

Health risk implications from simultaneous exposure to multiple environmental contaminants

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Abstract

Water quality has deteriorated in the upper Olifants River system, South Africa, as a result of land use activities which include mining, agriculture and industries. A health risk assessment was conducted from 2009 to 2011 in the catchment to determine the possible risks local communities face from various pollutants such as microbials, heavy metals and oestrogen in the river water and vegetation. Aluminium and manganese accumulated in plants and vanadium and aluminium concentrations found in selective water samples posed significant health risks when consumed. A quantitative microbial risk assessment revealed that the combined risk of infection ranged from 1 to 26 percent with the Norovirus posing the overall greatest health risk. The anticipated disability adjusted life years resulting from drinking untreated water from these sites are in the order of 10,000 times greater than what is considered acceptable. The oestradiol activity, caused by endocrine disrupting compounds in the water, measured above the trigger value of 0.7ngL(-1). Impoverished communities in the area, who partially depend on river water for potable and domestic use, are exposed to immune-compromising metals that increase their probability of infection from waterborne diseases caused by the excess microbial pathogens in the contaminated surface water.