SILENT SPRING INSTITUTE
Researching the Environment and Women's Health

320 Nevada Street, Suite 302, Newton, MA 02460 / 617.332.4288 / www.silentspring.org

Re: Submission to the call for inputs on plastic pollution and human rights.

Thank you for the opportunity to provide scientific information relevant to the UN's Human Rights Council Advisory Committee questionnaire on the "Implications of Plastic Pollution for the Full Enjoyment of Human Rights." Silent Spring Institute is an independent research organization and a national leader in studies investigating links between everyday chemicals and health. The Institute has been the principal investigator for studies funded by the U.S. National Institutes of Health, the U.S. National Science Foundation, U.S. National Cancer Institute (NCI), the U.S. Environmental Protection Agency (EPA), and the U.S. Centers for Disease Control and Prevention, among others.

Our Institute has published the most comprehensive list of chemicals that are relevant to breast cancer. Drawing from international and U.S. government databases, including the International Agency for Cancer Research (IARC), the National Toxicology Program, the EPA, and NCI, we identified chemicals known to cause mammary tumors or have endocrine-disrupting effects in ways that could promote breast cancer. We identified a total of 921 potential breast carcinogens (Kay et al., 2024), nearly half of which (414) are found in plastics (Shakti et al., 2024).

Below, we include responses to the questions aimed at academia, public health, and scientific institutions.

1. Which impacts of plastics and plastic pollution on human rights and in relation to which affected communities/groups of individuals do you find most under-researched and why?

Reducing the burden of breast cancer is an important human right as it disproportionately impacts women. Women are twice as likely as men to be diagnosed with cancer before age 50, and breast cancer diagnoses are a major contributor to the incidence of early onset disease. Breast cancer rates are rising in many parts of the world, including parts of Asia, Latin America, Africa, and the Middle East, with significant increases happening among younger demographics (Vaccarella et al., 2021). Well-studied breast cancer risk factors, such as having fewer children, cannot fully explain these trends (Lima et al., 2020), underscoring the importance of addressing breast cancer-relevant chemicals in food, water, and consumer products as likely risk factors.

Plastics pollution can be one factor underlying rising breast cancer rates. We identified 414 plastic chemicals relevant to breast cancer by cross-referencing Silent Spring's list of breast cancer-relevant chemicals to data from the PlastChem project, an initiative of academic and nonprofit researchers to create a database of more than 16,000 chemicals used in plastics (Wagner et al., 2024). Overall, we prioritized 175 potential breast carcinogens in plastics for regulation and reduction due to evidence that they cause mammary tumors or have robust hormonal activity combined with genotoxicity. Of our high-priority potential breast carcinogens only 18 are regulated under multilateral environmental agreements.

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Plastics can be a significant source of exposure to potential breast carcinogens and it is important to address both plastic pollution and, more critically, deal with its upstream production.

2. What is the role for the precautionary approach and what for the preventive approach?

Increasing evidence demonstrates links between environmental chemical factors and breast cancer, and we encourage policymakers to act to decrease the burden of cancer. Several of our breast cancer-relevant chemicals have been associated with breast cancer in epidemiological studies (Kay et al., 2022). Chemicals that increase the risk of human breast cancer risk also typically increase the frequency of mammary gland tumors in experimental studies, and these chemicals are also often enriched for endocrine disrupting activity in cell studies (Kay et al., 2024; Rudel et al., 2014). Because of disease latency and the multifactorial nature of breast cancer, inferences from animal studies and cell studies are an important basis for regulation and are consistent with approaches made to determine carcinogenicity by the International Agency for Research on Cancer.

PlastChem also highlights gaps in hazard information for plastic chemicals. Their *Grey List* of plastic chemicals includes 10,345 chemicals that lack hazard classifications (Wagner et al., 2024). PlastChem proposes a practical and precautionary approach by proposing regulations for all plastic chemicals within a structural class if more than 40% of them are considered hazardous. High-throughput testing for diverse biological activities can be used to fill those gaps. Action on data-limited chemicals, as well as those with extensive evidence, is critical.

3. How would you suggest improving existing policy and legal frameworks to effectively tackle the implications of plastic pollution on human rights and respect, protect and ensure the right to science?

International regulation of plastic chemicals needs to be strengthened and improved. To flag highly hazardous chemicals that lack international regulation, PlastChem used hazard data from governmental and international sources and data on global regulations to develop a *Red List*. The PlastChem *Red List* includes 149 breast cancer-relevant chemicals that we consider priorities due to in vivo carcinogenicity or robust in vitro endocrine activity, and 46 of them have global production volumes of more than 10,000 tons per year (Shakti et al., 2024). Potential breast carcinogens on PlastChem's *Red List* should be a priority for international regulation. Of the 175 potential breast cancer chemicals we prioritized due to evidence that they cause mammary tumors or have robust hormonal activity combined with genotoxicity, only 18 are regulated under multilateral environmental agreements.

4. Which areas of plastic related health research remains under-studied especially due to lack of proprietary (chemical) data?

As discussed, there is a need for more research on environmental risk factors for breast cancer, and how plastic chemicals may be linked to breast cancer. Our article in *Environmental Science*

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and Technology Letters goes into further detail on recommendations for how to advance research on breast-cancer relevant chemicals in plastics (Shakti et al., 2024).

5. Are health systems adequately equipped to diagnose, monitor, and respond to illnesses linked to chronic exposure to plastic-associated chemicals and pollutants? What capacity gaps exist?

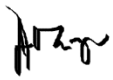
Health systems across the globe are unequipped to diagnose, monitor, and respond to illnesses linked to the environment, much less those linked to chronic exposure to plastic-associated chemicals and pollutants. Environmental health content is limited or absent in medical education, with only a small number of U.S. medical schools including any environmental health content (and this is typically restricted to a minor part of the curriculum). Due to significant provider knowledge gaps and missed opportunities for prevention, there needs to be greater clinician training on environmental diseases including those associated with plastic chemicals (such as phthalates).

6. How can health professionals, public health institutions and health ministries meaningfully participate in policy-making processes addressing plastics, including environmental impact assessments, chemical regulation, and international negotiations?

It is important to include environmental health scientists in any policy-making processes, including that have expertise in diseases that disproportionately impact sensitive populations including women and children.

We are happy to provide additional information or discuss further.

Best,



Jennifer Liss Ohayon
Research Scientist, Silent Spring Institute

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