

Indoor air pollution linked to cardiovascular risk

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An estimated two billion people in the developing world heat and cook with a biomass fuel such as wood, but the practice exposes people – especially women – to large doses of small-particle air pollution, which can cause premature death and lung disease.

In a study just published online in the peer-reviewed journal *Environmental Health Perspectives*, researchers at the University of Wisconsin-Madison have associated [indoor air](#) pollution with increased [blood pressure](#) among older women.

In a remote area of Yunnan Province, China, 280 women in an ethnic minority called the Naxi wore a portable device that sampled the air they were breathing for 24 hours. The Naxi live in compounds including a central, free-standing kitchen that often has both a stove and a fire pit, says Jill Baumgartner, who performed the study with National Science Foundation funding while a Ph.D. student at UW-Madison.

"I spent a lot of time watching women cook in these unvented kitchens, and within seconds, my eyes would burn, it would get a little difficult to breathe. The women talk about these same discomforts, but they are viewed as just another hardship of rural life," Baumgartner says.

Most women are exposed to this smoke for several hours a day, and even if the cookstove is vented, a second fire is often burning for heat, says Baumgartner, who is now a global renewable energy leadership fellow at the Institute on the Environment at the University of Minnesota.

By correlating exposure over 24 hours with blood pressure, Baumgartner and colleagues associated higher levels of indoor air pollution with a significantly higher blood pressure among women aged 50 and over. Small-particle pollution raises blood pressure over the short term by stimulating the nervous system to constrict blood vessels. In the long term, the particles can cause oxidative stress, which likewise raises blood pressure.

Other studies have shown that improved stoves or cleaner fuels can cut indoor air pollution by 50 to 75 percent. In the Baumgartner study, that reduction in pollution level was linked to a four-point reduction in systolic blood pressure (the first number in a blood pressure reading). Such a change "may be of little consequence for an individual," says co-author Leonelo Baustista, an associate professor of population health sciences at UW-Madison. "However, changes of this magnitude in a population would have a significant, large impact on the risk of cardiovascular disease in the population."

In fact, the researchers concluded that this reduction would translate into an 18 percent decrease in coronary heart disease and a 22 percent decrease in stroke among Asian women aged 50 to 59. These benefits would save the lives of 230,900 Chinese women each year.

Because biomass fuels are also the primary source of energy for more than 2 billion people globally, cleaner fuels and better stoves would produce even greater cardiovascular benefits worldwide.

"This is the first study that links personal exposure to indoor air pollution to blood pressure changes; considering that a couple of billion people are exposed, this represents an extremely important public health discovery," says co-author Jonathan Patz, director of the UW Global Health Institute.

"We have known for years that unvented cooking indoors causes respiratory damage, but now that we have documented cardiovascular effects as well, the rationale for cleaner stoves and better fuels becomes that much stronger," adds Patz, a professor in the Nelson Institute for Environmental Studies.

Although China had a major program to promote cleaner stoves during the 1980s, indoor [air pollution](#) problem remains, Baumgartner says.

"Having a cleaner stove or fuel is important, but in these villages, the piece that is missing is education about the health implications. You can have a great stove, but if it is sitting right next to an open fire, the health benefit is lost," Baumgartner says.

Provided by University of Wisconsin-Madison

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