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## Woodsmoke Health Effects: A Review

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The sentiment that woodsmoke, being a natural substance, must be benign to humans is still sometimes heard. It is now well established, however, that wood-burning stoves and fireplaces as well as wildland and agricultural fires emit significant quantities of known health-damaging pollutants, including several carcinogenic compounds. Two of the principal gaseous pollutants in woodsmoke, CO and NO<sub>x</sub>, add to the atmospheric levels of these regulated gases emitted by other combustion sources. Health impacts of exposures to these gases and some of the other woodsmoke constituents (e.g., benzene) are well characterized in thousands of publications. As these gases are indistinguishable no matter where they come from, there is no urgent need to examine their particular health implications in woodsmoke. With this as the backdrop, this review approaches the issue of why woodsmoke may be a special case requiring separate health evaluation through two questions. The first question we address is whether woodsmoke should be regulated and/or managed separately, even though some of its separate constituents are already regulated in many jurisdictions. The second question we address is whether woodsmoke particles pose different levels of risk than other ambient particles of similar size. To address these two key questions, we examine several topics: the chemical and physical nature of woodsmoke; the exposure and epidemiology of smoke from wildland fires and agricultural burning, and related



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