Bayesian Hierarchical Model Assessment of Yield Improvement in District Hospitals Systems, Senegal

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Abstract

District hospitals in Senegal are facing challenges in providing adequate healthcare services to their populations. The current systems lack a comprehensive evaluation framework that can effectively measure and improve service yield. A Bayesian hierarchical model was constructed to analyse hospital data from Senegal. The model accounts for variability between districts and within each district's healthcare services, incorporating prior knowledge about system efficiency. The model identified significant disparities in service yield across different districts, with some areas reporting yields up to 30% below expected levels. The Bayesian hierarchical model provides a robust tool for assessing hospital performance and identifying systemic issues that need addressing. Future research should explore the implementation of this model at larger scales. District health authorities in Senegal are encouraged to use the proposed model as an evaluation framework, alongside targeted interventions to improve service yield. Bayesian hierarchical models, district hospitals, healthcare systems, yield improvement, Senegal Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\rightarrow} p\,X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *District Hospitals, Bayesian Hierarchical Models, Methodological Evaluation, Senegal, Quantitative Healthcare Analysis, Geographic Information Systems, Statistical Methods*

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