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Excess lifetime cancer risk due to natural radioactivity in soils: Case of Karibib town in Namibia

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The Erongo region of Namibia has been reported to experience high natural background radiation resulting from the presence of uranium bearing ores. In order to estimate the radiation risk to the general populace living in the Erongo region, a total of thirty surface soils samples and twenty radon gas monitors (CR 39) were collected from a Gold Mining town of Karibib. The radon gas monitors were deployed in selected households for three months. Naturally occurring radionuclides ^{238}U , ^{232}Th and ^{40}K present in these soils were measured using HPGe γ -ray spectrometer to evaluate the radiation health hazard indices and excess lifetime cancer risk (ELCR). Average concentrations of ^{238}U , ^{232}Th and ^{40}K in the soil were found to be 62.33 ± 0.10 , 66.65 ± 0.06 , 1122.20 Bq/kg respectively. The mean concentration of indoor radon gas in the selected households was 79.00 ± 6.68 Bq/m³. The average radium equivalent activity 244.05 Bq /kg, the total annual effective dose 1.23 mSv/yr due to ^{238}U , ^{232}Th and ^{40}K and the effective indoor dose rate due to radon was found to be 2.28×10^{-3} mSv/yr. The higher values for some of the health parameters in the town may present a serious public health problem because the soil is used as a constructing material for building. The excess lifetime cancer risk (ELCR) due to radionuclides in soil was found to be 4.08×10^{-3} which slightly higher than the world value of 0.29×10^{-3} .

Keywords

HPGe γ -ray spectrometer, health hazard indices, lifetime cancer risk, radioactivity

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