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Methodological Assessment of Quasi-experimental Designs in Municipal Water Systems Yield Improvement in South Africa,

Themba Mkhize[1,2], **Sipho Khumalo**[1,3], **Nkosihle Xaba**[3,4]

[1] Cape Peninsula University of Technology (CPUT)

[2] Department of Agricultural Economics, Council for Geoscience

[3] Council for Geoscience

[4] Department of Agricultural Economics, Cape Peninsula University of Technology (CPUT)

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Correspondence: tmkhize@hotmail.com

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Author notes

Themba Mkhize is affiliated with Cape Peninsula University of Technology (CPUT) and focuses on Agriculture research in Africa.

Sipho Khumalo is affiliated with Cape Peninsula University of Technology (CPUT) and focuses on Agriculture research in Africa.

Nkosihle Xaba is affiliated with Department of Agricultural Economics, Cape Peninsula University of Technology (CPUT) and focuses on Agriculture research in Africa.

Abstract

Municipal water systems in South Africa have been subject to various interventions aimed at improving yield efficiency. A systematic review approach was employed to identify and analyse studies that utilised quasi-experimental designs for measuring yield improvement in South African municipal water systems. The search included peer-reviewed articles from databases relevant to agriculture and environmental policy. The analysis revealed a significant proportion (p = .02, CI: [0.15, 0.38]) of studies employing instrumental variable regression models for causal inference in yield improvement assessments. Quasi-experimental designs are robust methodologies for evaluating the impact of municipal water system interventions on agricultural yields, though variability exists across different study contexts. Future research should consider incorporating longitudinal data and multi-level modelling to enhance the robustness of quasi-experimental design applications in this field. The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, econometric, randomized controlled, longitudinal, intervention analysis, impact evaluation, spatial statistics*

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