoid burning candles or incense
4. Avoid smoking
5. Open your windows only during certain times of day. You can check an air quality resource like the BreezoMeter Air Quality app or website <https://breezometer.com/real-time-air-quality/> to find out not it's safe to do so. These resources can be used to find out about air quality at any time.



The Air Quality Flag Program in San Joaquin Valley, CA.

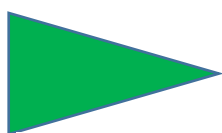
Image source: US EPA

Air Quality Flags

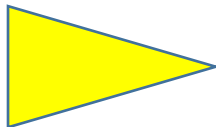
Some communities use the **Air Quality Flag Program** to notify their community members about the quality of the outside air. Here's how it works:

- Each day, people in the community raise a flag that corresponds to how clean or polluted the air is.
- The color of the flag matches the local air quality for the day: green, yellow, orange, red, and purple. There are multiple resources to help you figure out outdoor air quality, including the Environmental Protection Agency's Air Now website: <https://www.airnow.gov/>. Simply enter in your zip code in the "Local Air Quality Conditions" tab, click "Go" and the website will list the air quality in your area, and the corresponding flag color.
- The flags are raised in a public place outside where all community members can see them.

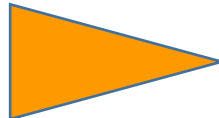
Flag colors represent different levels of air quality:



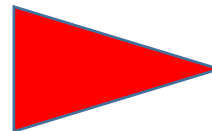
Good



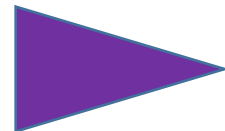
Moderate



Unhealthy for
sensitive groups



Unhealthy



Very unhealthy

References

BreezoMeter. Air Quality Map. <https://breezometer.com/air-quality-map/>. (Accessed November 26, 2018).

Clinton J. Andrews, Jie Gong, Gedi Mainelis, Jennifer Senick, MaryAnn Sorensen Allacci, Deborah Plotnik, Leonardo Calderon, Mengyang Guo, Nirmala Thomas, Yi Yu, Brian Pavilonis, Prarthana Raja, Bingsheng Liu. “Cost-Effective Detection of Multi-Family Housing-Related Health and Safety Standards.” 2017.

Environmental Protection Agency. “Current AQI”. <https://www.airnow.gov/flag>. (Accessed November 13, 2018).

Environmental Protection Agency. Formaldehyde. <https://www.epa.gov/formaldehyde>. (Accessed December 12, 2018).

Environmental Protection Agency. “Particulate Matter (PM) Pollution.” <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#PM> (Accessed December 15, 2018).

GreenGuard. Your Guide to Low-And Zero-VOC Paints. <http://greenguard.org/files/LivingGreenPaintGuide.pdf>. (Accessed November 16, 2018).

Ioanna Tsoulou; Clinton J Andrews, PhD; Gediminas Mainelis , PhD; Ruikang He; Jennifer Senick , PhD; Deborah Plotnik. “How the elderly urban poor cope with heat waves: A socioecological analysis.” 2018.

Rutgers Edward J. Bloustein School for Planning and Public Policy for the Trenton Healthy Communities Initiative. “Planning Healthy Communities Initiative”. May 2016.

Rutgers Center for Green Building. “New Jersey Home Remodeling Guidelines.” 2009. <http://greenmanual.rutgers.edu/existingresidential/strategies/full.php>. (Accessed November 16, 2018).

Appendix: Healthy Home Literacy Toolkit

Nature's Air Filters

The Best Indoor Plants for a Healthy Home



Succulents



Aloe



Bamboo



Fern



Peach Lily



Spider Plant



Chrysanthemums



English Ivy



Christmas Cactus



Yucca



Bromeliads



Dracaena


Problem: DIRTY SINK FIXTURES

Solution:
To break down a lime buildup and get back that shine, make a paste of:
2 Tbsp. salt
1 tsp. WDV

Problem: GERMY, DIRTY SURFACES

Solution: Spray or wipe a cloth soaked in full-strength WDV. Wipe dry.

*Don't use on marble countertops.



WDV
= White Distilled Vinegar



Baking Soda

Problem: DIRTY, SMELLY MICROWAVE

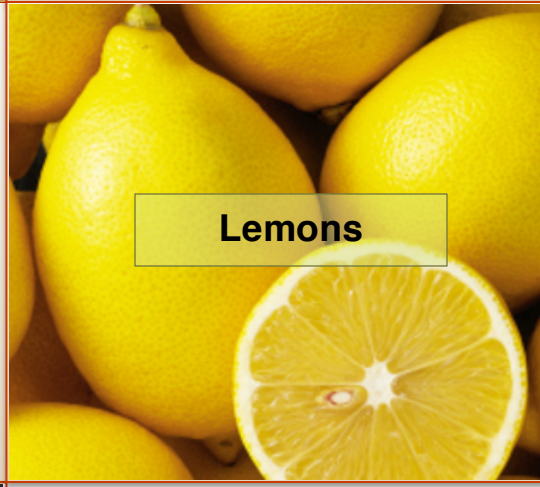
Solution: Mix ½ C. WDV and ½ C. water in a microwave-safe bowl. Boil at a high heat in the microwave. Food bits will be loosened and odors gone. Wipe with a damp cloth.

Problem: SMELLY FRIDGE, MOLDY FOOD

Solution: Rinse food/mold residues with soap and water. Spray WDV. Wipe with a damp sponge. Leave an open-box of baking soda in the fridge for a few days.

Problem: GREASY OVEN DOOR WINDOW

Solution: Soak window with full-strength WDV. Keep door open for 10-15 minutes. Wipe with a sponge.



Lemons

Problem: STAINED CERAMICS

Solution:
Scrub gently with:
1 part salt or baking soda
1 part WDV

Rinse clean.



Problem: CLOUDY GLASSWARE

Solution: Soak paper towels or a cloth in full-strength WDV. Wrap around the inside and outside of the glass. Let sit for about 20 minutes.

Problem: FRUIT FLIES

Solution: Set out a small dish of undiluted WDV.

Bathroom Solutions

A Green Cleaning Guide



WDV
= White Distilled Vinegar

Problem: STAINED LINOLEUM

Solution: Apply WDV on tough stains. Leave for 10-15 minutes. Wipe clean. If stains remain, sprinkle baking soda over the WDV. Scrub with a brush or sponge. Rinse with water.

Problem: DIRTY GROUT

Solution: Let full-strength WDV soak for a few minutes. Scrub with an old toothbrush.

Problem: LIME DEPOSITS ON SINK FAUCET

Solution: Fill a plastic bag with 1/2 to 1/3 C. WDV. Tie bag around faucet. Leave for 2-3 hours. Scrub remaining lime deposits with an old toothbrush.

Problem: SCUMMY SHOWERHEAD

Solution: Mix 1/2 C. baking soda and 1 C. WDV in a sandwich bag. Tie bag around showerhead. Leave for an hour after bubbling stops. Remove bag. Turn on water.

Problem: DIRTY SHOWER DOOR TRACKS

Solution: Fill tracks with WDV. Leave for a few hours. Pour hot water into tracks. Wash and scrub scum with a toothbrush.

Problem: SMELLY, DIRTY TOILET BOWL

Solution: Pour 3 C. of WDV in toilet bowl. Leave for about 30 minutes to a couple of hours. Scrub well. Flush.



Baking Soda

Problem: SOAP BUILDUP ON FAUCETS

Solution: Make a solution of:
1 part salt
4 parts WDV
Scrub soap buildup with solution.

Problem: DULL VINYL OR LINOLEUM FLOOR

Solution: Make a solution of:
1 C. WDV
1 gallon water
Clean with a cloth or soft sponge for a shiny finish.

Problem: SMELLY BATHROOM AIR

Solution: Spray into the air a solution of:
1 tsp. baking soda
1 Tbsp WDV
1 C. water

