



# Methodological Evaluation of Off-Grid Communities Systems in Tanzania Using Difference-in-Differences for Yield Improvement Analysis

Mwenye Kibua<sup>1</sup>

<sup>1</sup> Ardhi University, Dar es Salaam

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**Correspondence:** [mkibua@gmail.com](mailto:mkibua@gmail.com)

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## Author notes

*Mwenye Kibua is affiliated with Ardhi University, Dar es Salaam and focuses on Environmental Science research in Africa.*

## Abstract

Off-grid communities in Tanzania face challenges in accessing reliable energy sources for agricultural productivity. A difference-in-differences (DiD) regression was employed to assess the impact of off-grid energy interventions on agricultural output, comparing pre- and post-intervention periods within treatment and control groups in Tanzania. The DiD model revealed a significant increase in crop yields by 15% when applying an off-grid system compared to traditional methods, with robust standard errors indicating the reliability of these findings. This study provides evidence that off-grid community systems can contribute positively to agricultural yield improvement in Tanzania. Further research should explore scalability and cost-effectiveness of these interventions across different regions in Tanzania. Difference-in-Differences, Off-Grid Communities, Energy Access, Agricultural Yields, Tanzania The empirical specification follows  $Y = \beta_{0+\beta} X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** Tanzania, Off-grid Communities, Methodology, Energy Access, Agricultural Productivity, Difference-in-Differences, Regression Analysis

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