A Comparative Study of the Environmental Impact of Waste Dumpsite in Selected Rural and Peri-Urban Communities in Greater Accra

KWARTENG OWUSU JUSTICE

2012

ABSTRACT

Open dumping of solid wastes is a common phenomenon in towns and cities of many developing countries. The study was carried out on dumpsite soils from two peri-urban (Dodowa and Boi) and two rural (Doryumu and Kordiabe) communities in the Greater Accra Region Ghana. The main objective of this study was to determine the concentration of selected physicochemical properties of open dumpsite soils, waste composition and the potential environmental impact of dumpsites in peri-urban and rural areas. The concentrations of organic carbon (% C), copper (Cu), nickel (Ni), iron (Fe), cadmium (Cd), calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), pH and electrical conductivity were determined from dumpsite soils sampled in both peri-urban and rural dumpsite. A total of 40 questionnaires were administered to respondents living within 100 m and beyond 100 m of the dumpsites in both communities to assess their impact on them. Soils from peri-urban and rural dumpsites differed in percentage carbon, heavy metals, exchangeable base, electrical conductivity and pH concentrations at each site in December 2011 and March 2012. In December the mean % C was higher in peri-urban dumpsite soil (20.172) than rural dumpsite soils (20.002). There were no significant differences in the mean concentrations of% C ($p = 0.805$), between peri-urban and rural communities at 95 % confidence interval. Peri-urban recorded lower mean Cu (5.116), Fe (518.733), Cd (4.65) and Ni (4.083) concentrations than Cu (13.333), Fe (520.116), Cd (4.567) and Ni (34.267) in rural dumpsite soils. The p-values of Cu, Fe, Cd and Ni were 0.131, 0.603, 0.936 and 0.059, respectively for the differences in concentration between rural and peri-urban dumpsites soils. At 95 % confidence interval there were no significant differences in the concentration of heavy

metal between peri-urban and rural dumpsite soils. Rural dumpsite soils recorded the highest mean Ca (17403.33) and Mg (4856.5) than peri-urban dumpsite soils. Peri-urban dumpsite soils recorded higher Na (1292.5) and K (1933.33) than rural dumpsite soils. There was significant difference ($p = 0.018$) in the mean Mg concentration between peri-urban and rural dumpsite soils. In March 2012 the mean % C was higher in peri-urban dumpsite soil (20.080) than rural dumpsite soils (19.966). Peri-urban recorded mean Cu, Fe, Cd and Ni concentrations of29.7, 406.683, 4.117 and 6.3, respectively. Rural dumpsite soils recorded higher mean concentration of Fe (4.117) and Ni (23.4) than peri-urban dumpsite soils. Peri-urban dumpsite soil recorded the highest mean Na (4131.667) and K (3960) compared to rural dumpsite soil. Rural dumpsite soils recorded the highest mean Ca (3844.667) concentration in comparison to peri-urban dumpsite soils. There were no significant differences in the concentration of Ca ($p = 0.690$), Na ($p = 0.468$), K ($p = 0.951$) and Mg ($p = 0.238$) between peri-urban and rural dumpsite soils. Rural dumpsite soil recorded a higher mean pH (7.6) than peri-urban dumpsite soil (7.5), while peri-urban recorded higher electrical conductivity value (1219.5) than rural dumpsite soil (593.3). Peri-urban dumpsites recorded the largest volume of waste compared to rural dumpsites. Size of dump sites was dependent on the availability of land and not on the type of community. Plastics dominated the waste materials at the peri-urban dumpsites whilst plant materials formed majority of waste at the rural waste dumpsites. Malaria was the common diseases recorded by households in rural communities whiles in peri-urban communities malaria and \cholera were both recorded. Based on the study it was recommended that open dumps should be discouraged in both peri-urban and rural communities since they could serve as potential sources of pollution.

Supervisors

Dr. Nyame Frank

Mr. Allotey Jonathan