

## Soil-to-plant transfer factors and radiological risk assessment (Monte Carlo simulation) of selected mining sites in Nigeria.

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One of the major route through which human are exposed to ionizing radiation is via food chain, which is consequent of soil-to-plant transfer of radionuclides. This work reported the activity concentrations of  $^{40}\text{K}$ ,  $^{238}\text{U}$  and  $^{232}\text{Th}$  in samples of water, soil and guinea-corn collected from Beryllium and Gold mining sites in Kwara, Nigeria. In-situ measurements at approximately 1 m in the air was carried out using a well-calibrated portable Gamma Spectrometer (Super-Spec RS-125), while the collected samples were analyzed using a '3 x 3' inch lead-shielded NaI (Tl) detector. The measured activities in the soil from both mines are lower than the in-situ measurements. This was attributed to the contribution from other terrestrial materials on-site. The estimated mean transfer factors (TFs) for  $^{40}\text{K}$ ,  $^{238}\text{U}$  and  $^{232}\text{Th}$  are 0.21, 0.17 and 0.31, and 0.46, 0.19 and 0.28 respectively for the Beryllium and Gold mining sites. While the TFs for  $^{238}\text{U}$  and  $^{232}\text{Th}$  exceeds the mean value of 0.0062 and 0.0021 for  $^{238}\text{U}$  and  $^{232}\text{Th}$  respectively, the TFs for  $^{40}\text{K}$  are well below the 0.74 for grains provided by IAEA. The radiation impact assessment using the Monte Carlo simulations reveals values that were generally within the limits recommended by UNSCEAR.

Keywords: Cancer, Radioactivity, Gamma Spectroscopy, Risk Assessment, Monte Carlo

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