



Bayesian Hierarchical Model for Assessing Cost-Effectiveness in Secondary Schools Systems in Kenya: A Methodological Evaluation

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Abstract

The secondary education sector in Kenya faces significant challenges related to cost-effectiveness, efficiency, and resource allocation across different schools. A Bayesian hierarchical model was developed to analyse data from various secondary schools in Kenya. This model accounts for both systematic and random variations within and between schools, ensuring robust inference across the entire system. The analysis revealed significant differences in cost-effectiveness among schools, with a notable proportion (30%) of schools requiring targeted interventions to improve their efficiency. This study provides evidence that Bayesian hierarchical models can effectively assess and enhance the performance of secondary school systems, highlighting areas for intervention and resource allocation. Based on the findings, specific recommendations are made for policymakers to implement tailored strategies aimed at improving cost-effectiveness in secondary education across Kenya. Bayesian Hierarchical Model, Cost-Effectiveness, Secondary Schools, Resource Allocation, Education Systems The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Bayesian statistics, hierarchical models, cost-effectiveness analysis, secondary education, resource allocation, Africa, econometrics*

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