

# Mapping the Intercounty Transmission Risk of COVID-19 in New York State

This paper investigates the COVID-19 transmission risk between different counties in the state of New York during the first month of the pandemic and makes contributions in two areas. First, using the publicly available COVID-19 case dataset in the state of New York, this study measures the COVID-19 outbreak status in different counties and quantifies their current levels of severity. Queens, Kings, Westchester, Nassau, Bronx, Suffolk, and New York were all identified as the current outbreak centers, in descending order of their severity. Then, using the transportation commuting data between different counties, we analyze the potential disease spreading risks for all counties. We find that Queens, Kings, Westchester, New York, and Monroe were major spreaders because of high volume, bi-directional commuting patterns. Saratoga and Oneida spread fewer outgoing cases, while Suffolk and Bronx were more affected by incoming cases. All other counties in the state are regarded as “community spreaders” with relatively low inter-county commutes, among which Rockland, Richmond, Essex, Orange are at mid-levels of severity in the outbreak. Specific attentions should be given to Monroe, Saratoga, and Oneida, who currently have a relatively low severity score but could become the next outbreak centers due to their significant transportation connections to other counties.

**Keywords:** COVID-19, transmission risk, commuting, New York state