



# Methodological Evaluation of Municipal Water Systems in Uganda: Quasi-Experimental Design for Risk Reduction Measurement Over Time

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## Abstract

Ugandan municipal water systems face challenges in ensuring safe drinking water, leading to frequent outbreaks of waterborne diseases. A quasi-experimental design will be employed, utilising pre- and post-intervention data on water quality parameters to measure changes in risk reduction. Statistical analysis will include a linear mixed-effects model for trend analysis:  $\beta_0 + \beta_1 t + \epsilon$ , where  $t$  represents the time period. A significant decline ( $p < 0.05$ ) was observed in waterborne disease incidence rates across monitored communities, mirroring improvements in water quality indicators over a three-year study period. The quasi-experimental design effectively captured temporal changes in risk reduction metrics, providing robust evidence for the impact of municipal water systems on public health outcomes. Continuous monitoring and periodic system upgrades are recommended to sustain observed reductions in disease incidence. Quasi-Experimental Design, Municipal Water Systems, Risk Reduction, Uganda

**Keywords:** African geography, waterborne diseases, quasi-experimental design, environmental health, methodology, risk assessment, sanitation systems

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