African Aquatic Resource Management
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Bayesian Hierarchical Model for Yield Improvement in Smallholder Farm Systems in Ghana,

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Abstract

Smallholder farming systems in Ghana face yield challenges due to limited access to modern agricultural technologies and management practices. The study employed a Bayesian hierarchical linear regression model to analyse yield data from multiple farms across different regions of Ghana. Data were collected through surveys and field observations over two years. A significant improvement in average maize yields was observed (25% increase), with substantial variability between farms, suggesting the need for tailored interventions. The Bayesian hierarchical model provided a robust framework to assess yield improvements and highlighted the importance of regional-specific strategies. Farmers should be trained on best management practices adapted to their specific conditions, while policymakers should prioritise investment in localized agricultural extension services. Bayesian Hierarchical Model, Smallholder Farms, Yield Improvement, Agricultural Extension Services The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, Africa, Smallholder, Farming, Systems, Bayesian, Hierarchical, Model*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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