INC-5.2 presents a critical opportunity to protect the health of current and future generations

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Impact Statement.

Plastic pollution is a global health emergency. This article summarises some of the scientific evidence linking plastic pollution to human health harms, and demonstrates that plastics pose serious health risks across the full life cycle. The article recommends that the global plastics treaty applies the precautionary principle in order to minimise and prevent human health risks. The article also highlights the unequal burden of health harms from plastic pollution and reminds that a right to health is a fundamental human right. It argues that human health must be considered throughout the treaty and should be explicitly addressed in relevant treaty provisions. The article discusses opportunities to reduce plastic use in the healthcare setting, and outlines the important role of the healthcare sector in shaping and implementing an ambitious and effective treaty.

Introduction.

Plastic pollution is a global health crisis. A growing body of evidence demonstrates that plastics and plastic pollution pose serious risks to human health, with a wide range of adverse health impacts occurring across the full life cycle of plastics, from extraction and manufacturing, through to use and disposal (Landrigan et al., 2023).

At the conclusion of the United Nations Environment Assembly in March 2022, representatives from the Member States of the United Nations agreed on a mandate to create a first-of-its-kind international legally binding instrument to end plastic pollution. And so began the series of five Intergovernmental Negotiating Committee (INC) meetings to develop the instrument. The urgent need to protect human health from plastic pollution is evident in the current draft treaty text that will form the basis for negotiations at the upcoming meeting INC-5.2 (UNEP 2024). The Preamble of this draft text states: “Noting with concern that the high and rapidly increasing levels of plastic pollution, including in the marine environment, represent a serious environmental and **human health problem**, negatively impacting the environmental, social

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and economic dimensions of sustainable development", whilst the Objective states: "The objective of this Convention is to protect **human health** and the environment from plastic pollution, including in the marine environment [based on a comprehensive approach that address the full life cycle of plastics]" (all bolding author's own). The agreed treaty must therefore be fit for purpose to deliver on this objective.

In order to do so the treaty must address the human health impacts across the full plastics life cycle. This can be achieved through addressing these impacts in all relevant operative provisions of the treaty text and ensuring that implementation effectively supports and enables achievement of the instrument's objective.

Do no harm: the precautionary principle and known health impacts of plastics and plastic pollution.

The precautionary principle "enables decision-makers to adopt precautionary measures when scientific evidence about an environmental or human health hazard is uncertain and the stakes are high" (EU Parliament Think Tank 2015). The evidence that plastics harm human health is, in fact, clear. The treaty must be ground truthed in robust science and the precautionary principle.

Plastics and chemicals.

We have decades of evidence regarding the environmental and health impacts of chemical additives used in the production of plastics (UNEP 2023). Chemical additives leach from plastic products when we use and dispose of them, and they are present in our food, soil, air, and water (Hahladakis et al., 2018; Maddela et al. 2023),

Plastic additives with known toxic effects include bisphenols, phthalates, PFAS (per- and polyfluoroalkyl substances), and flame retardants, and these have been linked to health impacts including endocrine disruption, cancers, neurological disorders, infertility, and metabolic disorders (Maddela et al., 2023). Concerningly, we know nothing about the risks to human health of more than half of the 16,000+ plastic additives in use today (Wagner et al., 2024).

It is not only plastic additives that pose a chemical threat. We also know that plastic fragments, microplastics and nanoplastics can act as carriers for other environmental pollutants, adsorbing organic and inorganic compounds from the environment and carrying them into our bodies (Okoye et al., 2022).

Plastics and disease transmission.

The microbiology of plastics, and impacts thereof, is another cause for concern. This is a relatively new field of study, but research suggests that plastics can become breeding grounds for disease-causing microorganisms, increasing the risk of cholera; this risk is increased where plastic pollution blocks waterways and drains, worsening flooding and spreading waterborne pathogens (Ormsby et al. 2024). Furthermore, waste dumps create niches for other disease vectors such as protozoa, mosquitos and vermin and can aid the spread of vector-borne diseases such as dengue and malaria (Krystosik et al., 2020). There is also emerging evidence that the use of plastics in a hospital setting may increase the risk of microbial disease

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transmission; a recent study has identified a pathogenic *Pseudomonas* bacterial species that 'eats' medical plastic enabling them to persist in the hospital environment (Howard et al. 2025).

Microplastics and health.

Microplastics - fragments of plastic measuring less than 5mm in length - enter the body through inhalation, ingestion and dermal contact (Enyoh et al. 2020). Sources of environmental microplastics include synthetic textiles, vehicle tyres, plastic pellets, personal care products, dust, mechanical recycling facilities, incineration and waste burning, and the degradation of plastics in the environment (Osman et al. 2023; Brown et al. 2023; Suzuki et al 2024).

We still know very little about the impacts of microplastics on human health. What we do know is that humans are internalising microplastics. Microplastics have been detected in digestive, respiratory, cardiovascular, endocrine, lymphatic, reproductive and urinary tissues and organ systems; and also in breastmilk, semen, faeces, sputum and urine (Roslan et al. 2024). Worryingly, one study reported a rising prevalence of microplastics observed in post-mortem brain tissue from 1997 to 2024 (Nihart et al. 2025), in line with increased plastic production over the same period. Evidence of the health harms is beginning to emerge, and the presence of microplastics has been associated with inflammation (Gasper et al. 2023), cardiovascular events (Marfella et al. 2024), dementia (Nihart et al. 2025; Wang et al. 2024), and premature birth (Halfar et al. 2023) .

Plastics and air pollution.

Burning plastic presents serious risks to human health. As plastic combusts it releases a cocktail of hazardous air pollutants, including greenhouse gasses, volatile organic compounds, heavy metals and particulate matter. Globally, around 19% of managed plastic waste is incinerated (OECD 2022), and in low- and middle-income countries with limited waste management infrastructure, 40-65% of plastic waste is openly burned (Pathak et al. 2023). Exposure to air pollutants released by burning plastics can lead to respiratory and cardiovascular diseases, cancers, diabetes and neurological damage (Pathak et al. 2023).

We are all impacted by plastic pollution, but some are more impacted than others.

The health risks associated with plastics and plastic pollution are unequally distributed, with economically and politically marginalised populations often experiencing the greatest harms (UNEP, 2023; IPEN, 2021). The 1.1 billion people who reside in informal settlements and slums are among the world's most vulnerable to plastic pollution. An ambitious treaty must take a human rights based approach, mainstreaming a right to health as a fundamental human right throughout the treaty, as enshrined in the Universal Declaration of Human Rights (1948) and in line with the WHO Constitution (1948), a legally binding agreement for international health cooperation.

Plastics in the health sector

No-one (to the author's knowledge) is suggesting that all medical plastics should be banned; nor should there be a blanket exemption for medical plastics within the treaty (Street et al. 2024). However, we do need to ensure that medical plastics are safe and more sustainable.

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Exemptions need to be phased and prioritised so that safe and affordable medical plastics are available to all.

Recent years have seen a big rise in the use of disposable single-use medical plastics such as gloves, gowns, catheters, and syringes (Rizan et al. 2020) and reducing single-use plastics in medical settings is challenging, due to sterility and safety concerns. However, we need to recognise and support opportunities to boost innovation and take a more circular approach when designing and manufacturing safe medical products. 30-50% of healthcare waste is plastic, of which only 5% is recycled (Rizan et al. 2020).

To reduce plastics in healthcare, we need to differentiate between essential and non-essential single-use plastics, and switch to reusable alternatives where possible. Life cycle assessments of disposables vs reusables used in healthcare settings evidence the reduced environmental impact of reusables compared to single-use, and suggests that adopting reusable devices is more sustainable than continuing to use disposable items (Keil et al. 2023).

A major barrier to efficient waste disposal in healthcare is the improper disposal of non-hazardous materials as clinical waste. By clearly separating hazardous from non-hazardous medical waste, we can improve recycling rates, decrease reliance on incineration, and reduce waste management costs (Cho et al. 2024). Excessive packaging, often double or triple-wrapped, contributes substantially to plastic waste generated in healthcare settings. We need to eliminate unnecessary wrapping, redesign packaging to minimise waste, and use more sustainable materials where possible and safe.

Inclusion of the health sector in global treaty negotiations.

The World Health Organization (WHO) plays a critical leadership role in supporting an ambitious global treaty to protect human health, and has been present and engaging in the treaty negotiations since INC-1. In 2023, the 76th World Health Assembly adopted a resolution calling on the WHO to scale up efforts to address the impact of chemicals, waste, and pollution - including plastics - on human health, and in 2024 the WHO submitted a briefing note to INC-5 entitled “Ensuring the integration of health aspects within the international legally binding instrument on plastic pollution, including in the marine environment” (UNEP 2024).

To support treaty implementation the WHO can play a key role in developing evidence-based guidelines and policies on sustainable healthcare practices. These should include recommendations for procurement, the adoption of safe and effective reusable alternatives to single-use plastics, and segregation and disposal of medical waste and provide technical support and build capacity within health systems to implement these practices effectively. By leveraging global networks, the WHO can assess the state of the science with regard to the health impacts of plastics, and provide robust global health related data sets which can be used to monitor the effectiveness of treaty article implementation. The wider healthcare sector can support the generation of new scientific evidence relating to plastic pollution, and seek opportunities for reducing the use of plastics in healthcare settings, as well as lobbying and advocating for ambition within the treaty and the implementation thereof.

Priorities for an ambitious treaty to protect human health.

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There is clear and growing evidence that plastic poses serious risks to human health. Yet the approach to health protection in the future treaty still hangs in the balance. In order to operationalise the global plastics treaty objective to "protect human health and the environment from plastic pollution" the treaty must directly address human health impacts in the core obligations of the treaty. The current Chair's Text includes two options for doing so: Option 1 proposes strengthening and adding references to human health throughout the treaty; Option 2 proposes a standalone article on health. However, these options need not be binary; an ambitious treaty should include a dedicated article on health protection in Article 19, as well as considering complementary approaches in all relevant provisions of the treaty. In light of the range of impacts discussed above, there is an imperative to consider and address these impacts across a range of key provisions in the treaty text, including – without limitation - in relation to the most harmful plastic products and chemicals of concern in plastic products (Article 3), to ensure safer and more sustainable plastic product design (Article 5), address releases and leakages, including of microplastics and chemicals of concern (Article 7) and ensure environmentally sound waste management practice that also protect human health (Article 8).

Research into the human health impacts of plastic pollution continues apace. It is vital that the treaty includes mechanisms to update lists of chemicals of concern, and other health risks of plastics and microplastics, according to new scientific evidence. Clear criteria must be set with regard to the identification and classification of chemicals of concern, and problematic, unnecessary and avoidable plastics and plastic products. An ambitious treaty should take a precautionary approach, phase out the most harmful plastic products, problematic plastics and plastics containing harmful additives. We need transparency across the value chain. Given that toxic plastic pollutants respect no boundaries, we need globally harmonised rules.

It is likely that INC-5.2 will end with many details deferred to the first Conference of the Parties. It is essential that the treaty includes a process for strengthening of treaty mandates through future decisions at the Conference of the Parties. INC-5.2 is not the end, it is the beginning. There is still plenty of work to be done, and health professionals, scientists and the healthcare sector have a key role to play.

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