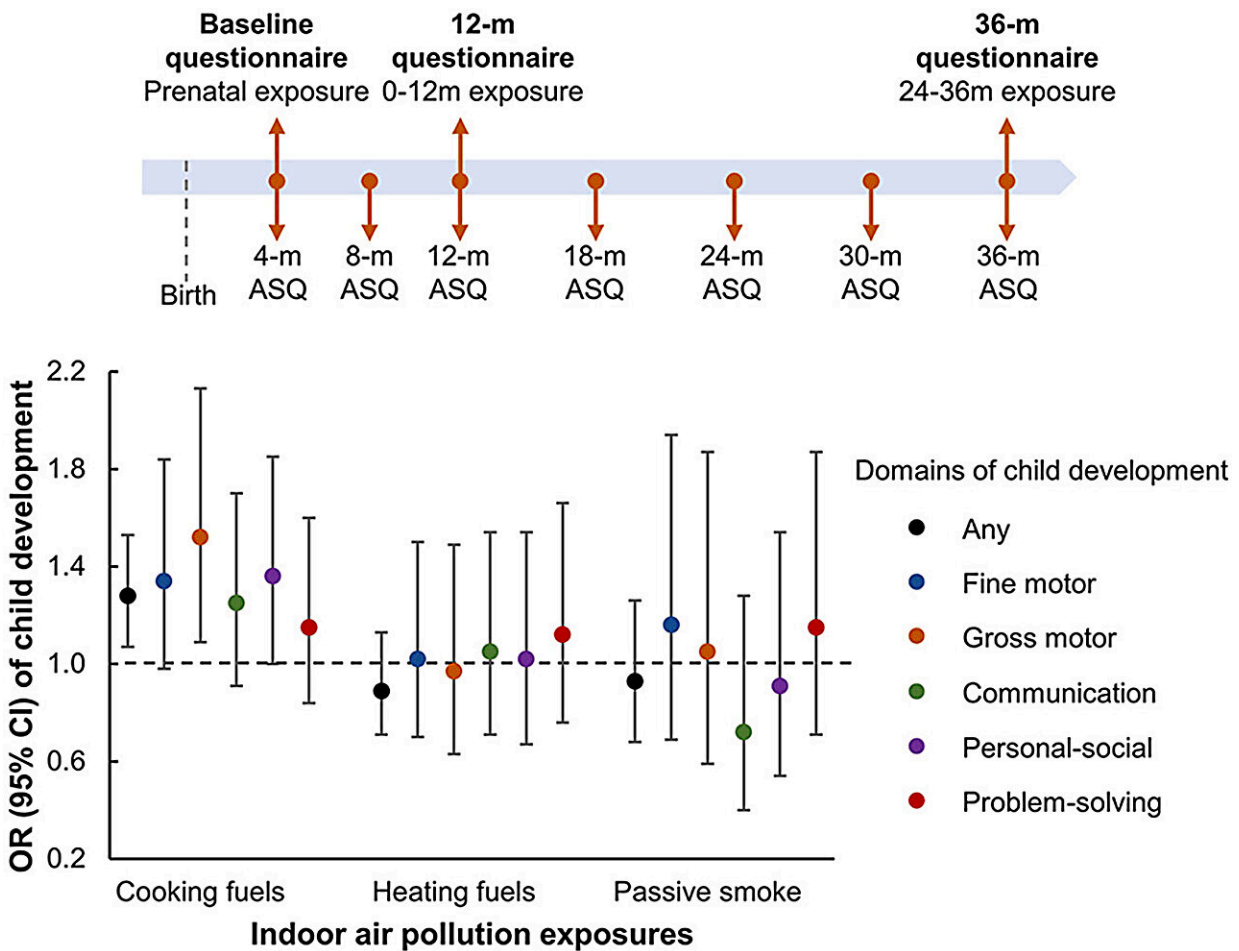


# Study finds link to unclean cooking fuels and developmental delays in children

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Just about everyone knows that cigarette smoke is bad for babies. Should

cooking fuels like natural gas, propane and wood be viewed similarly when used indoors?

That's the takeaway from [a new study](#) led by University at Buffalo researchers, who looked at indoor air pollution exposure and early childhood development in a sample of more than 4,000 mother-child pairs in the U.S.

"Exposure to unclean cooking [fuel](#) and [passive smoke](#) during pregnancy and in early life are associated with developmental delays in children," says Alexandra Grippo, first author on the study, published in the October issue of *Environmental Research*.

"While [cigarette smoke](#) is known to be harmful during pregnancy, cooking fuel may not be viewed the same way," adds Grippo, who worked on the study while pursuing her master's in epidemiology in UB's School of Public Health and Health Professions. "Gas stoves are a main contributor to indoor carbon monoxide and nitrogen dioxide levels, with some families using them multiple times a day. Infants and [young children](#) spend more time indoors and are particularly vulnerable to indoor pollutants because they are not fully developed."

Clean fuel use meant cooking with electricity, including a microwave, and heating using either electricity or [solar power](#), while unclean fuel users included those who used one or more fuels other than electricity.

While gas stoves have come under fire in recent years as cities around the country have moved to ban them in new buildings, the researchers stress that this study focused on more than just [natural gas](#).

"We found that children exposed to any unclean cooking fuel had an increased risk of [developmental delays](#)," says Kexin Zhu, Ph.D., a study co-first author who worked on the research as an epidemiology Ph.D.

student at UB; Zhu is now a postdoctoral associate in the Rutgers Center for Pharmacoepidemiology and Treatment Science.

Due to the small number of cases, researchers were not able to examine the associations for specific fuel types, Zhu notes. "Based on our study, future research with large sample sizes is needed to investigate the relationship between the use of [gas stoves](#) and [child development](#)."

The analysis included 4,735 [mother-child pairs](#) enrolled between 2008 and 2010 in the Upstate KIDS Study, a large population birth cohort that followed childhood development milestones through three years of age. Indoor air pollution information during pregnancy and the postnatal period was self-reported by participants.

Indoor air pollution exposure was assessed by collecting information on child exposure to cooking fuels, heating fuels and [passive smoking](#) at approximately 4 months old, 12 months and 36 months. Participants were asked what fuel was usually used for cooking and heating and whether they lived with someone who smoked.

The Ages and Stages Questionnaire, a parental rating instrument used for screening children's development and milestone achievement, was used to measure child development in five developmental domains: communication, gross and fine motor skills, personal-social, and problem-solving.

It is believed to be the first study to examine the impact of cooking fuels, heating fuels and passive smoking on child development measured in the five developmental domains in the U.S., according to Lina Mu, Ph.D., MD, senior author on the study and an associate professor of epidemiology and environmental health in UB's School of Public Health and Health Professions. Mu was also part of the Upstate KIDS Study research team.

Unclean cooking fuel exposure from pregnancy to 36 months of age increased the odds of failing any developmental domain by 28%, the gross motor domain by 52%, and the personal-social domain by 36%. Researchers observed significant associations of unclean cooking with failing any domains and specific domains among infants of young mothers, singletons (a pregnancy with one baby) and male infants, but not among infants of older mothers, non-singletons or female infants.

In this study, 21.5% of women reported exposure to passive smoke during pregnancy, and 14.2% reported being active smokers during pregnancy. There was a positive association reported of passive smoke exposure with failing the problem-solving domain among children of non-smoking mothers.

"Passive smoking or secondhand smoking is also an important source of indoor air pollution and should not be ignored," Zhu says.

"Passive smoke contains toxicants, such as lead, that can harm children's development," Zhu adds. "We found that passive smoke exposure may increase the likelihood of failing the problem-solving domain among young children of non-smoking mothers. Protecting children from passive smoke is therefore important for improving their [health](#) and well-being."

Other UB co-authors on the study include Matthew Bonner, Ph.D., associate professor in the Department of Epidemiology and Environmental Health, and Pauline Mendola, Ph.D., chair and professor in the Department of Epidemiology and Environmental Health. Additional co-authors are from the Eunice Kennedy Shriver National Institute of Child Health and the University at Albany School of Public Health.

**More information:** Alexandra Grippo et al, Indoor air pollution

exposure and early childhood development in the Upstate KIDS Study, *Environmental Research* (2023). [DOI: 10.1016/j.envres.2023.116528](https://doi.org/10.1016/j.envres.2023.116528)

Provided by University at Buffalo

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