



Methodological Evaluation of Off-Grid Communities Systems in Senegal Using Difference-in-Differences for Risk Reduction Measurement

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Mamadou Diallo is affiliated with Université Gaston Berger (UGB), Saint-Louis and focuses on Environmental Science research in Africa.

Abstract

This study addresses a current research gap in Environmental Science concerning Methodological evaluation of off-grid communities systems in Senegal: difference-in-differences model for measuring risk reduction in Senegal. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of off-grid communities systems in Senegal: difference-in-differences model for measuring risk reduction, Senegal, Africa, Environmental Science, conference paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, off-grid, renewable energy, econometrics, intervention analysis, climate resilience, stochastic dominance*

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