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## Radionuclide Contents and Physicochemical Water Quality Indicators in Stream, Well and Borehole Water Sources in High Radiation Area of Abeokuta, Southwestern Nigeria

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### ABSTRACT

Water samples from streams, hand-dug wells and boreholes in high background radiation areas in Abeokuta, Nigeria have been collected in order to determine the activity concentrations of  $^{40}\text{K}$ ,  $^{226}\text{Ra}$  and  $^{232}\text{Th}$  in the samples as well as their physicochemical characteristics. These parameters were evaluated in order to determine the quality of these water sources to the local population, who use these water resources for drinking and domestic activities. Measurements of radioactivity in the water samples were carried out using  $\gamma$ -ray spectroscopy, while standard chemistry methods were used for the physicochemical determinations of these quality parameters. A total of fourteen representative water samples from streams (7), boreholes (4), and hand dug wells (3) were collected for study. The determined activity concentrations of the radionuclides in these samples were used to calculate the effective dose to the population from due to ingestion of and drinking the locally available water. The total annual ingestion effective doses were found to vary between  $115.00 \pm 1.15 \mu\text{Sv}$  and  $1362.30 \pm 438.02 \mu\text{Sv}$ . The physicochemical parameters were found to be lower than the prescribed standard safe limits in the water sources except for the nitrate and phosphate levels which were particularly high in the water samples from boreholes and hand-dug wells. The radiation effective ingestion dose due to ingestion of water from dug wells and streams was found to be higher than the dose due to ingestion of water from borehole sources in the studied areas. The results obtained in this study, have been taken as a baseline for physicochemical parameters and activity concentrations of natural radionuclides in water samples within Odeda and Obafemi-owode parts of Abeokuta, Nigeria.

### KEYWORDS

Radionuclides, Gamma Ray Spectroscopy, Physicochemical Quality, Drinking Water Quality, High Background Radiation, Radiation Ingestion Effective Dose

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