

How Social Vulnerability and Connectivity Shape Community Risks for COVID-19?

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Who Are We?

- We study disasters, including wildfires in California and the impacts on local communities and currently concentrating on COVID-19
- Partnership with Facebook Data for Good
 - Crowdsourced products on mobility and connectivity (pre-crisis and in-crisis)
- Interested in aggregated mobility data and how disaster response practices can be of great benefit, including the COVID-19 pandemic

Buckee, C. O., Balsari, S., Chan, J., Crosas, M., Dominici, F., Gasser, U., . . . **Schroeder, A.** (2020). Aggregated mobility data could help fight COVID-19. *Science*, eabb8021. doi:10.1126/science.abb8021

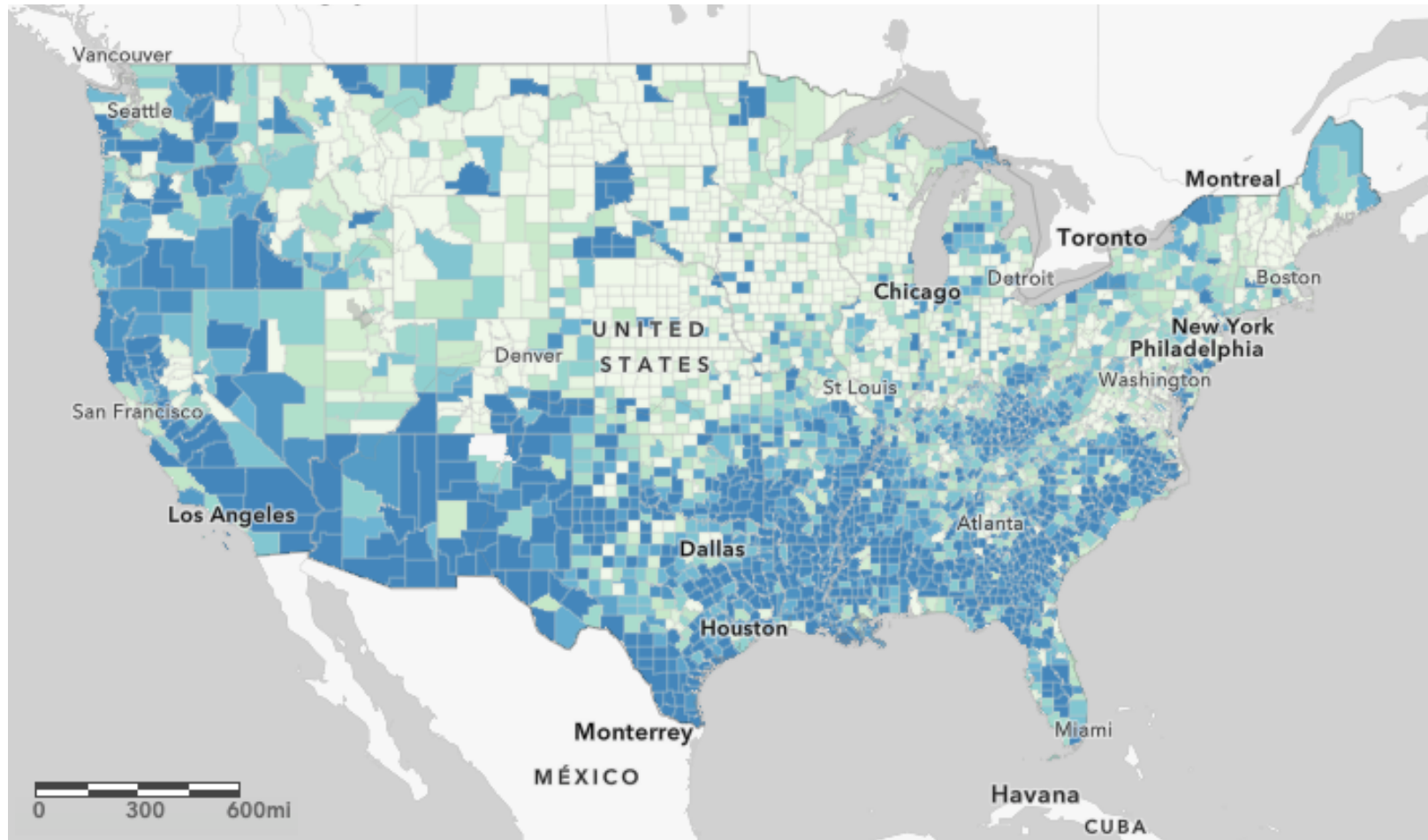
Jia, S., Kim, S. H., Nghiem, S. V., Doherty, P., & **Kafatos, M. C.** (2020). Patterns of population displacement during mega-fires in California detected using Facebook Disaster Maps. *Environmental Research Letters*. Retrieved from <http://iopscience.iop.org/10.1088/1748-9326/ab8847>

Team members are in COVID-19 Mobility Data Network
<https://www.covid19mobility.org/>

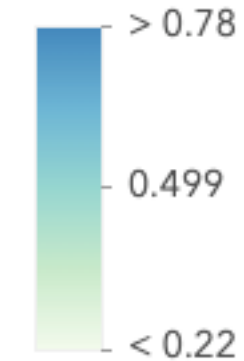
Why Are We Doing This Research?

- **Risk = Exposure x Vulnerability**
- Mapping the differences in vulnerability is a key step towards a better understanding on the resources needed to address the COVID-19 risks
- If a particular location is less vulnerable, it does not necessarily mean it may have a lower risk of surge in COVID-19 cases
- Level of connectivity matters a lot

Risk = Exposure x Vulnerability



CDC Social Vulnerability Index



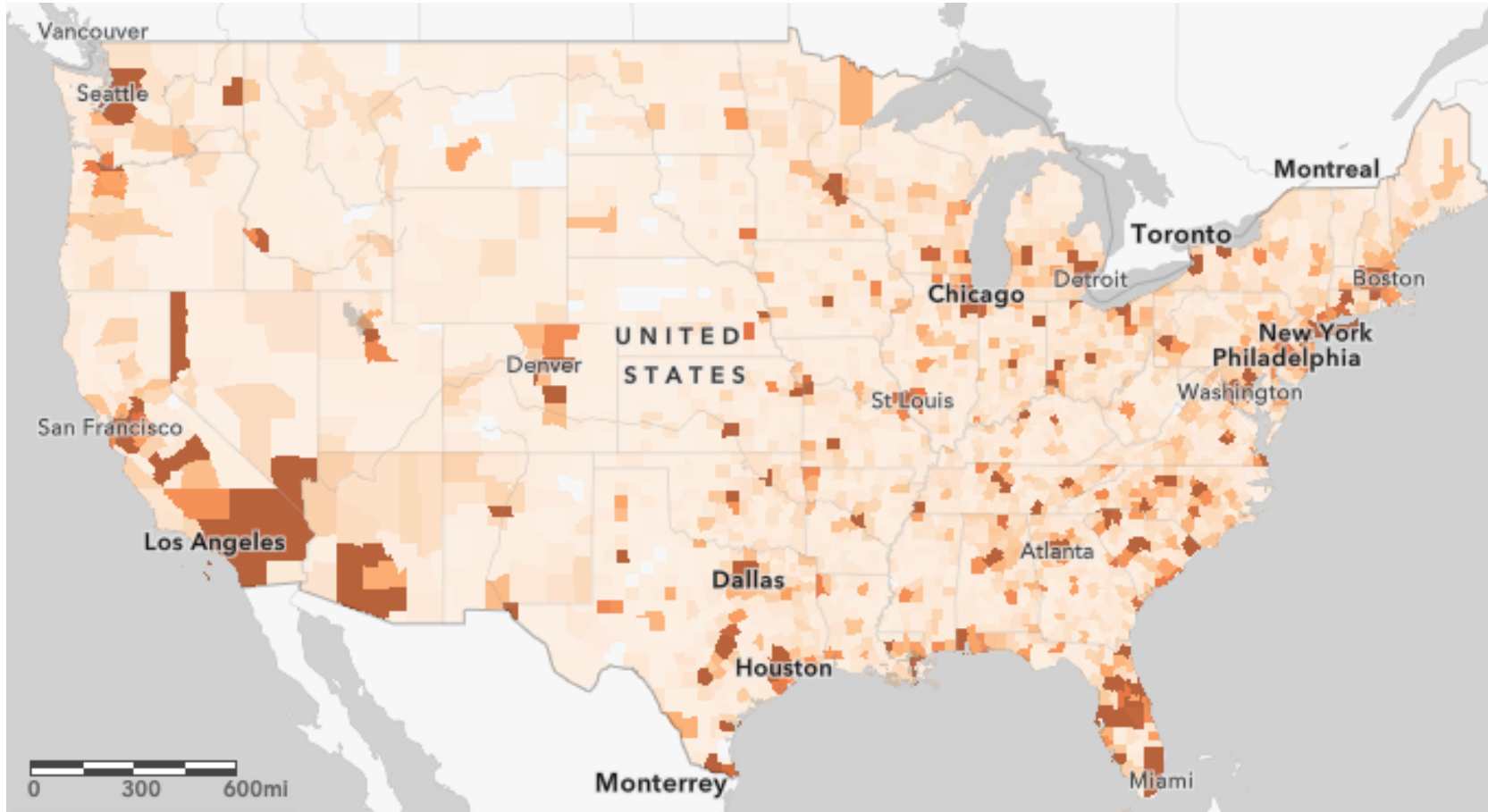
Social Vulnerability Index is a synthetic measurement on a community's preparedness towards any kind of major emergency, based on census data

based on 2018 Census Data, County-Level

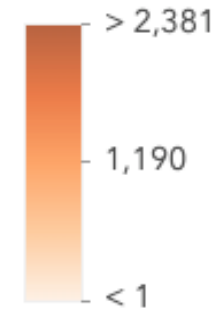
<https://svi.cdc.gov/map.html>

Risk = Exposure x Vulnerability

Regional hubs can be clearly identified by the level of connectivity



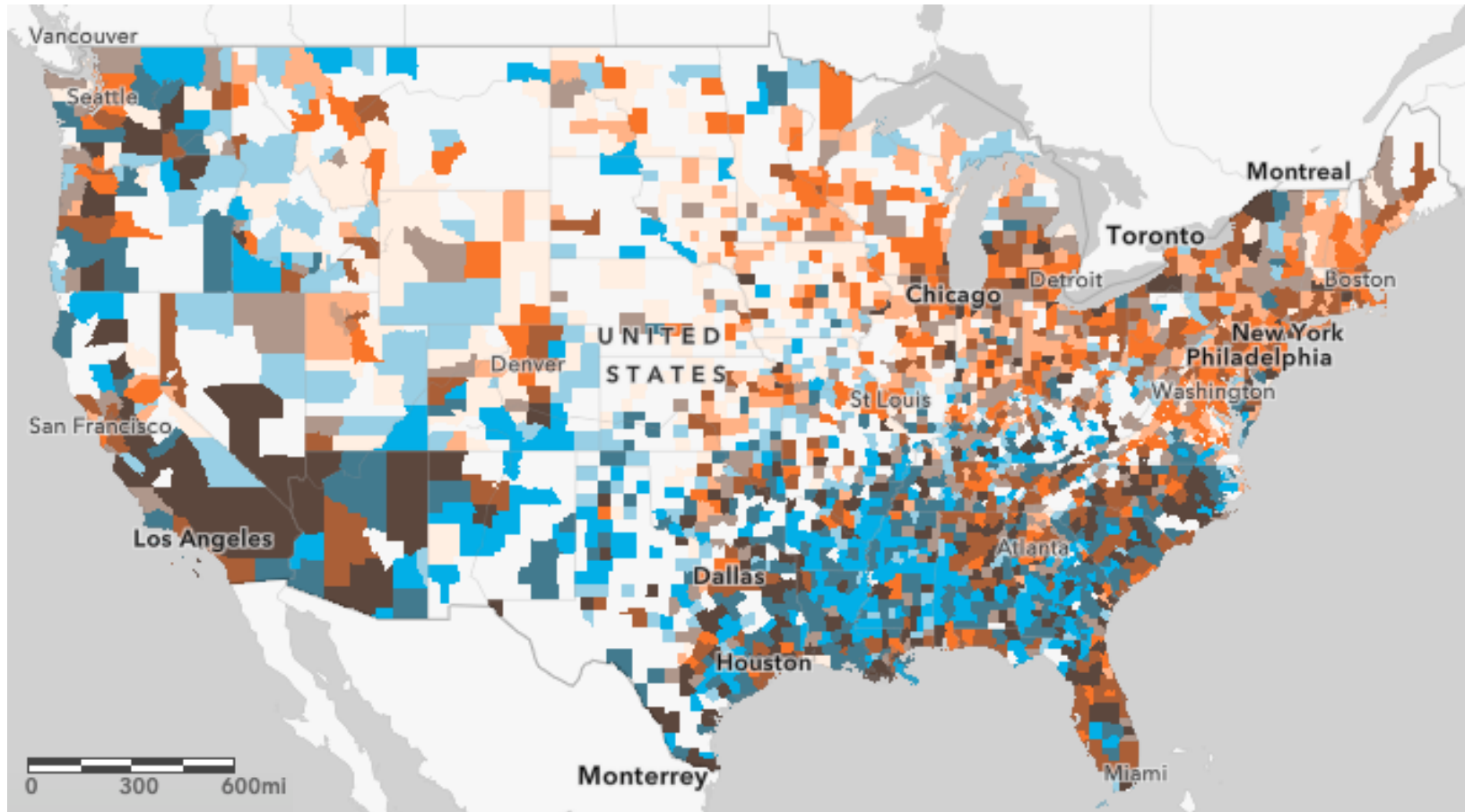
Cross-Boundary Connectivity



Cross-Boundary Connectivity is measured by the **likelihood** of Facebook users being outside of the same county. Likelihood is calculated based on Facebook user location history (pre-crisis) by [Facebook Data for Good](https://dataforgood.fb.com/docs/covid19/).

Risk = Exposure x Vulnerability

Observed **High** Risk: More than 10 COVID-19 Cases per 10,000 Persons (by April 15, 2020)

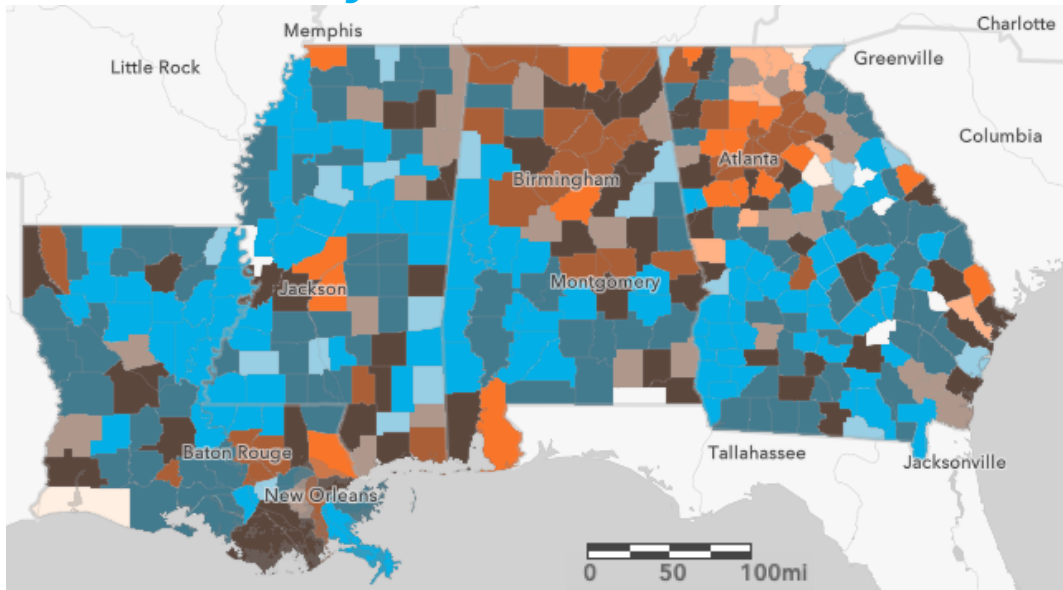


Highly vulnerable,
Less connected

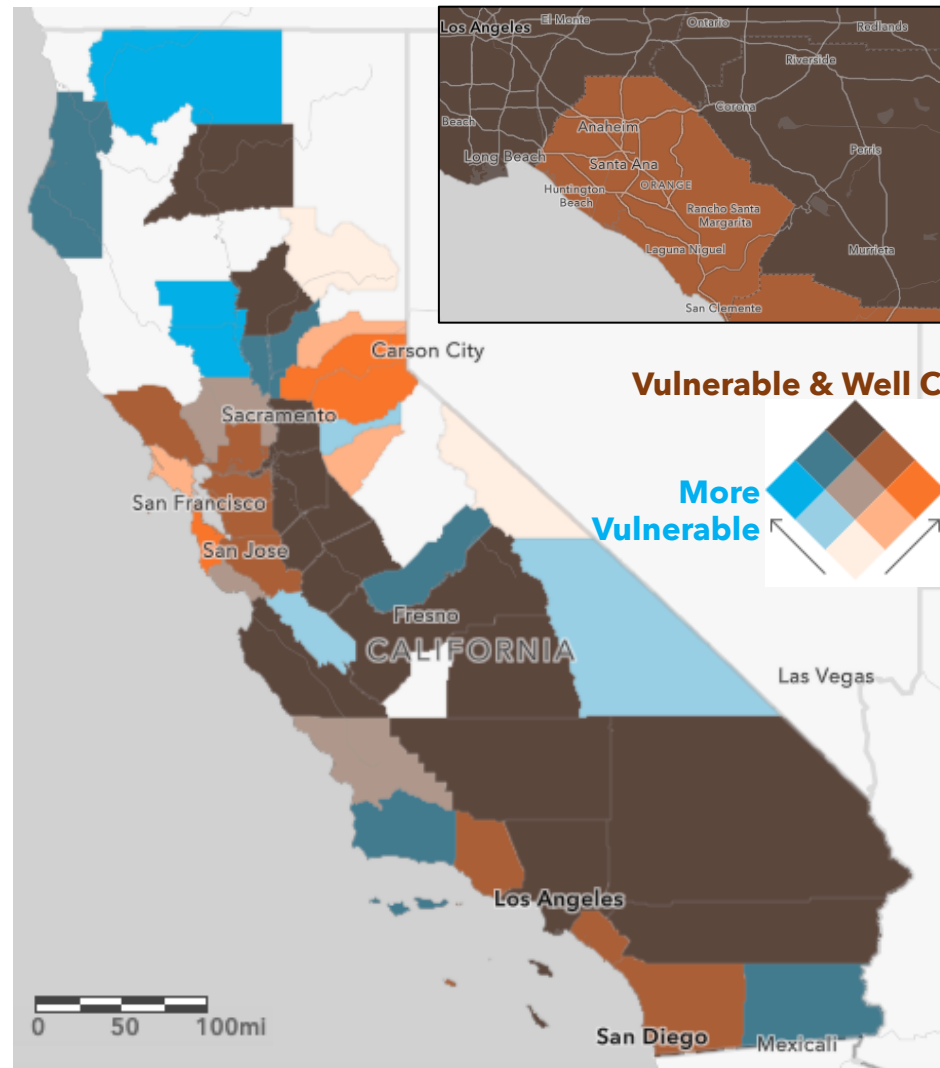


Highly connected,
Less vulnerable

Vulnerability matters (LA, MS, AL, GA)



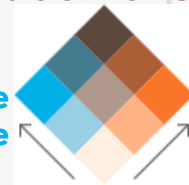
California: a mixture
Regional differences are prominent



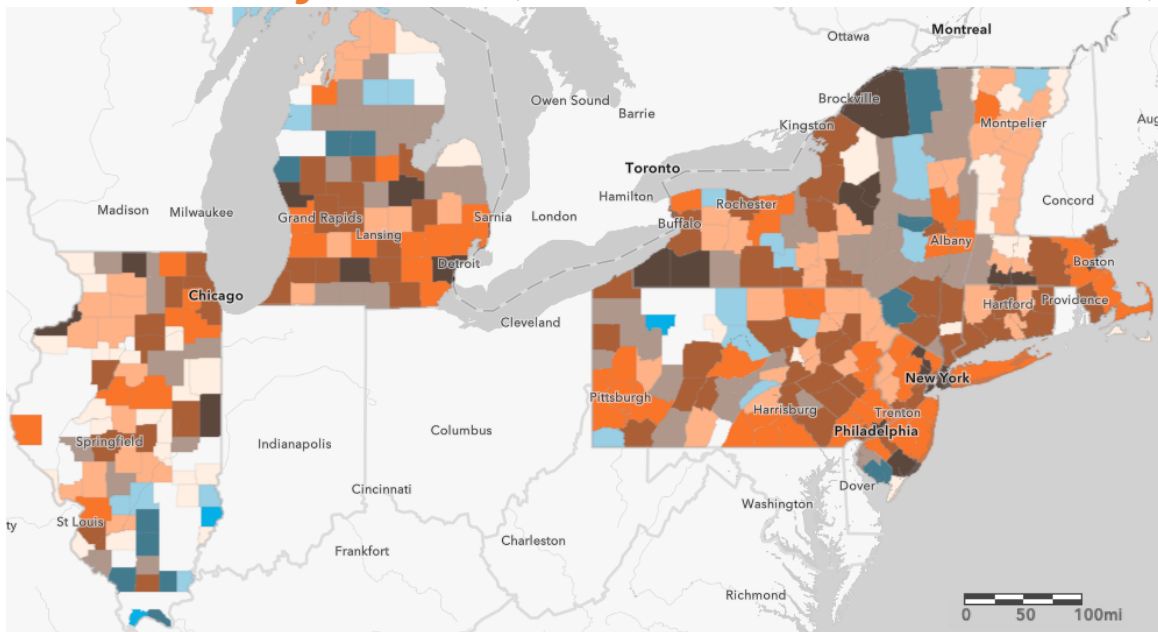
Orange County:
Connectivity Matters

Vulnerable & Well Connected

More Vulnerable Better Connected



Connectivity matters (NY, NJ, PA, MA, CT, VT, IL, MI)



Main Takeaways of Our Research with Potential Societal Payoffs in the COVID-19 Pandemic

- Connectivity should be taken into consideration for future emergency planning and policy-making
 - Isolated, more vulnerable communities should not be forgotten
 - Better cross-county or even cross-state coordination is needed to leverage resources available for a particular region
- We are all in this together

Thanks for your attention!
Happy to hear your comments and questions:
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