

Residue levels and discharge loads of antibiotics in wastewater treatment plants ( WWTPs), hospital lagoons, and rivers within Lake Victoria Basin, Kenya.

Authors.

### **Abstract**

The detection of antibiotics in water systems has instigated great environmental concern due to the toxicological effects associated with these compounds. Their discharge into the environment results from the ubiquity of use in medical, veterinary, and agricultural practices. Some of the effects of antibiotics include development of antibiotic-resistant bacteria, making it difficult to treat diseases, variation in natural microbial communities, and enzyme activities. In this study, the first comprehensive survey of some frequently used antibiotics namely ampicillin (AMP), amoxicillin (AMX), sulfamethoxazole (SMX), chloramphenicol (CAP), and ciprofloxacin (CPF) within Lake Victoria Basin of Kenya is presented. Sludge and wastewater samples were collected from wastewater treatment plants (WWTPs) and hospital lagoons within the study area. Samples were extracted and cleaned by solid-phase extraction, and analysis was carried out using high-performance liquid chromatography (HPLC). All wastewater samples and sludge collected contained quantifiable levels of the selected antibiotics. The highest concentrations were recorded for AMP with WWTPs and hospitals having  $0.36 \pm 0.04$  and  $0.79 \pm 0.07$   $\mu\text{g/L}$ , respectively. In sludge samples, SMX recorded the highest concentrations of  $276 \pm 12$   $\text{ng/g}$ . The high levels in sludge indicate the preferential partition of antibiotics onto solid phase, posing great danger to consumers of crops grown in biosolid-amended soils. The daily discharge loads of antibiotics from nine WWTPs ranged between  $80.75$  and  $3044.9$   $\text{mg day}^{-1}$  with a total discharge of  $6395.85$   $\text{mg day}^{-1}$ , signifying a high potential of water resource pollution within the region. This report will aid in the assessment of the risks posed by antibiotics released into the environment.

**Selly Kimosop, Zachary Moranga Getenga, Francis Orata, Veronica Okello, Jemoi Cheruiyot.**