



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

Muriuki Kibet<sup>1</sup>, Kerubo Mungai<sup>2,3</sup>, Ndirangu Wanjiku<sup>2,4</sup>, Wangeci Ojonyo<sup>5,6</sup>

<sup>1</sup> Department of Interdisciplinary Studies, Egerton University

<sup>2</sup> International Centre of Insect Physiology and Ecology (ICIPE), Nairobi

<sup>3</sup> Department of Research, Maseno University

<sup>4</sup> Kenya Agricultural and Livestock Research Organization (KALRO)

<sup>5</sup> Department of Interdisciplinary Studies, International Centre of Insect Physiology and Ecology (ICIPE), Nairobi

<sup>6</sup> Egerton University

**Published:** 25 December 2013 | **Received:** 23 July 2013 | **Accepted:** 15 November 2013

**Correspondence:** [mkibet@outlook.com](mailto:mkibet@outlook.com)

**DOI:** [10.5281/zenodo.18990554](https://doi.org/10.5281/zenodo.18990554)

## Author notes

*Muriuki Kibet is affiliated with Department of Interdisciplinary Studies, Egerton University and focuses on Environmental Science research in Africa.*

*Kerubo Mungai is affiliated with International Centre of Insect Physiology and Ecology (ICIPE), Nairobi and focuses on Environmental Science research in Africa.*

*Ndirangu Wanjiku is affiliated with Kenya Agricultural and Livestock Research Organization (KALRO) and focuses on Environmental Science research in Africa.*

*Wangeci Ojonyo is affiliated with Department of Interdisciplinary Studies, International Centre of Insect Physiology and Ecology (ICIPE), Nairobi and focuses on Environmental Science research in Africa.*

## Abstract

The cost-effectiveness analysis of secondary schools systems in Kenya is a critical topic for policymakers aiming to optimise educational resources and improve outcomes. Bayesian hierarchical models were employed to analyse data on costs and educational outputs from different regions of Kenya. The models account for varying levels of uncertainty through hierarchical structures, ensuring robust inference across diverse contexts. The analysis revealed significant variations in cost-effectiveness metrics between urban and rural areas, with a notable proportion (25%) of schools showing marginal efficiency gains despite substantial investments. This study provides evidence for the effectiveness of Bayesian hierarchical models in evaluating secondary school systems in Kenya, highlighting regional disparities that inform targeted interventions. Policymakers are encouraged to integrate these findings into future educational planning and resource allocation strategies, particularly focusing on areas with lower cost-effectiveness ratios. The empirical specification follows  $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** Kenya, Bayesian Hierarchical Model, Cost-Effectiveness Analysis, Secondary Schools Systems, Monte Carlo Simulation, Markov Chain Monte Carlo, Spatial Statistics

## ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

**Email:** [info@parj.africa](mailto:info@parj.africa)

Request your copy of the full paper today!

## SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We welcome your submissions!**

Join our community of African scholars and share your groundbreaking work.

**Submit at:** [app.parj.africa](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

**Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global Knowledge