African Sedimentology and Stratigraphy (Earth Science)

Methodological Evaluation of Off-Grid Communities Systems in Senegal Using a Difference-in-Differences Model for System Reliability Measurement

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Abstract

This study focuses on evaluating the reliability of off-grid communities' water supply systems in Senegal. A Difference-in-Differences model was employed to analyse data from off-grid communities in Senegal. The DiD approach compares changes over time between treatment groups (with implemented improvements) and control groups (without such improvements). The analysis revealed a significant improvement in system reliability for treated communities compared to controls, with an estimated effect size of +20%. This study confirms the utility of DiD models for evaluating off-grid community systems' reliability and provides empirical evidence supporting their effectiveness. Given the findings, further research should consider expanding the sample size and investigating long-term system sustainability. Off-Grid Communities, Water Supply Systems, Difference-in-Differences (DiD), System Reliability The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, Senegalese, Difference-in-Differences, Evaluation, Sustainability, Infrastructure, Quantitative-Methods*

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