African Horticulture Studies (Agri/Plant Science)

Methodological Evaluation of Municipal Water Systems in Tanzania Using Difference-in-Differences Models to Assess Yield Improvements

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Abstract

Municipal water systems in Tanzania have been introduced to improve agricultural productivity by addressing water scarcity issues. However, their effectiveness remains under scrutiny. The review synthesizes studies that apply difference-in-differences (DiD) econometric models to analyse yield improvements in areas supplied by municipal water systems versus non-supplied regions. Studies are selected based on relevance and methodological rigor, with a focus on DiD model application and robustness checks. A notable finding is the use of difference-in-differences models that incorporate control variables such as soil quality and market access to enhance yield improvement estimates. These models show mixed results in terms of statistically significant impact, with some studies reporting modest but potentially meaningful increases in yields for certain crops and regions. While DiD models provide a useful framework for assessing municipal water system impacts on agricultural productivity, the findings suggest that further research is needed to refine model assumptions and control for confounding factors. Future studies should consider expanding their datasets to include more diverse crop types and regions, as well as incorporating additional explanatory variables beyond those already used in existing DiD models. Additionally, methodological improvements such as improved measurement of water system infrastructure quality are recommended. Difference-in-Differences, Municipal Water Systems, Agricultural Productivity, Tanzania The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, irrigation systems, econometrics, randomized controlled trials, yield gap analysis, water scarcity mitigation, impact evaluation*