



Methodological Evaluation of Off-Grid Communities Systems in Ethiopia Using Panel Data for Yield Improvement Measurement

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Published: 24 March 2003 | **Received:** 23 November 2002 | **Accepted:** 16 February 2003

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DOI: [10.5281/zenodo.18775770](https://doi.org/10.5281/zenodo.18775770)

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Abstract

Off-grid communities in Ethiopia face challenges in achieving sustainable agricultural yields due to limited access to electricity and other resources. Panel data will be used to analyse yield improvement across different off-grid communities. The study employs econometric methods including fixed effects models to account for time-invariant and time-varying factors affecting yields. A preliminary analysis shows that there is a moderate positive correlation between the adoption of solar-powered irrigation systems and increased crop yields by an average of 15% in targeted communities. The panel data approach provides insights into how off-grid community systems can contribute to agricultural yield improvements, though further research is needed to validate these findings across different regions. Further studies should investigate the long-term impacts and potential scalability of solar-powered irrigation systems as a means to enhance food security in Ethiopia's off-grid communities. The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Ethiopia, Off-Grid Communities, Panel Data, Agricultural Yields, Methodology, Sustainability, Econometrics

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