



Bayesian Hierarchical Model for Measuring Clinical Outcomes in Rural Clinics Systems Over Time in South Africa,

Siku Masebo¹

¹ University of Cape Town

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Correspondence: smasebo@aol.com

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Author notes

Siku Masebo is affiliated with University of Cape Town and focuses on Medicine research in Africa.

Abstract

This study aims to evaluate the effectiveness of rural clinics in South Africa by measuring clinical outcomes over time. Bayesian Hierarchical Model (BHM) was employed to analyse longitudinal data from South African clinics. The BHM accounts for the variability between individual clinics while accounting for common trends over time. The Bayesian hierarchical model demonstrated significant heterogeneity in clinical outcomes across different rural clinics, with some clinics showing improvement rates of up to 20% compared to baseline. The findings suggest that targeted interventions could enhance the performance and efficiency of rural health systems in South Africa. Policy makers should consider implementing data-driven strategies to improve clinic performance based on this model's insights. Treatment effect was estimated with $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Geographic, Longitudinal, Hierarchical, Bayesian, Model, Evaluation, Rural Clinics*

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