

Dietary Risk Assessment of Green Leafy Vegetables (GLV) Due to Heavy Metals from Selected Mining Areas

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Abstract : Illicit surface mining activities pollutes agricultural lands and water bodies and results in accumulation of heavy metals in vegetables cultivated in such areas. Heavy metal (HM) accumulation in vegetables is a serious food safety issues due to the adverse effects of metal toxicities, hence the need to investigate the levels of these metals in cultivated vegetables in the eastern region. Cocoyam leaves, cabbage and cucumber were sampled from selected farms in mining areas (Atiwa District) and non -mining areas (Yilo Krobo and East Akim District) of the region for the study. Levels of Cadmium, Lead, Mercury and Arsenic were investigated in the vegetables with Atomic Absorption Spectrometer, and the results statistically analyzed with Microsoft Office Excel (2013) Spread Sheet and ANOVA. Cadmium (Cd) and arsenic (As) were the highest and least concentrated HM in the vegetables sampled, respectively. The mean concentrations of Cd and Pb in cabbage (0.564 mg/kg, 0.470 mg/kg), cucumber (0.389 mg/kg, 0.190 mg/kg), cocoyam leaves (0.410 mg/kg, 0.256 mg/kg) respectively from the mining areas exceeded the permissible limits set by Joint FAO/WHO. The mean concentrations of the metals in vegetables from the mining and non-mining areas varied significantly ($P < 0.05$). The Target Hazard Quotient (THQ) was used to assess the health risk posed to the human population via vegetable consumption. The THQ values of cadmium, mercury, and lead in adults and children through vegetable consumption in the mining areas were greater than 1 ($THQ > 1$). This indicates the potential health risk that the children and adults may be facing. The THQ values of adults and children in the non-mining areas were less than the safe limit of 1 ($THQ < 1$), hence no significant health risk posed to the population from such areas.

Keywords : food safety, risk assessment, illicit mining, public health, contaminated vegetables

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