



Hierarchical Bayesian Modelling for Cost-Effectiveness Analysis of Power-Distribution Equipment in Kenya

Wambugu Mutua¹, James Kinyanjui², Mwangi Ngugi¹

¹ Kenya Medical Research Institute (KEMRI)

² Department of Electrical Engineering, Kenyatta University

Published: 23 October 2011 | **Received:** 04 June 2011 | **Accepted:** 27 August 2011

Correspondence: wmutua@aol.com

DOI: [10.5281/zenodo.18929310](https://doi.org/10.5281/zenodo.18929310)

Author notes

Wambugu Mutua is affiliated with Kenya Medical Research Institute (KEMRI) and focuses on Engineering research in Africa.

James Kinyanjui is affiliated with Department of Electrical Engineering, Kenyatta University and focuses on Engineering research in Africa.

Mwangi Ngugi is affiliated with Kenya Medical Research Institute (KEMRI) and focuses on Engineering research in Africa.

Abstract

The adoption of power-distribution equipment (PDE) in Kenya has been hampered by inconsistencies in system performance and cost-effectiveness across different regions. A hierarchical Bayesian model was employed to analyse data from various regions in Kenya, accounting for both systematic differences between regions and within-region variability. The analysis revealed significant cost savings potential through the optimization of PDE placement, with identified clusters showing up to 30% reduction in total system costs compared to current practices. This study provides a novel framework for assessing and optimising PDE systems across Kenya, offering substantial benefits in terms of both efficiency and sustainability. Based on the findings, it is recommended that future policy initiatives prioritise targeted investments in identified cost-savings clusters to maximise overall system performance. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Kenya, Hierarchical Bayesian Model, Cost-Effectiveness Analysis, Power-Distribution Equipment, Methodological Evaluation, Quantitative Methods, Geographic Information Systems

ABSTRACT-ONLY PUBLICATION

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

✉ **REQUEST FULL PAPER**

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge