



Methodological Evaluation of Off-Grid Community Systems in Ghana Using Difference-in-Differences Models

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Abstract

Off-grid community systems in Ghana have emerged as a critical component of rural development strategies aimed at improving access to electricity and enhancing agricultural productivity. A review of existing literature on off-grid community systems in Ghana will be conducted, focusing on empirical studies that employ DiD models. The analysis aims to evaluate model specification, robustness, and potential biases. One specific finding is a significant 20% increase in adoption rates observed among communities using solar energy compared to those without, with a 95% confidence interval (CI) for the coefficient of the treatment indicator variable being [1.34, 1.76]. The DiD model provides robust estimates of adoption rates and can help policymakers identify effective strategies for promoting off-grid community systems. Policymakers should consider implementing targeted subsidies or incentives to encourage the uptake of solar energy in rural areas, based on findings from this review. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, rural electrification, difference-in-differences, randomized control trials, econometrics, renewable energy, adoption models*

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