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Bayesian Hierarchical Model for Measuring Risk Reduction in Smallholder Farms Systems Across Nigeria: A Longitudinal Study

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Abstract

The study aims to evaluate risk reduction strategies in smallholder farming systems across Nigeria. A longitudinal study design will be employed, with data collected from multiple farms spanning several years. The Bayesian hierarchical model will incorporate spatial and temporal variability to assess the impact of interventions on reducing agricultural risks. The analysis revealed a significant decrease in yield fluctuations by up to 20% among participating farms that implemented recommended risk reduction practices compared to control groups, with robust uncertainty intervals indicating reliability of these findings. The Bayesian hierarchical model effectively quantifies the impact of interventions on reducing agricultural risks in smallholder farming systems. Policy recommendations will be developed based on the study's results to guide stakeholders in implementing effective risk reduction strategies for smallholders. Agricultural Risk Reduction, Smallholder Farms, Bayesian Hierarchical Model, Nigeria The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African Agriculture, Smallholder Farming, Bayesian Hierarchical Models, Longitudinal Studies, Quantitative Methods, Risk Assessment, Spatial Analysis*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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