Evaluating the Impact of Hospital Type, Period, and Region on Healthcare Performance Metrics in Saudi Arabia: A Comparative Analysis of Clustered and Non-Clustered Hospitals

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ABSTRACT

To evaluate the impact of hospital type, reform period, and region on healthcare performance metrics in Saudi Arabia under the Health Sector Transformation Program (SHSTP). Convergent mixed-methods observational study. Four public hospitals in Mecca and the Eastern Province (two clustered, two non-clustered), 2016–2024. Quantitative data (80 hospital-period observations) were extracted from Ministry of Health administrative records. Outcomes included patient satisfaction, wait time, staff efficiency, resource utilization, and cost per patient. Associations were tested using fixed-effects regression and factorial ANOVA. Qualitative data came from 53 semi-structured interviews (23 patients, 30 physicians), analyzed thematically and integrated with quantitative findings. Clustered hospitals achieved significantly greater improvements than non-clustered hospitals. Patient satisfaction increased by 21.1% vs 9.5% ($p<0.001$), wait times decreased by 37.2% vs 13.1% ($p<0.001$), and staff efficiency rose by 26.5% vs 12.6% ($p<0.001$). Resource utilization improved significantly in clustered (+18.8%, $p<0.001$) but not in non-clustered hospitals (+5.7%, $p=0.089$). Cost per patient decreased by 22.9% vs 7.1%. Regression confirmed clustering ($\beta=18.23$, $p<0.001$) and reform phase ($\beta=10.15$, $p<0.001$) as strong predictors; region was not significant. Interaction analysis showed clustered hospitals benefited disproportionately in the later reform phase. Subgroup analyses indicated the largest gains in tertiary hospitals with advanced digital health adoption. Qualitative interviews validated these outcomes, emphasizing digital integration, improved coordination, and workforce reorganization. Hospital clustering under the SHSTP improved satisfaction, efficiency, costs, and access, particularly when supported by digital health infrastructure. Findings support scaling clustering reforms nationally as part of Vision 2030's strategy for integrated, patient-centered care.

Keywords: hospital clustering, SHSTP, Saudi Arabia, healthcare performance, Vision 2030, mixed-methods

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