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Bayesian Hierarchical Model for Measuring Adoption Rates in Tanzanian District Hospitals Systems

Muhamedani Nsimba[1], **Kiki Mwakisemba**[2,3], **Saidi Mkwaya**[4]

[1] Department of Clinical Research, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam

[2] Department of Internal Medicine, Mkwawa University College of Education

[3] Department of Pediatrics, Tanzania Wildlife Research Institute (TAWIRI)

[4] Mkwawa University College of Education

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Correspondence: mnsimba@yahoo.com

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Author notes

Muhamedani Nsimba is affiliated with Department of Clinical Research, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam and focuses on Medicine research in Africa.

Kiki Mwakisemba is affiliated with Department of Internal Medicine, Mkwawa University College of Education and focuses on Medicine research in Africa.

Saidi Mkwaya is affiliated with Mkwawa University College of Education and focuses on Medicine research in Africa.

Abstract

In Tanzania, district hospitals play a pivotal role in healthcare delivery, yet their adoption rates for modern medical practices vary significantly. A Bayesian hierarchical model was employed to analyse data collected from a sample of district hospitals. The model accounted for heterogeneity in hospital systems, incorporating both fixed effects and random effects to estimate adoption rates with uncertainty quantification. The analysis revealed that the average adoption rate across sampled hospitals varied between 30% and 70%, indicating substantial diversity within the healthcare system. Bayesian hierarchical modelling provided a nuanced understanding of district hospital adoption patterns, highlighting areas needing improvement in medical practices implementation. District health authorities should prioritise interventions focusing on increasing adoption rates beyond current levels to ensure equitable access to modern healthcare. Adoption Rates, Bayesian Hierarchical Model, District Hospitals, Tanzania Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \vec{\beta}\, p\, X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African healthcare, Bayesian statistics, hierarchical modelling, adoption rates, district hospitals, medical practice diffusion, spatial analysis*

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