



Methodological Assessment of Power-Distribution Equipment Systems in Uganda: A Randomized Field Trial for Risk Reduction Evaluations

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Abstract

This study focuses on assessing power distribution equipment systems in Uganda, a context where reliable electricity supply is critical for economic development and social welfare. A randomized field trial was conducted in two distinct regions of Uganda, with 10% of randomly selected households receiving each type of power distribution system for a period of one year. Data on equipment performance, user satisfaction, and electrical safety incidents were collected using standardised instruments. The analysis revealed that the use of surge protectors alongside smart meters significantly reduced electrical safety incidents by 30% compared to systems without these components (confidence interval: -25% to -35%). This randomized field trial demonstrated the efficacy of certain power distribution equipment configurations in mitigating risks associated with electricity supply, particularly in terms of safety and reliability. Based on this study, it is recommended that government policies prioritise the adoption of smart meters and surge protectors to enhance power distribution systems across Uganda. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Africa, Power-Distribution, Systems, Methodology, Evaluation, Randomized, Field Trials*

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