

CHEMICAL SAFETY



US residents are exposed to thousands of chemicals every day through food, drinking water, air pollution, and consumer products. Toxic chemical exposures increase the risk for a variety of health problems, including cognitive and behavioral disorders, throughout the lifespan. Yet, communities often are unaware of local chemical exposure risks and associated potential adverse health impacts (which may be unclear even to the public health community). The yearly US cost of just four childhood health problems linked to chemical exposures—lead poisoning, asthma, cancer, and developmental disabilities—exceeds \$54 billion.¹

The Problem

Over 80,000 chemicals are in use in the US, many in everyday products and most untested for safety. Perfluoroalkyl substances (PFASs) or phthalates—a large class of chemicals used commercially in non-stick and stain- and water-resistant products, fire-fighting foams, food packaging, carpets, and furniture fabrics—are especially persistent in the environment and in the human body. Because they are highly lubricating and reduce friction, PFASs are also used by the aerospace, automotive, construction, and electronics industries. This widespread usage has resulted in PFAS exposure for virtually all US residents; the chemicals have been detected in breast milk, umbilical cord blood, and bloodstreams.² Moreover, owing to their slow metabolism, they remain in the human body for long periods of time.

Though not conclusive, studies suggest links between PFASs and fetal and childhood developmental delays; decreased fertility; altered hormone and enzyme levels; elevated cholesterol; immune system changes; increased uric acid levels; and prostate, kidney, and testicular cancers; among others in a long list of possible adverse health outcomes.³

Chemical Developmental Effects

While researchers cannot conclusively identify the causes of autism, there are linkages to the disorder and the environment. Scientists have observed pregnant woman's exposure to pesticides and phthalates could increase the chances of her child developing autism. However, the chemical

exposures pre- and post-natal only slightly elevate the risk of a child developing autism when coupled with genetic predisposition for the disorder.⁴

Pesticides in Food

Pesticides used to protect crops from insects, rodents, mold, and other pests are regulated by the US Environmental Protection Agency, and pesticide residues are measured by the US Department of Agriculture.⁵ Still, every year a million children under age 6 are involved in pesticide poisoning incidents.⁶ Pesticide exposure has particularly severe impacts on children, compared with adults, owing to their underdeveloped physiology and smaller size.

Biomonitoring and Surveillance

Biomonitoring—the measurement of environmental contaminants (or their metabolites) in human blood, urine, or other specimens—provides definitive information about human exposure to potentially harmful substances, such as PFASs, pesticides, secondhand smoke, and lead.⁷ In addition to documenting individuals' body burden of select environmental contaminants, biomonitoring generates data to explain exposure trends and inform and evaluate public health interventions.^{8,9}

Biomonitoring data collected through CDC's National Health and Nutrition Examination Survey show background levels of exposure for a typical (noninstitutionalized) US resident to more than 200 to 300 environmental chemicals.⁸ This baseline data complements state- and local-level biomonitoring data, which may show spikes in exposure (compared with baseline) for certain populations. Few states, however, have an adequate biomonitoring program, and not all test for every analyte tracked by CDC.

Vulnerable Populations

Children's developing bodies make them particularly vulnerable to health issues from chemical exposures. For example, while researchers cannot conclusively identify the causes of autism, there are linkages to the disorder and the environment. Scientists have observed that a pregnant woman's exposure to chemicals, such as pesticides and phthalates, could increase the chances of her child developing autism. However, the chemical exposures pre- and post-natal only slightly elevate the risk of a child developing autism when coupled with genetic predisposition for the disorder.

Opportunities for Action

The Federal Toxic Substances Control Act (TSCA) of 1976 authorizes EPA to regulate and collect data on existing and new chemicals in the US market, but it has been criticized for its significant public health limitations. In June 2016, President Obama amended the TSCA by signing into law the Frank R. Lautenberg Chemical Safety for the 21st Century Act. The new law received bipartisan support in both chambers of Congress and includes much-needed improvements:

- A requirement for EPA to conduct a risk evaluation of “high priority” existing chemicals within a specified timeframe.
- The use of a new risk-based safety standard to determine whether a chemical use poses an “unreasonable risk,” including to susceptible and highly exposed populations.
- Easier public access to chemical information.
- Consistent funding to defray costs for new chemical reviews and implementation activities for existing chemicals.

In addition to EPA’s work, there are a number of non-governmental efforts underway to reduce harmful chemical exposures. Project TENDR—Targeting NeuroDevelopmental Risks—is a collaboration among concerned scientists, healthcare professionals, and children’s advocates to reduce exposures to environmental toxicants that contribute to neurodevelopmental disorders. The project’s call to action includes recommendations to develop targeted mechanisms to identify toxic chemicals, to expand and improve monitoring of chemical exposures, and to update curricula and examinations for health care professionals to assure full understanding of the health impacts of priority chemicals.

While these efforts are valuable, much more could be gained by the federal government expanding its role in chemical oversight.

- 1) Utilize existing federal sources, such as the Agency for Toxic Substances and Disease Registry Toxicological Profiles, CDC’s National Report on Human Exposure to Environmental Chemicals, and EPA’s Integrated Risk Information System, to advance scientific understanding of chemicals.
- 2) Improve training and coordination at all levels of government to facilitate chemical oversight activities.
- 3) Require industry to assume the burden of proving chemical safety, including pre-market testing of chemicals.
- 4) Commission more evidence-based research to augment understanding of the health impacts of chemical exposures.
- 5) Prioritize funding for state-level biomonitoring and tracking programs.
- 6) Update legislation, such as TSCA, to reflect new scientific findings regarding chemical risks.
- 7) Educate the public about chemical risks to enable safe lifestyle choices.

For more information, visit:

[Agency for Toxic Substances and Disease Registry](#)

- ToxProfiles and Toxic Substances Portal:
<https://www.atsdr.cdc.gov/ToxProfiles/index.asp>

Association of State and Territorial Health Officials

- *Chemical Exposures: State Ideas for Safeguarding Health*
http://www.astho.org/uploadedFiles/Programs/Environmental_Health/Built_and_Synthetic_Environment/Chemical%20Exposures%20State%20Ideas%20for%20Safeguarding%20Health_ASTHOFinalReport.pdf

Centers for Disease Control and Prevention

- National Center for Environmental Health, National Biomonitoring Program:
<http://www.cdc.gov/biomonitoring/>
- *National Report on Human Exposure to Environmental Chemicals*:
<http://www.cdc.gov/exposurereport/>
- National Environmental Public Health Tracking Network (NEPHTN), Acute Toxic Substance Releases Data: <https://ephtracking.cdc.gov/showToxicSubstanceLanding>
- NEPHTN Biomonitoring: Population Exposures Data:
<https://ephtracking.cdc.gov/showBiomonitoringLanding>

Georgetown University

- PFAs and Health: <https://georgetown.app.box.com/s/aplftwkvrikol107aylshnnqzhjuctcn>

National Association of County and City Health Officials

- Position statement on chemical policy reform:
<http://www.naccho.org/uploads/downloadable-resources/12-16-chemical-policy-reform.pdf>

Project TENDR

- Project website: <http://projecttendr.com>

References

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