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Barriers to youth adoption of climate-smart agriculture in Liberia: A socio-technical systems approach

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Abstract

Liberia, a West African nation of approximately 5.8 million people, faces escalating climate-induced livelihood barriers among disadvantaged, war-affected, and at-risk youth whose agricultural prospects are increasingly threatened. As rising crop failures, animal diseases, and soil degradation erode opportunities, many youth are compelled into precarious survival strategies, including informal labour, substance abuse, drug trafficking, and other illicit activities (Fortune, 2021; Wesseh, 2025). Despite sustained interventions by the Government of Liberia to Climate-Smart Agriculture (CSA), these efforts have not made any substantial impact on youth productivity, while young people remain largely excluded from CSA frameworks. This has reinforced the cycles of economic vulnerability and social instability. Against this backdrop, the study addressed two central questions: What are the barriers to CSA adoption across urban, peri-urban, and rural Liberia, and what climate-resilient empowerment framework is needed to enhance youth economic outcomes? The study adopted a mixed-methods approach using a convergent parallel design, with a target population of 68,304 disadvantaged youth across the 15 counties of Liberia. From the above population, 399 youth and 25 youth organisation representatives were sampled using multiphase techniques. Data were collected through a researcher-developed questionnaire and semi-structured interviews, with validity ensured through expert review and reliability confirmed (Cronbach's $\alpha = 0.93$). Quantitative data were analysed using descriptive statistics, mean rating, and ANOVA, while qualitative data were thematically analysed. Findings indicate severe climatic and systemic barriers, including economic, institutional, technical, social, and environmental constraints, notably high input costs ($\bar{x} = 1.97$), weak extension services ($\bar{x} = 1.99$), low awareness ($\bar{x} = 2.04$), gender inequality ($\bar{x} = 1.78$), and climate variability ($\bar{x} = 2.17$) respectively. Hypothesis testing showed no significant differences across locations for most variables, except for inadequate CSA training and capacity building ($p = 0.048$), weak extension services ($p = 0.038$), dissemination of CSA information ($p = 0.038$), and awareness ($p = 0.046$), with rural youth most affected ($M = 4.28$, $SD = 1.68$). The study concludes that integrating socio-technical systems into a coordinated, youth-inclusive CSA framework is essential for enhancing sustainable economic empowerment.

Keywords: Climate-smart agriculture, disadvantaged youth, economic empowerment, Liberia, socio-technical systems

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