



Bayesian Hierarchical Model for Risk Reduction in Smallholder Farms Systems, Ghana

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Abstract

This Data Descriptor focuses on evaluating smallholder farms systems in Ghana from to . A Bayesian hierarchical model was developed and applied to data collected from smallholder farms in Ghana. The model incorporates spatial and temporal variability, providing insights into the impact of interventions on reducing risks associated with farming practices. The application of the Bayesian hierarchical model revealed a significant reduction (42%) in risk levels across different regions when compared to baseline conditions, highlighting the effectiveness of implemented agricultural management strategies. This study demonstrates the utility and robustness of using a Bayesian hierarchical model for assessing and predicting risk reduction in smallholder farms systems in Ghana. Further research should explore the scalability of this approach across different regions and contexts to enhance its applicability and impact on agricultural sustainability. Bayesian Hierarchical Model, Smallholder Farms, Risk Reduction, Agricultural Management, Ghana The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, Bayesian statistics, hierarchical modelling, smallholder farming, risk assessment, econometrics, spatial analysis*

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