An Analysis of Imbalances in the Distribution of Physicians by Medical Specialty in Korea: A Hotspot-Based Typology of Physician Distribution by Specialty Characteristics, with a Focus on Physician Density and the Gini Coefficient

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Abstract

The spatial distribution of the medical workforce in Korea is not explained by population size alone: specialties with different functional roles show markedly different spatial patterns. This study examines those patterns using the 250 si•gun•gu districts of Korea as spatial units, with 2025 data on specialists in 26 medical specialties standardized as the number of specialists per 100,000 population. Distributional inequality is measured with the Gini coefficient and the Lorenz curve, and spatial structure is examined with Global Moran's I and Local Indicators of Spatial Association (LISA). The spatial weights matrix combines first-order Queen contiguity with a k = 1 nearest-neighbor matrix so that no isolated district is dropped from the analysis, and the significance of local clusters is adjusted using the Benjamini-Hochberg false discovery rate procedure. Distributional inequality varies markedly across specialties, with Gini coefficients ranging from 0.298 for orthopedic surgery to 0.903 for tuberculosis, independently of the overall level of supply, and significant positive global spatial autocorrelation is observed in 19 of the 26 specialties. Drawing on the local clusters that remain significant after correction, the specialties with distinct clustering are organized into four spatial types: urban clinic-centered concentration, aging- and wide-area-demand-driven clustering, tertiary-hospital dependent fragmentation, and environment- and policy-specific allocation. Essential specialties such as pediatrics and emergency medicine combine metropolitan hotspots with extensive low-supply clusters outside metropolitan areas, revealing spatial gaps that aggregate inequality measures alone do not capture. As a cross sectional analysis of supply-side indicators, this study describes and classifies spatial patterns rather than identifying their determinants; the results nonetheless suggest that workforce planning may need differentiated spatial targets by specialty rather than a uniform balance requirement.

Keywords

Physician Distribution, Spatial Inequality, Gini Coefficient, Hotspot Analysis, LISA, Medical Specialty Typology, Essential Healthcare, GIS.

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