

The reach of human health risks associated with metals/metalloids in water and vegetables along a contaminated river catchment: South Africa and Mozambique

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Abstract:

Background: Anthropogenic pollution was identified as an environmental problem of concern when, in 2008, dozens of crocodiles died in the Olifants River catchment near the border of South Africa and Mozambique. Given the close proximity of households to the river and their making use of river water, we aimed to determine to what extent water pollution has an impact on health of indigent communities in South Africa and Mozambique in the catchment area. Methods: Water and vegetable samples were collected from the study areas. Biota samples were washed with double de-ionized Milli-Q water and freeze-dried. Heavy metal analyses in water and vegetables were done by means of Inductively Coupled Plasma Optical Emission Spectroscopy. Metal concentrations were applied in a human health risk assessment to estimate health risks. Results: Mean concentrations of antimony, arsenic, cadmium, chromium, mercury, molybdenum, nickel and selenium in water samples from South Africa exceeded the World Health Organization guidelines for safe levels of intake. Only iron exceeded the recommended guidelines in water samples from Mozambique. Metals/metalloids were found in lower concentrations at Mozambique sites downstream of South African sites. In vegetables, uranium was between 10 and 20 times above safe guidelines in South Africa and between 3 and 6 times in Mozambique. Arsenic in water samples posed the highest cancer risk. Conclusions: Even with a reduction in the metal concentrations in river water from South Africa to Mozambique, the potential to cause adverse human health impacts from direct use of polluted river water is evident in both countries.