14 January 2025

Dear Top 20 Plastic Company,

RE: International legally binding instrument on plastic pollution

1 Introduction

1.1 On 2 December 2024, in Busan, the Fifth session of the Intergovernmental Negotiating Committee (Committee) to develop an internationally legally binding instrument on plastic pollution (INC-5) stalled and was adjourned. No date has been set for INC-5.2.

1.2 It was widely reported[i] that lobbyists sponsored by companies from the Fossil Fuel and Chemical Industry, like yourselves, maintained a disproportionate presence at INC-5, both disclosed and in stealth.

1.3 These brazenly partisan industry lobbyists comprised the largest delegation at INC-5. These powerful stakeholders leveraged their influence to stifle critical discussions, contributing to its collapse without meaningful progress. Indeed, representatives who attended inform me that was the case and that the primary objectives of the Committee are now in serious jeopardy.

1.4 As a businessman and philanthropist who has over many years devoted substantial personal resources to address the current plastics pollution crisis, this alarms me.

1.5 Your company has been comprehensively identified as a substantial contributor to single use plastic waste[ii]. This is so, without demur from your company. Minderoo Foundation has previously sent you a copy of the ***Plastic Waste Makers Index*** identifying your company as a major international producer of plastic. Those who have met me understand my passion for the ocean and my personal resolve to see the plastic pollution crisis end, whether that be through collaborative initiatives, legislation or legal action.

1.6 I am therefore also writing to reiterate the compelling evidence behind the damage to human health and the environment caused by plastic pollution and, to put you on notice, first of your legal accountability and secondly, your moral responsibility to take a meaningful leadership position on behalf of your industry. I implore you to take this evidence seriously and to act urgently to address these harms.

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2 Damage to Human Health and the Environment

2.1 There is a large body of consistent and irrefutable scientific evidence for multiple harms to human health across the lifecycle of plastic production, use and disposal – including from a single use. [Appendix – The impact of plastic on human health]

2.2 Over 4,200 of the chemicals used in plastic production are classified as '*Chemicals of concern*' and hazard information is lacking for over 10,000.[iii] There is a mounting body of evidence - of which your company is no doubt aware due to the growing volume of coverage in international news publications[iv] and the inclusion of health concerns in the Global Plastics Treaty discussions[v] - that comprises powerful attribution science linking the production, use and disposal of plastics to serious human health consequences and widespread environmental harms:

(i) Plastic releases harmful chemicals that are found in seminal fluid, follicular fluid, amniotic fluid, cord blood, meconium, blood, urine, breast milk, and tissues such as liver, brain, breast tissue and adipose tissue (Appendix p8)

(ii) During plastic use, health impacts from plastic chemicals occur across the whole human lifespan including our ability to reproduce from before conception (reduced sperm concentration) onwards (miscarriage, endometriosis, polycystic ovarian syndrome), during childhood (loss of IQ points, insulin resistance, hypertension and asthma) and in adults (type 2 diabetes, obesity, cardiovascular disease and cancer).[vi]

(iii) The recent successful PFAS (per- and polyfluoroalkyl substances) litigation against 3M and others is a wakeup call for all plastic producers to the dangers and the liabilities of using toxic chemicals in plastic.[vii]

(iv) In addition, plastic releases and micro- and nanoplastics into the air, water, soil, and food, resulting in ubiquitous exposure and associated harms[viii, ix], invoking the precautionary principle.[x]

- Micro- and nanoplastics have been reported in the human lung[xi] and gut[xii] as well as deeper inside the human body (Appendix p9).

(v) The risks do not end when plastics are discarded. Recycling and waste disposal processes expose workers and surrounding communities to toxic chemicals, dust, heavy metals, and plastic particles. Incinerating plastic waste releases highly dangerous toxins, such as mustard gas and dioxins.[xiii]

- The health consequences from these diverse exposures include endocrine disruption, adverse pregnancy outcomes (such as increased spontaneous pregnancy loss, still birth and premature birth), reproductive impacts, respiratory disease, neurological damage and behavioural problems (such as developmental delays, cognitive defects, and ADHD) in children as well as cardiovascular disease, and increased cancer risks in adults.[xiv]

3 **Stalled talks and further delay compounding liability**

3.1 While the negotiations have, for now, failed to secure the urgent global action needed, the impact on human health of reckless plastic production without regard to the chemicals that are wantonly leached into the environment is abundantly clear and continues to intensify.

3.2 As a leading producer in the plastics industry, your executive, your board, your shareholders and your insurers will recognise these accelerating legal risks. These developments are shaping public opinion, triggering regulatory action, and driving a wave of litigation with novel theories of liability which will inevitably reach individual board member responsibility.

3.3 Your position as a leader in the industry, with abundant expert insider knowledge is an advantage, but it is also a corporate vulnerability. I urge you to adopt a precautionary approach to chemicals in plastic production and foster meaningful contributions to the INC process.

3.4 Companies that fail to address the risks from their current production may face substantial legal and financial exposure.

4 **Conclusion**

4.1 I personally attended INC-4 in Ottawa and left those talks in the hope and expectation that meaningful progress to a comprehensive international plastics treaty was being made.

4.2 I urge your company to adopt safer, more sustainable alternatives and take proactive measures that will help protect human health, reduce legal exposure, and position your company as a leader in responsible manufacturing. Failure to address these issues may expose your company to significant litigation risk, potentially resulting in costly legal battles and reputational harm.

I warmly welcome the opportunity to discuss this matter with you further at the nearest opportunity, to discuss how we may work with your team to identify ways to reduce the health risks associated with plastic.

I look forward to your response to this letter and to hearing about your company's plans for addressing these critical issues.

With kind regards and deep respect,

Dr Andrew Forrest AO

Founder, Minderoo Foundation

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APPENDIX
The impact of plastic on human health

Key messages from the scientific evidence

Plastic has a toxic life cycle

- Emissions of gases, particulates and chemicals occurs during plastic production (fossil fuel extraction, refining, petrochemical and polymer production, product manufacture) and during recycling and disposal (controlled and uncontrolled landfill, e-waste and incineration)
- Plastic products release plastic chemicals and shed micro- and nanoplastics during everyday use
- Health impacts are multiple and occur at every stage of the plastic life cycle

Plastic is not safe

- Exposure to plastic chemicals is ubiquitous with toxic chemicals being found in human body fluids and tissues, even in the womb
- Harms occur across our life cycle starting from before conception and in the womb
- The evidence for harm to human health from plastic chemicals is irrefutable

Plastic impacts the most vulnerable

- Plastic harms us all but does so disproportionately, impacting the those who have no choice, in particular pregnant women and the unborn child, children, as well as adults
- Plastic also disproportionately impacts vulnerable populations living in sacrifice zones next to petrochemical plants, landfill and waste dumps

Plastic is not cheap

- Costs to human health from plastic production and just 3 high volume plastic chemicals outstrip subsidies to the polymer producers by at least a factor of 10
- In addition to being subsidised, industry is externalising costs with human health paying the price

As plastic production continues to soar, so will harms to human health

- Plastic production is increasing exponentially and is projected to triple by 2060
- Harm to human health and plastic pollution will mirror this trend

Sources of evidence

A large body of published evidence collectively documents harms to human health from plastic, including plastic-associated chemicals. The evidence consistently points to multiple harms that arise across the plastic life cycle of production, product use and both controlled and uncontrolled disposal.

In addition to peer-reviewed scientific evidence, publicly available information is available from:

- Intergovernmental agencies including UNEP,[1] OECD,[2,3] WHO,[4] UNICEF[5]
- Government organisations[6,7]structurally similar substances and replacement substances, as a consequence of migration from food contact materials (FCMs
- Human biomonitoring programs[8,9]
- NGOs such as Pew Trusts[10,11] and CIEL[12]
- Foundations such as the Food Packaging Forum[13]
- Philanthropies such as Bloomberg Philanthropies[14] and Minderoo Foundation-funded peer-reviewed scientific research[15–18]electronics, aerospace, construction, food packaging, and sports. It is now clear, however, that plastics are also responsible for significant harms to human health, the economy, and the earth's environment. These harms occur at every stage of the plastic life cycle, from extraction of the coal, oil, and gas that are its main feedstocks through to ultimate disposal into the environment. The extent of these harms not been systematically assessed, their magnitude not fully quantified, and their economic costs not comprehensively counted.
- Publicly funded human research cohorts[19–21]
- Peak scientific bodies[22–26]

i. Human health impacts during plastic production, recycling and waste disposal

Production

Global impacts of plastic production and upstream industrial emissions

Almost all (99%) feedstock for the monomers and additive chemicals in plastic are made from fossil fuel.[12,27] Currently almost 90% of the required energy comes from greenhouse gas emitting fossil fuel combustion.[28] Estimates of greenhouse gas emissions attributable to plastic production were ~7% of global emissions in 2020.[29] While the production phase of plastic is the main source of greenhouse gas emissions, end-of-life phase emissions must be included, accounting for nearly 10% of the total.[30]global plastics production has quadrupled1. If this trend were to continue, the GHG emissions from plastics would reach 15% of the global carbon budget by 20502. Strategies to mitigate the life-cycle GHG emissions of plastics, however, have not been evaluated on a global scale. Here, we compile a dataset covering ten conventional and five bio-based plastics and their life-cycle GHG emissions under various mitigation strategies. Our results show that the global life-cycle GHG emissions of conventional plastics were 1.7 Gt of CO2-equivalent (CO2e Indeed, today's enormous and ever-increasing production and use of virgin plastics (504 Mt in 2022) applies direct pressure on the climate planetary boundary, which is already exceeded, along with impacts on all planetary boundaries including biodiversity loss and man-made chemicals and materials.[31]

Local human health impacts from plastic production

The hazards and health impacts of producing plastic are extensive, with workers and vulnerable "fenceline" communities living locally, i.e. closest to facilities, also known as sacrifice zones, suffering the most.[32]

Fossil fuel extraction – particulate matter

Extraction of coal, oil and produces extensive airborne particulate matter (PM) pollution, which arises from mining, drilling, transport, wells and flaring.[33] Exposure to PM contributes to disease and premature death in workers and nearby fenceline communities. Fine PM can penetrate deep into the lungs, in adults increasing risk for cardiovascular disease, stroke, chronic obstructive pulmonary disease, lung cancer and diabetes,[34] as well as dementia,[35]especially airborne particles, is a risk factor for type 2 diabetes mellitus (T2DM and in infants and children increasing risk for premature birth and low birth weight (which themselves are risk factors for chronic diseases in adult life), stillbirth,[36] impaired lung development and asthma,[37] as well as IQ loss, memory deficits, behavioural dysfunction, reductions in brain volume, and increased risks of attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder.[38] Coal dust inhalation results in further specific health impacts in miners, including pneumoconiosis, silicosis and emphysema[39–41]coal contributes a great deal to the world economy. Coal mining and processing involve multiple dust generation processes including coal cutting, transport, crushing and milling etc. Coal dust is one of the main sources of health hazard for the coal workers. Exposure of coal dusts can be prevented through administrative controls and engineering controls. Ineffective control of coal dust exposure can harm coal workers' health. Although many efforts have been made to eliminate these threats, recent years have seen an unexpected increase in coal workers' pneumoconiosis (CWP and in increasing respiratory infections for exposed nearby communities.[41]

Fossil fuel extraction – ozone

Ground-level ozone is formed in the air surrounding gas and oil extraction sites,[42,43] and as a respiratory irritant that is especially dangerous for children and the elderly, exposure can lead to asthma and chronic obstructive pulmonary disease.[44]

Fossil fuel extraction – other emissions

Conventional coal, oil and gas extraction, and unconventional gas extraction, i.e. fracking, also expose fenceline communities and workers to multiple other emissions[33,41,45–47] including gases (e.g. methane, carbon monoxide, sulphur dioxide), heavy metals such as mercury, solvents (benzene, xylene, toluene) and other volatile organic compounds (VOCs).[15] A range of health impacts are linked to these exposures, for example VOCs can cause damage to the liver, kidneys and central nervous system,[48] some increased risk of neuropathy and asthma[49–51] and others are known carcinogens, such as benzene, 1,3 butadiene and formaldehyde, causing leukemia and lymphoma in adults and children.[52]

Fossil fuel extraction – fracking

Fracking is a particularly chemically intensive process, involving chemicals that are harmful to both reproduction and development[53] and releasing particulates and toxic chemicals that risk assessments show have the potential to cause many health impacts including respiratory disease, cardiovascular disease, cancer, as well as kidney, liver and neurological damage.[54,55] Epidemiological studies conducted among those born or living near fracking sites have found health impacts in infants, including preterm birth and reduced birth weight,[56] elevated rates of childhood cancer, especially leukemia, and congenital heart defects.[57,58]

Petrochemical refining, ethane cracking and plastic production

Once fossil fuel is extracted, industrial processes along the value chain of converting fossil fuels into plastic exposes workers and fence-line communities to multiple air pollutants and toxic chemicals such as monomers (e.g. vinyl chloride, styrene), benzene, formaldehyde, toluene, 1,3-butadiene, styrene, and other chemicals used to make plastic (e.g. phthalates and bisphenols) that are released into air, water and soil.[15,59] Exposure to the carcinogens benzene and 1,3-butadiene cause leukaemias and lymphomas, increase the risk of lung and breast cancer,[60,61] anaemia and immunosuppression, irregular menses, pre-term birth and low birth weight, asthma and respiratory problems,[62] hypertension, which is a precursor for cardiovascular disease, and kidney disease.[63]

Catastrophic events

As well as exposure occurring during day-to-day plastic production, there are also extreme exposures that occur during catastrophic failures of the plastic production process, such as fires and explosions,[64,65] oil spills,[66] and chemical spills.[67]

Recycling and waste disposal

Human health impacts from recycling and waste disposal

End-of-life waste management and mismanagement include both formal and informal recycling, landfill and waste dumps as well as controlled and uncontrolled burning and leakage to the environment[2] and threatens the lives of 2bn people worldwide with 11m waste pickers lacking safe workplaces and protective equipment.[68]

Recycling

Life cycle assessment modelling suggests that, in the food packaging sector at least, recycling provides health benefits compared to landfill and/incineration and virgin plastic in terms of climate change, ozone depletion, particulate matter and mortality and morbidity due to cancer and toxicity.[69]syntheses of which could inform policy. This systematic review assessed LCA evidence for health effects of increased plastic recycling and reuse in the food sector. Scientific databases including Web of Science, Scopus, MEDLINE, Embase, Global Health, GreenFile and grey literature websites were searched for peer-reviewed LCA of consumer-level food sector plastics that compared virgin or single-use plastics with scenarios of increased recycling and reuse. Data on Human Health impacts and related midpoint impacts were extracted, converted to Disability-Adjusted Life Years (DALYs However, from a global and overall plastic recycling perspective, health impacts are observed including physical injury and exposure to toxic chemicals and solvents which are more likely in the Global South due to a lack of formal infrastructure.[70] From a chemical perspective, chemical content and complexity is a major impediment to recycling (see Section 2, p33 in Landrigan et al., 2023).[15] Compared to virgin plastic, recycled plastics in a wide range of products including toys, tyres, food contact and construction materials pose higher risks to consumers as they contain increased numbers, as well as higher concentrations of, hazardous chemicals.[71,72] As another example, black plastic products made from recycled e-waste contain high concentrations of flame retardants including legacy flame retardants.[73] Just as virgin plastic contains toxic chemicals, so do recycled plastics which results in poisoning the circular economy.[23]

Landfill

Landfills result in gas emissions and water contamination including by solvents (benzene, toluene, ethylbenzene and xylene) and naphthalene.[74] Proximity to landfill increases cancer risk.[75]

e-Waste

Because of its chemical complexity and wide range of toxic chemicals, electronic waste (e-waste) in dumps results in exposure to a wide range of hazardous chemicals including flame retardants, plasticisers, bisphenols, dioxins, heavy metals and particulate matter.[76]also known as E-Waste Pregnant women and children are severely affected including stillbirth, preterm birth lower birth weight, reduced cognition, loss of IQ points, ADHD and behavioural problems.[77] Further impacts are decreased immune function and changed thyroid function as well as compromised lung function, respiratory symptoms and asthma. Chronic disease appearing later in life are also common and include cancer, cardiovascular disease, obesity and osteoporosis.[77]

Incineration

Uncontrolled burning of plastic waste is also a major issue and produces particulate matter and a wide range of hazardous chemicals including heavy metals, volatile organic compounds, toxic gases and mustard gas and dioxins.[78] Health impacts include endocrine disruption, reproductive and developmental disorders, changed thyroid function increased risk of cognitive defects, respiratory, cutaneous symptoms and cancer, reviewed in Section 2, p35 of Landrigan et al., 2023.[15]

II. Human health impacts from everyday use of plastic products

Plastic releases harmful chemicals

Plastic is a complex chemical mixture comprising of monomers, many of which are highly hazardous, that are polymerised to form polymer backbone with products often containing multiple polymer types.[79] A wide range chemicals ('plastic additives') such as plasticisers, flame retardants, uv light and heat stabilisers are added during production to impart functionality.[80–82] Of the documented ~16,000 chemicals used to make plastic, 4,200 are chemicals of concern of which ~3,600 are not regulated globally and, in addition, hazard information is lacking for over 10,000.[82] In addition, other 'non-intentionally added substances' (NIAS) are found in plastic. These include impurities, contaminants from machinery as well as degradation and transformation products of the original constituent chemicals. Impacts are also seen from the polymers themselves in terms of the constituent chemicals, human exposure and health impacts.[83]

Plastic additives, which are not chemically bonded to the polymer back-bone, as well as unreacted monomers and NIAS leach out of plastic products[84] such as drink[85] and food[86] containers as well as baby food pouches.[87]

Plastic chemicals are ubiquitous in the human body

Plastic chemicals, amongst others, are found in seminal fluid,[88] follicular fluid,[89] amniotic fluid,[90] cord blood,[91] meconium,[92] children's and adult's blood and urine,[17] breast milk,[93] hair[94] and in solid tissues such as liver, brain, breast tissue and adipose tissue.[95,96]

Impacts of plastic chemicals on human health

Quantitative analysis encompassing ~1,000 meta-analyses of ~1.5m men, women and children shows consistent and statistically significant (95%) evidence for harm to human health from just 5 classes of chemicals widely use in plastic, namely the monomer Bisphenol-A, phthalate plasticisers, polychlorinated biphenyl flame retardants and their polybrominated diphenyl ether replacements as well as some perfluoroalkyl and polyfluoroalkyl substances PFAS.[17]

Health impacts include our ability to reproduce with reduced sperm counts and sperm DNA damage in men, as well as endometriosis and polycystic ovarian syndrome in women. At birth, harm includes miscarriage and reduced birthweight which impacts on children's ability to thrive. In children, harm includes loss of IQ points, asthma, obesity, insulin resistance (leading to type 2 diabetes) and high blood pressure (leading to cardiovascular disease), and in adults harm includes type II diabetes, obesity, cardiovascular disease and cancer, to name a few.[17] In addition, recent hybrid epidemiological studies have identified causal evidence that BPA exposure during pregnancy acts through genetic and testosterone metabolic pathways increasing the risk of autism in boys by over 3-fold at age 2 and over 6-fold at age 9.[18]

Furthermore, of a subset of approximately 1500 chemicals commonly used in plastic, comprising bisphenols, plasticisers, flame retardants, some PFAS and polymers, less than 25% have been studied in humans.[16] Equally concerningly, chemicals identified as being harmful to human health are being replaced by others that are also harmful. These include bisphenol A (BPA) being replaced with its analogues such as BPS and BPF[97]; flame retardant polychlorinated biphenyls (PCBs) being replaced with polybrominated diphenyl ethers (PBDEs)[17] and then organophosphorus flame retardants.[98]

Another concern is that the majority of epidemiological studies evaluate health impacts associated with only one plastic chemical as a time (e.g. BPA) or class of chemicals (e.g. phthalate plasticisers). However, in reality, humans including maternal-newborns pairs[99]a critical period of development for future health risks. We applied liquid chromatography–quadrupole time-of-flight tandem mass spectrometry (LC-QTOF/MS are exposed to chemicals mixtures which often act through similar biological pathways such as endocrine disruption.[100] As yet, it is unknown whether chemical mixture interactions are additive, antagonistic or synergistic.

Plastic releases chemically-laden micro- and nanoplastics

Plastic sheds small particles (micro-and nanoplastics) with evidence for extensive environmental contamination.[101] Multiple sources include use of everyday products such as water bottles, teabags, food packaging,[102] synthetic textiles and recycling[103,104] as well as landfill and informal dumpsites.[83,105,106] In addition to their impacts arising from physical properties, such as size, shape, charge etc, reviewed in Section 4, p91, of Landrigan et al., 2023,[15] micro-and nanoplastics also leach chemicals[107] as well as acting as carriers of contaminants including heavy metals and pesticides.[108] Chemically-laden microplastics are found in the air, water, soil, household dust, food and drink acting as sources of human exposure.[4,109]

Micro- and nanoplastic particles enter the human body

In parallel with various emerging measurement techniques that include polymer identification, micro-and nanoplastics are increasingly being reported in human tissue. Reflecting inhalation and ingestion as major exposure routes, microplastics have been reported in lung and gut.[110–112]but most of the plastic waste is deposited in landfills and in the natural environment. Their degradation into submillimetre fragments, called microplastics, is a growing concern due to potential adverse effects on the environment and human health. Microplastics are present in the air and may be inhaled by humans, but whether they have deleterious effects on the respiratory system remain unknown. In this study, we determined the presence of microplastics in human lung tissues obtained at autopsies. Polymeric particles (n = 33 In addition, reports indicate microplastics deeper inside the human body including placenta, breast milk, blood and other organs.[101,113–116] These initial reports require verification as measurement techniques are refined. Evidence of human health impacts from micro-and nanoplastics is beginning to emerge. Synthetic textile workers occupationally exposed to high levels of microplastics suffer a wide range of lung diseases including shortness of breath, cough, respiratory failure as well as lung and large bowel cancer.[117] Faecal microplastic load is reported to correlate with the severity of inflammatory bowel disease[118] and liver cirrhosis[119] although reverse causality may have occurred. Patients with microplastics reported in carotid arterial plaques had a higher risk of myocardial infarction, stroke or death from any cause compared to those in whom microplastics were not detected.[120]
Although measurement techniques have several limitations, an increasing body of in vitro and animal laboratory studies indicate a wide range of harmful impacts including inflammation and oxidative stress.[121]

Although evidence for toxicity in humans is lacking, a precautionary regulatory approach is absolutely critical.[101]

III. Human health costs outstrip subsidies to the polymer producers

Human health costs

Global health costs from upstream emissions totalled ~US$592 bn in 2015.[15] Moreover, costs totalled ~US$675 bn in the US alone for just three chemicals. These are: diethyl hexyl ortho-phthalate (DEHP) plasticiser for all-cause mortality, PBDEs flame retardants for IQ point loss in children and BPA for heart-attack and stroke.[15] A recent study for the same chemicals but for one third of the word population (38 countries) put these estimates even higher at ~US$1.5 trillion.[122] Another study on the same chemical classes estimated that disease and associated costs were equivalent to 1.22% of the US gross domestic product.[123] Additionally, estimated health costs of PFAS exposure in the US was ~US$ 22 bn in 2018.[123]

Health costs for these plastic-associated chemicals are underestimates since they are based on a single country (US), cover a fraction of the chemicals known to be used in plastic, and are limited to only those health outcomes that have been examined to date. In addition, the reality is that we are exposed to chemical cocktails at any one time.[99]a critical period of development for future health risks. We applied liquid chromatography–quadrupole time-of-flight tandem mass spectrometry (LC-QTOF/MS but the effects of simultaneous exposure, and whether they are synergistic on human health outcomes, have not yet been examined.

Polymer production is subsidised

Subsidies are provided nationally for fossil fuel feedstock, energy and polymerisation and global estimates are US$43 bn in 2024 rising to US$78 bn by 2050.[124] Saudi Arabia accounted for the majority at US$38 bn in 2024 and US$64 bn in 2050. Modelling suggests that removing subsidies for plastic production would increase consumer prices only minimally (bottled water: 0.75%; bottled soft drink: 0.17%; clothing: 0.16%; flooring 1.53%; agriculture 3.16%).[124]

Human health costs due to exposure to these plastic-associated chemicals completely outstrip the total subsidies provided to industry for polymer production globally. The imbalance between the costs of subsidies and the costs to human health costs is a false economy. Not only is harming human health subsidised, but also, health costs are externalised by industry with consumers and civil society paying the price.

IV. Plastic production is increasing exponentially and, with it, so will harms to human health

Annual plastic production is estimated to be approximately ~500 bn Mt with predictions of a tripling by 2060 based on current trends and driven by both increased plastic production and growth in demand.[2,3]

As plastic production continues to soar, so does plastic pollution with a clear and strong log-log linear relationship between the two; i.e. production = pollution.[125,126]

As both production and pollution increase, so will human exposure and therefore health impacts. This includes increases in the known health impacts from known plastic-associated chemicals[17] as well as newly identified health impacts linked to these known chemicals including increased inflammation[127] as well as dampened immune responses.[128] Furthermore, there are the potential harms from numerous other chemicals of concern[82] that have yet to be examined in humans.

In addition, we are facing the very real threat of significant health impacts from chemically-laden micro- and nanoplastics as both legacy plastic pollution, and ever-mounting, new plastic debris breaks up in the environment and finds its way into us and our children.[5]

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