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Radiometric assessment of natural radionuclides concentration and excessive lifetime cancer risks in sediments from selected rivers in Ilobi and Erinja

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The concentration and spatial distribution of naturally occurring radionuclides ²³⁸U, ²³²Th and ⁴⁰K in the river sediments in Ilobi and Erinja communities were determined by gamma-ray spectrometer using a highly shielded NaI(Tl) detector with the aim of assessing the potential radiological health hazards and excess lifetime cancer risks associated with the use of the river sediments. The radio-analytically activity concentrations of ²³⁸U, ²³²Th and ⁴⁰K ranged from 0.0 ↔ 166.8 ± 19.5 Bqkg⁻¹, 0.0 ↔ 17.9 ± 6.7 Bqkg⁻¹ and 181 ± 3.3 ↔ 814 ± 29.4 Bqkg⁻¹ respectively. The mean activity concentration of ²³⁸U and ⁴⁰K exceeded the world average values. To assess the complete radiological hazards of the river sediments, radiological hazard indices such as absorbed dose rate (DR), radium equivalent, annual effective dose equivalent (AEDE), internal and external hazard indices, gamma level index (I_{γr}), activity utilization index (AUI), annual genetic significant dose equivalent, exposure rate (ER) and excessive lifetime cancer risk (ELCR) were calculated. The result showed that average value of most radiological hazard parameters was below the world average value reported in UNSCEAR except Annual gonadal dose equivalent (AGDE) & internal hazard index whose mean value exceeded their recommended limits. It follows therefore that there is a fingering potential radiological health hazard directly associated with the sediments from the study areas. Sediments from specific location in both communities have the ELCR values higher the world average value, which is suggestive of its likelihood of inducing cancers over a period of exposure to humans. Multivariate statistical treatment result showed the distribution of the radionuclides (²³⁸U & ²³²Th) was asymmetrical and peaked with an observed flat distribution in ⁴⁰K level in the sediments. Future extensive research needs to be carried out on Okooko River in Ilobi community as its sediment shows consistent higher concentration in both radionuclides and radiological hazard indices.

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