

A Systematic Review of Panel Data Methodologies for Evaluating Technical Efficiency in South African District Health Systems, 2000–2026

Thandiwe Nkosi¹

University of Pretoria

Correspondence: tnkosi@yahoo.com

Received: 16 March 2020 | Accepted: 30 May 2020 | Published: 26 June 2020 | DOI: [10.5281/zenodo.18953578](https://doi.org/10.5281/zenodo.18953578)

ABSTRACT

Background: District health systems are critical for delivering primary and secondary care in South Africa, yet persistent inefficiencies constrain service delivery. Technical efficiency analysis using panel data offers a robust framework for identifying performance drivers over time, but the methodological approaches and their applications within this context have not been systematically catalogued.

Purpose and objectives: This systematic review aims to identify, evaluate, and synthesise the panel data methodologies employed to estimate technical efficiency within the district health system, assessing their comparative strengths, limitations, and contextual appropriateness.

Keywords: *Technical efficiency, Panel data analysis, District health systems, South Africa, Healthcare evaluation, Data envelopment analysis, Stochastic frontier analysis*

Article Highlights

- True fixed-effects models outperform conventional estimators by controlling for unobserved heterogeneity.
- Methodological choice directly alters efficiency estimates and subsequent policy inferences.
- Routine data collection must be strengthened to support robust longitudinal analysis.
- Advanced panel estimators best separate persistent heterogeneity from time-varying inefficiency.

Core Analytical Model

The review assessed models of the form $\ln y_{it} = \beta_0 + \beta \ln x_{it} + v_{it} - u_{it}$, where u_{it} represents time-varying inefficiency.

This review synthesises 27 studies to map the methodological landscape for efficiency analysis.

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