Methodological Evaluation of Off-Grid Communities Systems in Ghana: Multilevel Regression Analysis for Measuring Adoption Rates

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Abstract

Off-grid communities in Ghana have adopted various systems to meet their energy needs, with varying levels of success. A meta-analysis will be employed to synthesize data from multiple studies conducted in Ghana. The study will use multilevel logistic regression models to analyse the factors influencing adoption rates of off-grid energy systems. The multilevel analysis revealed that community size and access to education were significant predictors of system adoption, with a coefficient for community size being positive and statistically significant at $p < 0.05$. This study provides insights into the socio-economic determinants of off-grid energy systems adoption in Ghana, contributing to more targeted policy interventions. Further research should explore potential barriers and facilitators specific to different community types within Ghana. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, regression, multilevel, meta-analysis, renewable, energy, adoption*

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