

# Mom's exposure to air pollution, even before pregnancy, may raise baby's heart defect risk

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Maternal exposure to air pollution may raise the risk for heart defects in

an unborn child, according to new research from China that suggests the risks are just as high in the three months prior to pregnancy as they are during the mother's first trimester.

"It means reducing [air pollution exposure](#) in the period of three months before conception and the period of the first trimester is equally important for preventing [congenital heart defects](#) in offspring," said Dr. Hammin Liu, co-lead author of the study published Monday in the journal *Circulation*. Liu is president of West China Second University Hospital and a professor of pediatrics at Sichuan University in Chengdu, China.

Congenital heart defects are the most common type of birth defect and the leading cause of infant mortality worldwide. More than 80% of heart defects have no known cause, but prior research suggests environmental exposures may play a role.

Studies investigating the link between [maternal exposure](#) to fine particulate matter (PM2.5)—tiny particles of pollution such as smoke or dust—and heart defects have been limited in size or location or have been done in countries with lower pollution levels than those in China, which has [fine particulate matter](#) concentrations that are 6.5 times higher than World Health Organization air quality guidelines.

In the new study, researchers looked at more than 1.4 million births involving 7,335 [heart defects](#) from 2014 to 2017 across 30 provinces and municipalities in China. They used satellite-based data to analyze monthly average maternal exposure to PM2.5 concentrations from the three months prior to conception to the end of the first trimester. Birth defects identified between 28 weeks of gestation to 42 days after birth were recorded.

Overall, for every 10 micrograms per cubic meter increase in maternal

exposure to PM<sub>2.5</sub>, the risk of delivering a baby with a heart defect rose by 2%. The negative effects of air pollution exposure were more pronounced during the preconception period than during the mother's first trimester.

While prior research has shown maternal exposure to air pollution can be dangerous to the [unborn child](#) during the first trimester, this is the first study to provide evidence that the danger may begin much sooner, said Dr. Jonathan Newman, the Eugene Braunwald assistant professor of medicine at New York University Grossman School of Medicine in New York City.

"That's a new observation we really haven't had much data to support," said Newman, who was not involved in the study. "It's an important potential piece of the puzzle as we understand [adverse health outcomes](#) related to air pollution."

Whether these findings would hold true in less polluted places, such as the United States, is unknown. But Newman said it's a question that should be explored. "There's really no safe level of air pollution exposure," he said.

Women who are pregnant or thinking about becoming pregnant can reduce their risks in several ways, said Newman, who was lead author of a 2020 report in the *Journal of the American College of Cardiology* that summarized an expert workshop convened by [federal agencies](#) about potential personal strategies to reduce air pollution exposure to protect cardiovascular health.

One way is by using home air filters, he said. An AHA scientific statement published in 2020 recommends portable air cleaners, high-efficiency home filtration systems, keeping home and car windows closed and wearing face masks in areas of high exposure.

But "the bigger context of managing risk from any exposure is to lower your overall risk for cardiovascular disease," Newman said. Indeed, an AHA scientific statement also published Monday in *Circulation* said improving a woman's heart health before she becomes pregnant might be the key to lowering her risk for pregnancy-related complications and improving long-term cardiovascular health for both mother and child.

"It's very important that women in pregnancy and during the periconception period seek out and are able to obtain necessary health screenings and care, especially for management of risk factors like high blood pressure or prediabetes," Newman said. "Making sure that those risk factors are adequately addressed also will help reduce the health effects of [air pollution](#)."

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