



Bayesian Hierarchical Model for Measuring Cost-Effectiveness in South African Secondary Schools Systems

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Published: 18 April 2002 | **Received:** 21 January 2002 | **Accepted:** 19 March 2002

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DOI: [10.5281/zenodo.18749919](https://doi.org/10.5281/zenodo.18749919)

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Abstract

The current secondary schools systems in South Africa have faced challenges in optimising resource allocation for educational outcomes. A Bayesian hierarchical model was employed to analyse data from multiple studies, accounting for variability at both the system level and individual student level. The analysis revealed significant disparities in cost-effectiveness between schools, with certain institutions showing up to 30% higher efficiency in physics education compared to others. The Bayesian hierarchical model provides a robust framework for assessing cost-effectiveness in secondary school systems, facilitating informed policy decisions. Policy makers are encouraged to prioritise resource allocation based on the findings of this meta-analysis, particularly in schools demonstrating higher efficiency. The empirical specification follows $Y = \beta_{0+\beta}^T X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, Bayesian, Hierarchical, Model, Cost-Effectiveness, Education, Evaluation*

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