

Banned and Hazardous Chemicals in Plastic Consumer Products in Kenya

Introduction

Plastic products have become ubiquitous in modern society, yet they are increasingly recognised as a significant source of hazardous chemical exposure. This summary presents findings from an assessment of 55 plastic consumer products collected from the Kenyan market, including children's toys, infant feeding bottles, food containers, kitchen utensils, sports bottles, and school supplies. The study evaluated the occurrence of hazardous flame retardants, bisphenols, and heavy metals in products commonly used by consumers, including children and infants, who are among the most vulnerable to chemical exposure. The findings provide evidence that hazardous chemicals continue to contaminate consumer products through recycling of electronic waste plastics into new consumer goods.

Collectively, the findings point to significant gaps in Kenya's chemical management system. Current regulatory frameworks do not adequately control hazardous additives in plastics, monitor toxic chemicals in recycled plastic feedstocks, or prevent contaminated materials from entering consumer products. The evidence also demonstrates that recycled electronic waste remains an important pathway through which legacy hazardous chemicals continue to circulate in the economy, undermining efforts to promote a safe and sustainable circular economy.

Methodology

This study assessed 55 plastic consumer products purchased from the Kenyan market to determine the presence of hazardous chemicals in products commonly used by consumers. The products were drawn from nine categories:

children's toys, infant feeding bottles, kitchen utensils, food containers, sports bottles, microwave lids, coffee cups, sunglasses, and pencil cases, with particular emphasis on products frequently used by children and infants because of their increased vulnerability to chemical exposure. Black plastic products, especially toys and kitchen utensils, were intentionally included because they are often manufactured from recycled electronic waste plastics, which are known to contain hazardous flame retardants.

All 55 products were initially screened using a NITON XL3t 800 X-ray Fluorescence (XRF) Analyser (Thermo Scientific) to identify bromine and heavy metals, which are indicators of hazardous chemical contamination. Based on the screening results, 31 samples were selected for comprehensive laboratory analysis.

This included four black plastic samples analysed for brominated flame retardants, including Polybrominated Diphenyl Ethers (PBDEs), novel brominated flame retardants (nBFRs), Dechlorane Plus, Hexabromocyclododecane (HBCDD), and Tetrabromobisphenol A (TBBPA), and 27 transparent and coloured plastic samples analysed for bisphenols. Quality assurance measures, including the use of procedural blanks and isotopically labelled internal standards, were applied throughout the analysis to ensure the accuracy and reliability of the findings. This systematic approach provides a robust evidence base to inform policy decisions on chemical safety, product standards, and the regulation of recycled plastics in Kenya.

Summary of Chemicals Identified, Comparison with EU Standards and Potential Implications

Chemical Group	Key Findings	Detected Concentrations (ng/g)	Comparison with EU Standards	Health Implications
PBDEs	Detected in all black plastic samples.	17,198 – 47,869	EU POPs limit is 500,000 ng/g. All samples had concentrations below this limit.	Endocrine disruption; impaired glucose metabolism; thyroid dysfunction; reproductive toxicity; reduced IQ following prenatal exposure; increased cancer risk.
Novel BFRs	Decabromodiphenylethane (DBDPE) was detected in all plastic samples.	35,742 – 103,449	No EU restrictions.	Endocrine disruption; impaired glucose metabolism; thyroid dysfunction; reproductive toxicity; reduced IQ following prenatal exposure; increased cancer risk.
	Bis(2,4,6-tribromophenoxy) ethane (BTBPE) was detected in all black plastic samples.	669 – 15,409	Indicates regrettable substitution of legacy brominated flame retardants.	
Dechlorane Plus	Detected in all black plastic samples.	269 – 911	Projected EU POPs limit from 2028: 1,000 ng/g. Levels detected approach this threshold.	Liver impairment; metabolic disruption; endocrine disruption ¹ .
HBCDD	Detected in one Rubik's Cube toy	26.3	EU POPs limit: 1,000,000 ng/g. Levels detected are below the threshold but confirm legacy chemical contamination.	Endocrine disruption; thyroid dysfunction; developmental toxicity ² .
TBBPA	Detected in all black plastic samples	851 – 32,927	EU limit of 1,000,000 ng/g for CMR impurities in toys and 2,500,000 ng/g for hazardous waste Levels detected are below this limit.	Endocrine disruption; potential cancer risk; nervous system toxicity ³ .
Bisphenols	Detected in all 27 samples tested.		Banned in polycarbonate baby bottles in the EU.	Endocrine disruption; reproductive toxicity (including reduced fertilisation).
<i>Bisphenol A (BPA)</i>	BPA detected in sports bottles	3.4 – 48,764	The EU prohibits its use in food contact materials.	
	BPA detected in infant feeding bottles	3.9 – 19.1		
	BPA detected in snack containers	1.12 - 19.4		
<i>Bisphenol S (BPS)</i>	Detected in 22 out of 27 samples tested		Authorised for food contact materials with a specific migration limit (SML) of 50 g/g under Regulation (EU) No. 10/2011	Endocrine disruption; reproductive toxicity (including reduced fertilisation and implantation rates).
	BPS detected in sports bottles	0.373 - 10.4 ng/g		
	Detected in food container lids.	0.334 ng/g - 15.7 ng/g		
<i>Bisphenol F (BPF)</i>	Detected in a single sample sports bottle	1.29	Not authorised for plastic food contact materials in the EU.	Endocrine disruption; reproductive toxicity (including reduced fertilisation and implantation rates).
Heavy Metals	Detected cadmium in a pencil case,	766,000	EU REACH cadmium limit: 100,000 ng/g. Cadmium exceeded by nearly 8x; Lead may exceed EU migration limits of 13,500 ng/g in toys.	Impaired foetal development with lifelong health implications.
	Detected lead in a toy sample.	82,700		

The results reveal widespread contamination of consumer plastics with hazardous chemicals associated with serious human health risks.

1. Liu, W., He, Q., Yue, C., Xu, T., & Hang, X. (2024). Effects of dechlorane plus on hepatic pathology, metabolic health and gut microbiota in male mice. *The Science of the Total Environment*, 957, 177532. <https://doi.org/10.1016/j.scitotenv.2024.177532>.

2. EPA finds HBCD poses unreasonable risks to human health and the environment | US EPA. (2026, May 27). US EPA. <https://www.epa.gov/chemicals-under-tsca/epa-finds-hbcd-poses-unreasonable-risks-human-health-and-environment>

3. Wu, H., Wang, J., Xiang, Y., Li, L., Qie, H., Ren, M., Lin, A., & Qi, F. (2021). Effects of tetrabromobisphenol A (TBBPA) on the reproductive health of male rodents: A systematic review and meta-analysis. *The Science of the Total Environment*, 781, 146745. <https://doi.org/10.1016/j.scitotenv.2021.146745>



Photos: Infant feeding bottles from the Kenyan market, containing detectable BPA, and Green-purple-blue sport bottles from the Kenyan market, containing BPA at 48,764 ng/g, the highest concentration recorded in this study.

Policy Recommendations

1. Prevent toxic additives from entering recycled plastics and consumer products

The National Environment Management Authority (NEMA) should develop recycling guidelines that prohibit the recycling of plastics containing toxic chemicals into everyday consumer products, including toys and food contact materials.

2. Establish enforceable concentration limits for hazardous chemicals in plastic products, including recycled materials

The Kenya Bureau of Standards should develop national standards that set the concentration limits of the identified hazardous chemicals in consumer plastic products, to prevent the intentional addition, importation of products containing these chemicals and recycling of these chemicals into new products.

3. Strengthen monitoring and enforcement capacity in Kenya and other low-and middle-income countries

The Kenya Bureau of Standards should invest in strengthening the technical capacity and analytical infrastructure for chemical detection and screening.

4. Control e-waste flows

The National Environment Management Authority should develop regulations that prevent the entry of e-waste or electrical and electronic equipment (EEE) that are nearing the end of their useful life into the country, which end up being recycled into consumer products.

5. Support just transition towards safer recycling systems in informal sectors

In collaboration with NEMA, EEE assemblers, distributors, and recyclers, the Electronic Waste Producer Responsibility Organisation Kenya should implement capacity-building programmes aimed at equipping informal sector workers with knowledge and skills for the safe handling, management, and recovery of e-waste-contaminated plastics for recycling.

Conclusions

The findings from this study provide evidence that hazardous chemicals continue to circulate in everyday plastic consumer products sold in Kenya, exposing consumers, especially children and infants, to unnecessary health risks. The detection of banned persistent organic pollutants, endocrine-disrupting bisphenols, and hazardous heavy metals in toys, food-contact materials, and infant feeding bottles demonstrates that current regulatory and market surveillance systems are insufficient to prevent toxic chemicals from entering the marketplace. The widespread occurrence of chemicals associated with recycled electronic waste further highlights critical gaps in plastic recycling systems.

These findings, therefore, present an important opportunity for Kenya to strengthen its leadership on chemical safety and sustainable plastics management. Establishing enforceable national standards for hazardous chemicals in plastics, strengthening market surveillance and laboratory capacity, regulating recycled plastic feedstocks, and improving the management of electronic waste will significantly reduce human exposure while supporting a safer circular economy. At the international level, Kenya should continue to champion an ambitious Global Plastics Treaty that eliminates hazardous chemicals throughout the plastics lifecycle and establishes globally harmonised controls for chemicals in virgin and recycled plastics.

Supported by:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH through its BMUKN Support Project on Marine Litter Prevention. The project is funded by the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN).

Disclaimer:

The opinions expressed in this publication are those of the authors and reviewers and do not necessarily represent the opinions or positions of GIZ nor of BMUKN. GIZ does not guarantee the accuracy or completeness of information in this document, and cannot be held responsible for any errors, omissions or losses which result from its use. Responsibility for the content of external websites linked in this publication always lies with their respective publishers.



**Centre for Environment
Justice and Development**

