

How Did the COVID-19 Pandemic Reshape the Urban Structure of Chinese Cities? Evidence from High-Resolution Population Density Data over 2015–2022

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Abstract

The outbreak of the COVID-19 pandemic at the end of 2019, the largest global health crisis in the past two decades, initiated profound changes in people’s daily lives compared with the pre-pandemic period. Recent studies have highlighted some of the consequences of COVID-19-related changes, including the connection between infection rates and changes in population density. However, these studies either employ data other than population/employment density data or rely on population density data over short periods and for specific cities.

To extend the body of knowledge on this topic, this study explores how the COVID-19 pandemic reshaped the urban structures of 297 Chinese cities using high-resolution population density data from LandScanTM from 2015 to 2022. Identifying city centers for each city through exploratory spatial data analysis, this study employs decomposition of Theil index decomposition and a stylized counterfactual decomposition, examining changes in three dimensions, mainly the last two, namely, population distribution inequality, dispersion and polycentricity. The key findings are as follows. First, distribution inequality generally decreases during the pandemic. Second and most important, owing to the changes in both population distribution and central areas, the population concentrated in central areas increases and there is no uniform change in polycentricity across the different city groups. Third, the change caused by central areas is the main driver of the changes in these two aspects of the urban structure through the counterfactual decomposition. Fourth, the urbanization ratio, personal income, and lockdown intensity all significantly affect either.

This study addresses the gap in the literature estimating dispersion and polycentricity across a broad spectrum of cities in China as well as provides a decomposition of the observed changes during the pandemic, a method applicable to future studies.