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GEOLOGY AND RADON: HEALTH RISK FROM LUXURY HOMES IN TROPICAL ENVIRONMENT OF NIGERIA, WEST AFRICA

The Geology of an area determines the source and distribution of radionuclide in an environment. Radionuclides have been in existence since the beginning of creation. They are present in the air we breathe, the water we drink and the food we eat. They are found in soils we grow crops, in building materials we use to construct our homes, hospital and industries. Soil and rocks serve as the main building materials, as they contain naturally occurring Radioactive Materials. These materials contain trace amount of Uranium (^{238}U), thorium (^{232}Th), they can be sources of radionuclide's radon (^{222}Rn), and thoron (^{220}Rn), with their respective decay series. Radon escape from building material through construction joints cracks in solid floor, cavities inside wall, gaps around service pipes, which can build up indoors. This paper is an ongoing radon exhalation study by different building materials in Kano City, North-western Nigeria, which commenced in 2019. The study is aimed at evaluating the health risk associated with life style and choice of building materials. High purity germanium RAD7 detector (HGe) EG & G ORTEC, p- type model GEMS 70 S equipment with 60% efficiency and 7.62 x 7.62 cm NaI (TI) crystal operating at 4000v was used. The Homes are grouped into three based on status and living conditions of home owners, these are low income, (Type I), medium income (Type II) and high and luxurious income earners, Type III, and respective materials utilized in building these homes as follows: (Type I) material, Laterite and mud (Type II) Sharp sand, Gravel aggregates, plaster sand Cement and Concrete block and Type III made of Sharp sand, Gravel aggregates, plaster sand Cement, Phosphogypsum (pop), quarry dust and vibrated concrete block. The preliminary result of studies showed radon radiological values from Type I Laterite as 37 ± 2 , Mud 26 ± 1.8 Plaster Sand 117 ± 12 , in (Type II) Plaster Sand 117 ± 12 , Sharp Sand 60 ± 1.0 , Gravel Aggregates 44 ± 7 , Cement 7 ± 0.3 , Concrete blocks 123 ± 1 , Type III Plaster Sand 117 ± 12 , Sharp Sand 60 ± 1.0 , Gravel Aggregates 44 ± 7 , Cement 7 ± 0.3 , Concrete blocks 123 ± 1 , Phosphogypsum $2,684\pm 22$. Total radon Type I 180 Bqm-3, Type II, 351 Bqm-3 and Type III 3,035 Bqm-3. Working level at home (WLM) for the Type I, 0.79 (3.16mSv), Type II, 1.54 (6.16 mSv) and Type III 13.35 (53.4 mSv). The preliminary studies indicated that the exposure to radon daughters is higher than recommended values by the EPA, NRC and USDOE of 4 and 12WLM per year for radon and thoron, respectively. The research also shows that Radon build up is less in Type I but higher in Type III Luxurious home built Phosphogypsum.

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