

# Community Characteristics and Their Influence on Pandemic Resilience During Shanghai's SARSCoV-2b Surge

## Introduction

In early March 2022, Shanghai witnessed a rapid outbreak of the SARSCoV-2b virus, a variant of Omicron, which ultimately led to a lockdown that lasted for three months. In response, Shanghai government implemented various epidemic control policies. We noted significant regional disparities in the number of days communities were "listed" due to resident infections. Our research aims to investigate the correlation between the quality of community environments and the higher SARSCoV-2b infection rates under the implementation of epidemic policies.

## Method

This study focuses on the transition from localized grid-based management to city-wide lockdown. We collected data on the coordinates and infection rates of residential communities, as well as housing prices, population density, and other relevant housing metrics. We both applied Bayesian-optimized XGboost and Multi-scale geographically weighted regression (MGWR) to investigate how community environmental factors affected SARS-CoV-2 outbreak dynamics at various policy implementation milestones.

## Result

We discovered that high population density and community ages were always the primary drivers of epidemic spread. Intriguingly, during the rapid city-wide lockdown phase within three days, higher housing prices emerged as a main factor associated with community infections. We performed spatial clustering on communities with high infection times and found that they are predominantly concentrated in the central areas of Shanghai.

## Intepretation

We noted that in the politics to mitigate epidemic transmission, the allocation of scarce resources to poorer community may yield the greatest benefit. Additionally, irrational city-wide lockdowns may lead to higher-income and central city populations stockpiling supplies more aggressively, thereby causing increased population movement and pandemic outbreaks.

**Primary author:** LI, Tianyu (The University of HongKong)

**Presenter:** LI, Tianyu (The University of HongKong)

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