

A Bayesian Hierarchical Modelling Intervention for Maternal Care Facility Systems and Clinical Outcomes in Kenya

Wanjiku Mwangi^{1,2}. Amina Hassan^{3,4}. Kamau Otieno^{4,5}

University of Nairobi | Moi University | Department of Internal Medicine, University of Nairobi | Technical
University of Kenya | Department of Public Health, Moi University

Correspondence: wmwangi@gmail.com

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ABSTRACT

Background: Maternal care facility systems in Kenya are complex, with heterogeneous performance and outcomes. Current evaluation methods often fail to adequately account for this heterogeneity and the hierarchical structure of health system data, limiting the precision of impact assessments and system-level inferences.

Purpose and objectives: This intervention study aimed to develop and apply a novel Bayesian hierarchical model to evaluate maternal care facility systems and quantify their association with key clinical outcomes. The primary objective was to provide a robust methodological framework for facility-level performance measurement.

Keywords: *Bayesian hierarchical modelling, Maternal healthcare, Health systems evaluation, Sub-Saharan Africa, Clinical outcomes, Kenya, Intervention study*

Article Highlights

- Bayesian model quantifies substantial performance variation at the facility level.
- Method partitions variance between county and facility random effects.
- Produces more reliable, shrunken estimates of facility performance.
- Reveals distinct clusters of under- and over-performing facilities.

Methodological Contribution

Applies a novel Bayesian hierarchical model to routine health data, providing a robust framework for facility-level performance measurement in complex health systems.

This study presents a statistically rigorous alternative to conventional evaluation methods.

ABSTRACT-ONLY PUBLICATION

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