African Desert Ecology (Environmental Science)

Bayesian Hierarchical Model for Evaluating Secondary School Systems' Efficiency Gains in Ethiopia

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Abstract

The educational sector in Ethiopia faces challenges in improving secondary school systems' efficiency, with limited data available for evaluation. A Bayesian hierarchical model was employed to analyse data from various secondary schools across different regions. The model accounts for both school-level and district-level variations, providing insights into system-wide performance. The analysis revealed significant efficiency gains in mathematics teaching when incorporating technology-enhanced learning strategies, with a proportion of at least 20% improvement observed in test scores among participating schools. The Bayesian hierarchical model successfully identified key factors contributing to improved efficiency and provided actionable recommendations for policy makers and educators. Implementing the recommended teaching strategies, particularly those involving technology integration, is critical for achieving sustainable educational improvements in Ethiopia's secondary school systems. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, African, Hierarchical, Bayesian, Evaluation, Efficiency, Education*

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