

2024-03-16

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<https://doi.org/10.21203/rs.3.rs-4174422/v1>

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Assessment of resistant *Escherichia coli* in groundwater sources and sanitary inspection for contamination risk in Bagamoyo, Tanzania.

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DOI <https://doi.org/10.21203/rs.3.rs-4174422/v1>

Abstract

Background

Two billion people globally are using faecal-contaminated water. *E. coli* poses a health risk due to its potential to cause diseases which highlights the need for understanding its antimicrobial resistance profile and associated factors for contamination.

Methods

A cross-sectional study was conducted in the Bagamoyo district council that involved 163 groundwater sources with sanitary inspection and isolation of *E. coli* was conducted using a Membrane filtration method and CHROMagar CCA. In this study, antibiotic susceptibility was carried out according to CLSI guidelines by disk diffusion methods. *E. coli* strain ATCC 25922 was used as the control strain in isolation and susceptibility tests.

Results

The current study found that 44.8% of groundwater samples were contaminated with *E. coli*, with 83.6% of isolates were resistant to antibiotics. High resistance was observed to cefazolin (56.16%), nitrofurantoin (54.79%), amoxicillin-clavulanic acid (45.21%), and ceftriaxone (42.47%). Also, the study reveals that 70% of *E. coli* isolates had multidrug resistance. On the other hand, sanitary inspection showed that 46.2% of dug wells were at a high sanitary risk level, 32.8% of tube wells with hand pumps were at High and low sanitary risk level, respectively and 73.3% of boreholes were at a low sanitary risk level. However, the study showed a high rate of *E. coli* contamination in boreholes at a low sanitary risk level. Also, tube wells with hand pumps and dug wells at high sanitary risk levels had a high rate of *E. coli* contamination. Moreover, resistant *E. coli* in groundwater across varying contamination risk levels revealed a significant prevalence of contamination