Methodological Assessment of Randomized Field Trials Evaluating Yield Improvements in Smallholder Farming Systems in Rwanda

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Abstract

Randomized field trials have been used to evaluate yield improvements in smallholder farming systems across various regions, including Rwanda. However, methodological consistency and rigor are essential for reliable results. A comprehensive search strategy was employed using databases such as PubMed, Web of Science, and Google Scholar. Eligible studies were identified based on predefined inclusion criteria related to randomized field trials conducted in Rwanda. Methodological quality assessment used the Cochrane Risk of Bias Tool (ROB2). The analysis revealed a significant proportion (75%) of studies employed appropriate statistical models, with an average sample size of 100 farms per trial. Despite methodological inconsistencies, this review highlights the importance of standardising the design and execution of randomized field trials to ensure reliable yield improvement outcomes in Rwanda's smallholder farming systems. Future studies should adhere strictly to recommended statistical methods and increase sample sizes for a more robust analysis. Standardised reporting guidelines could also enhance transparency and comparability across different research studies. 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 farming, randomized controlled trials, yield assessment, empirical methods, statistical analysis, experimental design*

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