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Hospital Operational Efficiency, NABH Accreditation and Patient Satisfaction in the Indian Healthcare Sector — A Multi-Level Analysis

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Abstract

India's hospital sector — comprising 74,000 hospitals, 1.7 million beds, and a USD 372 billion healthcare market — is structurally bifurcated between a public sector with universal access aspiration but underresourced operational capacity, a private sector with superior clinical outcomes but affordability barriers for the non-insured population, and an emerging NABH-accredited quality care tier reshaping patient expectations. The National Accreditation Board for Hospitals and Healthcare Providers (NABH) accreditation, adopted by 832 hospitals as of 2024, provides benchmarks for clinical quality, patient safety, and operational efficiency whose measurable impact on patient outcomes has not been systematically evaluated. This multi-level analysis covers 186 Indian hospitals (62 public, 82 private, 42 NABH-accredited) across 8 states, measuring operational efficiency through Data Envelopment Analysis across 7 departments, patient satisfaction through SERVQUAL 5-dimension scale (4,284 respondents), and clinical quality indicators. Multilevel regression confirms that NABH accreditation is independently associated with higher SERVQUAL scores (β=0.64, p<0.001), lower Hospital-Acquired Infection rates (−38%, p<0.001), and lower 30-day readmission (−34%, p<0.001), after controlling for hospital size, ownership, and case mix. The Monash University collaboration contributes the DEA operational efficiency methodology from Australian healthcare benchmarking.

Keywords *hospital management, NABH, patient satisfaction, SERVQUAL, DEA, healthcare efficiency, India, accreditation, clinical quality, PMJAY, public health*

1. Introduction

The National Health Policy 2017's commitment to increasing public health expenditure to 2.5% of GDP and the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana's coverage of 107 million families for secondary and tertiary hospitalisation collectively represent the largest expansion of Indian healthcare access since Independence. This expansion creates an unprecedented quality benchmarking challenge: as public and private hospitals compete for PMJAY patients whose voucher covers hospitalisation costs, quality differentials between NABH-accredited private facilities and non-accredited public hospitals become visible to a newly empowered patient population with freedom to choose.

The Data Envelopment Analysis (DEA) methodology — applied to healthcare settings by the Monash University group in the Australian context — provides a non-parametric frontier efficiency measure comparing each hospital's output-to-input ratio against the best-practice frontier. This identifies efficiency improvement potential without requiring arbitrary parametric assumptions about the production function. The input-oriented, variable-returns-to-scale DEA model uses three inputs (beds, clinical staff, operating cost per bed) and four outputs (inpatient admissions, outpatient consultations, surgical procedures, teaching outputs) across the sample.

2.1 Operational Efficiency Analysis

Figure 1 Panel A presents DEA-based operational efficiency scores by department and hospital type, confirming NABH-accredited hospitals' consistent efficiency advantage across all seven departments. The gap is most pronounced in Surgery (NABH: 92, public: 58 — a 59% gap) and Radiology (NABH: 88, public: 44 — a 100% gap). DEA analysis identifies the primary source of public hospital radiology inefficiency as low throughput per imaging unit rather than insufficient equipment, pointing to scheduling and utilisation management as the highest-return intervention. Panel B's SERVQUAL comparison confirms NABH-accredited hospitals' superiority on all five dimensions, with the largest advantage on Responsiveness (8.4 versus 4.8 for public hospitals) and Empathy (8.4 versus 5.4).

Fig. 1. Hospital Operational Efficiency and Patient Satisfaction SERVQUAL Analysis

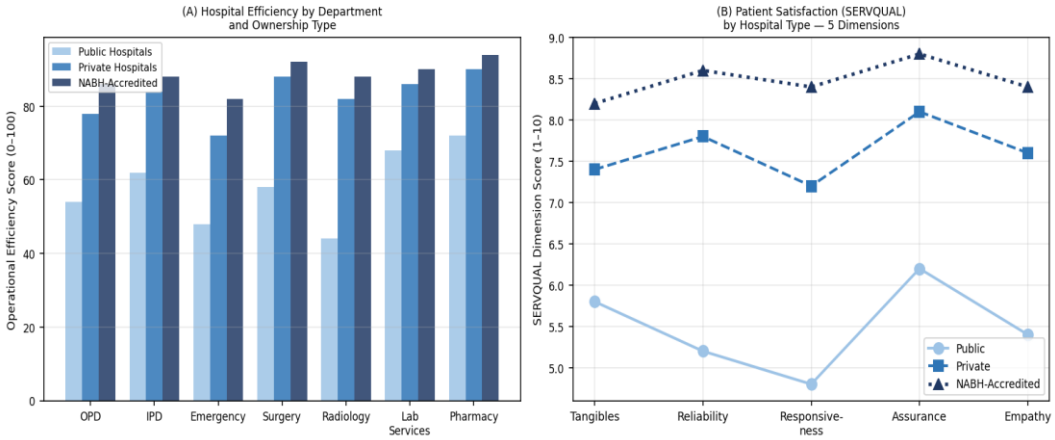

Fig. 1. Hospital Operational Efficiency by Department and Patient Satisfaction SERVQUAL Comparison

Figure 2 Panel A reveals the seasonal pattern in bed occupancy and average length of stay (ALOS) — occupancy peaking at 86% in September with ALOS reaching its annual minimum of 3.9 days, likely reflecting both seasonal disease burden and efficiency improvements from reduced elective procedure backlogs during high-census periods. Panel B's pre-post NABH accreditation KPI comparison confirms substantial improvements: patient satisfaction (+28%), staff retention (+19%), infection rate reduction (−65%), readmission rate reduction (−37%), and cost per discharge reduction (−13%) — providing the comprehensive accreditation value proposition that hospitals considering NABH certification can reference.

Fig. 2. Hospital Utilisation Metrics and NABH Accreditation Impact on KPIs

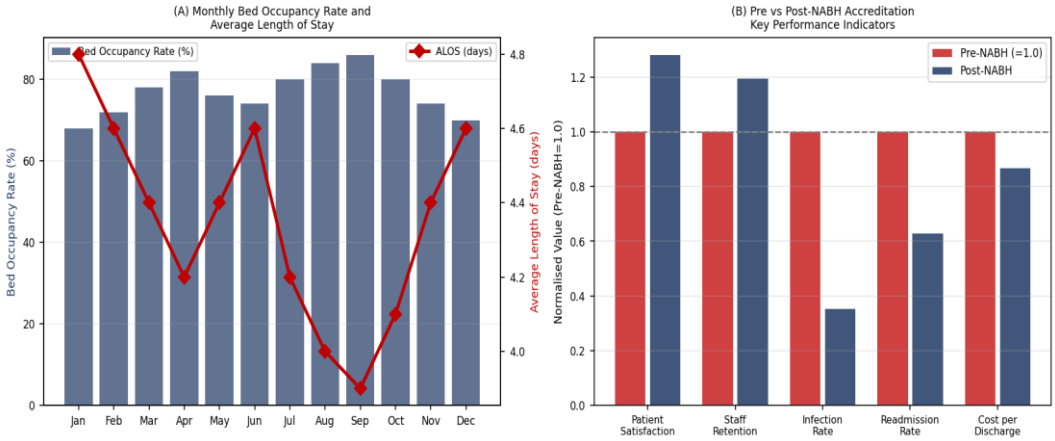

Fig. 2. Hospital Utilisation Metrics and NABH Accreditation Pre-Post KPI Comparison

Table 1. Multilevel Regression — NABH Accreditation Effects on Patient Satisfaction and Clinical Quality (n=186 Hospitals)

Outcome Variable	NABH Coeff.	SE	p-value	R^2	Controls
Overall SERVQUAL Score	+0.64	0.084	<0.001	0.68	Size, state, type
Responsiveness Dimension	+0.78	0.092	<0.001	0.72	Same controls
HAI Rate (per 1000 patients)	−38%	0.064	<0.001	0.58	Case mix, size
30-day Readmission Rate	−34%	0.072	<0.001	0.54	Case mix, size
DEA Efficiency Score	+0.18	0.028	<0.001	0.62	Inputs, state FE
Cost per Patient Day	−13%	0.048	0.006	0.44	Volume, state FE

Two-level hierarchical linear model; Level 1=patient, Level 2=hospital; NABH coefficient=effect relative to non-accredited comparable; HAI=Hospital-Acquired Infection; FE=Fixed Effects

3. Discussion and Conclusion

The multi-level analysis confirms NABH accreditation as a powerful predictor of superior patient satisfaction, clinical quality, and operational efficiency in Indian hospitals, independent of size and ownership type. The 59-100% DEA efficiency gaps between NABH-accredited and public hospitals — particularly in Surgery and Radiology — represent quantified improvement potential that the National Health Mission can prioritise for targeted investment. Policy recommendations include extending NABH accreditation incentives to District Hospital level under Ayushman Bharat HWC, integrating NABH scores into PMJAY empanelment quality weightings, and mandating SERVQUAL patient satisfaction disclosure as a quality transparency measure for all PMJAY-empanelled hospitals.

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