



Toxic plastic chemicals number in the thousands, most are unregulated, report finds

By Sandee LaMotte, CNN

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(CNN) — “Life in plastic; it’s fantastic,” so the song goes, but in reality, plastics and the chemicals used to create them have been increasingly linked to numerous harms to human health and the environment. And with new plastic chemicals entering the market all the time, it’s been difficult for regulators and policy makers to determine the scope of the problem.

Now, for the first time, researchers have pulled together scientific and regulatory data to develop a database of all known chemicals used in plastic production.



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It's a staggering number: 16,000 plastic chemicals, with at least 4,200 of those considered to be "highly hazardous" to human health and the environment, according to the authors.

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"Only 980 of those highly hazardous chemicals have been regulated by agencies around the world, leaving us with 3,600 chemicals that are unregulated — and these are only the known chemicals," said Martin Wagner, first author and project lead of the [PlastChem Report](#), released Thursday.

"There are many more unregulated chemicals that we're just unaware of how they may be hazardous to our own health or the environment," said Wagner, an associate professor of biology at the Norwegian University of Science and Technology in Trondheim.

The report is an important one, said pediatrician and biology professor Dr. Philip Landrigan, director of the Program for Global Public Health and the Common Good and the Global Observatory on Planetary Health at Boston College.

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"It's the most comprehensive catalog of the chemicals in plastics that I've seen today," said Landrigan, who was not involved in the report's creation.

Landrigan, however, was the lead author of a massive undertaking by the Minderoo – Monaco Commission on Plastics and Human Health, a global consortium of scientists, health care workers and policy analysts charged with following plastics from creation to final product.

In its March 2023 report, the consortium determined that "plastics are associated with harms to human health at every single stage of the plastic lifecycle," Landrigan said.

"This new report underscores what we found: Plastics pose a very real threat to human health," he added. "The plastics and the chemicals in them require a much tighter regulation than they have had up until now."



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Matt Seaholm, president and CEO of the Plastics Industry Association, told CNN in an email that "plastic as a material continues to offer safety, protection and efficiency while also being able to be reused and recycled. Chemicals are chemicals, and policies should be developed that are applicable to all of them. Trying to focus exclusively on 'plastics chemicals' risks redundancy and tunnel vision in policy."

Kimberly Wise White, vice president of regulatory and scientific affairs for the American Chemistry Council, told CNN in email that "unfortunately, today's report seeks to advance a hazard framework that ignores real-world exposures and paints an incomplete picture for regulators and the public. This contrasts with risk assessments, used to underpin the most effective chemical management laws."





Of the 16,000 plastic chemicals, 10,000 have no safety or hazard data, the report found.

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Toxicity is a key measurement

The PlastChem Report report outlines a systematic approach to identify and prioritize chemicals of concern that can be used by agencies and regulators around the world, including those attending the April meeting of the International Negotiating Committee on Plastic Pollution. The committee is part of the United Nations Environment Programme, which has committed to developing a Global Plastics Treaty between 175 nations by the end of 2024.

"The most important criterion we used is toxicity," Wagner said. "Many of these chemicals are known to be very toxic for human health or the environment. They are carcinogenic or mutagenic or toxic to reproduction. Some have organ-specific toxicity, typically the liver, as that is where many of the chemicals are absorbed from circulation."

Other chemicals like phthalates, bisphenols, flame retardants and pesticides are also endocrine disruptors, interfering with the body's hormones and contributing to obesity, low birth weight, gestational diabetes, some cancers, birth defects and neurodevelopmental disorders, Wagner said.



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In addition to toxicity, the report characterized chemicals of concern by how long they stayed in the environment or the human body, Wagner said.

"The chemicals of concern we identified are also persistent, in that they don't easily degrade in the environment; bio-accumulative, meaning they build up in the body over time; and mobile, which means they spread easily in drinking water or in the aquatic environment," he added.

Scientific studies are often criticized by the plastic industry as not being specific or as able to show only an association, not cause and effect, due to ethical concerns about experimenting on humans. To alleviate that concern, the researchers mined data from regulatory agencies around the world that had already flagged a chemical as potentially hazardous.

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"Our report is not only based on the scientific evidence in the literature but also on regulatory agencies saying 'this chemical is likely to cause cancer or have another toxic impact.' It's a quite conservative approach to identifying plastics of concern," Wagner said.

Using data from regulatory agencies in addition to scientific research "adds a whole layer of credibility" to the report, Landrigan said.

Grouping chemicals of concern

In the United States, the regulatory process requires proof of an individual chemical's harm before action can be taken. Critics of this approach say this allows industry to change a small molecule in that chemical's structure, effectively sending scientists back to the lab to prove that the chemical harms the body in the same way as its predecessor.



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"The chemical industry has become very skilled at this kind of bait and switch," Landrigan said, even though all of the chemicals in that group will have a similar biological impact on the body.

Along with many other advocates, the PlastChem Report suggests bundling similar chemicals into groups that would then be regulated as classes. The report identifies 15 such priority groups, which include familiar names such as bisphenols (BPA and its offspring); phthalates; per- and polyfluoroalkyl substances (PFAS); and parabens (preservatives).

Although grouping would capture about 1,000 of the most toxic chemicals in plastics, Wagner said, that still leaves about 2,600 chemicals that still need to be regulated.

Missing hazard data

In addition to the massive number of toxic chemicals, the report found that detailed hazard information is missing for more than 10,000 of the 16,000 chemicals. Without this information, regulators and the public do not have the data needed to determine whether chemicals may be harming the human body, wildlife and the environment, advocates say.



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"This report is long overdue. People are exposed to these chemicals daily, highlighting a critical issue where the vast majority have never gone through a hazard or safety assessment," said Tasha Stoiber, a senior scientist at the Environmental Working Group, an environmental and health advocacy organization.

Stoiber was not involved in the creation of the PlastChem report.

"We will never know in full what these chronic exposures mean for our health, but the sheer number of toxic chemicals used in plastics should set off alarm bells," said Jane Houlihan, research director for Healthy Babies, Bright Futures, an alliance of nonprofits, scientists and donors with a mission of reducing babies' exposures to neurotoxic chemicals. She was not involved with the new report.

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