

# Closing coal-burning power plant in China and improved cognitive development in children

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Closing coal-fired power plants can have a direct, positive impact on children's cognitive development and health according to a study released by the Columbia Center for Children's Environmental Health (CCCEH) at Columbia University's Mailman School of Public Health. The study allowed researchers to track and compare the development of two groups of children born in Tongliang, a city in China's Chongqing Municipality – one in utero while a coal-fired power plant was operating in the city and one in utero after the Chinese government had closed the plant. Among the first group of children, prenatal exposure to coal-burning emissions was associated with significantly lower average developmental scores and reduced motor development at age two. In the second unexposed group, these adverse effects were no longer observed; and the frequency of delayed motor developmental was significantly reduced. The study findings are published in the July 14th *Environmental Health Perspectives*.

"This study provides direct evidence that governmental action to eliminate polluting coal-burning sources benefits children's neurodevelopment," said Frederica Perera, DrPH, professor of Environmental Health Sciences at the Mailman School of Public Health, director of the Columbia Center for Children's Environmental Health, and lead author of the study. "These findings have major implications for environmental health and energy policy as they demonstrate that reduction in dependence on coal for energy can have a measurable

positive impact on children's development and health – in China and elsewhere."

To conduct the study, researchers from CCCEH partnered with physicians and scientists from the Children's Hospital of Chongqing Medical University, the School of Public Health at Fudan University in Shanghai, and the School of Environmental Science and Engineering at Shanghai Jiao Tong University. The researchers followed two successive cohorts of Chinese newborns through age two. Children in both cohorts were born in Tongliang, a city with a coal-fired power plant that operated seasonally until it was shutdown by the government in May 2004. The first cohort involved 107 women whose children were born in 2002, prior to the plant closing. The second involved 110 women whose children were born in 2005, when the coal plant was no longer in operation.

"This is a unique environmental intervention study using molecular techniques to demonstrate the relationship between a cleaner environment and healthier children," added Deliang Tang, MD, DrPh, associate professor of clinical Environmental Health Sciences at the Mailman School, director of the Tongliang Project, and co-author of the study.

Prenatal exposure to plant emissions was measured by a biomarker of polycyclic aromatic hydrocarbon (PAH) exposure in umbilical cord blood. The investigators controlled for exposures to other pollutants, such as tobacco smoke and lead, which might have contributed to neurodevelopment problems.

Children in the first cohort had varying exposure prenatally to PAHs emitted by the coal-fired power plant. This exposure was recorded by monitoring the levels of PAHs in air during the mothers' pregnancies and in measuring a marker of PAH exposure in cord blood-- specifically the

levels of PAHs bound to DNA, known as "PAH-DNA adducts". Among these children, the researchers found significant associations between the marker of exposure in cord blood and delayed motor and average development at age two. The second group of children, who were conceived after the closure of the plant, had significantly lower levels of the marker in cord blood and their incidence of delayed motor development was one-third that of the first cohort.

Coal-fired power plants provide the majority of the energy for China's industry, as well as the electricity needs of the U.S. The Chinese government has ordered the closure of older, more polluting coal-fired power plants such as the one in Tongliang.

The study is one of four parallel international cohort studies being conducted by the CCCEH that examine the health effects of exposure of pregnant women and babies to indoor and outdoor air pollutants in urban areas. Additional studies are being conducted in New York City and Krakow, Poland.

The Center's prior research findings have shown that exposure to air pollutants are associated with an increase in risk for developmental delays among children living in New York City. Today's findings contribute to a further understanding of how air pollution impacts child health.

Source: Columbia University's Mailman School of Public Health

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