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

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Abstract

Off-grid communities in Uganda rely on various renewable energy systems for lighting, communication, and power generation. These systems often face challenges related to efficiency and reliability. A systematic review was conducted using electronic databases including PubMed, Web of Science, and Scopus. The search strategy included keywords related to Ugandan agriculture, renewable energy, and yield improvement. Studies were selected based on specific criteria related to methodology and effectiveness of off-grid systems. The analysis revealed that a particular randomized field trial implemented in the semi-arid region showed an average increase in crop yields by 20% with improved system efficiency compared to traditional farming practices. This study highlights the potential for enhanced agricultural productivity through better implementation and maintenance of off-grid systems, particularly those using solar technology. Future research should focus on scaling up successful models, improving community engagement in system use and maintenance, and exploring synergies with other renewable energy applications. Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, randomized controlled trials, renewable energy, community systems, system integration, efficacy assessment, performance metrics*

ABSTRACT-ONLY PUBLICATION

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