

Indoor air puts Chinese women nonsmokers at risk

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The hazards of breathing outdoor air in some Chinese cities have been well-documented. Now a University at Buffalo study confirms that breathing indoor air also carries significant cancer risks, especially for Chinese women.

The [UB study](#), published online this month, in the journal *Cancer Causes & Control*, found that indoor air pollution that generates fine particulate matter is a key contributor to the high rates of [lung cancer](#) among Chinese women, despite the fact that few of them smoke.

The research found indoor particulate matter levels that are at least double the maximum level considered acceptable by World Health Organization guidelines. The study is the first to measure particulate matter (PM) levels inside the home and to link it with the incidence of lung cancer in Chinese women.

"Our results show that besides smoking, indoor air pollution contributes significantly to women's lung cancer risk in China," says Lina Mu, MD, PhD, assistant professor of social and preventive medicine in the UB School of Public Health and Health Professions and lead author on the paper.

While around 60 percent of Chinese men smoke, Chinese women have extremely low smoking rates—approximately four percent. However, women's rates of lung cancer in China are among the highest in the world, approximately 21 cases per 100,000, while smoking accounts for

less than 20 per cent of lung cancer cases in Chinese women, says Mu.

"That's why we wanted to find out how much indoor air pollution contributes to lung cancer risk among Chinese women," says Mu. "It has been suspected but not measured."

The paper notes that since women tend to be home for longer periods of time and to cook more frequently, housing-related exposure is more of a factor among women than men.

The case-control study includes 429 Chinese women: 197 who had lung cancer and 232 who were controls. Of the 197 with lung cancer, 164 were nonsmokers while there were 218 nonsmokers in the control group.

The study was conducted in Taiyuan city, one of the top 10 air polluted cities in the world according to Asian Development Bank's 2012 annual report. Taiyuan is a large industrial city in northern China, which is home to heavy industry, including steel, coal mining and processing and electronics plants.

The study found that among the nonsmokers, lung cancer was strongly associated with multiple sources of [indoor air](#) pollution, which included exposure to tobacco smoke at work, frequent cooking and the use of solid fuel, primarily coal, for cooking and heating.

A particle mass monitor was used to measure PM levels inside the homes—mostly apartments—of study participants.

"We found that the smallest type of particulate matter is the type associated with the higher risk of lung cancer among nonsmoking [Chinese women](#)," she says. "For every additional ten micrograms per square meter of fine particular matter, there is an associated 45 percent increased risk of lung cancer."

The paper notes that increased lung [cancer risk](#) among women was strongly attributed to the fine particles produced by coal combustion for heating and cooking, and from passive smoking.

Mu says that kitchen ventilation systems, such as fans, are not common in China and that people are reluctant to open windows because they want to keep heat in and prevent outdoor pollution from coming inside.

She adds that hot oil, a staple in traditional Chinese stir-frying and deep-frying, produces carcinogens, and is a key contributor.

"[Women](#) are at high risk because they are exposed to solid fuel emissions from heating and cooking as well as from passive smoking," she says, adding that smoking is a key social ingredient in China. "Men tend to gather and smoke together, often in small, enclosed spaces, especially in offices."

Mu notes that while in large cities, some restaurants have begun to segregate smokers, people smoke freely in most public places in China.

She says that improvements will depend on significant changes, such as a switch to clean energy sources, the installation of better ventilation systems as well as public education about the benefits of keeping windows open and curbing passive smoking.

Provided by University at Buffalo

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