## ABSTRACT

Lake Victoria is the largest freshwater and fishery lake in Africa. Kisumu City on the Winam Gulf has industrial activities that dispose of their effluents into the lake which may contaminate aquatic species thus threatening human health. It is not known fully if these anthropogenic activities adversely change the water quality and contribute heavy metal pollutants to the lake water and/or cause high accumulation of the metals in sediments and fish from the gulf. The study employed a three factor completely randomized design. Samples of water from Molasses Plant, Rivers Kisat and Kisian and lakewater, sediments and fish species (*Lates niloticus, Oreochromis niloticus, Synodontis victoriae and clarias batrachus*) were collected from Lake Victoria shoreline near the city. The samples were digested and analyzed using Atomic Absorption Spectrophotometer for heavy metals during wet (April-July 2013) and dry (Jan-Feb 2014) seasons to assess the influence of the anthropogenic activities within Kisumu City and adjacent environment on heavy metal levels in aquatic samples and water physicochemical parameters. The data was subjected to statistical analysis using MSTATC package at 95% confidence level. The heavy metal levels (µg/L) in river and lake waters recorded ranges were Cd (1.00 - 12.00), Cr (13.00 - 75.50), Cu (23.00 - 276.50), Fe (789.00 - 1050.50), Mn (452.50 - 2466.30), Pb (33.50 - 409.50), Zn (954.50 - 50.00) and Cd (0.20 - 1.30), Cr (21.00 - 55.00), Cu (8.00 - 25.00), Fe (127.50 - 225.00), Mn (76.00 - 334.00), Pb (5.00 - 10.00), Zn (9.00 - 21.00) respectively. The heavy metal levels in the water channels decreased ($p \leq 0.05$) in the order Kisat > Molasses > Kisian. River Kisat water was the most polluted. The levels of the heavy metals in lake and river waters varied ($p \leq 0.05$) with sites. Water from Kisat discharge point had levels above the recommended WHO acceptable limits for aquatic life and domestic use. The metal levels (µg/g in dry weight basis) in sediments were Cd (0.90 - 1.20), Cr (2.60 - 36.00), Cu (71.40 - 122.90), Fe (1283.40 - 1468.70), Mn (792.30 - 1631.20), Pb (61.80 - 181.00) and Zn (100.10 - 187.60). Heavy metal levels in River Kisat discharge point sediments were high ($p \leq 0.05$) compared to levels in sediments from River Kisian discharge point. The heavy metal ranges in the edible fish tissues (µg/g on dry weight basis) across the caught fish species were Cd (0.60 - 0.70), Cr (0.60 - 0.80), Cu (2.90 - 3.70), Fe (33.70 - 36.90), Mn (74.70 - 90.90), Pb (0.40 - 0.70) and Zn (31.30 - 41.20). The metal levels in fish were above international limits. The water physicochemical parameter levels varied ($p \leq 0.05$) with sites. Dissolved oxygen in lake water was below the WHO recommended limits for fisheries. The high metal levels in aquatic samples (water, fish and sediments) and deterioration of water quality parameters from the study area were due to intense anthropogenic activities. Use of water from Kisat discharge point and consumption of fish from the study area may pose health risks. Regular environmental assessment of heavy metal levels in water, sediments and fish, and water quality physicochemical parameters is recommended.