



# Methodological Assessment of Regional Monitoring Networks in Ghana: A Multilevel Regression Analysis for Yield Improvement Studies

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## Abstract

In Ghana, regional monitoring networks have been established to enhance agricultural productivity through yield improvement studies. However, methodological consistency and robustness across these networks are essential for reliable yield assessments. The review employs a comprehensive search strategy across multiple databases and journals. A multilevel regression model is used to analyse data from various studies, accounting for hierarchical structures such as farms within villages and regions. A key finding indicates that incorporating village-level contextual factors significantly enhances the accuracy of yield predictions compared to regional averages alone, with a coefficient of determination ( $R^2$ ) above 0.7 in some models. The multilevel regression analysis demonstrates the importance of considering multiple levels of influence for more precise yield improvement measurements. Future studies should incorporate village-level data to improve the robustness and reliability of regional monitoring networks, ensuring they are better aligned with actual agricultural practices and outcomes. The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, Africa, RegionalMonitoring, Networks, SystematicReview, Methodology, RegressionAnalysis*

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