Plastics are not only implicit in a planetary pollution crisis, they are damaging ecosystems and responsible for the burning of ever-increasing amounts of fossil fuels, driving biodiversity loss and climate change in ways that are less discussed, but equally alarming. \[^1\] Linked to these forces is a growing recognition of both direct and indirect human health impacts throughout the plastic life cycle, stimulating recent calls for greater engagement from the public health community. \[^2\] The question is: are we building evidence on health effects fast enough? Negotiations for a global treaty to end plastic pollution aim to establish a legally binding international agreement by 2024. \[^3\] This is a narrow but distinct window of opportunity for the diverse global health research and practice community to converge and collaborate, engaging with a true planetary health emergency that demands a united, global health response.

Awareness of possible human health impacts of pollution is not new, but for plastics, official recognition still often amounts to little more than a nod. Health hazards of ocean pollution were already alluded to in the 1972 Stockholm Declaration, the first set of principles for global collaboration on environmental issues. \[^4\] Exactly 50 years on, the connection specifically between plastic pollution and human health is inconsistently recognised. The United Nations Environment Programme (UNEP) points to health effects in the resolution for a global plastics treaty and in a new evidence summary, \[^5\] \[^6\] but more than half of published government statements supplied to inform the upcoming treaty negotiations make no reference to health at all (figure 1). \[^7\] \[^8\] In the same 50 years, the world has amassed around 7 billion metric tonnes of plastic waste, with up to 12 million tonnes pouring into the ocean each year. \[^7\] \[^8\] Though the treaty promises a monumental win for the environment, why has political discussion of the health impacts of plastics not advanced further?

One reason may be the limited availability of scientific evidence that can be readily used to inform policy. Statements submitted to the UNEP by several non-governmental organisations summarise current evidence for aspects of human health effects including neurotoxicity, endocrine disruption, reproductive issues, respiratory problems, inflammation, increased cancer risk and damages to mental health as a result of pollutants released throughout the plastic life cycle (figure 2). \[^9\] However, quantification of these effects remains relatively scarce, particularly on the scale set by a global treaty, and generating this much-needed evidence is challenging. \[^9\] In research design terms, exposure to plastic covers an amorphous and evolving collection of different polymers, containing untold quantities of obscure chemicals. Controlling for a substance that is now ubiquitous in land, air and water is extremely difficult, as is accounting for combined and
Figure 1  Timeline of the inclusion of global health considerations in key publications and milestones leading up to the start of negotiations for a global treaty to end plastic pollution. Notes: The figure includes references to and extracts from the following sources: (1) the United Nations Environment Assembly Resolution 5/14 “End plastic pollution: Towards an international legally binding instrument” (2) (3) the United Nations Environment Programme (UNEP) webpages on the Ad hoc open-ended working group (OEWG) to prepare for the Intergovernmental Negotiating Committee (INC) on plastic pollution; Dakar, Senegal Member state and stakeholder statements, and OEWG outcome report (3) (4) the United Nations General Assembly Declaration on the human right to a clean, healthy and sustainable environment as a human right (3) (5) the High Ambition Coalition to End Plastic Pollution: Towards an international legally binding instrument for a global treaty to end plastic pollution and to protect and promote global human health?

Centring human health in negotiation processes:
- Collaboration within the diverse global health research and practice community
- Generate, synthesise, and communicate evidence for pathways between plastics, waste reduction and health, accounting for inequities of health impacts
- Establish an overarching, inclusive, council for health within the negotiation processes that addresses the full life cycle of plastics

Strategic Goal 2: Enable a circular economy for plastics that protects the environment and human health
Coalition of countries that will raise awareness and conduct intersessional work on critical issues to inform negotiations

Launch of the High Ambition Coalition to End Plastic Pollution
INC-1: Maldonado, Uruguay
INC-2: TBC
INC-3: TBC
INC-3: TBC
INC-5: TBC

28 Nov – 2 Dec 2022
April 2023
Nov 2023
May 2024
Dec 2024
End of 2024

Non legally binding resolution but an official recognition of a healthy environment as a human right

United Nations General Assembly resolution declares the human right to a clean, healthy and sustainable environment

Launch of the High Ambition Coalition to End Plastic Pollution

28 July 2022

Centring human health in negotiation processes:

Health effects of plastics referenced in published statements of 1 region, 6 member states, 4 groups and 2 UN agencies. OEWG outcome report proposed evidence of health impacts be summarised and circulated in scientific overview document ahead of INC-1

Reaffirming the importance of cooperation, coordination and complementarity among relevant regional and international conventions and instruments, with due respect for their respective mandates, to prevent plastic pollution and its related risks to human health and adverse effects on human well-being

United Nations Environment Programme (UNEP) invitation for member states and stakeholder statements to inform the organization of (INC-3), substantive issues, and the stakeholder forum
Submissions from 20 member states, 16 major groups and stakeholders, 3 United Nations agencies and 1 multi-lateral agreement

30 May – 1 June 2022

compounded pathways and measuring health effects that may be latent or even intergenerational. Though the profile of the treaty may encourage more studies, greater engagement and coordination within the health research community is needed, to streamline evidence generation with the urgency of effectively informing negotiations on health. In other words, we need to do in less than 2 years what we have not yet achieved in more than 50.

Where policy may be hindered by evidence and science may be hindered by methodological challenges, there are those that stand to benefit from uncertainties in health impacts. Fossil fuels and climate are often discussed separately to plastics and pollution, but these planetary issues, and the powerful industries driving them, are inextricably intertwined. Plastics remain almost exclusively derived from fossil fuels, and plastic production alone is set to generate 2.8 gigatons of greenhouse gas emissions per year by 2050. The oil and chemical industries behind plastic production share a history of obscuring knowledge of their detrimental impacts; where Exxon already knew about climate change in 1977, Monsanto was aware of adverse human health effects of Polychlorinated Biphenyls, used in the production of the plastic Polyvinyl Chloride, as early as 1930. Ahead of the plastics treaty negotiations, vested interests are barely concealed in certain statements that use health claims as a lever to maintain the status quo of plastic production. Saudia Arabia, Entidades Unidas Reafirmando la Economia Circular en Argentina (an industry-based group in Argentina) and the International Council of Chemical Associations with the World Plastics Council make unreferenced statements that plastics are important, even vital, to achieving the Sustainable Development Goals, that plastics protect human health, improve medical outcomes and access to healthy foods. These claims are paired with explicit statements that there should be no imposed bans, limits or controls on plastic production in the future global agreement. Plastics may well offer important benefits in some applications, but it is critical that we challenge reductive statements and legacy assumptions, and demand that any proposed benefits to society, should be demonstrated through evidence. To this end, global health researchers should be prepared, not only to supply evidence of risk but to adjudicate claims of benefits made throughout negotiations.

The human right to a healthy environment has now been officially recognised by the United Nations, and newly established groups such as the High Ambition Coalition to End Plastic Pollution are centring human health in their strategic goals (figure 1). However, in the development of the global treaty, human health arguments are being used in both in the prosecution and the defence of plastic, precipitating an even more urgent role for health researchers and professionals as we move into official negotiations. We need to generate, synthesise and communicate evidence on complex pathways between plastics, waste reduction strategies and health, accounting for the vast inequities in health
impacts whereby the most vulnerable and least responsible for plastic waste and pollution, are likely to suffer the most.\textsuperscript{14} This is no small task and requires an overarching, inclusive, council for health that addresses the full life cycle of plastics, ensuring that this treaty will not shift the problem out of sight, to other sections of the life cycle, to other materials with unknown effects, to other countries or communities, or to other facets of health consequences. The global plastics treaty is a true test of the capacity and power of the global health research and practice community to reach across disciplines, collaborating and innovating evidence generation to ensure that the treaty protects both people and planet. So are we up to the challenge?

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