



# Methodological Foundations for Evaluating Off-Grid Communities Systems in Tanzania: A Randomized Field Trial Approach

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## Abstract

Off-grid communities in Tanzania often rely on unreliable energy sources, leading to increased risks of power outages and health hazards. The study employs a two-arm randomized controlled trial design where participants are randomly assigned to either an intervention group using solar-powered energy solutions or a control group. Data on risk reduction is collected and analysed over a 12-month period. The randomized field trial methodology provides robust evidence on the effectiveness of off-grid systems in Tanzania. Further research should explore cost-effectiveness and scalability of these solutions across different socio-economic contexts in Tanzania. The empirical specification follows  $Y = \beta_{0+\beta} X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, randomized controlled trial, community-based, renewable energy, risk assessment, evaluation methodology, sustainability assessments*

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