



# Methodological Evaluation of Regional Monitoring Networks in Ghana Using Multilevel Regression Analysis

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## Abstract

Regional monitoring networks have been established in Ghana to enhance agricultural productivity through targeted interventions. A multilevel regression model was employed to analyse data from multiple levels within the monitoring networks. The model accounts for both fixed effects (e.g., type of intervention) and random effects (e.g., variability across regions). The findings indicate that certain regional factors significantly influence the efficiency gains, with a coefficient estimate of -0.53 on the regression analysis. The multilevel approach revealed substantial variations in network performance, necessitating targeted interventions to optimise resource allocation and intervention effectiveness. Tailored policy recommendations are provided based on the identified regional factors affecting efficiency gains. The empirical specification follows  $Y = \beta_{0+\beta}^{\vec{p}} X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, econometrics, stratification, regression, spatial analysis, precision agriculture, data validation*

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