

Did You Know?

Proper ventilation can improve your health & comfort, as well as the durability of your home

Ventilation and Health

Harmful indoor air pollutants can affect mental & physical health if not properly ventilated

Ventilation Systems

Protect your health by installing a ventilation system appropriate for your climate & budget

Indoor Air Pollutants

Common Indoor Air Pollutants^{2, 7, 9, 10}

- **Biological contaminants**
Bacteria, fungi, mites, insects, pet dander, pollen
- **Combustion gases**
Carbon monoxide & others from cooking & heating
- **Particulates**
Asbestos, lead, carpet fibers, & others
- **Formaldehyde & other VOCs**
Paints, finishes, adhesives, caulking, cleaners
- **Soil gases**
Radon, methane, fertilizers, & others
- **Moisture**
Ground soil, cooking, bathing, laundry
- **Outdoor allergens**
Smoke, smog, traffic fumes, pollen
- **Occupant generated pollutants**
Tobacco by-products, carbon dioxide & others

People spend about 90% of their days indoors,¹¹ including time at home. Poorly ventilated homes often suffer from high levels of indoor air pollutants, condensation & moisture problems, mold & mildew growth, & high utility bills.² These issues can affect both physical & mental health.^{1, 7, 8, 9, 12, 13, 14, 15}

Older homes typically rely on ventilation through cracks in walls, ceilings, floors, & around doors & windows. Unfiltered fresh air entering through these openings can introduce additional pollutants to living spaces. Ventilation systems provide opportunities, for both old & new homes, to control & filter incoming fresh air & remove polluted indoor air.^{2, 5, 10}

Physical Health

Cold temperatures, which can lead to heart disease & even heart attack, are not the only health issues related to poor ventilation systems.¹ Indoor air pollutants can cause health problems ranging from stuffy noses & respiratory illness to lung cancer, short stature, & even death.^{1, 7, 8, 9, 12, 13, 15} Listed below are examples of how specific pollutants can affect your physical health when not properly ventilated.^{2, 8, 9, 12, 15}

- **Carbon Monoxide** (combustion gas)
Headaches, nausea, dizziness, convulsions, death
- **Radon** (soil gas)
Related to lung cancer prevalence
- **Moisture & Mold** (moisture problems)
Associated with wheezing, aches & pains, diarrhea, headaches, & fever, especially in children
- **Outdoor Allergens & Biological Contaminants**
Asthma, allergies, respiratory illness, lung function
- **Tobacco by-products** (occupant generated)
Asthma & lung cancer

Mental Health

Indoor air pollutants can also affect mental health. Lead poisoning, for example, affects neurological development in children.^{8,9,12,15} High energy bills, chronic health issues, & discomfort caused by lingering odors, uncomfortable temperatures & humidity, cold drafts, mechanical noise, & frequent maintenance also contribute to stress.^{2,3,4,5,6,7,10}

When stress is chronic, it significantly affects mental health & well-being.¹⁴ The improved indoor air quality & control afforded by proper ventilation systems allows temperature & humidity to be maintained while filtering & removing harmful indoor air pollutants.⁵

Exhaust Only

^{2, 4, 10}

Single-point Multi-point
\$ \$\$\$

Cold Climates

Health & Comfort: +

- Indoor air is continuously drawn outdoors by a central fan. This draws fresh outdoor air indoors through building cracks.
- **Advantages**
Affordable & easy to install mechanical ventilation. Properly installed systems minimize moisture problems.
- **Disadvantages**
Fresh outdoor air is not filtered, heated, cooled, or humidified. Provides adequate ventilation, but air could contain pollutants.

Supply Only

^{2, 6, 10}

Central Fan Multi-point
\$ \$ \$ \$ \$

Hot/Mixed Climates

Health & Comfort: ++

- Most affordable in homes with a duct system (furnace or A/C).
- Fresh air is delivered to living spaces by a fan & duct system.
- **Advantages**
Fresh air is drawn from an unpolluted source. Possible to pretreat (filter, heat, &/or air condition) fresh air.
- **Disadvantages**
Pressurized interior could lead to moisture problems in walls. Unfiltered fresh air must be mixed with recirculated indoor air.

Balanced Supply & Exhaust

^{2, 3, 10}

\$ \$ \$ \$ \$

All Climates

Health & Comfort: +++

- Equal amounts of fresh & indoor air are supplied & exhausted.
- Uses 2 fans: 1 draws fresh air in, 1 forces indoor air out.
- **Advantages**
Effective in any climate; fresh air can be filtered. Indoor pressure approximately equals outdoor pressure.
- **Disadvantages**
High initial equipment & installation costs. Requires careful, climate-specific installation.
- **Type 1: With Heat Recovery Ventilation (HRV)**
A heat exchanger transfers some heat between exhausted indoor air & supplied fresh air. Some heat is added to cold winter air, but removed from warm summer air.
- **Type 2: With Energy Recovery Ventilation (ERV)**
A heat exchanger transfers some heat & moisture between exhausted indoor air & supplied fresh air. Some moisture is removed from humid summer air, but added to dry winter air.

Resources

Where to learn more and how to locate professional assistance

Books: * = for homeowners * = for professionals

- **Consumer Guide to Home Energy Savings** (9th ed.)
J. Thorne, A. Wilson, K. Ackerly (2007)*

- **Residential Energy: Cost Savings and Comfort for Existing Buildings** J. Krigger (2009)*

- **Homeowner's Handbook to Energy Efficiency: A Guide to Big and Small Improvements** J. Krigger (2009)*

- **Green Building Guideline: Meeting the Demand for Low-Energy, Resource-Efficient Homes**
U.S. Department of Energy, Building America (2007)*

- **Builder's Guide to Cold Climates** J. Lstiburek (2006)*

Web sites:

U.S. Dept. of Energy, Energy Efficiency & Renewable Energy
http://www.energysavers.gov/your_home/insulation_airsealing

Consumer Guide for Home Energy Savings
<http://www.energysavers.gov/>

Building Technologies-Home Builders, Developers, Manufacturers
http://www1.eere.energy.gov/buildings/building_america/

Available Tax Credits & Rebates:

N.Y. State Energy & Research Development Authority
Lists tax credits & rebates for energy efficient improvements
<http://www.getenergysmart.org/>

Federal tax credits for energy efficient home improvements
http://www.energystar.gov/index.cfm?c=tax_credits.tx_index

N.Y. State tax credits for energy efficiency improvements
<http://www.dsireusa.org/incentives/index.cfm?State=NY>

Low-income assistance for energy efficient home improvements
<http://apps1.eere.energy.gov/weatherization/>

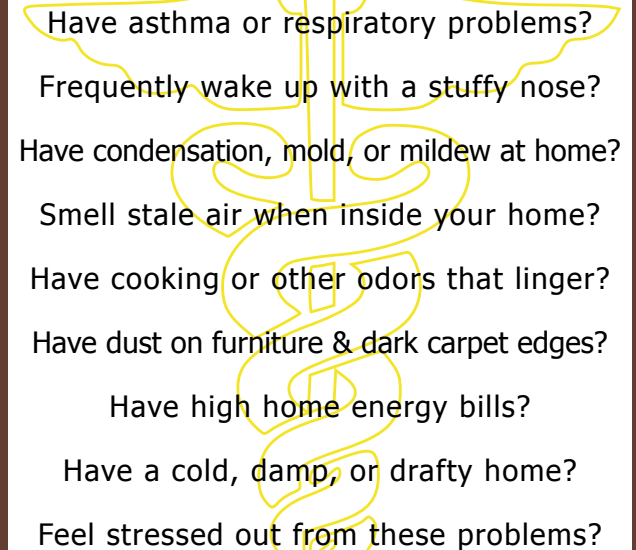
For more information, call:
1-877-NY-SMART
Or visit this web site:
www.GetEnergySmart.org

References

- 1 Bashir, S.A. (2002). Home is where the harm is: Inadequate housing as a public health crisis. *American Journal of Public Health*, 92, 5, 733-738.
- 2 Dorsi, C. & Krigger, J. (2007). *Residential Ventilation Systems: Strategies That Protect People & Preserve Buildings*. Helena, MT: Saturn Resource Management, Inc.
- 3 Energy Star. Balanced Ventilation Systems. *US Environmental Protection Agency*. Retrieved February 10, 2010 from: http://www.energystar.gov/ia/new_homes/features/BalancedVentSys1-17-01.pdf.
- 4 Energy Star. Exhaust Ventilation Systems. *US Environmental Protection Agency*. Retrieved February 10, 2010 from: http://www.energystar.gov/ia/new_homes/features/ExhaustVentilation1-17-01.pdf.
- 5 Energy Star. Mechanical Ventilation. *US Environmental Protection Agency*. Retrieved February 10, 2010 from: http://www.energystar.gov/ia/new_homes/features/MechVent_062906.pdf.
- 6 Energy Star. Supply Ventilation Systems. *US Environmental Protection Agency*. Retrieved February 10, 2010 from: http://www.energystar.gov/ia/new_homes/features/SupplyVent1-17-01.pdf.
- 7 Environmental Protection Agency. *Indoor Air Pollution: An Introduction for Health Professionals*. Retrieved February 10, 2010 from: <http://www.epa.gov/iaq/pubs/hpguide.html>.
- 8 Evans, G.W. (2003). The built environment and health. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 80, 4, 536-555.
- 9 Hedge, A. (2010). *Course notes, DEA 3500 Ambient Environments Course*. Ithaca, NY: Cornell University.
- 10 Rudd, A. (2006). *Ventilation Guide*. Westford, MA: Building Science Press, Inc.
- 11 Samet, J.M., Spengler, J.D. (2003). Indoor environments and health: Moving into the 21st century. *American Journal of Public Health*, 93, 9.
- 12 Shaw, M. (2004). Housing and public health. *Annual Review of Public Health*, 25, 397-418.
- 13 Srinivasan, S., O'Fallon, L., & Dearry, A. (2003). Creating healthy communities, healthy homes, healthy people: Initiating a research agenda on the built environment and public health. *American Journal of Public Health*, 93, 9, 1446-1450.
- 14 Taylor, S.E. & Repetti, R.L. (1997). Health psychology: What is an unhealthy environment and how does it get under the skin? *Annual Review of Psychology*, 48, 411-447.
- 15 Wells, N.M., Evans, G.W., & Yang, Y. (in press). Environments and health: Planning decisions as public health decisions.

HEALTH and

DO YOU:

- 
- Have asthma or respiratory problems?
 - Frequently wake up with a stuffy nose?
 - Have condensation, mold, or mildew at home?
 - Smell stale air when inside your home?
 - Have cooking or other odors that linger?
 - Have dust on furniture & dark carpet edges?
 - Have high home energy bills?
 - Have a cold, damp, or drafty home?
 - Feel stressed out from these problems?

Learn more about

**Residential ventilation
and your health**



your
HOME