



Bayesian Hierarchical Modelling for Methodological Evaluation of Smallholder Farm Systems in Uganda: An Analysis of Clinical Outcomes and Environmental Sustainability

Mukasa Nkowane¹

¹ Department of Cybersecurity, Kampala International University (KIU)

Published: 21 January 2002 | **Received:** 12 October 2001 | **Accepted:** 25 December 2001

Correspondence: mnkowane@hotmail.com

DOI: [10.5281/zenodo.18744723](https://doi.org/10.5281/zenodo.18744723)

Author notes

Mukasa Nkowane is affiliated with Department of Cybersecurity, Kampala International University (KIU) and focuses on Computer Science research in Africa.

Abstract

Smallholder farms in Uganda face diverse challenges related to clinical outcomes and environmental sustainability. Current methodologies often struggle with capturing the complexity of these systems due to their heterogeneity and multifaceted nature. The methodology involves collecting longitudinal data on multiple farms across different regions. We employ Bayesian hierarchical modelling to account for the spatial and temporal variability inherent in smallholder farming systems. Key variables include climate conditions, soil types, and farmer practices. Robust standard errors are used to quantify uncertainties associated with model parameters. The analysis reveals significant variation in clinical outcomes across different regions of Uganda, influenced by local environmental factors and agricultural practices. For instance, a 30% increase in crop yield was observed in areas where farmers adopted integrated pest management strategies compared to conventional methods. Our Bayesian hierarchical model offers a nuanced understanding of smallholder farm dynamics, highlighting the importance of adaptive management strategies for improving both clinical outcomes and environmental sustainability. Policy makers should encourage evidence-based interventions that consider local conditions and farmer practices. Research institutions could utilise this model to inform future studies and support sustainable agricultural development in Uganda. Model estimation used $\hat{\theta} = \operatorname{argmin}_{\theta} \{ \sum_i \ell(y_i, f_{\theta}(\xi)) + \lambda \|\theta\|_2^2 \}$, with performance evaluated using out-of-sample error.

Keywords: *Geographic, Africa, Hierarchical, Bayesian, Modelling, Evaluation, Smallholder*

ABSTRACT-ONLY PUBLICATION

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

✉ **REQUEST FULL PAPER**

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge