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Assessing climate-smart agriculture's impact on food security: The case of semi-arid Tanzania

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Abstract

Climate change presents a substantial challenge to global food security, particularly in developing countries like Tanzania, where 78 % of the population relies on agriculture, predominantly rain-fed and subsistence farming. This underscores the necessity for sustainable agricultural practices like Climate-Smart Agriculture (CSA). This study aims to investigate a) the impact of CSA practices on food security among smallholder farming households (HHs) and b) the role of local institutions and indigenous knowledge in facilitating CSA adoption. This study employed a mixed-method approach incorporating 380 HH surveys, 12 focus group discussions, and 15 key informant interviews across six villages in Dodoma region. Seven CSA practices were evaluated, including tree intercropping, intercropping, tied ridges, contour, Chololo pits, manure application, and the use of drought-tolerant improved seeds. Food security was assessed using diverse indicators aligned with the four FAO food security pillars: the Household Food Insecurity Access Scale (HFIAS) (access), the Household Dietary Diversity Score (HDDS) (utilisation), the Coping Strategy Index (CSI) (stability), and food availability was measured in terms of crop production and kilocalories per HH. Preliminary findings indicate that over 90 % of HHs adopted intercropping, leading to its exclusion from the food security impact analysis. HHs practicing one or more CSA practices (excluding intercropping) were categorised as CSA adopters. Results show that 42 % of the HH did not adopt any CSA practice, while 58 % adopted one or more practices. Comparing food security between adopters and non-adopters indicates that adopters are more food secure. For instance, 82 % of adopters fell within the most food secure tercile (0–11) according to HFIAS, compared to 61 % of non-adopters. Additionally, findings suggest that the role of local institutions is crucial in scaling-up CSA, as more HHs adopted CSA practices in villages with better institutional support. Understanding the impacts of CSA practices on food security among smallholder farming households is crucial to ensuring HH food security; however, identifying effective adoption strategies is equally essential. This research aims to connect food system elements, bridge the gap between theories and practice, inform policy, and empower smallholder farmers to mitigate climate change effects on food security in Tanzania and beyond.

Keywords: Adoption, climate-smart agriculture, food security, smallholder farmers

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