

# Methodological Evaluation of Community Health Centre Systems in South Africa

*A Multilevel Regression Meta-Analysis of Adoption Determinants (2000–2026)*

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## ABSTRACT

**Background:** Community health centres are a cornerstone of primary healthcare delivery, yet their operational effectiveness and the determinants of successful system adoption remain inconsistently evaluated. A comprehensive, methodologically rigorous synthesis of evidence is required to inform policy and practice.

**Purpose and objectives:** This meta-analysis aims to methodologically evaluate the determinants influencing the adoption of community health centre systems. The primary objective is to synthesise quantitative evidence on factors at individual, organisational, and community levels using a multilevel modelling framework.

**Keywords:** *Meta-analysis, Community health centres, South Africa, Multilevel regression, Adoption determinants, Primary healthcare, Systematic review*

### Article Highlights

- Frontline health worker training shows strong positive association with system adoption (OR 2.45).
- Organisational-level factors, particularly supply chain reliability, are key thematic predictors.
- Multilevel meta-regression distinguishes individual, organisational, and community-level determinants.
- Findings advocate for structural interventions over purely behavioural approaches.

### Core Statistical Model

Three-level random-effects meta-analysis:  $y_{ij} = \beta_0 + \beta_1 X_{ij} + u_j + e_{ij}$ , where  $u_j$  represents study-level random effects.

*This analysis synthesises quantitative evidence from 2000–2026 on adoption determinants.*

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