



Methodological Evaluation of District Hospitals Systems in Ethiopia: Panel Data Estimation for System Reliability Assessment

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Abstract

District hospitals in Ethiopia are critical for healthcare services, yet their operational efficiency varies significantly. A panel-data regression model was employed to analyse system performance across multiple districts. Robust standard errors were used for inference. The estimated coefficient for patient wait time was -0.75 (95% CI: [-1.2, -0.3]), indicating a negative relationship between district size and average wait times. Panel data analysis revealed systematic inefficiencies in hospital operation that require targeted interventions to improve system reliability. Immediate attention should be given to reducing patient wait times in smaller districts to enhance overall healthcare service quality. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African geography, panel data, econometrics, hospital efficiency, system reliability, regression analysis, health systems assessment*

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