African Food Systems Research (Interdisciplinary - incl Agri/Env) | Vol. 1 | No. 1 | 2001 | DOI: 10.5281/zenodo.18957531

A Bayesian Hierarchical Meta-Analysis of District Hospital Cost-Effectiveness in Ghana

Methodological Evaluation and Health Systems Optimisation

Kwame Agyeman-Badu[1,2], **Efua Nkrumah Osei**[2,3]
Ama Serwaa Mensah[2,4], **Kofi Anokye-Ansong**[5]

Kwame Nkrumah University of Science and Technology (KNUST), Kumasi | Ghana Institute of Management and Public Administration (GIMPA) | Department of Surgery, University of Professional Studies, Accra (UPSA) | Department of Surgery, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi | Department of Pediatrics, University of Professional Studies, Accra (UPSA)

Correspondence: kagyemanbadu@hotmail.com

Received: 15 January 2001 | Accepted: 24 April 2001 | Published: 05 June 2001 | **DOI:** 10.5281/zenodo.18957531

ABSTRACT

Background: District hospitals are critical nodes in Ghana's healthcare system, yet synthesising evidence on their cost-effectiveness is hampered by heterogeneous study designs and outcome measures. Existing systematic reviews often fail to quantify uncertainty and integrate disparate data sources effectively.

Purpose and objectives: This study aimed to develop and apply a Bayesian hierarchical meta-analytic model to synthesise cost-effectiveness evidence for district-level hospital services, evaluating the model's methodological performance and deriving optimised estimates to inform resource allocation.

Keywords: *Bayesian hierarchical model, cost-effectiveness analysis, district hospitals, health systems research, sub-Saharan Africa*

Article Highlights

- Bayesian model integrated heterogeneous data, quantifying uncertainty via posterior distributions.
- Maternal and child health interventions showed highest probability of cost-effectiveness.
- Methodology outperforms frequentist models in synthesising disparate evidence.
- Findings support targeted investment for significant health system efficiency gains.

Core Analytical Model

$y_{ij} \sim \text{Normal}(\theta_j, \sigma^2_{ij})$, $\theta_j \sim \text{Normal}(\mu, \tau^2)$. Model parameters estimated via Markov chain Monte Carlo sampling, providing full posterior distributions for inference.

This analysis provides a probabilistic framework for optimising district hospital resource allocation in Ghana.