

IFMSA Policy Document Plastics in Healthcare: Impact and Implications

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MSAI India



DENEM Brazil



Sign and stamp of President of National Member Organization 2

Policy Commission

- Soham Aggarwal, MSAI India, msai-india@ifmsa.org
- Gabriel Esteves, DENEM Brazil, <u>denem-brazil@ifmsa.org</u>
- Salman Khan, IFMSA Liaison Officer for Public Health Issues, lph@ifmsa.org

Policy Contributors

- Rhea Rajkumar, MSAI India
- Saneeka Vaidya, MSAI India
- Pedro Henrique Alves de Freitas Martins, DENEM Brazil

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Policy Statement

Introduction

Plastics stand as a modern marvel, providing immense societal benefits across various sectors, notably in healthcare, where they have contributed to saving numerous lives. However, the escalating crisis of plastic pollution is becoming increasingly apparent. The global concern about the potential effects of plastics on health has risen due to the risks and harms associated with plastics throughout their lifecycle. Adverse effects on human health include endocrine abnormalities, cardiovascular diseases, reduced fertility, damaged nervous system and cancers. Despite existing gaps in scientific knowledge regarding the health impacts of various types of plastics, chemicals, and additives, there is a growing public awareness and unanimous agreement among stakeholders that plastics should not be present in the environment. It is widely acknowledged that steps should be taken to reduce exposure to microplastics and harmful chemicals released during the manufacturing, use, and disposal of plastics. Given the UN Environmental Assembly's adoption of a historic resolution on the 2nd of March 2022 [1] to develop a global plastics treaty by the end of 2024, the current emphasis on discussions regarding the impact of plastics on health requires our utmost attention. This treaty should address all facets of plastic pollution, with a particular focus on its implications for healthcare.

IFMSA Position

As medical students and future healthcare providers, we recognize the massive impact of plastics on health, amongst various other aspects and contributions of the healthcare industry in alleviating plastic pollution. As medical students, we play a crucial role as key stakeholders in this issue. We must actively engage in conversations and, through our advocacy efforts, contribute to the comprehensive development of the UN plastics treaty and its implementation.

Call to Action

Therefore, the IFMSA calls on:

Relevant UN Agencies including UNEP WHO, etc to:

- Actively engage in the implementation of the UN plastics treaty, after its adoption.
- Encourage member states to commit to and abide by the provisions of the plastics treaty
- Advocate for increased collaboration and coordination among UN agencies, governments, industries, and civil society to address plastic pollution comprehensively.
- Advocate for transparency and accountability in reporting plastic use and pollution.
- Establish mechanisms to hold governments and industries accountable for meeting agreed-upon targets and commitments.

National Governments to:

- Develop and enforce comprehensive legislation that reduces and regulates the production, use, and disposal of plastics.
- Implement robust measures against single-use plastics and encourage the use of sustainable alternatives.and allocate resources for the development and improvement of waste management infrastructure, including recycling facilities.
- Ensure efficient collection, sorting, and recycling processes to reduce plastic leakage into the environment.
- Work with relevant stakeholders to raise awareness amongst the general public about recycling plastics, the impact of plastic overuse to the environment and health and the benefits from reusing plastics

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Non-Governmental Organisations to:

- Ensure meaningful engagement of individuals from all backgrounds and levels of knowledge in the fight against plastic.
- Organising campaigns, both in-person and virtual, aimed at raising awareness among the population about the harmful and hazardous aspects of current plastic production and advocate for reduction in use of plastics
- Being present through advocacy efforts including but not limited to non-violent protests and collective actions with other stakeholders, during and after the approval of the plastic treaty at the United Nations, to ensure its implementation and approval.

Hospitals and the Healthcare industry to:

- Reduce the dependence on plastic in healthcare products, especially those for single-use.
- Ensure the implementation of effective disposal and recycling measures for plastic waste generated by hospital use.
- Establish goals within the healthcare service to gradually reduce plastic usage.
- Raise awareness among healthcare professionals about their role as key stakeholders in the plastic issue and the need to combat it.
- Acknowledge the complexity of the health-disease process and understand how the use of plastic is associated with health, particularly in developing countries.

Manufacturing industries and commercial setups to:

- Implement the regulations established by the United Nations during the Plastic Treaty and the national governments.
- Recognize the necessity of reducing plastic use in packaging and shipping processes.
- Collaborate with inspections during production stages related to the use of plastic.

Healthcare Students Organisations (Including IFMSA National Member Organisations, Medical Students and Student-led organisations) to:

- Take initiatives to organise local and national activities to create awareness about recycling plastics, the impact of plastic on the environment and health and the benefits of reusing plastics
- Advocate for sustainable practices within healthcare institutions, emphasising the reduction of single-use plastics in medical settings.
- Engage in policy advocacy to influence institutional and governmental policies related to plastic use and waste management in healthcare.
- Take up advocacy initiatives to amplify this issue by giving a youth perspective.
- Advocate for the integration of environmental health and sustainability topics into healthcare professionals' curricula.
- Ensure that future healthcare professionals are educated about the health implications of plastic pollution and are equipped with sustainable practices.

General Public to:

- Engage in individual actions related to reducing plastic consumption.
- Utilise available recycling mechanisms in their community.
- Organise collectively to exert pressure on local, national and international organisations for a sharp reduction in plastic usage.
- Empower themselves about the harms caused by plastic and its role in climate change.

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Position Paper

Background information

Plastics have a history of innovation, notably in supporting various sectors such as healthcare ,food preservation, packaging, building and manufacturing, electronics, aerospace and more. Since the commencement of industrial plastic production in the 1950s, the sheer volumes of plastics manufactured have surpassed those of nearly any other material. However, the very characteristics that make plastics highly desirable also contribute to their ubiquitous presence in the environment, particularly as a significant portion of plastics is designed for immediate disposal after use. The ability of society to handle the immense volumes of produced and discarded plastic is greatly surpassed, as only 9% of all manufactured plastic undergoes recycling.[2] The predominant portion of plastic waste finds its way into landfills, eventually permeating the environment

Over the years we have witnessed plastic transforming various sectors.But no sector has been as significantly enhanced as the Healthcare industry. This is based on the fact that as the healthcare industry made successful advancements, plastic was found to be the preferred material of choice to manufacture critical medical components. From something as small as plastic syringes, and gloves to prosthetics, heart valves and other complex life-saving equipment, the use of plastics in healthcare is far-reaching. The qualities of plastic that make it of immense importance in healthcare include enhanced sterility and hygiene, affordability and cost-effectiveness, flexibility and comfort and scope for innovation.

Most plastics exhibit a resistance to degradation, breaking down into smaller particles known as microplastics and likely nanoplastics. These particles, whether in larger or smaller forms, have profound and adverse consequences for ecosystems, wildlife, the environment, the economy, and human health. Smaller plastic particles, being hydrophobic and possessing high surface area-to-volume ratios, can adsorb contaminants and serve as sources or sinks of contamination in organisms. Moreover, plasticizers, chemicals used to enhance plastic characteristics, can leach into the environment, creating new routes of exposure for organisms and contributing to potential bioaccumulation. [4]

The economic impact of plastic waste is substantial, with studies indicating global damage to marine ecosystems exceeding €11 billion.[5] According to the reports released by the United Nations Environment Assembly in 2014, estimates of the overall financial damage that plastics cause to marine ecosystems is approximately US\$13 billion each year.[6] According to 2019 research, marine plastic pollution costed more than US\$ 2.2 trillion annually in just five years. It is a sign of an intrinsically wasteful linear plastic economy.Gross domestic product (GDP) losses resulting from marine plastic pollution have been calculated to be as high as US\$7 billion for 2018. More than US \$32 billion is spent yearly on the collection, sorting, disposal, and recycling of the vast amounts of plastic trash produced. [7] Clean-up efforts to get rid of the debris come at a great expense as well to the governments, NGOs, and concerned citizens at up to \$15 billion annually. [8]

The impact of plastics on healthcare, the environment, the economy and various other sectors highlights the growing need for the international determination to reassess and scrutinise the entire life cycle of plastics, including its design, manufacturing, use, reuse, and end-of-life management. Regulatory policies and tools exist to control and manage plastic use, particularly focusing on single-use plastics, through penalties and voluntary efforts adhering to the 3R principle—reduce, reuse, and recycle. However, these measures have had limited impact, as evidenced by the consistent annual increase in plastic production and use, along with the development of new materials and applications.[5]

Discussion

This section is dedicated to a comprehensive discussion of the diverse ways in which plastic has influenced healthcare and underscores the urgency of prompt action.

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1. Plastics and environment

The plastic marks the contemporary age, being ubiquitously disseminated throughout every corner of the ecosystem. Its invasion is so pervasive that it can currently be used as a biological marker to define the Anthropocene Era. [9] It is noteworthy that to comprehend the impact of plastic on the environment, one must not only observe its immediate effects but also its global commitment and involvement in the majority of currently operating industries. A comprehensive analysis of this issue initially focuses on the damage caused by plastic production. Currently, 3.7% of greenhouse gases are attributed to this production. Associated with that, the plastic life cycle, from production to disposal, is estimated to contribute to 7% of global CO2 equivalent emissions. [10]

Another significant problem when considering this material is its non-degradable condition, meaning that the monomers that compose a large part of plastics cannot be adequately modified by microorganisms and existing environmental conditions. Plastics have been discovered in the stomach contents of various organisms, ranging from earthworms and birds to turtles, dolphins, and whales. [11] Smaller particles may be even more pervasive, potentially entering organisms at the foundation of different food webs. An example is the recently identified species *Eurythenes plasticus*, an amphipod found at a depth of 6,900 metres, named after the plastic contaminating its gut—illustrating how we unwittingly contaminated even the most remote environments.

This fact, coupled with the recycling of only 7% of produced plastic and the incineration of 9%, leads to this product's accumulation and improper disposal. Currently, plastic accounts for approximately 10% of household waste, with the majority being disposed of in landfills. However, it is noted that 60% of the waste found on beaches and in oceans is plastic. Within water reserves and under environmental influence, plastic, and especially its additives, can undergo decomposition, releasing harmful substances such as chromium, cobalt, copper, and lead. [12] This problem is exacerbated by atmospheric pollutants released through the incineration of plastic, which can bioaccumulate in the food chain or contribute to global warming.

The plastic problem is multifactorial, with its pollution cycle highly related to its consumption cycle and primarily to its abusive use by various industries. Plastic's affordability and ease of reproduction are fundamental attributes that make it the preferred raw material for adoption by global corporations. To comprehend the current state of plastic-induced destruction, it is crucial to explore the commercial benefits it offers compared to other biodegradable alternatives. Despite the increased sustainability of these alternatives, they raise the production cost of the final product. This intersection of the environmental issue with economic conditions highlights the tendency of cooperatives to prioritise immediate interests over the long-term well-being of the planet. Understanding this dynamic is essential in unravelling the complexities surrounding the environmental challenges posed by plastic.

2. Plastics and health

At every point of their life cycle, plastics have far-reaching effects and pose an increasing threat to world health.[13] Plastic waste generation is predicted to triple by 2040, and its detrimental effects extend beyond environmental contamination to directly affect human health. Single-use plastics, which account for a significant portion of plastic manufacture, are contributing significantly to climate change and are rising exponentially. The global health crisis is made worse by the persistence of plastics in the environment and their capacity to accumulate in living things. [14]

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A large amount of plastic waste finds its ultimate repository in the oceans, where it causes widespread pollution that harms marine life and makes its way into human diets through food chain species. Microplastics have been found in the bodies of various species, including fish, birds, and sea turtles. They have even been found in the placenta and bloodstream of humans. [15]

Recent research has revealed concerning evidence of microplastics deep into human lungs, raising concerns about potential health effects. Research studies highlight the harmful impacts of plastics on human health and highlight how urgent it is to address this growing problem. [16] Particularly in occupational environments, plastic fibre exposure has been linked to lung problems and decreased function, which may be the result of inflammatory damage. Furthermore, the harmful substances included in plastics pose a global health risk, with known consequences including cancer and hormone disruption, which can impede growth, reproduction, and cognitive function. Plastic production workers are more likely to have health issues such as cancer and cardiovascular disease, which adds to the estimated \$250 billion in economic costs associated with plastic manufacture worldwide in 2015. [17]

Besides direct manufacturing, populations living close to plastic production and waste disposal sites are also impacted by the health consequences connected with plastic. The "fenceline" communities are more vulnerable to respiratory problems, cardiovascular disease, childhood leukaemia, and premature births. The financial toll that plastics have on human health is enormous, including the annual costs of greenhouse gas emissions, which amounted to \$341 billion in 2015. [18]

Plastic also contributes significantly to water pollution, both from improper primary disposal and home sewage. It is this kind of pollution that makes bacterial, viral, and parasite infections more likely to spread. [19] Simultaneously, as we understand plastic as a driving force in climate change, we must observe the resulting impacts on public health. Human life will be drastically changed by climate change in every way, from the need to modify infrastructure to the availability of resources, food, and clean water. Notably, populations in underdeveloped countries—which are already the most susceptible and impacted by the existing plastic pollution—are disproportionately affected by these changes. As defined by the World Health Organization (WHO), health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. Thus, when considering the direct effects of climate change and plastic use on all aspects of human life, we can contemplate the devastating presence of the uncontrolled use of this product in our society. [20,21]

3. Plastics and tobacco

Post-consumer waste from tobacco products, encompassing both packaging and cigarette butts, stands out as one of the most pervasive forms of litter globally. Recognized as non-biodegradable plastic waste, cigarette butts include heavy metals, chemicals, and tobacco residue that are harmful to aquatic and plant life. The environmental damage is further exacerbated by the breakdown of plastics in cigarette butts and packaging into microplastics, as animals and marine life can consume these particles.

The designation of cigarette butts as "single-use plastics" (SUPs) highlights the need for immediate regulatory actions, including restrictions and bans. Governments need to make tobacco control a priority because it is known that smoking results in eight million deaths and more than USD 1.4 trillion in economic losses per year. addressing the effects of tobacco

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production, waste, and agriculture on the environment. Additionally, evidence highlights that plastic pollution caused by cigarette butts is likely to contribute to an estimated USD 26 billion per year (or USD 186 billion in 10 years taking into account adjustments related to inflation), in waste management and marine ecosystem damage globally. Addressing the environmental consequences of tobacco agriculture, manufacturing, and disposal is integral to this effort. The health care costs due to smoking is substantial, and policymakers should acknowledge the direct and secondary environmental costs.[22,23] Additionally, the rapid expansion of the e-cigarettes and vapid pods production, distribution, usage, and disposal worldwide can be considered a potential environment threat, including the context of plastic pollution. However, there are limited scientific studies on the same, hence, a comprehensive assessment of the environmental burden of e-cigarettes is desperately needed. [24]

4. Plastic Waste in Healthcare

Modern medicine has witnessed a transformative reliance on plastics, contributing significantly to medical practices. A thorough evaluation of plastic consumption in healthcare should take into account a wide range of products, from disposable gloves, IV bags, and protective clothes to essential medical equipment and non-medical products including trash bags, food containers, and cleaning supplies. Plastics make up a startling 70% of sanitary trash and 34% of general waste, according to recent data from European hospitals, highlighting the extent of plastic pollution in the healthcare industry. This problem has been made worse by the COVID-19 pandemic, which has caused a 350-370% increase in waste made of plastic. A single day's care for Wuhan's residents produces 200 tons of medical waste. between 2005 and 2020, there will be a more than twofold increase in the global demand for plastic medical disposables, which include medical gadgets and personal protective equipment. Before the pandemic, the National Health Service's (NHS) waste output in the United Kingdom was made up of 23% plastic medical waste. However, the demand for single-use items surged due to the epidemic, exposing the weakness of healthcare systems that depend on disposables. Environmental problems are exacerbated by the combustion of medical waste that is frequently caused by current regulations and unclear recycling policies. The enormous amount of plastic trash produced by the healthcare industry not only endangers the environment but also goes against the fundamental idea of "primum non nocere" (first, do no harm). With the looming threat of climate change predicted to cause 250,000 additional deaths annually by 2030, healthcare professionals must reassess their use of planet-harming technologies and products. The healthcare sector must take a more comprehensive approach, taking into account the possibility of reuse and the consequences of decisions on product usage, all the while understanding the importance of patient health. [25-28]

5. Plastic and pharmaceutical companies

At the same time that we observe the use of plastic in the healthcare sector, it is crucial to note the impact of its utilisation by pharmaceutical industries on their production processes. To assess plastic use in this context, we must consider the differences between this industry and others, especially concerning the preservation of medications in packaging against environmental conditions and the regulations and biosafety steps necessary for drug production. These safety measures and actions are crucial to the manufacturing process and must not be disregarded or undervalued. Nonetheless, it is clear how design modifications might be made to reduce this industry's negative environmental effects.

Presently, the pharmaceutical sector accounts for 8% of the United States' yearly CO2 emissions and contributes globally to the disposal of 300 million tons of plastic annually, with 50% of this

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being single-use.[29] The adoption of Dry Powder inhalers as opposed to hydrofluoroalkane (HPA) inhalers—the latter being the most popular and having a 380-fold higher potential for climate change than the former—is a notable illustration of how design modifications affect environmental results. Additionally, it has been shown that a 60% decrease in the Global Warming Potential (GWP) could result from a decrease in the subtype of HPA utilised in inhalers. We may therefore observe how design modifications impact environmental repercussions in these situations. [30]

Similarly, there is an understanding of the need for the search and research for biodegradable or more sustainable materials than plastic, ensuring the safety and efficacy of medications. Along with this, products such as soap, energy drinks, and toothpaste, also associated with these industries, end up contributing to the global plastic waste issue, often with a more significant impact at the end of the life cycle of these products. Consequently, there is a trend to recognize that addressing this part of the problem requires solutions focused on consumer behaviour. However, it is essential to always consider that systemic problems demand systemic solutions. Therefore, care must be taken when pointing to the end consumer as directly responsible for the change, as they may not always have the conditions to make "sustainable" and typically more expensive choices. This reflection leads us to understand that changes related to the use of plastics by pharmaceutical industries should originate from these industries, through the pursuit of more sustainable and equally safe alternatives for packaging and transporting their entire production chain.

6. Impact of plastics on the Global South Vs the Global North

Plastic has transformed life since its invention in the 1950s for both the Global North and the South and is a challenge for both the global hemispheres. Despite this, As is noted in the case of almost every other environmental or health issue, there is a significant difference in how the Global South vs Global North is affected by the impact of plastics and their ill effects. Its impact is not uniform across the globe. The Global South is unequivocally more affected by the disastrous effects of plastic pollution. This is mainly due to its lesser infrastructure and greater dependence—both economically and in terms of population—on factors highly susceptible to the degradative effects of plastics, and its lower adaptive capacity in the face of environment and health-related catastrophes. [31] The global south faces significant challenges in managing plastic waste due to the exponential increase in consumption and inadequate waste management systems [32]

When looking at the statistics, it's easy to assume that the global north comparatively is not a major contributor to the global issue of plastic pollution. The countries in the global south are currently the biggest contributors to plastic pollution in the oceans. But assuming that these countries are using more plastic in a less sustainable way than the developed countries of the Global North might be a far stretch. Both geographical and economic factors are at play here. Firstly, countries that have a smaller geographical area, longer coastlines, high levels of rainfall, many river systems and poor waste management infrastructure will automatically see higher levels of plastic following oceans than countries that don't have these characteristics. This is because all of these features facilitate the movement of plastics towards the coastlines and out to sea. These features are typical of tropical archipelagos and islands in the Global South such as The Philippines and Malaysia, so it is expected for similar countries to contribute a greater amount to plastic pollution in the oceans.

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However, it is not just the geographical features of these countries that contribute to the Global South being the largest producer and consumer of plastics. All of this plastic is supposed to originate from a notable source, and the shopping habits in the Global South population including developing countries do not align with the amount of waste that is generated. The exporting of plastic waste from developed countries in the global north for recycling in other countries is a common practice. For developed countries, exporting plastic waste is ideal as it is cost-effective, helps meet recycling targets, and reduces the need for domestic landfills. However, for developing countries, this is not the case. Much of the plastic waste exported into developing countries is of low quality, or contaminated. This means that if it can't be recycled, then it will either be burned or dumped illegally. This, along with the fact that many of these developing countries don't have sufficient infrastructure to deal with the volume of waste indicates that waste ends up accumulating in regions that are already predisposed to having plastic flow towards the oceans. The combination of the waste industry and the geographic features in these developing countries creates the perfect environment for plastic to end up in the oceans.

However, this economic and environmental phenomenon may not continue for long. Many developing countries within the Global South have started implementing concrete policies to curb illegal export of plastic waste into their countries and focus on proper disposal and reducing plastic production and consumption within their countries. [33]

However, it is crucial to emphasise that this reflection does not intend to assert that practices to curb plastic pollution by certain countries are negative or fall into the argumentative fallacy. Any form of initiative to reduce the impact of plastic pollution is beneficial. It is important to note here how the primary promoters of change are and were in the Global North, and thus, the changes to alter it should not be imposed on the Global South. Simultaneously, it is understood that the solutions to these changes should follow the path of climate justice, focusing on inclusive practices that understand the multifactorial roots of the problem and empower regions disproportionately affected by it. [34]

7. Impact of Plastics on Low and Middle-income Countries (LMICs)

The impact of plastics on vulnerable communities, particularly in low and middle-income countries (LMICs), is both severe and disproportionate. Despite consuming significantly less plastic than high-income countries, these vulnerable communities bear the brunt of the environmental and health consequences associated with plastic production and waste.

7.1 Economic Disparities: Low and middle-income countries are left grappling with a disproportionate share of the world's plastic waste. Despite their consumption being three times less than high-income countries, the actual economic toll of plastic on low- and middle-income nations is eight times higher. [35] This cost amplification is even more pronounced for low-income countries, where the burden is ten times greater than that faced by their high-income counterparts.

7.2 Health Impacts: Studies reveal a dire situation, indicating that 93% of recorded deaths directly associated with plastic production occur in LMICs. [35] The toll on human lives is estimated to be up to 1 million deaths annually in LMICs due to the impacts of plastic pollution. This calls for an urgent need for global attention and intervention.

7.3 Disproportionate Plastic Waste Generation: Despite contributing to global plastic consumption at a fraction of the rate of high-income countries, LMICs are burdened with an

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outsized share of the consequences. Globally, plastic waste generation has more than doubled from 2000 to 2019, reaching a staggering 353 million tons. [35] This disproportionate impact further exacerbates the challenges faced by vulnerable communities.

7.4 Urgent Need for a Global Solution: The call for a global treaty on plastic waste becomes imperative in the face of this escalating crisis. [1] The treaty represents a once-in-a-lifetime opportunity to address the pressing issues associated with plastic pollution on a global scale. It is a chance to bring about comprehensive and sustainable solutions that consider the specific challenges faced by vulnerable communities.

In conclusion, the devastating effects of plastic pollution on vulnerable communities, particularly in LMICs, extend beyond environmental concerns to encompass economic burdens and severe health impacts. Urgent global action is required to rectify this imbalance and create sustainable solutions that address the root causes of plastic pollution while prioritising the well-being of the most affected communities.[36]

8. The UN Plastics Treaty

In March 2022, during the resumed fifth session of the UN Environment Assembly (UNEA-5.2), a momentous resolution (5/14) was adopted [1], paving the way for the development of an international legally binding tool on plastic pollution, particularly in marine environments. The resolution mandated the Executive Director of the UN Environment Programme (UNEP) to convene an Intergovernmental Negotiating Committee (INC) tasked with formulating "the instrument." This comprehensive approach is designed to encompass the entire life cycle of plastic, addressing aspects such as production, design, and disposal. Commencing its work in the latter part of 2022, the INC aims to conclude its negotiations by the end of 2024.

With the endorsement of 175 nations, the UN resolution for an international legally binding agreement sets the stage for the Global Plastics Treaty (GPT). This landmark agreement is poised to revolutionise the design, production, and recycling of plastics. The treaty will address critical topics such as the life cycle of plastics and ocean pollution, anticipating significant collaborative efforts and innovations within the sector.

The formulation of this treaty presents itself as a pivotal moment for the future of our planet and the health of all its inhabitants. Thus, we, as future healthcare professionals, must urge the World Health Organization (WHO) to ensure that this resolution considers all aspects involved in plastic production. Consequently, it should hold governments accountable and support them in enacting legislation and actions that address all stakeholders in this equation, particularly avoiding a focus solely on measures related to the end consumer and their consumerist choices. We implore that the actions outlined in this document be more direct and aggressive in their policies on plastic, avoiding concealment behind notions of austerity to mask worldwide plastic production. [37]

9. Minimising plastic production in healthcare

A comprehensive strategy is required to reduce the plastic footprint of healthcare, which involves addressing entrenched culture and procurement patterns. While there have been some achievements in decreasing the demand for certain products, such as nitrile gloves, significant change necessitates a comprehensive review of the products utilised in patient care.

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Packaging is responsible for up to 50% of the plastic waste generated in the healthcare industry, which presents a huge chance for improvement. To address this crisis, healthcare services must invest in prevention, reduce demand for consumables, and insist on recyclable packaging. Important actions include adopting innovative technologies for processing medical device waste, working with suppliers who care about the environment, and reprocessing equipment whenever possible.

The health risk is exacerbated by toxic chemical additives included in medical supplies, such as phthalates, bisphenol A (BPA), and per- and polyfluorinated substances (PFAS), which are known to be harmful to human health. Negative health effects, such as an elevated risk of cholestasis, necrotizing enterocolitis, and bronchopulmonary dysplasia, have been linked to neonatal exposure to these substances. With its large purchasing power, the healthcare industry may influence suppliers worldwide and bring about change. Healthcare professionals can set an example for others by advocating for sustainable practices and minimising their environmental effects. Making more thoughtful decisions, being transparent about what may be recycled, and working together with suppliers are all steps toward promoting the "first, do no harm" philosophy and protecting the environment for present and future generations.

10. Role of Youth and Youth-led Organisations

The youth has consistently been at the forefront of many social movements since their inception. In this context, when we observe the movement against plastic, the role of the youth can be aligned along two distinct paths. The first focuses on individual points such as discussing and raising awareness about the topic, as well as encouraging the choice of more sustainable products and practices with reduced plastic usage. However, it is emphasised that isolated individual actions will have limited effectiveness.

Secondly, we see how the youth, utilising their potential for collective organisation, can actively engage in the movement. Youth-led organisations are key mobilizers in the fight against plastic. Some good examples of effective and successful youth-led campaigns are as follows:

- "Bye Bye Plastic Bags" campaign which envisions a world free of plastic where young generations are empowered to take action. [38] BBPB was launched in 2013, in Bali, by founders and sisters, Melati and Isabel Wijsen when they were 10 and 12 years old. BBPB raises awareness and educates youth about the harmful impact of plastic on our environment, animals and health while also sharing how to be part of the solution. Having spoken to over 20,000 youth and created two educational booklets aimed at elementary schools in Indonesia, education has a huge place in the role of BBPB.
- The POP Ocean Initiative, which was launched during the "Perils of Sea Level Rise" session at the Second World Sustainable Development Forum 2020, serves as an innovative new model for International Ocean Cleanup Day and Launch of the Youth-Led Ocean Action and Advocacy Workshop for ocean action to stimulate youth-led marine conservation efforts through education and mentorship.[39]
- "Stow It-Don't Throw It" Project a youth-driven marine debris prevention and ocean conservation program dedicated to protecting marine environments and their inhabitants while educating others to do the same. Students Take on Plastic (S.T.O.P.) is an initiative born out of the Ban the Bag Conference at the Hewitt School (NY) in 2013 and their follow-up student training on how to talk to lawmakers to encourage them to pass legislation that bans or places a surcharge on single-use plastic bags.[40]

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When specifically talking about the impact and implications of plastics on healthcare, it's imperative to mention the role of medical students and medical student organisations and their crucial role in driving meaningful change towards plastic use in healthcare. Young medical students being the future doctors and healthcare professionals must be sensitised at the very beginning of this pressing issue so that they inculcate a sense of minimal use of plastics right from their first steps into their professional careers. Moreover, as mentioned earlier, youth activism plays an influential role in driving needful change, hence medical students trained and capacitated in the right direction will prove beneficial in this fight against plastic. Therefore, medical student organisations prove to be one of the best ways to implement coordinated innovative efforts, strategic partnerships, leveraging volunteers and effective communication tools like social media, storytelling, and digital platforms which allow us to reach a broader audience, share our experiences, and highlight our initiatives—increasing the impact and engagement towards the cause.[41]

Thus, it is evident that youth-led organised movements are one of the most effective ways to combat global health challenges. The youth plays an essential role in acting collectively as protagonists in movements of change, fulfilling their role in influencing decision making institutions and stakeholders that can ultimately lead to resolving the problems generated by plastics in healthcare and its impact and implications.

11. Regulatory policies for plastic use across the world

Several countries, regions and cities across the world have introduced regulations and policies focused on plastic usage and reduction.

These primarily target usage and disposal in order to lower consumption and enhance waste management. Over 60 countries have implemented bans and levies on plastic packaging and single-use waste. Policies that aim to increase plastic recycling and lessen reliance on fossil fuels and greenhouse gas emissions may have an indirect impact on companies that produce raw materials for plastics, including oil and gas companies, even though there are currently no laws or regulations that specifically target this process. The global waste management systems have been greatly impacted by policies and regulations that concentrate on the disposal stage of the plastics value chain, such as China's prohibition on imported waste.

By 2022, 127 out of the 192 countries that were reviewed had already established some kind of policy to control the use of plastic bags. These measures included the following:

- Bans/ restrictions on usage
- Standards for thickness thresholds and the distribution and usage of materials
- Levies/ taxes targeting consumers or manufacturers

In recent years, many nations have expanded their scope of regulations to cover other types of single-use plastics products, e.g. straws, wrappers and bottles. The following are a few of the most recent legislation to be implemented:

 The proposed regulations in Canada would prohibit six different types of single-use plastics, such as straws, stir sticks, ring carriers, supermarket bags, cutlery and hard to recycle takeout containers.

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- China announced a five-year plan to ban the plastic product use by the years 2020, 2022, and 2025, respectively. Phase 1 involves banning plastic bags and straws in large cities beginning in 2021.
- In France starting from 2022, 30 varieties of fruits and vegetables are banned from being wrapped in plastic. The country has also banned the use of plastic straws, cups, cutlery and takeaway cartons made of polystyrene since 2021.
- Hong Kong It is proposed to ban all single-use plastic cutlery in both dine-in and takeaway services by 2025.
- Spain Sales of fruits and vegetables with plastic packaging was banned in 2023.
- UK Announced plans to prohibit all single-use plastic cutlery and tableware. [42]

12. Effects of COVID-19 Pandemic on plastic use

In 2020, the COVID-19 pandemic and lockdown measures had a significant impact on plastics production, use and waste. In most sectors, use of plastics declined with the reduction in demand and output, especially for large-scale plastics-using sectors such as motor vehicles, trade and construction. Global plastics use in 2020 is estimated to have declined in 2020 by around 10 million tonnes (Mt) or 2.2%, which is 4.5% below the pre-COVID projection for 2020. This reduction is substantially smaller than the decline in overall economic activity, with the annual global gross domestic product (GDP) growth rate dropping from around +4% in 2019 to -3.5% in 2020. Consequently, the plastics intensity of the economy increased on average despite the pandemic.

In some sectors, especially healthcare, plastics use increased significantly – for instance for face masks and other personal protective equipment. Plastic use for face masks and other personal protective equipment is estimated to be around 300 kilotons, i.e. less than 0.1% of total plastics use in 2020, or a few percent of the overall impact of the pandemic on plastics use.

In other sectors, the nature of economic activity changed, for instance from eating in restaurants to take-away, and from in-store shopping to online retail (e-commerce). The net effects of such shifts are unclear at the time of writing of this report, but the boosted activities use significant amounts of single-use plastics. Plastics use declined in industrial sectors, with plastics use in construction and motor vehicles, respectively, estimated to have declined by 4.6 and 2.6 Mt from 2019 levels.

The pandemic has also resulted in significant disruptions to plastics recycling. This is due to the temporary halting of separate collection in some municipalities, a temporary shift to single-use plastics, disruptions to waste plastic trade, as well as a temporary loss of competitiveness of recycled plastics linked to the low price of oil and resulting low prices for primary plastics. Plastics waste has been affected by the pandemic in the short run by a switch to single-use plastics and a switch from industrial and commercial waste to household waste. In 2020, while total plastic waste may have remained roughly stable, municipal plastic waste most likely increased, although robust information is not yet available. However, a significant portion of the effects on plastic waste will be delayed to future years due to the long lifespan of many plastics uses. [43]

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