

# A Bayesian Hierarchical Modelling Approach to Evaluating Urban Primary Care Networks

*Clinical Outcomes in the Ethiopian Health System*

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## ABSTRACT

**Background:** Urban primary care networks are a critical component of health system strengthening in sub-Saharan Africa, yet robust methodologies for evaluating their impact on clinical outcomes are underdeveloped. Existing evaluations often rely on aggregated data, failing to account for heterogeneity across facilities and patient populations.

**Purpose and objectives:** This study aimed to develop and apply a Bayesian hierarchical modelling framework to quantify the effect of urban primary care network integration on key clinical outcomes within a national health system, using antenatal care completion as a primary indicator.

**Keywords:** *Bayesian hierarchical modelling, primary health care, health systems strengthening, sub-Saharan Africa, clinical outcomes, Ethiopia, urban health*

### Article Highlights

- Bayesian hierarchical modelling reveals a 14.2 pp increase in antenatal care completion with network integration.
- Substantial facility-level variation shows the network's benefit is context-dependent.
- The framework provides a nuanced tool for evaluating health system interventions.
- Findings support network integration coupled with targeted facility support.

### Methodological Contribution

Introduces a Bayesian hierarchical model with facility and time random effects to quantify network impact while accounting for heterogeneity often missed in aggregated analyses.

*This study offers a robust analytical framework for health systems evaluation in resource-constrained settings.*



## ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.



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