# Study shows environmental and social factors contribute to higher rates of pneumonia in children

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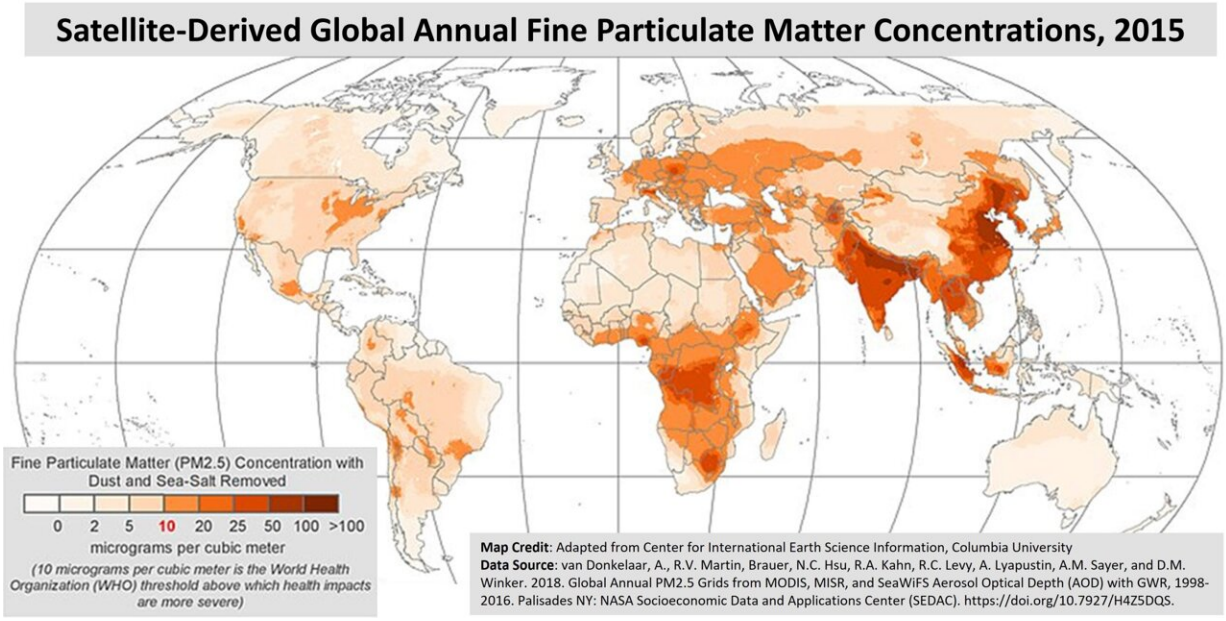


A unique aspect of this study is that the researchers estimated PM2.5 concentrations using satellite data. Credit: LSU Superfund Research Center

A new study led by researchers in the LSU Superfund Research Program demonstrates that children who are exposed to a certain type of environmental air pollution are more likely to contract community acquired pneumonia, or CAP, and to be hospitalized for longer periods of time. Social factors, including race and socioeconomic status, were

also found to be associated with living in high-risk areas for CAP.

"This research contributes to the body of evidence linking poor respiratory health to exposure to environmental air pollution, especially combustion-derived particulate matter," said study co-author Stephania Cormier, who leads the LSU Superfund Research Program.

Research conducted by LSU Superfund Research Program scientists has shown similar patterns for other respiratory diseases including asthma, and recent data suggest implications for COVID-19.

Using data from a Centers for Disease Control surveillance study of pediatric pneumonia and geographic information systems, the investigators identified high- and low-risk areas for CAP in the metropolitan area of Memphis, Tennessee. They collected information including the cause of the child's pneumonia, such as a bacterial or viral infection, public versus private health insurance, age, race and exposure to particulate matter pollution less than 2.5 micrometers in diameter, or $PM_{2.5}$. These tiny particles in the air are released by industrial combustion, car exhaust and forest fires. $PM_{2.5}$ is one of the six air pollutants regulated by the Environmental Protection Agency, or EPA, and is linked to higher rates of respiratory tract infections and a plethora of other health problems, including cardiovascular disease.

When analyzed independently, race, type of insurance and exposure to $PM_{2.5}$ were all identified as significant risk factors associated with residence in areas with higher-than-expected CAP. However, race was the most significant factor associated with living in a high-risk area. In the Memphis metropolitan area, Hispanic and non-Hispanic Black children were hospitalized for pneumonia at significantly higher rates compared with white children.

Another important finding from this study is that the health risk

associated with high $PM_{2.5}$ occurred at levels below the current regulatory maximum standard set by the EPA.

"The fact that we saw increased risk for pediatric pneumonia at PM2.5 levels lower than what is currently allowed by the EPA is a concern and signals the need for continuous review and policy adjustment based on health effects evidence and exposure or risk information such as this," Cormier said.

The World Health Organization recently lowered the maximum standards for environmental particulate matter globally to below the EPA's current maximum level for the U.S.

This change in policy and this new research is especially significant in the context of the global COVID-19 pandemic, which is caused by severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2.

"COVID-19 also causes pneumonia, and our research suggests that $PM_{2.5}$ may contribute to higher rates of infection and enhanced disease among those who do get sick," Cormier said.

"Through incredible advances in technology, we have access to high-resolution satellite data that accurately capture environmental pollution information anywhere around the world. We were able to use this data to hone in on specific neighborhoods that are experiencing higher than average hospitalization rates for pediatric pneumonia to find out why," said Tonny J. Oyana, lead author and professor in the Department of Preventive Medicine at the University of Tennessee Health Science Center and principal of the College of Computing and Information Sciences at Makerere University, Uganda.

This study was published in the scientific journal *Experimental Biology & Medicine* and was selected as a highlight article by the journal last

month.

**More information:** Tonny J Oyana et al, Particulate matter exposure predicts residence in high-risk areas for community acquired pneumonia among hospitalized children, *Experimental Biology and Medicine* (2021). DOI: 10.1177/15353702211014456

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