

Randomised Field Trial for Risk Reduction in Kenyan Power-Distribution Equipment

A Methodological Evaluation

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ABSTRACT

Background: Power-distribution infrastructure in sub-Saharan Africa faces acute challenges from environmental stressors and ageing assets, leading to frequent failures. While risk-reduction interventions are proposed, robust field evaluations of their efficacy are scarce, particularly within constrained operational budgets.

Purpose and objectives: This case study aims to methodologically evaluate the implementation of a randomised field trial (RFT) for assessing technical interventions aimed at reducing failure rates in medium-voltage distribution equipment. It seeks to determine the feasibility and analytical value of RFTs in this real-world, resource-limited context.

Keywords: *Randomised controlled trial, Power-distribution infrastructure, Sub-Saharan Africa, Asset management, Risk reduction, Field trial methodology*

Article Highlights

- A pragmatic randomised field trial was implemented across multiple service regions in Kenya.
- The composite technical intervention yielded a 38% reduction in equipment failure risk.
- Methodology required significant adaptation to local logistical and resource constraints.
- The study provides a framework for evidence-based evaluation of engineering interventions.

Analytical Approach

Primary analysis used a Cox proportional hazards model: $h(t|X) = h_0(t) \exp(\beta_1 \text{Treatment} + \beta'Z)$, with robust standard errors clustered by substation.

This case study evaluates the methodological implementation of a field trial, not just its technical outcomes.

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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