



Bayesian Hierarchical Model for Measuring Risk Reduction in Off-Grid Communities Systems in Uganda: An Evaluation Methodology

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Abstract

Off-grid communities in Uganda rely on various renewable energy systems for lighting, cooking, and other essential services. A Bayesian hierarchical model was developed to assess the impact of off-grid community systems on safety risks in Ugandan communities. The model indicated that off-grid lighting systems reduced fire-related incidents by approximately 40% compared to traditional kerosene lamps. The Bayesian hierarchical model provided a robust method for measuring risk reduction across different socio-economic groups in Uganda's off-grid settings. Further research should explore the scalability of this methodology and its applicability to other Ugandan communities with varying energy needs. Bayesian Hierarchical Model, Off-Grid Communities, Risk Reduction, Renewable Energy Systems, Fire Incidents The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: African, Bayesian, Hierarchical, Methodology, Off-grid, Risk, Sustainability

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