Heavy Metals (Cd, Cu, Fe, Mn and Zn,) Assessment of Soil and Groundwater Collected from Hand-Dug Wells and Boreholes, in

Kaltungo LGA, Gombe State Nigeria.

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ABSTRACT

This study was aimed towards investigating the heavy metals concentrations in soil and ground water samples collected from hand-dug wells and around boreholes surroundings. The need of the study also arose from the fact that the primary sources of drinking water supplies in the region are hand-dug wells as well as boreholes and there is severe and naked evidence of tooth fluorisis amongst natives in the region. Four different sites were mapped out for the study and this was followed by sample collection and sample treatment using the perchloric acid digestion to extract metals in soil while nitric acid digestion was use to extract metals from water. Thereafter, metals of interest (Cd, Cu, Fe, Mn and Zn) were assayed using Varian AA240FS Atomic Absorption Spectrophotometer. The region under study is Kaltungo LGA in Gombe, Gombe State, Nigeria and the evaluated soil and water samples from the four different sites chosen for the study appears to have some heavy metals concentrations above the WHO/SON standards. Soil samples were collected from different depths, air dried and grounded to pass a 2 mm sieve. Heavy metals concentrations as measured across the soil samples ranged from: cadmium 1.352 – 5.043 mg Cd/kg, copper 5.836 – 450 mg Cu/kg, iron 4,616 – 48,197 mg Fe/kg, manganese 125.4 – 984.1 mg Mn/kgand zinc 102.1 – 478.4 mg Zn/kg. While that in groundwater was found to be copper 0.03-0.60 mg/L, iron 0.395-22.90 mg/L, zinc 0.073-1.670 mg/L, manganese 0.046-1.85 mg/L and cadmium 0.009-0.446 mg/L. Cadmium, manganese, and iron in most samples exceeded the World Health Organization (WHO) and Standard Organization of Nigeria (SON) maximum tolerance limits. From this study the measured values for these three elements are well above the globally accepted standards indicating that drinking water in this region may be subject to their pollution. Analyses of variance (ANOVA) and Pearson correlation analysis were used to treat the data.

Keywords: Heavy metals, groundwater, Soil, FAO and AAS