

Coal used for indoor heating is associated with shorter stature in very young children

February 7 2011

In a finding of significant worldwide public-health consequence, researchers at the UC Davis School of Medicine and in the Academy of Sciences in the Czech Republic have found that emissions from the indoor use of coal for heating and cooking may impair early childhood growth and development.

The research, published online today in the *Archives of Pediatrics & Adolescent Medicine*, a JAMA Archives journal, found that children reared in homes where [coal](#) was the primary fuel source exhibited shorter stature at 36 months of age when compared with children reared in households where other sources of energy were used.

The study is accompanied by an opinion piece by the editors on the increasing evidence of the developmental toxicity on indoor solid fuel combustion.

The study found that children whose families used coal as a primary fuel source had an average height at 3 years of age that was a statistically significant 1.3 centimeters, or approximately one-half inch, shorter than children reared in households that used other fuels, like electricity or gas central heating. The use of another biomass — wood — was not associated with a shorter stature.

"While the difference in height is not large, it does indicate that exposure to dirty fuel sources has an influence on basic processes associated with growth," said Irva Hertz-Picciotto, professor of public

health sciences at UC Davis. The study notes that while previous studies have identified adverse affects from prenatal exposure to indoor coal and solid biomass combustion, the relationship between such exposure and postnatal growth is a novel finding.

The study was conducted in two districts in the Czech Republic, Teplice and Prachatice, between 1994 and 1998, in partnership with researchers at the Institute of Experimental Medicine, Academy of Sciences of the Czech Republic, as part of the Teplice Program of the Czech Ministry of Environment, with assistance from the U.S. Environmental Protection Agency (EPA).

The epidemiological study used data collected from the Childhood Health and Air Pollution (CHAP) Study, also known as the Czech [Early Childhood](#) Health Study, a longitudinal follow-up of a birth cohort of Czech children. The study included 1,133 male and female children of Czech and Roma ethnicity whose parents completed questionnaires about the mothers' reproductive and medical histories and lifestyle factors, including smoking and drinking at two time points: at delivery and when the children were 3 years old.

The questionnaire contained several inquiries pertaining to indoor coal use for cooking or heating. These included "In which way is your household heated?" and "What is the primary type of fuel used for cooking?" Available responses for heating included central heating, gas furnace inside versus outside the house or apartment, coal furnace inside versus outside, electricity, or wood-burning stove. Answer options for cooking included gas, propane, electricity, coal, wood or other. Few respondents used coal for cooking and virtually all who used it for cooking also used it for heating.

A little more than 10 percent of study households used coal for heating and 6.8 percent used wood. After adjustment for a variety of factors,

indoor coal use was significantly associated with decreased height for age and sex at age 36 months. The study's authors said the findings "reaffirm that the negative impact of indoor air pollution from coal may extend beyond the respiratory system of [children](#) and indicate possible systemic affects."

About half of the world's households use solid fuels — biomass and coal — for heating and cooking in small devices that produce significant amounts of [emissions](#). These emissions probably are the cause of about 4 to 5 percent of the global burden of disease, according to a 2000 study by the World Energy Assessment.

"Coal smoke contains, among other types of chemicals, polycyclic aromatic hydrocarbons (PAHs), which may influence the production or activity of certain growth factors. Slower growth, particularly in early life, often is an indicator of poorer health or greater disease susceptibility," Hertz-Picciotto said. "PAHs also are present in direct or second-hand tobacco smoke, emissions from the tailpipes of motor vehicles and smoke from most fires."

More information: Arch Pediatr Adoles Med. Published online February 7, 2011. doi:10.1001/archpediatrics.2010.294

Provided by University of California - Davis

Citation: Coal used for indoor heating is associated with shorter stature in very young children (2011, February 7) retrieved 5 May 2024 from <https://medicalxpress.com/news/2011-02-coal-indoor-shorter-stature-young.html>

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