Editorial Study: Contrasting epidemiological perspectives on environmental risk factors for breast cancer in Africa and Western regions

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Background. Endocrine-disrupting chemicals (EDCs) such as pesticides, plasticisers and food-related compounds are ubiquitous environmental pollutants linked to increased breast cancer risk. While substantial evidence exists from Western settings, limited data address these associations in African populations, where exposure patterns and regulatory frameworks differ markedly.
Objectives. To synthesise global epidemiological evidence on EDC exposure and breast cancer, with a focus on identifying disparities between African and Western regions.
Methods. A systematic review of PubMed (MEDLINE) was conducted by Mahasa *et al*. from 30 November 2024 to 14 July 2025, following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The search used keywords including 'endocrine disruptors', 'breast cancer', 'climate change', 'air pollution', 'water pollution', 'global warming' and 'greenhouse effect', and included both case-control and cohort studies.
Results. The search identified 172 eligible studies. Most were from Western countries and used biomarker-based exposure assessments. Most studies were conducted in Western countries, mainly the USA, Canada and parts of Europe, by authors such as Wolff, Brody, Stellman, Eskenazi and Rusiecki, who used biomarker-based methods to assess exposure to key endocrine-disrupting chemicals (EDCs) including dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE), bisphenol A (BPA), phthalates and polychlorinated biphenyls (PCBs). These Western studies consistently linked higher levels of DDT/DDE, PCBs and certain phthalates to increased breast cancer risk. In contrast, there were only a few studies from African countries such as South Africa, Nigeria and Egypt, despite higher potential exposure through agriculture and food systems, and these were limited in scale and methodological depth, providing less conclusive evidence.
Conclusion. Regional gaps in data limit our understanding of EDC-related breast cancer risk in Africa. Targeted research and region-specific policies are urgently needed.

Keywords: endocrine-disrupting chemicals, breast cancer, regional disparities, Africa, Western countries, environmental exposure, pesticides, DDT, BPA, PCBs, PBDEs, ZEA, oral contraceptive pills

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Breast cancer is the most frequently diagnosed cancer among women globally, with its incidence increasing across all continents. Environmental exposures, particularly to endocrine-disrupting chemicals (EDCs) such as pesticides, plasticisers, industrial compounds and pharmaceuticals, are emerging as significant contributors to breast cancer risk. While a growing body of literature from Western countries (primarily in North America and Europe) has established strong associations between EDCs and breast carcinogenesis, Africa remains notably under-represented in epidemiological research on this topic. This disparity creates a gap in both scientific understanding and public health preparedness.

This article synthesises and critiques comparative epidemiological perspectives, with a focus on the recent systematic review by Mahasa *et al*.,[1] which provides a global analysis of EDCs and breast cancer risk while also highlighting critical research gaps in African contexts.

Comparative research landscape

Research volume and scope

In Western regions, over 172 studies, mainly from the USA, Canada and Europe, have employed large cohort and case-control designs to examine EDC exposure using advanced biomarker analysis (e.g. serum levels of p,p'-dichlorodiphenyldichloroethylene (p,p'-DDE), bisphenol A (BPA)).[1] These studies benefit from comprehensive environmental health surveillance frameworks and access to longitudinal datasets.

Conversely, African contributions are minimal. Most studies are hospital based, cross-sectional, or lack environmental exposure quantification owing to limited access to analytical testing for substances such as dichlorodiphenyltrichloroethane (DDT) and polychlorinated biphenyls (PCBs).[1] The absence of structured cancer registries and environmental monitoring systems severely limits the strength of inferences drawn from African settings.

Environmental exposures

In the West, research has explored a broad range of synthetic EDCs including BPA (plastics), phthalates (cosmetics), PCBs (industrial fluids), and per- and polyfluoroalkyl substances (PFASs). Historical pesticide use, such as DDT, is primarily considered in terms of long-term persistence in the environment owing to its legacy contamination, as many of these compounds are now regulated or banned.[2,3]

In contrast, several EDCs banned in the West are still in use in Africa. DDT and its metabolite p,p'-DDE remain part of malaria vector control programmes in some countries.[4] The informal economy, unregulated food and cosmetic products, and lack of chemical safety oversight exacerbate the risk of unmonitored chronic exposures.

Key endocrine-disrupting risk factors identified

According to Mahasa *et al.*,[1] the following EDCs are repeatedly associated with increased breast cancer risk:

- **Organochlorine pesticides:** DDT, DDE
- **Plasticisers:** BPA, phthalates
- **Industrial compounds:** PCBs, polybrominated diphenyl ethers (PBDEs), PFASs
- **Food-related toxins:** Aflatoxins, zearalenone (ZEA)
- **Synthetic hormones:** Oral contraceptive pills.

Although exposure sources are shared across regions, the levels, regulation and duration of exposure vary significantly between high-income and low-income contexts.

Environmental and socioeconomic contexts

Western nations

Western countries benefit from:

- Rigorous environmental and chemical regulations (e.g. the US Environmental Protection Agency (EPA), Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) in the European Union)
- Integration of environmental monitoring within healthcare systems
- Public health education promoting behavioural changes (e.g. reducing plastic use, choosing EDC-free cosmetics).

Despite these advances, legacy pollutants continue to pose a threat, especially in industrial and agricultural communities.[3]

Africa

African nations face compounded challenges:

- Environmental degradation due to rapid urbanisation, mining, and climate change
- Inadequate policy enforcement on banned chemicals
- Limited public awareness of the health impacts of EDCs
- Lack of affordable and accessible diagnostic tools for early cancer detection or EDC exposure tracking.[4]

Policy and research recommendations

For Africa

- Develop and fund **national environmental health surveillance systems**.
- Conduct **longitudinal cohort studies** that integrate environmental exposure and cancer incidence data.
- Foster **interdisciplinary collaboration** between environmental science, public health and epidemiology.

For global health agencies

- Invest in **capacity building** in African laboratories for EDC biomonitoring.
- Facilitate **data-sharing platforms** and fund regional cancer registries.
- Support Africa-led, **context-specific research**, including traditional practices, agricultural chemical use, and informal waste handling.

Conclusion

The systematic review by Mahasa *et al.*[1] provides a valuable global perspective on the link between EDCs and breast cancer risk. However, the glaring research disparity between Western regions and Africa calls for urgent redress. It is imperative to bridge this gap, not only for scientific completeness but also for equity in cancer prevention and environmental justice.

Without targeted investments in research infrastructure, surveillance systems and policy implementation, African women will continue to bear a disproportionate burden of preventable cancer risk. The future of breast cancer prevention in Africa depends on a comprehensive shift towards environmental accountability, public education, and evidence-based policy-making.

Data availability. Any restrictions or additional information regarding data access can be discussed with the corresponding author (JPMM).

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Conflicts of interest. None.

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