



Bayesian Hierarchical Model for Measuring Adoption Rates in District Hospitals Systems in South Africa: A Longitudinal Study

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Abstract

South Africa's district hospitals systems have faced challenges in adopting new medical technologies and practices. A longitudinal study employing Bayesian hierarchical modelling to estimate adoption rates across different hospitals. The model accounts for hospital-specific and regional variations in technology uptake. Bayesian hierarchical models indicated significant variation in adoption rates among districts (e.g., a 20% difference between the highest and lowest adopting areas), suggesting tailored interventions are needed. The study contributes by demonstrating how Bayesian methods can enhance understanding of technology adoption dynamics within complex healthcare systems. Health policymakers should prioritise district-specific strategies based on findings to optimise resource allocation for new medical technologies. Bayesian hierarchical models, adoption rates, longitudinal studies, South Africa, district hospitals Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Sub-Saharan, Africa, Bayesian, Multilevel, Modelling, Hospital, Systems, Adoption

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