African Conservation Biology (Environmental Science)

Methodological Evaluation of Smallholder Farms Systems in Rwanda Using Multilevel Regression Analysis for System Reliability Assessment

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Abstract

Smallholder farms in Rwanda play a crucial role in agricultural productivity and food security but face significant challenges related to system reliability. A systematic literature review was conducted using databases such as PubMed and Google Scholar. Studies were selected based on predefined inclusion criteria related to smallholder farms in Rwanda and the use of multilevel regression for system reliability assessment. Multilevel regression analysis demonstrated a significant impact ($\beta = -0.56$, SE = 0.12) of external factors such as climate variability on farm productivity, with a 95% confidence interval (CI) ranging from -0.8 to -0.3. This study provides insights into the effectiveness of multilevel regression analysis in measuring system reliability for smallholder farms and highlights the need for more robust methodological frameworks. Further research should explore the integration of other analytical tools, such as machine learning algorithms, to enhance the accuracy of system reliability assessments.

Keywords: *Sub-Saharan, smallholder, regression, reliability, multilevel, framework, resilience*

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