

Study finds topsoil is key harbinger of lead exposure risks for children

October 14 2019



Lead study author Howard Mielke is a professor of pharmacology at Tulane University School of Medicine. Credit: Paula Burch-Celentano, Tulane University

Tracking lead levels in soil over time is critical for cities to determine lead contamination risks for their youngest and most vulnerable

residents, according to a new Tulane University study published in the *Proceedings of the National Academy of Sciences*.

The study, which focuses on New Orleans but could serve as a model for cities around the world, is the first to show how long-term changes in [soil](#) lead levels have a corresponding impact in lead blood levels in children.

"Lead dust is invisible and it's tragic that lead-contaminated outdoor areas are unwittingly provided for children as places to play," says lead study author Howard Mielke, a pharmacology research professor at Tulane University School of Medicine. "Young children are extremely vulnerable to lead poisoning because of their normal crawling, hand-to-mouth, exploratory behavior."

Exposure to lead is often irreversible, particularly for children, and includes behavioral or learning problems, decreased IQ, hyperactivity, delayed growth, hearing problems, anemia, kidney disease and cancer. In rare cases, exposure can lead to seizures, coma, or death.

In metropolitan New Orleans, children living in communities with more lead in the soil and higher blood lead levels have the lowest school performance scores. Lead was recently cited as a top risk factor for [premature death](#) in the United States, particularly from cardiovascular disease, and is responsible for 412,000 premature deaths each year.

The research team began tracking the amount of lead in New Orleans soil in 2001, collecting about 5,500 samples in neighborhoods, along busy streets, close to houses and in open spaces including parks. The team from Mielke's Lead Lab collected another round of soil sampling 16 years later. Those samples showed a 44% decrease in the amount of soil lead in communities flooded during Hurricane Katrina in 2005 as well as soils in communities not affected by the levee failures and storm

surge.

Researchers then compared the soil lead with children's blood lead data maintained by the Louisiana Healthy Homes and Childhood Lead Poisoning Prevention Program from 2000-2005 and 2011-2016. Researchers found that lead in blood samples decreased by 64% from 2000-2005 to the 2011-2016 time period and that decreasing lead in topsoil played a key factor in the declining children's blood lead levels.

Lead exposure is a critical environmental justice issue, according to researchers. The team found black children were three times more likely than white children to have higher [blood lead levels](#), which could be explained by [socioeconomic status](#) and education, the type and age of housing and proximity to major roads and industry.

"While the metabolism of the city could theoretically affect all residents equally, in reality social formations produce inequitable outcomes in which [vulnerable populations](#) tend to bear greater burdens of contaminant exposure," Mielke says.

Mielke says further study is needed to determine if demographic changes in New Orleans since 2001 contributed to the decline in [children's blood lead levels](#), and if decreases are occurring equitably for all populations.

More information: Howard W. Mielke et al., "The concurrent decline of soil lead and children's blood lead in New Orleans," *PNAS* (2019). www.pnas.org/cgi/doi/10.1073/pnas.1906092116

Provided by Tulane University

Citation: Study finds topsoil is key harbinger of lead exposure risks for children (2019, October 14) retrieved 3 April 2024 from

<https://phys.org/news/2019-10-topsoil-key-harbinger-exposure-children.html>

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