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Bayesian Hierarchical Model for Evaluating Smallholder Farm Systems in Rwanda: Methodological Insights and Clinical Outcomes Assessment

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Abstract

Smallholder farming systems in Rwanda face significant challenges related to energy access and sustainability. A Bayesian hierarchical model was developed to analyse data from smallholder farms, incorporating uncertainty through robust standard errors. The model revealed that the proportion of farms achieving improved energy efficiency was 45%. The Bayesian hierarchical model successfully identified key factors influencing energy use in smallholder systems and provided insights for policy interventions. Implementing targeted energy-saving technologies and policies could enhance productivity and sustainability among smallholder farmers. Bayesian Hierarchical Model, Smallholder Farm Systems, Energy Efficiency, Rwanda The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Rwanda, Bayesian Hierarchical Model, Smallholder Farming, Energy Access, Sustainability, Methodology, Quantitative Analysis*

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