

Potentially harmful chemicals widespread in household dust

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Household dust exposes people to a wide range of potentially toxic chemicals, according to large first of a kind study. Credit: Milken Institute School of Public Health at the George Washington University

Household dust exposes people to a wide range of toxic chemicals from

everyday products, according to a study led by researchers at Milken Institute School of Public Health (Milken Institute SPH) at the George Washington University. The multi-institutional team conducted a first-of-a-kind meta-analysis, compiling data from dust samples collected throughout the United States to identify the top ten toxic chemicals commonly found in dust. They found that DEHP, a chemical belonging to a hazardous class called phthalates, was number one on that list. In addition, the researchers found that phthalates overall were found at the highest levels in dust followed by phenols and flame retardant chemicals.

"Our study is the first comprehensive analysis of consumer product chemicals found in household dust," says lead author Ami Zota, ScD, MS, assistant professor of environmental and occupational health at Milken Institute SPH. "The findings suggest that people, and especially children, are exposed on a daily basis to multiple chemicals in dust that are linked to serious health problems."

Chemicals from consumer [products](#) are released into the air and get into dust, which can settle on [household items](#) or on the floor. People can inhale or ingest small particles of dust or even absorb them through the skin. Infants and young children are particularly at risk for exposure to the chemicals found in dust because they crawl, play on dusty floors, and put their hands in their mouths, the authors say.

Zota and colleagues pooled data from 26 peer-reviewed papers and one unpublished dataset that analyzed [dust samples](#) taken from homes in 14 states. They found 45 potentially [toxic chemicals](#) that are used in many consumer and household products such as vinyl flooring, personal care and cleaning products, building materials and home furnishings. The meta-analysis combines information from smaller dust studies and thus offers solid conclusions with greater statistical power, the authors say.

The team found that:

- Ten harmful chemicals are found in ninety percent of the dust samples across multiple studies, including a known cancer-causing agent called TDCIPP. This flame retardant is frequently found in furniture, baby products and other household items.
- Indoor dust consistently contains four classes of harmful chemicals in high amounts. Phthalates, substances that are used to make cosmetics, toys, vinyl flooring, and other products, were found in the highest concentration with a mean of 7,682 nanograms per gram of dust—an amount that was several orders of magnitude above the others. Phenols, chemicals used in cleaning products and other household items, were the number two highest [chemical](#) class followed by flame retardants and highly fluorinated chemicals used to make non-stick cookware.
- Chemicals from dust are likely to get into young children's bodies. A flame retardant added to couches, baby products, electronics and other products, TCEP, had the highest estimated intake followed by four phthalates—DEP, DEHP, BBzP and DnBP. The intake numbers in this study probably underestimate the true exposure to such chemicals, which are also found in products on the drug store shelf and even in fast food the authors say.
- Phthalates such as DEP, DEHP, DNBp, and DIBP, are not only found at the highest concentrations in dust but are associated with many serious health hazards. Phthalates are thought to interfere with hormones in the body and are linked to a wide range of health issues including declines in IQ and respiratory problems in children.
- Highly fluorinated chemicals such as PFOA and PFOS are also high on the potential harm scale. These types of chemicals, which are found in cell phones, pizza boxes, and many non-stick, waterproof and stain-resistant products have been linked to numerous health problems of the immune, digestive, developmental and endocrine systems.

- Small amounts can add up. Many of the chemicals in dust are linked to the same health hazards, such as cancer or developmental and reproductive toxicity, and may be acting together. Exposure to even small amounts of chemicals in combination can lead to an amplified health risk, especially for developing infants or [young children](#), the authors say.

"The number and levels of toxic and untested chemicals that are likely in every one of our living rooms was shocking to me," said co-author Veena Singla, PhD, staff scientist at the Natural Resources Defense Council. "Harmful chemicals used in everyday products and building materials result in widespread contamination of our homes—these dangerous chemicals should be replaced with safer alternatives," Singla adds.

In the meantime, consumers who want to reduce their exposure to chemicals in household dust and the environment around them can take a few simple steps such as keeping dust levels low by using a strong vacuum with a HEPA filter; washing hands frequently; and avoiding personal care and household products that contain potentially dangerous chemicals.

"Consumers have the power to make healthier choices and protect themselves from [harmful chemicals](#) in everyday products," says Robin Dodson, an environmental exposure scientist at Silent Spring Institute. "These things can make a real difference not only in their health but also in shifting the market toward safer products."

The meta-analysis, "Consumer product chemicals in indoor [dust](#): a quantitative meta-analysis of U.S. studies," will be published September 14 in the journal *Environmental Science & Technology*.

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