



# Bayesian Hierarchical Model for Evaluating Yield Improvement in District Hospitals Systems in Tanzania,

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## Abstract

This study focuses on evaluating the yield improvement in district hospitals systems in Tanzania, providing a methodological evaluation of health system performance. A Bayesian hierarchical model was employed to analyse data from district hospitals in Tanzania. The model accounts for spatial heterogeneity and varying levels of performance among different facilities by incorporating random effects at the district level. The analysis revealed significant variability in hospital yield across districts, with some showing substantial improvements while others did not meet expected targets. The Bayesian hierarchical model provided insights into which hospitals were performing well and where interventions could be most effective. The model's robustness was confirmed by its ability to handle complex data structures and uncertainty quantification. Health policymakers should consider the findings in planning future resource allocation and intervention strategies, particularly focusing on strengthening underperforming facilities with proven improvement models. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Tanzania, Bayesian hierarchical model, district hospitals, health system performance, yield improvement, geographic information systems, spatial analysis

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