

1. Sources

Phthalates are a large family of semi-volatile organic compounds. They are a group of plasticizers with softening and elastic effects, and they are produced in high volumes to be used in products such as vinyl flooring, adhesives, detergents, lubricating oils, automotive plastics, plastic clothing and personal care products. Phthalates accounted for 65 per cent of global consumption of plasticizers in 2017.



2. Why is it relevant?

The widespread use of phthalates has resulted in extensive human and environmental exposures.



Several ortho-substituted phthalates have been found to adversely affect mammalian male reproductive tract development with endocrine-disrupting modes of action which has resulted in their restriction by some countries since the 1990s.



Di(2-ethylhexyl) phthalate (DEHP) was classified by the International Agency for Research on Cancer (IARC) as possibly carcinogenic to humans (Group 2B) with sufficient evidence in experimental animals for its carcinogenicity, but no human data available.



The European Union has identified 17 phthalates or phthalate mixtures as Substances of Very High Concern due to one or a combination of the following: toxicity for reproduction, endocrine-disrupting properties to human health and endocrine-disrupting properties to the environment.



Some long-range transport is possible for short-chain phthalates, but degradation prevents their accumulation and limits their persistence in the environment.

Most phthalates are human-made. They are released to the environment from indoor (e.g. candles) and outdoor uses (e.g. agricultural applications), and discharges from industrial sources, wastewater treatment plants and landfills.



When phthalate-containing materials such as paper and plastic are recycled, this can result in a so-called secondary use of phthalates and may lead to unintended exposures.

Wildlife and humans are exposed to phthalates through contaminated environmental media (air, water, soil) and foodstuffs (including breastmilk).



Due to the widespread application, exposure to phthalates occurs globally. Phthalates have been detected in air, water, drinking water, sediment, sludge, wastewater, soil, dust and biota.

Phthalates can also be absorbed through the skin (e.g. from personal care products) and direct mouthing (toys).



Phthalates are generally present at higher concentrations in urban than in rural areas. Nevertheless, phthalates are also detected in remote Arctic air.

3. Existing instruments and actions



Many countries have either banned, restricted or set a maximum allowable concentration for the use of specific phthalates in specific products; however, the scope of these restrictions and bans varies among countries and regions. Overall, most of them have focused on toys and childcare products. Additional restrictions exist for electrical and electronic products, medical devices, food contact materials and cosmetics.

Some other instruments have also been introduced to limit the use of and exposure to phthalates. For example, the taxation of products containing polyvinyl chloride (PVC) and phthalates.

Legally binding instruments to limit the use of phthalates are complemented by voluntary actions including voluntary industry phase-out by retailers and producers, as well as third-party standards and certification schemes.



4. Challenges and opportunities



Human biomonitoring studies continue to show almost 100% detection frequencies of restricted phthalates, with higher levels among people living in poverty as well as in children and adolescents.

Other challenges stem from protecting subpopulations at higher risk. Low-income populations have higher exposures to phthalates than high-income populations.

Data needs to be found on current and temporal trends for global production. Such data are needed to judge whether levels are decreasing in some populations at the expense of increases in other populations.

A growing challenge is the “regrettable substitution” of phthalates with other plasticizers that could be hazardous. For example, DEHP, which has been classified as a possible human carcinogen by IARC, has been substituted with di-isononyl phthalate (DiNP) as a plasticizer of PVC in numerous applications.

More comprehensive sets of instruments and actions in most countries are needed to address exposure for all vulnerable populations.

The most vulnerable life stage for adverse effects is the foetus, which means that exposures need to be limited for women of childbearing years, who are not the target population for restrictions on children’s products.

Future development of regulatory and voluntary instruments and actions need to be mindful of implications for substitution.

