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Environmental and human health risks assessment of potentially toxic elements content in soils of a prospective phosphate mining area in Hinda district, Republic of Congo

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The present study aims to assess environmental pollution and human health hazard due to potentially toxic elements content in the soils of a prospective phosphate mining area in Hinda district. 24 soil samples were collected in a study area. Samples were analyzed using ICP-MS. Results obtained shown mean concentration of potentially toxic elements above the upper continental crust (UCC) and decreased in the following order: Cr > Pb > Zn > Cu > As > Cd > Hg. Environmental and ecological pollution were evaluated by the calculation of contamination factor (CF) and degree of contamination (Cdeg), geo-accumulation factor (Igeo), and pollution load index (PLI). Results obtained shown the whole study area polluted by potentially toxic elements (PLI > 1). However, carcinogenic health risk was evaluated for children and adults. Results found shown cancer risk levels greater than 1×10^{-4} for both children and adults, also indicating that children are more susceptible to carcinogenic health effects due to potentially toxic elements, leading to an alarming contribution of potentially toxic elements to the cancer. Environmental pathways of potentially toxic elements were described, showing different scenarios of contamination through ingestion and dermal contact by children and adults in the study area. Principal component analysis (PCA) was applied to identify and group the potentially toxic elements in different sampling localities. The present paper will serve as a baseline data for environmental scientists around the world regarding environmental, ecological and human health risks due to potentially toxic elements.

Keywords: Potentially toxic elements, soil contamination, risk assessment, human health risk, prospective phosphate mining area, Republic of Congo.

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