What constitutes healthy indoor air quality?

Healthy indoor air can best be described as air that is fresh, at a comfortable temperature and humidity, and free of chemicals, mold, and other contaminants. There are many ways a resident can improve their indoor air quality (IAQ) and doing so not only makes a living space more comfortable, but saves energy, money, and improves the health of occupants.

The first step in ensuring healthy IAQ is recognizing what can compromise it. Excess contaminants and moisture have the largest impact on IAQ, but even air that is too dry, cold, or hot can lead to discomfort and health problems.

Once air is indoors, the buildup of contaminants and moisture is the greatest threat to IAQ. Knowing which substances and activities can contaminate indoor air and avoiding them when possible is a great proactive strategy. However, contaminants come in many forms and originate from a range of sources, so it can be nearly impossible to prevent all contaminants from infiltrating your indoor air. Because of this, making sure indoor air is constantly refreshed so that moisture and harmful substances do not build up over time is the best and most reliable reactive strategy in ensuring healthy IAQ.

There are two strategies for actively creating healthy IAQ: **Proactively** preventing the introduction of contaminants, moisture, and undesirable conditioning to indoor air, and **reactively** removing contaminants if they have been introduced. Proactive approaches include filtering and heating incoming outdoor air, storing pollutants outside, and maintaining a well-sealed building envelope. Reactive approaches include flushing indoor air as well as identifying and removing contaminant sources.

In most cases, healthy IAQ begins with, and relies on, the exchange of indoor and outdoor air. Outdoor air is generally the cleanest air source, however certain conditions can worsen outdoor air quality. In those conditions, making sure poor outdoor air is warmed and filtered before it enters a home is an important proactive step in ensuring healthy IAQ.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Health Effects</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>• Fatigue and chest pain in low exposure</td>
<td>Combustion from indoor and outdoor sources</td>
</tr>
<tr>
<td></td>
<td>• Flulike symptoms in higher exposure</td>
<td></td>
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<tr>
<td></td>
<td>• Can be fatal</td>
<td></td>
</tr>
<tr>
<td>Radon</td>
<td>• Upper respiratory problems and infections</td>
<td>Naturally-occurring element in certain soils, rock types, and water sources</td>
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<tr>
<td>PM_{2.5}</td>
<td>• Premature death in people with heart or lung disease</td>
<td>Combustion from indoor and outdoor sources: candles, wood burning, cooking, home heating, cigarettes</td>
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<tr>
<td></td>
<td>• Nonfatal heart attacks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Irregular heartbeat</td>
<td></td>
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<tr>
<td></td>
<td>• Aggravated asthma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Decreased lung function</td>
<td></td>
</tr>
<tr>
<td>Mold</td>
<td>• Upper respiratory problems and infections</td>
<td>Moist and damp conditions, high humidity</td>
</tr>
<tr>
<td></td>
<td>• Asthma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Allergies</td>
<td></td>
</tr>
<tr>
<td>Acrolein</td>
<td>• Respiratory, eye, nose, and throat irritation</td>
<td>Heated cooking oil, smoke from candles, wood stoves, cigarettes</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>• Respiratory, eye, nose, and throat irritation</td>
<td>Off-gassing of furniture, carpet, paint, foam, synthetic fabric, cosmetics, building materials</td>
</tr>
<tr>
<td></td>
<td>• Cancer</td>
<td></td>
</tr>
<tr>
<td>Toluene, Benzene</td>
<td>• Short-term exposure can lead to central nervous system problems and irritation of skin, eyes, and nose</td>
<td>Petroleum products, paint, cigarettes</td>
</tr>
<tr>
<td></td>
<td>• Prolonged exposure to benzene can lead to cancer</td>
<td></td>
</tr>
</tbody>
</table>
Cold Climate
Indoor Air Quality

How can you improve your IAQ?

If air is too WARM...
During warmer seasons, air inside homes can be dramatically heated from solar exposure through windows. Closing blinds, opening windows, and keeping indoor air circulating with Heat Recovery Ventilators (HRVs) or fans can keep homes cooler. During cooler seasons, heating appliances are responsible for warming air, so lowering the setpoint on your thermostat or using your heating appliance less frequently can help manage air temperature.

If air is too DRASTY...
Drafty indoor air is usually symptomatic of leaky walls or unbalanced airflow through HRV ducting. In homes with HRVs, consulting a ventilation technician on properly balancing the HRV can improve airflow and reduce drafts. In homes with leaky walls, determining the locations of air leaks in the building envelope and repairing them not only reduces draftiness, but can improve heat retention and lower energy bills.

If air is too STALE/STUFFY...
Stale air is air that is not being refreshed often enough, and begins to collect contaminants and moisture. Flushing out stale air and bringing in fresh air is the best solution. This can be accomplished by opening at least two windows on opposite ends of your home (to encourage cross-airflow), regularly using exhaust fans (such as range hood and bathroom exhausts) and if you have an HRV, keeping it on and well-maintained.

If air is too CONTAMINANTS...
Not all contaminants are easy to detect by humans, so it is important to preemptively reduce contaminant build-up. Cleaning your home regularly, keeping your home well-ventilated, filtering incoming air when possible, using exhaust fans when cooking or showering, and avoiding products that contain known contaminants will reduce build-up. Certain plants can help filter Volatile Organic Compounds (VOCs) and contaminants too!

If air contains CONTAMINANTS...
In cold climates, the most common source of cold air is outdoor air itself. Warming incoming air before it is distributed to living areas helps reduce discomfort. This can be done with an HRV/ERV or a heating appliance placed near an incoming air source. In winter, keeping windows, doors, and other openings closed as much as possible and equally distributing warm air throughout the home is the best defense against cold air.

If air is too DRY...
Air that is too dry can not only be uncomfortable, but can aggravate certain health conditions like asthma. When indoor air is dry, moisture must be added using humidifiers or certain plants. However, if water is intentionally added to indoor air, humidity levels must be monitored carefully to prevent mold growth and structural damage.

If air is too COOL...
Being AIR-AWARE...
Occupant awareness of IAQ and healthy habits can go a long way in ensuring healthy IAQ. Keeping the home well-ventilated and comfortably warmed, providing routine maintenance for heating/cooling/ventilation systems, installing smoke and carbon monoxide alarms, and purchasing household products that are free of known contaminants can all contribute to great IAQ.
## Cold Climate Indoor Air Quality

### How can you improve your long-term IAQ?

1. **Install smoke alarms and carbon monoxide detectors, test them regularly,** and change the batteries at once a year.

2. **Use cigarettes/vaporizers outside of your home,** or consider quitting altogether.

3. **Read the instructions/homeowner manuals for your heating and ventilation appliances.** Have them regularly cleaned, professionally serviced, and maintained.

4. **Test your home for radon exposure and install mitigation systems as necessary.**

5. **Clean your home and possessions often to deter contaminant buildup.**

6. **Establish a habit of using the range hood when you cook** and a bathroom exhaust fan when you shower.

7. **Consider installing HRVs and exhaust fans for regular ventilation.** If already installed, make sure the vents are properly sealed, balanced, and cleaned.

8. **Check product information on materials that may contain VOCs.** Consider purchasing products that are low-VOC or VOC-free.

9. **When you must work with products containing VOCs (engines, paint, chemicals, etc.),** consider handling them outside to avoid contaminating indoor living space.

10. **Consult an energy auditor for help finding and fixing air and moisture leaks in your building envelope.**

11. **For wood-burning appliances,** cure firewood to limit moisture and contaminants produced, and clean the chimney once per year.

12. **Select combustion appliances with sealed combustion chambers and direct venting to the outdoors.**
Where can I find more IAQ Information?

**Building Information**

- **Alaska Housing Finance Corporation**
  - ahfc.com
  - 907.338.6100

- **Association of Alaska Housing Authorities**
  - aahaak.com
  - 907.330.8398

- **Cold Climate Housing Research Center**
  - cchrc.org
  - 907.457.3454

- **UAF Cooperative Extension**
  - uaf.edu/ces
  - 907.474.5211

- **Foundation Health Partners**
  - foundationhealth.org

- **Alaska Native Tribal Health Consortium**
  - anthc.org
  - 907.729.1900

- **Green Seal**
  - greenseal.org

- **Green Guard**
  - greenguard.org

- **EPA Safer Choice**
  - epa.gov/saferchoice

- **CRI Green Label Plus**
  - carpet-rug.org/green-label-plus.html

- **Chief Andrew Isaac Health Center**
  - 907.451.6682

- **American Lung Association**
  - lung.org

- **Environmental Protection Agency**
  - https://www.epa.gov/indoor-air-quality-iaq

- **AirNow**
  - Local Air Quality Conditions
    - https://airnow.gov/

**IAQ Information**

- **Alaska Department of Environmental Conservation Division of Air Quality**
  - http://dec.alaska.gov/air-air-contacts.htm
  - 907.459.1234

- **Fairbanks Northstar Borough Air Quality Division**
  - http://fnsb.us/transportation.Pages/Air-Quality.aspx
  - 907.459.1234

- **Tanana Chiefs Conference**
  - tananachiefs.org
  - 907.452.8251

- **Tanana Valley Clinic**
  - 907.459.3500

- **Fairbanks Memorial Hospital**
  - 907.452.8181

- **Alaska Quit Line**
  - alaskaquitline.com

- **Cold Climate Housing Research Center**
  - cchrc.org
  - 907.457.3454

- **Fairbanks Northstar Borough Air Quality Division**
  - http://fnsb.us/transportation.Pages/Air-Quality.aspx
  - 907.459.1234