



## Methodological Evaluation of Off-Grid Communities' Adoption Rates Using Difference-in-Differences in Tanzania

Simiyu Akinyemi<sup>1,2</sup>, Sserunkuwa Kigubana<sup>3</sup>, Kamonyi Muhire<sup>4</sup>, Mwakarange Magugu<sup>5</sup>

<sup>1</sup> Department of Soil Science, Catholic University of Health and Allied Sciences (CUHAS)

<sup>2</sup> Department of Animal Science, University of Dar es Salaam

<sup>3</sup> Department of Agricultural Economics, National Institute for Medical Research (NIMR)

<sup>4</sup> Department of Crop Sciences, Sokoine University of Agriculture (SUA), Morogoro

<sup>5</sup> University of Dar es Salaam

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**Correspondence:** [sakinyemi@outlook.com](mailto:sakinyemi@outlook.com)

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### Author notes

*Simiyu Akinyemi is affiliated with Department of Soil Science, Catholic University of Health and Allied Sciences (CUHAS) and focuses on Agriculture research in Africa.*

*Sserunkuwa Kigubana is affiliated with Department of Agricultural Economics, National Institute for Medical Research (NIMR) and focuses on Agriculture research in Africa.*

*Kamonyi Muhire is affiliated with Department of Crop Sciences, Sokoine University of Agriculture (SUA), Morogoro and focuses on Agriculture research in Africa.*

*Mwakarange Magugu is affiliated with University of Dar es Salaam and focuses on Agriculture research in Africa.*

### Abstract

This study addresses a current research gap in Agriculture concerning Methodological evaluation of off-grid communities systems in Tanzania: difference-in-differences model for measuring adoption rates in Tanzania. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of off-grid communities systems in Tanzania: difference-in-differences model for measuring adoption rates, Tanzania, Africa, Agriculture, methodology paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows  $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** Tanzania, Off-Grid Communities, Methodology, Adoption Rates, Difference-in-Differences, Quantitative Methods, Regression Analysis

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