



Methodological Evaluation of Off-Grid Communities Systems in Ethiopia Using Difference-in-Differences for Clinical Outcomes Assessment

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Abstract

Off-grid communities in Ethiopia face challenges accessing reliable healthcare services, leading to suboptimal clinical outcomes. A difference-in-differences (DiD) regression analysis was employed to compare pre- and post-intervention changes in healthcare utilization and patient outcomes between control and intervention groups. The DiD model revealed that the off-grid community health systems led to a 15% increase in antenatal care attendance among pregnant women, with robust standard errors indicating a marginally significant effect (95% CI: 0.02-0.34). Off-grid communities in Ethiopia benefited from improved access to healthcare services, evidenced by increased antenatal care utilization. Further research is needed to explore the broader impacts of these health systems on other clinical outcomes and community well-being. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Off-grid Communities, Difference-in-Differences, Clinical Outcomes, Renewable Energy Systems, Health Access Metrics, Geographic Information Systems*

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