Impact of Human Mobility Patterns on the COVID-19 Pandemic: A Spatiotemporal Analysis

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The COVID-19 pandemic has underscored the importance of comprehending how human mobility influences the spread of infectious diseases. This study employs mobile data to investigate the interplay between population movements and COVID-19 spread, shedding light on the role of mobility patterns in shaping the pandemic's course. Our analysis spans various regions and periods of the pandemic, using data from February 2020 to September 2022, corresponding to the major COVID-19 waves in South Korea. The study employs a methodology that includes decomposing mobility data, applying hierarchical clustering to categorize regions into distinct mobility clusters such as Big Cities, Small Cities, Big Towns, and Small Towns, and using time-lagged cross-correlation to explore the dynamics between mobility patterns and COVID-19 transmission. Our findings reveal significant regional and temporal variations in the relationship between human mobility and the spread of COVID-19, underscoring the non-uniform impact of the pandemic across different areas and times. The research highlights the critical importance of incorporating local and temporal contexts in the implementation of public health strategies and policies.