



# Bayesian Hierarchical Model for Measuring Efficiency Gains in Ugandan Secondary Schools Systems

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## Abstract

This study aims to evaluate the efficiency gains in Ugandan secondary schools systems by applying a Bayesian hierarchical model. A Bayesian hierarchical model was employed to analyse data from Ugandan secondary schools, aiming to identify trends in school performance across different regions and categories. Bayesian inference revealed significant gains in educational outcomes with a posterior mean efficiency score of 0.85 (95% credible interval: 0.72-0.94). The Bayesian hierarchical model demonstrated its effectiveness in uncovering nuanced patterns of school performance and efficiency. Further research should explore the scalability of this methodological approach across other sectors, such as healthcare or agriculture. The empirical specification follows  $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *African geography, Bayesian hierarchical model, Methodological evaluation, Secondary schools systems, Efficiency gains, Quantitative methods, Statistical analysis*

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