

A Randomised Field Trial Methodology for Evaluating Maintenance Depot Risk Reduction in Ghana

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ABSTRACT

Background: Transport maintenance depots in Ghana are critical infrastructure nodes where systemic safety and operational risks are concentrated. Current risk assessment methodologies are largely observational and lack rigorous causal inference for evaluating intervention effectiveness.

Purpose and objectives: This article presents a novel methodological framework for conducting a randomised field trial to causally evaluate engineering and procedural interventions aimed at reducing depot-wide risk. The primary objective is to detail a protocol for randomisation, measurement, and analysis suitable for complex, operational industrial environments.

Keywords: *Randomised controlled trial, Risk assessment methodology, Transport infrastructure maintenance, Sub-Saharan Africa, Depot safety management, Field experiment, Operational risk reduction*

Article Highlights

- Presents a cluster-randomised, waitlist-controlled trial design for depot safety.
- Employs a linear mixed model with cluster-robust standard errors for analysis.
- Protocol is validated as feasible through a pilot power analysis.
- Aims to detect a 30% risk reduction with 80% statistical power.

Methodological Innovation

Shifts depot safety evaluation from observational studies to a rigorous causal framework using a randomised field trial.

This is a methodology paper; no empirical trial results are presented.

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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