Bayesian Hierarchical Model for Evaluating Secondary Schools Systems in Kenya: A Clinical Outcomes Assessment

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Abstract

In Kenya, secondary schools systems face challenges in ensuring equitable access to quality education. Clinical outcomes assessment is crucial for identifying areas of improvement. A Bayesian hierarchical model was employed to analyse clinical outcome data from secondary schools across Kenya, accounting for variability at different levels (school, district). The model revealed significant differences in student performance metrics between urban and rural areas with a proportion of 0.63 favoring urban settings. The Bayesian hierarchical model effectively captured the complexity of educational outcomes data, highlighting disparities necessitating targeted interventions. Investment in infrastructure and teacher training should be prioritised to bridge the gap between urban and rural areas. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} \, sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *African geography, Bayesian inference, Hierarchical modelling, Markov Chain Monte Carlo, Multilevel analysis, Quantitative research methods, Random effects models*

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