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Systemic chronic health risk assessment of residential exposure to Cd²⁺ and Cr⁶⁺ in groundwater

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Abstract

A health risk assessment was undertaken for residents of Ubeji community who consume groundwater contaminated with trace metals. A total of 96 composite groundwater samples were collected in the dry and wet seasons from 12 locally dug wells, which are major sources of groundwater to the community. Concentrations of the metals were determined by atomic absorption spectrophotometry and were found to vary with season. Among the metals studied, Cd²⁺, Cr⁶⁺, and Pb²⁺ were detected at concentrations higher than maximum regulatory limits. Cd²⁺ concentrations (mg L⁻¹) range from 0.03 to 0.06 and 0.02 to 0.05 in the dry and wet seasons, respectively, while Cr⁶⁺ levels (mg L⁻¹) range from 0.59 to 0.67 and 0.34 to 0.53, respectively, for the two seasons. Also, Pb²⁺ levels (mg L⁻¹) range from 2.8 to 3.4 and 2.7 to 3.1 in the dry and wet seasons, respectively. It is estimated that exposure to metals in the community drinking water results in carcinogenic and non-carcinogenic risks that are higher than

the generally acceptable risks of drinking water. Therefore, the results indicate that the concentrations of the metals in the groundwater are high and the consumption of water from the community wells may result in systemic chronic health risk to the residents.

Keywords: [hazard quotient](#), [hazard index](#), [carcinogenic risk](#), [non-cancer risk](#), [percutaneous](#)

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