# Concentrations of radionuclides in selected foodstuffs and consumer products in Nairobi using gamma-ray spectroscopy

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**Abstract:**

Concentration of radionuclides in some selected foods and environmental samples were measured using a Hyper-Pure Germanium (HPGe) gamma-ray spectrometer. The radionuclides include the naturally occurring radionuclides (40K, 226Ra 238U and 232Th) and fission products (I37Cs and 134CS) from nuclear power and the weapon tests conducted in the 50s and early 60s. The samples include cereals, milk, fertilizer and their byproducts which are widely used in Kenya. Presence of radionuclides in these materials therefore represent important direct and indirect pathways for internal and external radiation exposure to the public and assessment of their radionuclide concentrations is a step towards the realization of a database on radioactivity levels in foodstuffs and consumer products. These samples were obtained from retail outlets in Nairobi city. Quality control of the measurements and detector efficiency calibration were carried out using the International Atomic Energy Agency (IAEA) Certified Reference Materials comprising of soil, (IAEA - 375 soil and milk powder (IAEA - 152). Among all the radionuclides, 40K has the highest concentrations in the samples analyzed. Concentrations of 40K range from 5.7 - 637.0 Bq kg' in foodstuffs; 12.7 - 75.3 Bq kg-1 in environmental samples and 196.9 - 670.2 Bq kg-1 in geological materials. Concentrations of 232Th range from 0.15 - 5.9 Bq kg-1 for foods; 0.15 - 5.51 for environmental samples and 0.86- 25.6 Bq kg' for geological materials. 22~ (238U) was found to be in the range 0.19 - 6.9 Bq kgI in foodstuffs; 0.19 - 424 Bq kg-1 in environmental samples and 0.86 - 284 Bq kg' of 238U in geological samples. Concentration of fission products like l37 Cs and 134CS in Kenyan foods, environmental and geological samples were all found to be below the low limit of detection; 0.54 and 0.30 Bq kg' forl37Cs and 134CS respectively. Results of this study indicates 40K as the major contributor to annual ingestion dose as a result offood consumption ranging from 0.023 mSv a-I for tea leaves to 0.162 mSv a-I for maizemeal. Infant milk was found to contribute 0.05 mSv a-Ion average. 40K was used to estimate the radiation doses due to ingestion of food because it had the highest concentrations in all analyzed samples. Maizemeal (maize flour) is the staple diet in Kenya, and Nairobi in particular. This sample was therefore used in estimating the radiation dose due to food intake.