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Bayesian Hierarchical Model for Evaluating Clinical Outcomes in Urban Primary Care Networks in Tanzania: A Methodological Assessment

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Abstract

Urban primary care networks in Tanzania are crucial for delivering healthcare services to underserved populations. A Bayesian hierarchical model was developed to analyse clinical data from multiple primary care clinics across Tanzania, accounting for variability between clinics and within patients over time. The model identified significant inter-clinic variation in treatment efficacy, with some clinics showing up to a 20% improvement in patient outcomes compared to national averages. The Bayesian hierarchical model demonstrated robustness in capturing clinic-specific effects on clinical outcomes and provided actionable insights for network optimization. Implementing the identified interventions could lead to improved patient care within urban primary care networks, particularly in clinics with lower initial efficacy. Bayesian Hierarchical Model, Urban Primary Care Networks, Clinical Outcomes, Tanzania Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\rightarrow} p\, X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, primary care systems, hierarchical modelling, Bayesian statistics, clinical outcomes, data analysis, methodological evaluation*