



# Methodological Assessment of Quasi-Experimental Designs in Off-Grid Community Systems in Senegal,

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## Abstract

Off-grid community systems in Senegal have seen an increase in quasi-experimental design applications for evaluating efficiency gains. A systematic literature review approach was employed, searching databases including PubMed and Web of Science. Studies were screened based on inclusion criteria related to Senegalese contexts. The analysis identified that while many studies used intention-to-treat (ITT) models, few applied robust standard errors or corrected for clustering issues in their data analyses, leading to potential underestimation of effect sizes. Despite limitations, the review highlighted the need for more rigorous methodological approaches to enhance the validity and generalizability of quasi-experimental studies in off-grid systems. Researchers should adopt advanced statistical techniques such as clustered standard errors or intention-to-treat analyses with robust methods to improve study reliability. Model estimation used  $\hat{\theta} = \text{argmin}\{\theta\} \text{sumiell}(y_i, f\theta(\xi)) + \lambda |V\theta rVert|^2$ , with performance evaluated using out-of-sample error.

**Keywords:** *Sub-Saharan, Senegalese, quasi-experimental, randomized controlled trial, impact evaluation, community-based systems, econometric methods*

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