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Assessment of Background Radiation in Ojota Chemical Market, Lagos, Nigeria

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Abstract

The monitoring of radiation levels in human-inhabited environments is imperative to avoid public exposure. The activity concentration of primordial radionuclides at Ojota Chemical Market was measured to determine the in situ activity of ^{238}U , ^{232}Th , and ^{40}K in ambient air using an RS-125 Super SPEC gamma spectrometry with global positioning system. The measured absorbed dose rates ranged from 28.35 to 106.55 nGy/h, giving an average value of 70.46 nGy/h. The estimated absorbed dose rate spanned from 22.25 to 101.03 nGy/h with a mean value of 65.50 nGy/h. The average concentrations of ^{40}K , ^{238}U , and ^{232}Th were 458.55, 30.26, and 54.77 Bq/kg respectively. The outdoor and indoor absorbed doses averaged 80.39 and 132.55 $\mu\text{Sv/y}$, respectively, and the mean value of excess lifetime cancer risk was $0.26 \times 10^{-6} \mu\text{Sv/y}$. The external and internal hazard index averaged 0.39 and 0.47, respectively, and the mean annual

gonadal dose equivalent was 465.14 $\mu\text{Sv/y}$. The radium equivalent dose averaged 143.45 Bq/kg while the gamma representative index averaged 1.05. The absorbed dose rate, mean concentration of ^{40}K and ^{232}Th , the average values of excess lifetime cancer risk, the annual gonadal dose equivalent, and the gamma representative index were above the permissible limit as set by the radiation regulatory agencies. The study concluded that the human activities in Ojota Chemical Market might have increased the radiation burden of the community.

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