Working papers economics - Productivity and Efficiency of Public Hospitals in Colombia by Complexity Level: New Evidence from 2007 to 2021

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Hospital productivity has declined steadily across all three complexity levels. Level 3 public hospitals (ESEs) were more resilient during the pandemic, while Level 2 hospitals suffered the greatest impact but showed a stronger recovery. Level 1 hospitals experienced the most prolonged decline with the weakest recovery.

Publication Date: Monday, 24 of November 2025 **Approach**
This study analyzes the evolution of multifactor productivity based on the dynamics of efficiency and technological change in public hospitals in Colombia between 2007 and 2021. It uses a comprehensive database of health services, installed capacity, and health and non-health personnel from the Hospital Information System (SiHO) of the Ministry of Health and Social Protection. For the estimation of the Malmquist multifactor productivity index, technical efficiency and technological change, a novel methodology is applied that combines group-specific stochastic frontier distance functions and a metafrontier for the entire public hospital system. This is the first time such an approach is applied to health-related topics, allowing for comparisons between hospitals according to their complexity level and type of services provided. Unlike previous studies, this approach acknowledges that not all hospitals operate under the same technological conditions or provide the same service groups, enabling a more accurate and realistic measurement of performance, ultimately considering the relationship between productivity and quality.

Contribution
This study makes a methodological contribution by applying, for the first time in the analysis of productivity and efficiency in health services, the strategy proposed by Cao et al. (2017), which combines stochastic frontier distance functions by complexity level with a stochastic metafrontier for the entire public hospital system. This approach enables comparisons between hospitals operating under different technological conditions and providing different service groups, adjusting the measurement of technical efficiency and multifactor productivity to the institutional heterogeneity of the Colombian system. Furthermore, the study overcomes empirical limitations present in previous national literature, such as the lack of differentiation by complexity levels and the use of partial subsamples. In a context of high coverage but increasing access barriers, and where expenditure exceeds revenue, having accurate metrics differentiated by hospital level is essential to guide investment, reorganization, and modernization decisions for the public hospital system.

Results

Hospital productivity has declined steadily across all three complexity levels. Level 3 public hospitals (ESEs) were more resilient during the pandemic, while Level 2 hospitals suffered the greatest impact but showed a stronger recovery. Level 1 hospitals experienced the most prolonged decline with the weakest recovery. The study identifies technological lag as the main negative factor, both within each group and across the system as a whole. Although some ESEs have improved their operational efficiency, they have not achieved technological progress, widening the gap with best practices in the system. It is also observed that institutional size and human resource composition influence efficiency. Larger ESEs tend to be less efficient, and non-clinical staff may have a positive effect in high-complexity hospitals. These findings help identify gaps, guide investments, and strengthen technology transfer networks. To improve productivity, it is recommended to rethink the financing model, design specific policies by hospital level, and establish minimum standards for technical and technological efficiency.

Fuente: https://d1b4gd4m8561gs.cloudfront.net/en/publications-research/working-papers-economics/productivity-efficiency-public-hospitals