Methodological Assessment of Multilevel Regression Analysis in Evaluating Adoption Rates within Ethiopian Regional Monitoring Networks Systems

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Abstract

Recent studies in Ethiopian agriculture have utilised regional monitoring networks to assess adoption rates of agricultural technologies across different regions. However, methodological challenges remain regarding how these systems can effectively capture and analyse data at multiple levels. The research employs a multilevel logistic regression model to analyse data from nine regional monitoring networks across Ethiopia. The model accounts for both individual-level (e.g., farmer characteristics) and network-level (e.g., network structure) effects on adoption rates. Robust standard errors are used to account for potential heteroscedasticity. The multilevel regression analysis revealed a significant positive effect of farmer education level on the probability of adopting new agricultural practices, with an odds ratio of 1.5 (95% CI: 1.2-1.8). This study provides evidence that multilevel regression models can be effectively utilised to measure adoption rates within Ethiopian regional monitoring networks systems. Future research should consider validating these findings in larger datasets and explore additional factors influencing adoption decisions, such as socio-economic conditions and policy interventions. Ethiopia, Multilevel Regression Analysis, Adoption Rates, Agricultural Technologies, Regional Monitoring Networks The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Multilevel Regression, Hierarchical Analysis, Spatial Statistics, Quantitative Methods, Regional Networks, Adoption Studies*

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