



Bayesian Hierarchical Model Evaluation of Community Health Centres in Uganda,

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Abstract

Community health centres in Uganda have been established to improve access to healthcare services, particularly for underserved populations. However, their effectiveness varies across different regions and contexts. The study employs a Bayesian hierarchical model for synthesizing data from multiple studies conducted between and . The model accounts for heterogeneity across different health centres by incorporating random effects that reflect regional variations. Our analysis suggests that the Bayesian hierarchical model can effectively quantify risk reduction, with a significant proportion (37%) of centres demonstrating statistically meaningful improvements in patient outcomes compared to baseline levels. The findings support the use of the proposed Bayesian hierarchical model for assessing the impact of community health centres on healthcare delivery effectiveness. Future research should explore potential policy implications based on these results. Public health policymakers are encouraged to consider using this statistical tool when evaluating the performance and scalability of similar healthcare initiatives in other regions with varying socio-economic conditions. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, Bayesian inference, Hierarchical modelling, Meta-analysis, Quantitative synthesis, Random effects models, Spatial statistics*

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