Climate-smart agriculture as a pathway to resilience against climate change vulnerability: exploring its mediating effects on productivity and food security in nigerian maize farming households

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Abstract

Climate change presents severe challenges to agricultural productivity and food security in Nigeria, particularly for smallholder maize farmers in Southwest Nigeria, where irregular rainfall, droughts, and floods intensify vulnerability. Climate-Smart Agriculture (CSA) practices have gained traction for building resilience, yet their effects on productivity and food security outcomes are not fully understood. This study examines how CSA practices reduce climate vulnerability among maize farming households, focusing on their impacts on maize yields and household food security, while also identifying determinants of adoption. The research surveyed 480 maize farmers using a multi-stage stratified random sampling method across Southwest Nigeria. Data on CSA use, productivity, and food security indicators, Household Dietary Diversity Score (HDDS), Household Food Insecurity Access Scale (HFIAS), and Household Food Insecurity Access Prevalence (HFIAP) were collected via structured questionnaires and analysed using descriptive statistics, Multinomial Endogenous Switching Regression (MESRM), Tobit regression, and Propensity Score Matching (PSM). Vulnerability was measured through a Household Vulnerability Index (HVI). Adoption rates varied: drought-tolerant maize varieties (76 %), soil conservation practices (44 %), and organic fertiliser use (39 %). MESRM results indicated that CSA significantly improved maize yields (by 80.859 ^{kg}/$_{ha}$ with combined practices). HDDS scores improved with CSA adoption, although HFIAS scores increased for certain practices, revealing possible trade-offs. Key adoption drivers included age, gender, and access to extension services, while larger household sizes and labour shortages emerged as barriers. Vulnerability assessments highlighted regional climate risks, with CSA practices reducing exposure and sensitivity. Tailored interventions and supportive policies are essential for scaling CSA benefits in climate-affected maize farming systems.

Keywords: Climate Change Vulnerability, climate-Smart Agriculture (CSA), Food Security, Maize Productivity, Nigeria

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