

Human health risk assessment of heavy metals in soils and commonly consumed food crops from quarry sites located at Isiagwu, Ebonyi State

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Abstract. In view of ensuring healthy agricultural foods for human consumption, this study assessed the human health risk implicated in selected heavy metals in some commonly consumed vegetables, tubers, nuts and fruits grown around the quarry sites at Ishiagu, Ebonyi State, Nigeria. Samples from agriculture area of Umudike, Abia State, Nigeria, constituted the control. The concentration of Mn, Zn, Fe, Cu, Cd, and Pb, were determined using atomic absorption spectrometry. The potential non-carcinogenic health risk for consumers which included Estimated Daily Intake (EDI) and Target Hazard Quotients (THQ) for Pb, Fe, Mn, Zn, Cd and Cu while carcinogenic health risk using Cancer Slope Factors (CSF) was established for Cd and Pb. Relative abundance of heavy metals across the locations and all samples was in the order Fe > Mn > Zn > Pb > Cu > Cd. There was statistical significant effect of quarrying activities on the concentration of the heavy metals (Fe, Mn, Zn, Pb, Cu, Cd) at $p < 0.05$ level. Based on the observed bioconcentration factors, cassava showed more hyperaccumulation potential compared to other samples. Pumpkin and bitter leaf also could be used in remediation owing to their high bioaccumulation index for Pb and Zn. THQ obtained for Mn and Pb were >1 indicating that the residents at the quarry site may be exposed to potential non-carcinogenic health risk due to Mn and Pb intoxication. With respect to US EPA prescriptions, average carcinogenic risk values obtained for Pb and Cd in this study indicated a lifetime (70 years) probability of contracting cancer suggesting that they be placed for further consideration as chemicals of concern with respect to the assessed locals.

Keywords: health risk assessment, bioconcentration factors, daily intake of heavy metals, target hazard quotient, carcinogenic risk, heavy metal.

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