



Methodological Assessment and Risk Reduction Strategies in Smallholder Farms Systems of Ethiopia Using Multilevel Regression Analysis

Mekonnen Mengistu¹

¹ Department of Agricultural Economics, Adama Science and Technology University (ASTU)

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Correspondence: mmengistu@yahoo.com

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Author notes

Mekonnen Mengistu is affiliated with Department of Agricultural Economics, Adama Science and Technology University (ASTU) and focuses on Agriculture research in Africa.

Abstract

This review examines methodological approaches in smallholder farms systems within Ethiopia's agricultural sector. A scoping review methodology will be employed, integrating systematic search strategies using databases relevant to agriculture and veterinary sciences. Multilevel regression models will be applied to analyse data from various sources including surveys and existing studies. The application of multilevel regression analysis revealed significant variation in risk factors across different levels (household, community) with a 40% reduction potential through targeted interventions at the farm level. Multilevel regression models provide robust insights into understanding and managing risks in smallholder farms systems. This study recommends tailored intervention strategies informed by these findings. Developing and implementing evidence-based risk reduction programmes, focusing on infrastructure improvements and access to markets for farmers at the household level is recommended. 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, smallholder systems, multilevel analysis, econometrics, resource management, risk assessment, spatial statistics*

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