



Methodological Evaluation of Smallholder Farm Systems in Tanzania Using Multilevel Regression Analysis to Measure System Reliability

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Abstract

Smallholder farming systems in Tanzania are subject to various environmental and socio-economic pressures that influence their resilience and sustainability. This study employs a comprehensive literature search strategy to identify relevant studies that utilise multilevel regression models. The methodology includes screening criteria based on publication year, language, and relevance to smallholder farming systems in Tanzania. Multilevel regression analysis was applied to assess system reliability across multiple levels of the farm hierarchy (e.g., household, field). A key finding is that incorporating contextual variables significantly improved model accuracy. The review concludes with recommendations for future research and policy development aimed at enhancing smallholder farm resilience in Tanzania. We recommend further studies to validate findings using different datasets and methodologies, and the implementation of evidence-based policies to support sustainable farming practices. Multilevel regression analysis, Smallholder farms, Farm reliability, Systematic literature review, Environmental science The empirical specification follows $Y = \beta_{0+\beta} p X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Tanzania, Smallholder Farms, Multilevel Regression, Reliability Analysis, Sustainability, Methodology, Empirical Studies

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