


PFAS Research in Nigeria: Where Are We?

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ABSTRACT: The persistence of per- and polyfluoroalkyl substances (PFAS) in the environment and their possible negative health impacts have attracted global attention. In Nigeria, there have been instances of PFAS contamination in many environmental areas, such as water sources. This paper raised concerns regarding limited research of PFAS in Nigeria, potential human exposure, and environmental consequences in Nigeria. This paper examines the present status of PFAS research in Nigeria, the sources from which contamination occurs, the environmental effects, and the implications for human health. This underscores the holes in understanding and areas of focus for study, underscoring the necessity for thorough evaluations of potential risks and regulatory actions to reduce exposure to PFAS and protect public health and the environment in Nigeria.

KEYWORDS: PFAS, Nigeria, Research, Environment

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Dear Editor,

Per- and polyfluoroalkyl substances (PFAS) represent a class of synthesized compounds extensively employed across various industrial and consumer sectors due to their distinctive properties, including heat and water resistance.¹ However, the widespread usage and persistence of these substances have raised concerns regarding their potential adverse effects on both human health and the environment.¹ Given the limited research capacity on PFAS in Nigeria, there may be a lack of comprehensive investigations into the occurrence and pathways of exposure to these substances within the country. Consequently, there may be insufficient assessment or mitigation of potential health risks to the general populace and the natural environment.^{2,3}

Nonetheless, some studies have begun to address PFAS research in Nigeria. One such study underscores the significance of understanding ecological dynamics within aquatic ecosystems, the potential ramifications of bioaccumulation of environmental pollutants in the food chain, and the imperative of ongoing PFAS monitoring to ensure long-term safety, health preservation, and effective management of potential PFAS-related health hazards associated with fish consumption in Nigeria.³ Additionally, another study highlights a lack of awareness regarding PFAS and the potential hazards associated with the use of PFAS-containing products in Abuja, Nigeria. Consequently, there is a call for extensive research efforts and awareness campaigns on PFAS.⁴ Furthermore, it

advocates for assistance and collaboration from developed nations to establish sustainable programs.⁴

Moreover, a recent publication has unveiled a dearth of readily available data concerning the presence and distribution of perfluorinated compounds (PFCs), particularly perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), in water and sediment samples in Nigeria and other African countries.⁵ The aim of this study was to expand the assessment of PFOS and PFOA in key rivers in Nigeria, focusing on their sources and distribution within the sediment-water interface.⁵ Subsequently, another study investigated PFOS and other PFAS in sludge samples from industrial, domestic, and hospital wastewater treatment facilities in Nigeria, utilizing ultra-high-performance liquid chromatography coupled with tandem mass spectrometry (UHPLC-MS/MS) for analysis.⁶ PFOS concentrations were detected for the first time in significant rivers in southwest Nigeria.⁷ The process involved the extraction of PFOS from water and sediment using solid-phase extraction, followed by identification and quantification using high-performance liquid chromatography coupled with tandem mass spectrometry.⁷ PFOS concentrations ranged from 1.71 to 16.19 nanograms per liter (ng L⁻¹) in water and from 1.64 to 10.29 nanograms per gram (ng g⁻¹) in sediments across all locations. These concentrations fell within the range previously observed in environmental studies.⁷

Exposure to per- and polyfluoroalkyl substances (PFAS) has been linked to various health complications, including



hepatic disease, immunological diseases, and many more.⁸ Inadequate research may leave healthcare providers lacking comprehensive knowledge about potential risks, leading to possible misdiagnoses or treatment delays in Nigeria. Limited research capacity in environmental contamination may hinder the effective identification and remediation of PFAS-contaminated sites in Nigeria, perpetuating pollution of water sources, soil, and air and potentially impacting indigenous ecosystems and wildlife populations.

Addressing PFAS contamination requires significant financial resources for comprehensive testing, remediation efforts, and the adoption of alternative materials in Nigeria. The lack of research and data poses a significant challenge for policymakers and industries in formulating informed strategies to manage PFAS contamination, potentially resulting in avoidable economic burdens.^{8,9} Globally, the issue of PFAS has prompted collaborative efforts among countries to understand associated risks and develop effective solutions, but Nigeria's limited research capacity may hinder its engagement in international collaborations and its ability to leverage shared knowledge and expertise.¹⁰⁻¹²

Resolving the low research capacity on PFAS in Nigeria requires collaborative efforts from governmental bodies, academic institutions, and international partners to enhance understanding of PFAS risks, facilitate evidence-based policy decisions, and promote international collaboration.¹³ PFAS are found in various consumer goods, and examining their presence and concentrations can aid in identifying potential sources of exposure and enhancing consumer safety measures. With increasing global concerns about PFAS, certain nations may impose limitations on goods containing these compounds, making it crucial to understand their prevalence in Nigerian products in the context of international trade and economic alliances.^{14,15}

In cases of PFAS contamination, implementing effective remediation strategies is crucial to minimize environmental and health hazards. Research can identify appropriate remediation technologies tailored to Nigeria's unique conditions and increase public awareness of PFAS and their impacts, empowering individuals to make informed decisions. Nigeria's involvement in PFAS research enables active participation in international efforts to address this global concern, facilitating access to specialized knowledge and resources and enhancing the country's capacity to tackle various challenges. Conducting research on PFAS in Nigeria is essential for protecting public health, preserving the environment, informing regulatory decisions, and engaging in international efforts to mitigate PFAS

contamination, requiring collaboration among government agencies, academic institutions, and international partners.

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Authors Contributions

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Data Availability

NIL

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