

Forest fires linked to low birth weight in newborns

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Women exposed to smoke from landscape fires during pregnancy are more likely to give birth to babies with low or very low birth weights, according to findings published in *eLife*.

The study is the first to report a link between [low birth weight](#) and exposure to fire smoke in low and middle-income countries (LMICs), where 90% of low [birth weight](#) infants are born and [landscape](#) fires are prevalent.

Landscape fires, such as wildfires, tropical deforestation fires and agricultural biomass burning play an important role in maintaining terrestrial ecosystems. Yet, landscape fire smoke is triggering a costly and growing global public health problem, causing recurrent episodes of pollution mostly affecting LMICs.

Previous studies have shown that exposure to fire smoke during pregnancy is linked to low birth weight, which itself is a public health problem in LMICs. Reducing the risk of low birth weight is one of the World Health Organization's global targets for 2025.

"Babies with low birth weights are at higher risk of a range of diseases in later life compared to normal weight newborns," explains co-first author Jiajianghui Li, a Ph.D. student at the Institute of Reproductive and Child Health, School of Public Health Science Centre, Peking University, China. "Several studies have shown the effects of landscape fire smoke on acute lung and heart conditions, but the health impacts of these pollutants on susceptible pregnant women are not well known. We wanted to explore the association between birth weight and exposure to fire source pollution across several countries and over a long time period."

The researchers conducted a case-control study in 54 LMICs where they matched 108,137 groups of siblings to their mothers. They used surveys conducted by the US Agency for International Development between 2000 and 2014 to find out information about sibling birth weights and other health and demographic factors. They then assessed exposure to landscape fire pollutants using data on fire emissions from the Global

Fire Emission Database and a model that converted this data into ground-surface concentrations of particulate matter in different regions.

Their analysis showed that an increase in exposure of one microgram per cubic meter of fire-sourced particulate matter was associated with a 2.17-gram reduction in birth weight. "The effect was even more pronounced when we looked at whether exposure to fire smoke was linked to low or very low birth weight; for every microgram per cubic meter increase in particulate matter exposure, the risks of low and very low birth weight increased by around three and 12 percent, respectively," says co-first author Tianjia Guan, an assistant professor at the Department of Health Policy, School of Health Policy and Management, Chinese Academy of Medical Sciences and Peking Union Medical College, China.

The researchers found that very low birth weight was most strongly linked to the pollution. To find out why, they developed a model that looked at the average birth weight of infants within single families. Newborns in families that had lower birth weights on average were more susceptible to the risks of fire smoke pollution than those who had moderate baseline birthweights. "This suggests that other factors affecting maternal and fetal health, such as nutrition or maternal employment status, might make mothers and their developing infants even more susceptible to the risks of pollution," says co-first author Qian Guo, a Ph.D. student at the School of Energy and Environmental Engineering, University of Science and Technology, China.

"Our global, sibling-matched study has identified a link between exposure in pregnancy to landscape [fire](#) pollution and reduced [birth weight](#) in low and [middle-income countries](#)," concludes senior author Tao Xue, Assistant Professor at the Institute of Reproductive and Child Health, School of Public Health Science Centre, Peking University.

"Newborns from families where lower birth weights were more common

were the most susceptible. It is essential to develop steps that reduce the frequency of landscape fires, for example through climate change mitigations, to protect maternal and infant health in these vulnerable populations."

More information: Jiajianghai Li et al, Exposure to landscape fire smoke reduced birthweight in low- and middle-income countries: findings from a siblings-matched case-control study, *eLife* (2021). [DOI: 10.7554/eLife.69298](https://doi.org/10.7554/eLife.69298)

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