

Optimal Healthcare Delivery System Based on the Balance of Demand and Supply

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With rapid population aging and declining birth rates, Japan faces an urgent need to redesign its healthcare delivery system based on future healthcare demand. Using publicly available open data, this study conducted: (1) a long-term trend analysis of healthcare demand and supply from 1999 to 2023; (2) projections of future inpatient demand from 2025 to 2050 incorporating demographic changes and projected hospitalization rates; and (3) an evaluation and proposal of healthcare delivery configurations based on a geographic accessibility indicator. Demand was measured using hospitalization rates and estimated inpatient counts, while supply was assessed using the numbers of hospitals and hospital beds. Geographic accessibility was evaluated using the Enhanced Two-Step Floating Catchment Area (E2SFCA) method. In addition, mixed-integer linear programming (MILP) was applied to simulate the optimization of hospital and bed numbers under the constraint of maintaining 2020 accessibility levels. The results suggest that future healthcare demand will decline and that maintaining accessibility will require a gradual reduction in both hospital beds and hospitals. This study aims to provide quantitative evidence to support the redesign of healthcare delivery systems in response to anticipated demand–supply changes.