Efficiency of Public Sector District Hospitals of India: A Data-envelopment Analysis

Aarti Goyal*, Gaurav Jyani*, Shankar Prinja

Department of Community Medicine and School of Public Health, Postgraduate Institute of Medical Education and Research, Chandigarh, India
*Aarti Goyal and Gaurav Jyani are joint first authors and contributed equally

Abstract

Background: District hospitals are integral part of India's public healthcare delivery system, yet national-level assessment of their efficiency is lacking. **Objectives:** This research assesses the technical efficiency of district hospitals in India and identifies key determinants influencing their performance. **Materials and Methods:** Data envelopment analysis was utilized to measure the efficiency scores of district hospitals. The estimates of input and output variables from district hospitals were sourced from the primary data comprising 27 district hospitals across nine Indian states. Input variables included human resources for health, physical medical infrastructure, and the economic value of all other resources consumed to deliver health services, whereas the output variables comprised hospital workload indicators such as number of hospitalizations, surgeries, and outpatient episodes. Tobit regression investigated the factors influencing hospital efficiency. **Results:** 85.2% of the district hospitals ($n = 23$) under the variable returns to scale model and 74.1% of the hospitals ($n = 20$) under the constant returns to scale model had efficiency scores above the threshold of 0.9, suggesting high operational efficiency. Mean technical efficiency (TE), pure technical efficiency (PTE), and scale efficiency scores were 0.88, 0.94, and 0.93, respectively. The hospitals serving larger proportions of very young or elderly populations exhibited lower TE ($\beta = -0.017$). The hospitals located in tier 2 ($\beta = 0.653$) and tier 3 cities ($\beta = 0.600$) exhibited higher PTE than those in tier 1 cities. **Conclusion:** Most district hospitals are performing efficiently; thus, increasing output would require a higher budget. Progress toward universal health coverage necessitates either enhanced inputs or more district hospitals.

Key words: Constant return on scale, cost, data envelopment analysis, determinants of efficiency, district hospitals, Efficiency, health efficiency, health services, India, inputs, outputs, scale efficiency, technical efficiency, Tobit model, variable return on scale