References

[1] State of Washington, Department of Ecology, *Health Effects of Wood Smoke*
https://fortress.wa.gov/ecy/publications/publications/92046.pdf

[2] State of Washington, Department of Ecology, *Health Effects of Wood Smoke*
https://fortress.wa.gov/ecy/publications/publications/92046.pdf

[3] Chronic Neuroimmune Diseases, Woodburning, American Lung Association (last updated 2014)
http://www.anapsid.org/cnd/mcs/fireban2.html

[4] EPA Burn Wise
http://www.epa.gov/burnwise/healtheffects.html

[5] New Hampshire Department of Environmental Services, *Environmental Fact Sheet*
http://des.nh.gov/organization/commissioner/pip/factsheets/ard/documents/ard-36.pdf

[6] PubMed, *Woodsmoke Health Effects: A Review*
http://www.ncbi.nlm.nih.gov/pubmed/17127644

[7] *Scientific American,* October 3, 2008
http://www.scientificamerican.com/article/fire-pit-environmental-dangers/

[8] *Environmental Health Perspectives*
April 2005; 113(4): A254-A255
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1278521/

[9] Utah Physicians for a Healthy Environment
http://uphe.org/priority-issues/wood-burning/wood-burning-daq-presentation/

[10] Utah Physicians for a Healthy Environment
http://uphe.org/priority-issues/wood-burning/wood-burning-daq-presentation/

[11] Burning Issues, December 2001
http://burningissues.org/simple-facts.htm

[12] Puget Sound Clean Air, Wood Burning and the Law
http://burningissues.org/simple-facts.htm

[13] Colorado Department of Health, Utah Department of Health, New Mexico Air Quality, California Air Now
https://www.colorado.gov/pacific/cdphe/indoor-burning-restrictions

http://www.whentoburn.com/utah-air-quality-monitoring-no-burn-days

https://www.cabq.gov/airquality/todays-status/burn-no-burn

http://www.sparetheair.org/stay-informed/particulate-matter/wood-smoke/recommended-no-burn-days

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The Health Effects of Wood Smoke



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The Health Effects of Wood Smoke

Health Issues

- Although wood smoke conjures up fond memories of sitting by a cozy fire, it is important to know that the components of wood smoke and cigarette smoke are quite similar, and that many components of both are carcinogenic. Wood smoke contains fine particulate matter, carbon monoxide, formaldehyde, sulfur dioxide and various irritant gases, such as nitrogen oxides, that can scar the lungs. Wood smoke also contains chemicals known or suspected to be carcinogens, such as polycyclic aromatic hydrocarbons (PAHs) and dioxin.[1]

- Wood smoke interferes with normal lung development in infants and children. It also increases children's risk of lower respiratory infections such as bronchitis and pneumonia.[2]

- Wood smoke exposure can depress the immune system and damage the layer of cells in the lungs that protect and cleanse the airways.[3]

- According to the Environmental Protection Agency (EPA), toxic air pollutants are components of wood smoke. Wood smoke can cause coughs, headaches, and eye and throat irritation in otherwise healthy people.[4]

- For vulnerable populations, such as people with asthma and chronic respiratory disease, and those with cardiovascular disease, wood smoke is particularly harmful — even short exposures can prove dangerous.[5]

- The particles of wood smoke are extremely small and therefore are not filtered out by the nose or the upper respiratory system. Instead, these small particles end up deep in the lungs where they remain for months, causing structural damage and chemical changes. Wood smoke's carcinogenic chemicals adhere to these tiny particles, which enter deep into the lungs.[6]

- Recent studies show that fine particles that go deep into the lungs increase the risk of heart attacks and strokes. EPA warns that for people with heart disease, short-term exposures have been linked to heart attacks and arrhythmias. If you have heart disease, these tiny particles may cause you to experience chest pain, palpitations, shortness of breath, and fatigue.[7]

Exposure Issues

- The particulate matter in wood smoke is so small that windows and doors cannot keep it out — even the newer energy-efficient weather-tight homes cannot keep out wood smoke.[8]

- The EPA estimates that a single fireplace operating for an hour and burning 10 pounds of wood will generate 4,300 times more PAHs than 30 cigarettes. PAHs are carcinogenic.[9]

- A study by the University of Washington in Seattle showed that 50 to 70 percent of the outdoor levels of wood smoke were entering homes that were not burning wood. EPA did a similar study in Boise, Idaho, with similar results.[10]

What Others Are Doing

- Iowa's Supreme Court in 1998 declared that government bodies do not have the right to allow burning that results in smoke crossing property lines.[11]

- The State of Washington has laws to address neighbors' wood smoke. According to the Puget Sound Clean Air Agency, "generating excessive smoke is not only unneighborly, it's illegal. Under state regulations, smoke from a person's chimney cannot exceed 20 percent opacity for six consecutive minutes. Greater smoke densities could result in fines from air pollution control officials. It is always illegal to smoke out your neighbor. Everyone has a right to breathe clean air. If smoke from your fire is affecting your neighbors, it is considered a nuisance and subject to enforcement action."[12]

- Many states have restricted wood burning in fireplaces and wood-burning stoves on certain high-pollution days: Colorado; Utah; Albuquerque, New Mexico; and many towns in California have set up pollution numbers to call to find out if you can burn wood.[13]

What Needs to Be Done

- There is much we can do to protect the public's health from wood smoke exposures. Fireplace and wood stove chimneys should be regulated so that they are high enough to protect neighbors from exposures. Individual towns should pass zoning regulations to protect public health. State legislatures and state departments of health should strengthen local health departments with specific wood smoke language so that they can deal on a case-by-case basis with situations in which people are made sick by their neighbors' smoke. As the State of Washington Clean Air Agency has stated: "It is always illegal to smoke out your neighbor."