

Gold Mining Impact on Environment and Health in the Obuasi Municipality

Huago, Stephen G

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ABSTRACT

Physical and chemical properties of the soils, surface and groundwater samples in the catchment area of the Obuasi mines and a farming community outside the mining area were investigated to ascertain the impact of mining activities on soil and water resources and the possible health implication. Ten (Surface and Underground) water and 16 soil samples were analysed. Five water and 6 soil samples from a non-mining community were also analysed. The concentration of Fe, Cu, Zn, Pb, Cd, Hg, As and selected anions such as CN^- , NO_3^- , SO_4^{2-} as well as pH and conductivity in surface water, groundwater and soil samples were reported to assess their role in the contamination of the environment and the effect on human health. Views from residents and statistical data from different hospitals and Ghana Health Service (Chim) were collected to ascertain the health implication of mining on humans. The mineralogical composition of the various samples was investigated using AAS and NAA. Titrimetric method was employed to assess the levels of free CN in water and soil samples. The Hanna pH 211 instrumental microprocessor pH meters shows a pH range of 5.5 to 7.4 in water samples from study area and 5.5 to 6.5 in samples from non-mining area. Electrical conductivity analysis revealed low to medium levels ranging from 28 to 472 $\mu\text{S/cm}$. Free cyanide concentration in samples from mining communities ranged from <0.001 to 8.0 mg/l. About 60% of the water samples recorded cyanide concentrations exceeding the WHO guideline limit of 0.07 mg/l and EPA (Ghana) guideline limit of 0.2 mg/l in drinking water. Arsenic levels varied from 0.23 to 8.91 mg/l, which are above the WHO guideline limit (0.1 mg/l) in drinking water. Six out of the ten samples, constituting 60% of the entire samples had mercury levels ranging from 0.75 to 2.46 mg/l, which are above the WHO guideline limits of 0.005 mg/l for drinking water. Soil samples taken from a depth of 0-5 cm contained high As levels up to 3.93 mg/kg, whereas those taken at depth 5-20 cm contained up to 2.04 mg/kg. Levels of mercury in soils taken from the depth of 0-5 cm ranged from <0.01 to 0.030 mg/kg with a mean value of 0.015 mg/kg, whereas those from depth 5-20 cm had levels varying from <0.01 to 0.05 mg/kg with a mean value of 0.0157 mg/kg. Other metals such as Cu, Cd, and Cr had mean values of 22.40, 0.20, and 1.76 mg/kg at depth 0-5 cm whereas depth 5-20 cm concentrations were 20.54, 0.069, and 1.36 mg/kg respectively in samples from mining communities. Water samples from non-mining community had only traces of cyanide, As, Hg, Cd, Ni, Cr and Pb. The maximum values of Cu and Zn were 0.041 and

0.128 mg/l respectively. Soil samples from the farming community recorded traces of CN, Hg, and Cd. The average values of As, Cu, Zn and Pb in soils from the farming community were 0.29, 3.17, 2.95 and 1.44 mg/kg respectively. The study revealed that mining impacts on the environment and health. Fifty seven percent of the respondents claimed mining degrades the farm land whiles 13 % talked about deforestation. The remaining 30 % believed water pollution in the area is a significant effect of mining on the environment. The prevalence rates of mining related diseases were significantly higher in St Jude Hospital in Obuasi than Battor Catholic Hospital. The prevalence rates of mining related diseases were higher in Obuasi municipality than the average regional values from non-mining regions. The prevalence rate of Skin Disorders in Obuasi was found to be 12897 whiles the regional average prevalence rates in Central and Volta Regions were 4928 and 5439 respectively in 2010.

Supervisors

Dr. Hayford, E. K

Prof. Abekoe, M. K

Prof. Osae, E. K

