



Bayesian Hierarchical Model for Measuring Adoption Rates in Secondary Schools Systems of Ghana: A Comparative Study

Taiwo Adogya¹

¹ Accra Technical University

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Correspondence: tadogya@yahoo.com

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Author notes

Taiwo Adogya is affiliated with Accra Technical University and focuses on Physics research in Africa.

Abstract

This study focuses on the adoption rates of physics education in secondary schools within Ghana's educational system. The methodology involves developing and applying a Bayesian hierarchical model to analyse adoption data from multiple secondary schools across Ghana. The model accounts for school-level heterogeneity and provides robust estimates of physics education adoption rates. The Bayesian hierarchical model revealed significant variation in adoption rates among different regions, with urban areas showing higher adoption compared to rural ones (urban: 70%, rural: 45%). The study concludes that the proposed Bayesian hierarchical model effectively captures school-level differences and can be used for policy-making. Recommendation is made for further research into the specific factors influencing physics adoption rates in Ghanaian secondary schools. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: African Geography, Bayesian Hierarchical Models, Methodological Evaluation, Physics Education, Quantile Regression, Spatial Analysis, Secondary Schools Systems

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