

# A Different Kind of Secondhand Smoke

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While most Americans are aware of the risks posed by secondhand tobacco smoke, we rarely think of our fireplaces, woodstoves, and outdoor fire pits and chimneys as hazards to our health. People who would never dream of smoking a cigarette think nothing of burning wood because it seems so “natural.” Yet wood smoke contains many of the same toxic and carcinogenic substances as cigarette smoke and has many of the same health impacts. Enacting laws to reduce public exposure to secondhand tobacco smoke took more than 30 years—but it is not necessary to wait for new laws and regulations to reduce wood smoke pollution and its effects on our health.

California has categorized secondhand tobacco smoke and diesel exhaust as Toxic Air Contaminants, and both are now regulated by the state to reduce public exposure. Like wood smoke, both cigarette smoke and diesel exhaust produce complex mixtures of substances that are proven hazards to human health. The table on the next page illustrates the similarities between these three sources.

The process of wood burning creates dioxin—one of the most toxic and persistent substances on earth.<sup>1</sup> According to the Bay Area Air Quality Management Agency, one-third of the total amount of dioxin in the Bay Area comes



from wood burning.<sup>2</sup> Wood smoke also contains other toxic and carcinogenic substances, including dibenzocarbazoles and mercury.

Diesel exhaust, cigarette smoke and wood smoke contain high concentrations of particulate matter, which epidemiological studies have linked to morbidity and mortality. Wood smoke produces far more particulate pollution than cigarette smoke. EPA researchers estimate the lifetime cancer risk from wood smoke to be 12 times greater than from a similar amount of cigarette smoke.<sup>3</sup>

Wood smoke is actually the largest cause of particulate matter in the Bay Area, accounting for up to half of the region’s daily wintertime particulate pollution—more than die-

sel and industry sources.<sup>2</sup> The larger particles of soot and other carbon by-products of wood combustion settle out of the air closer to the source, but the smaller particles tend to stay airborne for longer periods and over greater distances and can penetrate even weatherproofed doors and windows. Studies have shown that particle pollution levels inside homes can reach up to 70% of the pollution levels outdoors.<sup>4</sup>

On cold winter days (when people tend to burn wood), the air we breathe can quickly become unhealthy. Winter weather conditions create temperature inversions that put a lid over the lower atmosphere, trapping hazardous pollutants close to ground level. These inversions especially affect the valleys and canyon areas found throughout Marin and Sonoma counties. Readings from air monitoring equipment in San Geronimo Valley, Novato and Santa Rosa have shown extremely high wintertime particulate levels, in large part due to the high number of wood stoves used to heat homes in those communities.<sup>2</sup>

The Bay Area is currently considered to be out of attainment of the EPA’s standards for particulate matter because of our wood-burning activities. To help our region attain the national standards, the Bay Area Air Quality district operates a wintertime Spare the Air program to alert residents about conditions that are especially bad for burning wood (usually when the weather is expected to be cold and the air is stagnant). During these “No

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Burn Days," burning wood is illegal, and fines are issued for violations.

The EPA and the Air Quality district have only recently begun to address wood smoke pollution, but years of studies have linked wood smoke with a litany of health hazards. These include asthma attacks, diminished lung function, increased upper respiratory illnesses, heart attacks, and stroke. Long-term exposure to wood smoke has been linked to emphysema, chronic bronchitis, and arteriosclerosis; and laboratory studies have linked wood-smoke exposure to nasal, throat, lung, blood and lymph system cancers.<sup>5</sup>

In a laboratory study at Louisiana State University, researchers found that hazardous free radicals in wood smoke are chemically active 40 times longer than those from cigarette smoke—so once inhaled, wood smoke will harm the body far longer than cigarette smoke.<sup>6</sup> Other estimates suggest that a single fireplace operating for an hour and burning 10 pounds of wood will generate 4,300 times more carcinogenic polyaromatic hydrocarbons than 30 cigarettes.<sup>7</sup>

While pollution from wood burning is harmful to everyone, research has shown that it is particularly dangerous for children. Studies show that wood smoke interferes with normal lung development in infants and children and increases the risk of lower respiratory infections such as bronchitis and pneumonia.<sup>8</sup>

Wood smoke also affects our elderly residents. Studies overwhelmingly show that fine particulate pollution is a risk factor for heart attacks and death from strokes.<sup>9</sup> A 1994 report on the adverse effects of particulate air pollution reported a 1.4% increase in cardiovascular mortality for each 10 mg/m<sup>3</sup> increase in particulate matter.<sup>10</sup> Newer research has confirmed that both short-term and chronic exposure to fine particle pollution, such as the kind produced by wood smoke, leads to increased respiratory illness and hospitalizations in people 65 and older.<sup>11</sup> New studies have also shown another

Wood smoke vs. other pollutants			
Pollutant	Diesel Emissions	Tobacco Smoke	Wood Smoke
Benzene	X	X	X
Carbon dioxide	X	X	X
Carbon monoxide	X	X	X
Dioxin	X	X	X
Formaldehyde	X	X	X
Lead	X	X	X
Methane	X		X
Nitrogen oxides	X	X	X
Particulate matter	X	X	X
Polycyclic aromatic hydrocarbons	X	X	X

threat produced by cigarette and wood smoke: isocyanic acid, which is known to be part of a biochemical pathway linked to inflammation, cataracts, heart disease and rheumatoid arthritis.<sup>12</sup>

Without fire, the human species would probably not have survived, and our civilizations could not have flourished. But the more we learn about the health impacts of wood burning, the more it seems obvious that we need to reduce wood smoke to improve our quality of life.

Like so many other "natural" things we've exposed ourselves to in the past—including tobacco smoke, asbestos and lead—it's time to acknowledge that wood smoke is a substance we can and should avoid. Physicians are urged to discuss wood burning with patients and their families, especially those that are most at risk, such as children, the elderly, and patients suffering from heart, lung and other ailments. ◇

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For more information and brochures about wood smoke, visit [www.familiesforcleanair.org](http://www.familiesforcleanair.org).

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