

Water Quality, Risk, Management and Distribution in Abeokuta, Ogun State

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Abstract : The ancient city of Abeokuta has been supplied with pipe borne water since 1911, yet, a continuous increase in population and unplanned city expansion makes water a very precious and scarce commodity. The government reserved areas (GRA's) are well planned, and public water supply is available; however, the sub-urban areas consist of scattered structures with individuals trying to source water by digging wells and boreholes. The geology of the city consists of basement rock which makes digging wells and boreholes very difficult. The present study was conducted to assess the risk arising from the consumption of toxic elements in the groundwater of Abeokuta, Ogun State, Nigeria. Forty-five groundwater samples were collected from nine different areas of Abeokuta and analyzed for physicochemical parameters and toxic elements. The physicochemical parameters were determined using standard methods, while the toxic elements were determined using Inductively Coupled Plasma-Mass Spectrometer (ICP/MS). Ninety-six percent (96%) of the water sample has pH < 6.5, and 11% has conductivity > 250 μSCm^{-1} limits in drinking water as recommended by WHO. Seven percent (7%) of the samples have Pb concentration >10 μgL^{-1} while 75% have Al concentration >200 μgL^{-1} recommended by WHO. The order for risk of cancer from different area of Abeokuta are $\text{Cd}^{2+} > \text{As}^{3+} > \text{Pb}^{2+} > \text{Cr}^{6+}$ for Funaab, Camp and Obantoko; $\text{As}^{3+} > \text{Cd}^{2+} > \text{Pb}^{2+} > \text{Cr}^{6+}$ for Ita Osin, Isale Igbein, Ake and Itoku; $\text{Cd}^{2+} > \text{As} > \text{Cr}^{6+} > \text{Pb}^{2+}$ for Totoro; $\text{Pb}^{2+} > \text{Cd}^{2+} > \text{As}^{3+} > \text{Cr}^{6+}$ for Idiaba. The order of non-cancer hazard index (HI) calculated for groundwater of Abeokuta City are $\text{Cd}^{2+} > \text{As}^{3+} > \text{Mn}^{2+} > \text{Pb}^{2+} > \text{Ni}^{2+}$ and were all greater than one, which implies susceptibility to other illnesses. The sources of these elements are the rock and inappropriate waste disposal method, which leached the elements into the groundwater. A combination of sources from food will accumulate these elements in the human body system. Treatment to remove Al and Pb is necessary, while the method of water distribution should be reviewed to ensure access to potable water by the residents.

Keywords : Abeokuta, groundwater, Nigeria, risk

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