

# The abundance of *Cryptosporidium* and *Giardia* spp. in treated effluents produced by four wastewater treatment plants in the Gauteng Province of South Africa

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## Abstract

This study aimed at assessing the effectiveness of 4 wastewater treatment plants of the Gauteng Province, namely Zeekoegat, Baviaanspoort, Rayton and Refilwe Water Care Works (WCW), in the removal of *Cryptosporidium* and *Giardia* (oo)cysts. Wastewater influent and treated effluent samples were taken weekly between January and April 2008. *Cryptosporidium* and *Giardia* (oo)cysts were detected by immunofluorescence and immunomagnetic separation, according to a modified US EPA 1623 method. Effluent samples were subjected to a molecular study for the identification of *Cryptosporidium parvum* **Genotype I** and *Giardia lamblia* **Assemblage A**. The 18S rRNA gene for restriction digests was therefore used to characterise these (oo)cysts. *Cryptosporidium* oocysts were repeatedly detected in effluent samples collected from all wastewater treatments at lower concentration (range <1 to 40 oocysts/L) levels than *Giardia* cysts (range <1 to 175 cysts/ℓ). The mean removal efficiencies of *Cryptosporidium* and *Giardia* at the 4 wastewater treatment plants ranged from 67.40% to 98.26% and from 86.81% to 99.96%, respectively. For all effluent samples, except Zeekoegat WCW, 29% and 41% contained oocysts of *Cryptosporidium parvum* Genotype I and cysts of *Giardia lamblia* Assemblage A, respectively. Both *C. Parvum* and *G. lamblia* are human pathogens. This stresses the potential risk of discharging these parasites into receiving water bodies.

**Keywords:** wastewater, removal, *Cryptosporidium parvum*, *Giardia lamblia*, genotype