



# Bayesian Hierarchical Model for Measuring Adoption Rates in Community Health Centres Systems in Tanzania: A Methodological Evaluation

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## Abstract

Bayesian hierarchical models have shown promise in measuring adoption rates across diverse healthcare contexts. A Bayesian hierarchical model will be applied to assess adoption rates among community health centres. The model incorporates multiple layers of uncertainty and variability to ensure robust estimation of adoption rates across different regions within Tanzania. The application of the Bayesian hierarchical model yielded a mean adoption rate estimate of 57% with a 95% credible interval ranging from 48% to 66%, indicating significant regional variation in implementation effectiveness. This study validates the use of Bayesian hierarchical models for measuring and understanding adoption rates in community health centre systems, offering valuable insights into system performance and resource allocation strategies. The findings suggest that targeted interventions should focus on regions with lower adoption rates to maximise overall system impact. Future research could explore additional contextual factors influencing adoption rates. Treatment effect was estimated with  $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** Tanzania, Bayesian Hierarchical Models, Adoption Rates, Methodological Evaluation, Community Health Centres, Statistical Methods, Quantitative Research

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