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Evaluating Emergency Care Systems in South Africa

A Difference-in-Differences Analysis of Clinical Outcomes

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ABSTRACT

Emergency care systems in sub-Saharan Africa face significant challenges, yet robust quantitative evaluations of their impact on clinical outcomes are scarce. Existing literature often lacks rigorous causal identification strategies. This study aimed to quantify the causal effect of a systematic reorganisation of hospital-based emergency units on patient mortality, using a quasi-experimental design. We employed a difference-in-differences model, $Y\{it\} = beta0 + beta1\,(text\{Treat\}i \times text\{Post\}t) + gammai + deltat + \varepsilon\{it\}$, where Y_{it} is the mortality rate for hospital i in period t. The analysis used patient-level administrative data from a national cohort. Inference was based on cluster-robust standard errors at the hospital level. The intervention was associated with a statistically significant reduction in all-cause 30-day mortality of 4.2 percentage points (95% CI: 2.1 to 6.3). This represents a relative decline of approximately 18% from the pre-intervention mean. The structured reorganisation of emergency care was causally linked to a substantial improvement in patient survival, demonstrating the potential for system-level interventions to enhance clinical outcomes. Health policy should prioritise investment in dedicated emergency care systems with standardised protocols. Future research should investigate the cost-effectiveness of such models and their applicability in lower-resource settings. Emergency medical services; health systems evaluation; difference-in-differences; mortality; South Africa; quasi-experimental design This study provides novel causal evidence on the effectiveness of an integrated emergency care model in a sub-Saharan African context, utilising a robust quasi-experimental methodology rarely applied in this setting.

Keywords: *Emergency medicine, Sub-Saharan Africa, Difference-in-differences, Clinical outcomes, Health systems evaluation, South Africa, Observational study*

Article Highlights

- Quasi-experimental design provides robust causal evidence for emergency care reform.
- Intervention associated with an 18% relative reduction in 30-day patient mortality.
- Analysis employs a difference-in-differences model with cluster-robust inference.
- Findings demonstrate the impact of system-level interventions on clinical outcomes.

Core Finding

The structured reorganisation of hospital-based emergency care significantly improved patient survival in a South African setting.

This study offers novel causal evidence for emergency system reform in sub-Saharan Africa.