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A Systematic Review of Climate-Smart Agriculture Training and Its Impact on Dietary Diversity among Smallholder Households in the Malian Sahel,

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Abstract

Climate change threatens food security and nutrition in the Malian Sahel. Smallholder households dependent on rain-fed agriculture are especially vulnerable to dietary deficiencies. Climate-smart agriculture training is advocated to bolster resilience, yet its specific effect on dietary diversity in this setting necessitates systematic evaluation. This systematic review aimed to synthesise evidence on the impact of climate-smart agriculture training interventions on the dietary diversity of smallholder farmer families in the Malian Sahel. A systematic search of peer-reviewed literature was performed across several electronic databases. Predefined inclusion and exclusion criteria were applied to select studies. Eligible studies were critically appraised for quality. Data were extracted and synthesised narratively owing to heterogeneity in interventions and outcome measures. A limited number of studies met the inclusion criteria. The available evidence, though sparse, suggests a tentative positive association between climate-smart agriculture training and improved household dietary diversity scores. One study noted a modest increase in vegetable and legume consumption following training. The evidence base is constrained by methodological limitations and an absence of longitudinal data. Current evidence on the impact of climate-smart agriculture training on dietary diversity in the Malian Sahel is insufficient for definitive conclusions. While potential benefits are indicated, the scarcity of robust, focused research underscores a significant knowledge gap. Future research should employ rigorous, longitudinal study designs with standardised metrics for both interventions and dietary outcomes. Programmes should integrate explicit nutrition education and gender-sensitive

approaches to better understand and enhance pathways from agricultural training to improved dietary intake. climate-smart agriculture, dietary diversity, food security, nutrition, Mali, Sahel, smallholder farmers, systematic review This review consolidates the limited existing evidence and clearly identifies critical gaps in the literature, providing a foundation for future primary research and informing the design of more effective, nutrition-sensitive agricultural programmes.

Keywords: *Climate-smart agriculture, dietary diversity, smallholder farmers, Sahel, Mali, food security, nutrition-sensitive agriculture*

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