



Smart Village Agriculture Models for Soil Fertility Enhancement and Economic Gains in Northern Ghana's Remote Regions,

Taiwo Awudede¹

¹ Department of Cybersecurity, Food Research Institute (FRI)

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Correspondence: tawudede@outlook.com

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Author notes

Taiwo Awudede is affiliated with Department of Cybersecurity, Food Research Institute (FRI) and focuses on Computer Science research in Africa.

Abstract

Smart Village Agriculture models have been proposed to enhance soil fertility and increase economic gains in remote regions of Northern Ghana. A comprehensive search strategy was employed to identify relevant studies from peer-reviewed journals, conference proceedings, and grey literature. Studies were selected based on predefined inclusion criteria and analysed using thematic synthesis. The review identified a significant proportion (35%) of the studies reporting positive impacts on soil fertility enhancement, with an average increase in crop yields by 20% across various crops tested. Smart Village Agriculture models show promise for enhancing soil health and increasing economic benefits in remote northern Ghanaian communities. However, there is a need for further empirical research to validate these findings. Further studies should be conducted to assess the long-term sustainability of these models and explore their potential scalability across different regions of Northern Ghana. Model estimation used $\hat{\theta} = \text{argmin} \{ \theta \} \text{sumiell} (y_i, f\theta(\xi)) + \lambda \text{Vert}\theta \text{rVert}^2$, with performance evaluated using out-of-sample error.

Keywords: *Geographic, Remote Regions, Soil Fertility, Agricultural Models, Smart Villages, Methodology, Sustainability*

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