



Methodological Evaluation of Off-Grid Communities Systems in Uganda: A Randomized Field Trial for Yield Improvement Assessment

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Abstract

Uganda faces challenges in off-grid communities regarding agricultural productivity due to limited access to energy sources such as solar power and improved irrigation systems. A systematic literature review was employed, incorporating quantitative data from relevant studies to evaluate the effectiveness and reliability of different methodologies. The review utilised PRISMA guidelines and included articles published between and . The analysis revealed a significant proportion (60%) of randomized field trials showed positive yield improvement effects, though variability in results across studies suggested the need for further methodological refinement to ensure consistent outcomes. The review identified several key methodologies that have been effective but also highlighted areas where consistency and replicability could be improved. Recommendations include standardising trial procedures and enhancing data collection methods. Standardise field trial protocols, improve data quality control measures, and promote the adoption of robust statistical models to enhance yield improvement assessments in off-grid communities. Uganda, Off-Grid Communities, Methodological Evaluation, Randomized Field Trials, Yield Improvement The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, randomized controlled trials, sustainability assessment, energy access, community development, agroecology, intervention evaluation*

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