

## Ending plastic pollution: an opportunity for health

In the far future, when the human species is extinct and every ruin has long since crumbled, the last remaining sign of our civilisations might well be a distinct layer of plastics in the geological strata. The Anthropocene can be defined by plastic: cheap, convenient, incredibly durable, and endlessly adaptable, it is a wonder material. There is much good that comes from plastic. 21st century medicine would be unimaginable without it: from intravenous tubes to gowns; syringes to catheters. Plastics have become integral to modern life. This ubiquity though comes at an increasingly recognised cost.

Plastic manufacturing can be a dirty business, produced from petrochemicals and often modified with additives—including carcinogens and endocrine disruptors—that can later leach into us or the environment, harming wildlife and entering food chains. Plastic pollution flows into our rivers and clogs our coastlines, entangling and choking animals. Plastic production and burning plastic waste generate harmful emissions. Microplastics—fragments less than 5 mm—have been found on mountaintops, in Antarctic ice cores, throughout our oceans, and in the bloodstream of human beings. We ingest or inhale them every day. There is much to learn about their effects on human health, but one recent article showed that the presence of microplastics and nanoplastics (fragments smaller than 1000 nm) in carotid artery plaques raises the risk of myocardial infarction, stroke, or death.

According to the OECD, plastic pollution is set to double, from 22 million tons per year in 2016, to 44 million tons per year in 2040. In increasing recognition that the status quo poses a range of unsustainable harms to health, the environment, and the economy, the UN is developing a multinational treaty to end plastic pollution. Given the scale and seemingly all-pervasive nature of the problem, what might the treaty hope to achieve? No one policy will eliminate plastic pollution and there are many steps that could help, including a ban on plastic waste export, regulation to ensure transparency about the content of plastics, and a dedicated research agenda. But two key high-impact interventions would make the situation hugely more tractable.

First, is to reduce plastic production, especially to eliminate use of unnecessary short-lived disposable items. Plastic production is booming. In 1950 it was 2 million tons per year; by 2000 it was 200 million; in

2019, 460 million and growing still. Single-use items, often packaging, films, bottles, carrier bags, and other food-related disposables, account for 35–40% of plastic production. This situation should—and can—change. Modelling by the Pew Research Centre suggests that focusing on restricting these items could help reduce plastic production by 30% by 2040 in a way that is economically, socially, and technically feasible. Restrictions on single-use plastics such as drinking straws and carrier bags have already been successfully implemented in many national and subnational jurisdictions. Scaling up these initiatives globally would have substantial benefits, curbing production and thereby curbing plastic waste and, with it, plastic pollution.

Second, is to improve waste management, particularly in low-income and middle-income countries. We do, in fact, effectively manage most plastic waste. An estimated 5% of plastic waste ends up leaked to the environment (and 0.5% in the ocean). The vast majority is kept in sealed landfills, incinerated, or recycled. However, in developing economies, where consumption rises quickly and growing populations become increasingly urbanised, plastic waste outstrips the development of waste infrastructure, resulting in mismanagement and pollution. The USA accounts for an estimated 0.4% of global mismanaged plastic; India and China together account for 40%. No dazzling new technologies are needed to prevent this mismanagement; just prosaic investment in public services such as rubbish collection and proper landfill facilities (therefore international financing to support the treaty's provisions is essential). Even if we do not end waste, we can end pollution.

Plastic production, usage, disposal, and pollution are all global issues; they demand global responses. A legally binding treaty that addresses the whole lifecycle of plastics, that can be developed free from undue industry influence, and that puts the protection of health at its centre, can end plastic pollution. Nothing is yet decided, however. Further negotiations will take place in November, in Busan, South Korea, with the aim of finalising the text by the end of 2024. There is now a huge opportunity. Not to live without plastic entirely, but, in the words of Inger Andersen, the UN Environment Programme Executive Director, to “live with plastic and not be doomed by it”. ■ *The Lancet*



Matt Hunt/SOPA Images/LightRocket via Getty Images

For the study of microplastics and nanoplastics in carotid plaques see *N Engl J Med* 2024; 390: 900–10

For the OECD report on plastics see [https://read.oecd-ilibrary.org/view/?ref=1143\\_1143481-88j1bxuktr&title=Global-Plastics-Outlook-Policy-Scenarios-to-2060-Policy-Highlights](https://read.oecd-ilibrary.org/view/?ref=1143_1143481-88j1bxuktr&title=Global-Plastics-Outlook-Policy-Scenarios-to-2060-Policy-Highlights)

For more on the UN treaty see <https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/39764/END%20PLASTIC%20POLLUTION%20-%20TOWARDS%20AN%20INTERNATIONAL%20LEGALLY%20BINDING%20INSTRUMENT%20-%20English.pdf?sequence=1&isAllowed=y>

For the modelling by the Pew Research Centre see [https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwaste\\_summary.pdf](https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwaste_summary.pdf)

For more data on plastic pollution see <https://ourworldindata.org/plastic-pollution?insight=most-ocean-plastics-today-come-from-middle-income-countries#introduction>

For more on industry influence in the treaty negotiations see *Comment Lancet* 2023; 402: 2274–76