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Bayesian Hierarchical Model for Assessing Cost-Effectiveness in Senegal's Secondary School Systems: A Methodological Evaluation

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Abstract

The secondary school system in Senegal faces challenges in cost-effectiveness, with significant disparities in resource allocation and student performance outcomes. A Bayesian hierarchical model was employed to analyse data from multiple secondary schools across various regions, incorporating random effects to account for differences in school performance and resource allocation patterns. The analysis revealed that schools with higher initial funding had better student-to-teacher ratios, suggesting a positive correlation between financial investment and educational quality. This study provides insights into the optimal distribution of resources within Senegalese secondary education systems, contributing to evidence-based policy-making. Recommendations for policymakers include allocating funds more equitably across regions and schools based on current performance metrics. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, Africa, Bayesian, Model, Hierarchical, Methodology, Economic, Evaluation*