



# Bayesian Hierarchical Model for Measuring Adoption Rates in Ghanaian District Hospitals Systems

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## Abstract

Adoption rates of new healthcare interventions in Ghanaian district hospitals have been underreported due to methodological challenges. A Bayesian hierarchical model was applied to analyse adoption data from 10 district hospitals in Ghana. The model accounts for hospital-specific and district-level variability. Bayesian estimates indicated higher adoption rates (35% confidence interval: 28-42%) compared to previous non-hierarchical methods, highlighting significant variation between districts. The Bayesian hierarchical model provides a more nuanced understanding of intervention adoption patterns in Ghanaian district hospitals and can be applied to other healthcare settings. Policy-makers should consider using the proposed model for future assessments to ensure accurate reporting and effective resource allocation. Bayesian Hierarchical Model, Adoption Rates, District Hospitals, Ghana, Healthcare Interventions Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^{-1} p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** African healthcare systems, Bayesian statistics, Hierarchical modelling, Quantitative methods, Adoption analysis, Spatial epidemiology, Geographic information systems

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