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30

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Methodological Assessment and Yield Improvements in Senegalese Smallholder Farm Systems Using Panel Data Analysis

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Abstract

Smallholder farm systems in Senegal have experienced varying levels of yield improvements over time, influenced by a multitude of factors including climate variability and agricultural practices. A comprehensive search strategy was employed across multiple databases, including Web of Science, Scopus, and Google Scholar, with specific inclusion criteria targeting articles published between and . Studies were assessed based on methodological rigor and data quality using a predefined set of inclusion/exclusion criteria. The analysis identified that the majority of studies used panel data analysis for their assessments, but there is a notable lack of robust statistical methods to account for potential endogeneity issues in yield improvement measurements. Despite the prevalence of panel data techniques, the review reveals significant methodological shortcomings such as insufficient control variables and failure to incorporate uncertainty measures. This highlights the need for more sophisticated econometric models in future studies. Future research should prioritise robust statistical methods that can address potential endogeneity concerns and provide more reliable estimates of yield improvements. Additionally, incorporating uncertainty measures will enhance the validity and reliability of findings. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, smallholder agriculture, panel data analysis, econometrics, yield measurement, agricultural productivity, empirical methods*

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