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Methodological Evaluation of Municipal Water Systems in Tanzania: Randomized Field Trial for Clinical Outcomes Assessment

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Abstract

Municipal water systems in Tanzania face challenges related to infrastructure quality, maintenance, and affordability, impacting public health outcomes. A cluster-randomized controlled trial design was employed, with schools randomly assigned to either receive improved water treatment or continue using existing facilities. Water quality and child health data were collected over six months. Diarrhea incidence decreased by 25% in the intervention group compared to baseline levels ($p < 0.01$), indicating a significant positive impact of improved water systems on public health. The randomized field trial provided robust evidence for the effectiveness of municipal water system improvements in reducing diarrheal disease among schoolchildren. Public health authorities should prioritise investment and maintenance of municipal water systems to further reduce incidence of diarrheal diseases. water quality, cluster-randomized trial, clinical outcomes, diarrheal diseases, public health Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *Cluster-randomized trial, Geographic Information Systems, Public Health Impact Assessment, Water Supply Management, Sustainability Metrics, Quantitative Research Methods, Community Engagement Strategies*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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