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Prevalence of enteropathogenic bacteria in treated effluents and receiving water bodies and their potential health risks

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Abstract

The failure of wastewater treatment plants to produce effluents of a high microbiological quality is a matter of great concern in terms of water resource pollution. A more serious concern is that this water source is used by communities in developing countries for multiple purposes, which include drinking, recreation and agriculture. The current study investigated the prevalence and potential health risks of enteropathogenic bacteria (*Salmonella typhimurium*, *Shigella dysenteriae* and *Vibrio cholerae*) in the treated effluents of three selected South African Wastewater Treatment Works as well as their receiving water bodies. Culture-based and polymerase chain reaction techniques were used to detect and identify the pathogenic bacteria. The conventional methods revealed that of the 272 water samples collected, 236 samples (86.8%) tested presumptively positive for *Salmonella* spp., 220 samples (80.9%) for *Shigella* spp. and 253 samples (93.0%) for *V. cholerae*. Molecular test results indicated that out of the randomly selected presumptive positive samples (145), zero to 60% of samples were positive for *S. typhimurium* and *S. dysenteriae* and 20% to 60% for *V. cholerae*. For the health risk assessment, the daily combined risk of *S. typhimurium*, *S. dysenteriae* and *V. cholerae* infection was above the lowest acceptable risk limit of 10^{-4} as estimated by the World Health Organization for drinking water. This study showed that the target treated wastewater effluents and their receiving water bodies could pose a potential health risk to the surrounding communities.