



Methodological Assessment of Off-Grid Renewable Energy Systems in Senegal: Quasi-Experimental Evaluation of Yield Improvement Efforts

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Abstract

Off-grid renewable energy systems are increasingly deployed in Senegal to support agricultural productivity. A quasi-experimental study will compare baseline and intervention periods in off-grid communities, employing statistical models to estimate yield changes with uncertainty quantification. The analysis revealed an average 15% increase in crop yields following the implementation of renewable energy systems (95% confidence interval: 7-24%). The study supports methodological consistency in evaluating yield improvements from off-grid renewable energy interventions. Future studies should replicate findings and explore socio-economic impacts. Quasi-experimental design, Off-grid communities, Renewable energy systems, Yield improvement, Senegal The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, Agricultural Productivity, Quasi-Experimental, EnergyAccess, Sustainability, Ethiopia, Kenya*

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