Coronavirus outbreaks

SOURCE: Johns Hopkins University
Outline

• Mobility data: representativeness and meaning
• Testing data: biases in confirmed case reports
• Assessing timing of policies versus epidemiology: accounting for non-linear dynamics
COVID19 Mobility Data Network:

- ~50 researchers internationally
- DUAs with Facebook, Camber Systems (incl unacast etc), Cuebiq
- Direct 1:1 connections between network members and local/state policy makers to guide response
- Standardized analyses across locations and data platforms

(Fig. 1 – **Countries** currently receiving support from the COVID-19 Mobility Data Network include: United States, Mexico, Peru, Chile, United Kingdom, Spain, Italy and India. **States** within the US include: New York, Massachusetts, Florida, Illinois, Michigan, Missouri, Louisiana, Texas, Colorado, Washington, and California. **Cities** within the US include: Boston, Cambridge, New York, Syracuse, Miami, Detroit, Chicago, New Orleans, Houston, Denver, Seattle, Santa Clara, San Jose and Los Angeles)
Mobile phone data for informing public health actions across the COVID-19 pandemic life cycle

with Nishant Kishore, Mathew Kiang, Navin Vembar
U.S. county-level characteristics to inform equitable COVID-19 response

Taylor Chin, Rebecca Kahn, Ruoran Li, Jarvis T. Chen, Nancy Krieger, Caroline O. Buckee, Satchit Balsari, Mathew V. Kiang

doi: https://doi.org/10.1101/2020.04.08.20058248
Linear Regression

\[ y = ax + b \]

Advantage: simple interpretation of \( a \)

Drawback: does not fit these data

Can we transform the variables?

Quadratic Regression

\[ y = ax^2 + bx + c \]

Advantage: fits the data better

Drawback: cannot interpret \( a \) and \( b \)

“SIR” Regression

\[ y = f(\beta, \nu) \]

Advantage: fits the data well

Advantage: can interpret \( \beta \) and \( \nu \)
Collaboration with Nishant Kishore (HSPH), Nick Menzies (HSPH), Ted Cohen (Yale), Aimee Taylor (HSPH), Pierre Jacob (Harvard)
Bayesian nowcasting with adjustment for delayed and incomplete reporting to estimate COVID-19 infections in the United States
Melanie H Chitwood, Marcus Russi, Kenneth Gunasekera, Joshua Havumaki, Virginia E. Pitzer, Joshua L Warren, Daniel Weinberger, Ted Cohen, Nicolas A Menzies
medRxiv 2020.06.17.20133983; doi: https://doi.org/10.1101/2020.06.17.20133983
NBA cancels season, March 11

State of emergency declared, March 13

Social Distancing is Effective at Mitigating COVID-19 Transmission in the United States

Hamada Badr, Hongru Du, Max Marshall, Ensheng Dong, Marietta Squire, Lauren Marie Gardner

medRxiv 2020.05.07.20092353; doi: https://doi.org/10.1101/2020.05.07.20092353
Collaboration with Nishant Kishore (HSPH), Nick Menzies (HSPH), Ted Cohen (Yale), Aimee Taylor (HSPH), Pierre Jacob (Harvard)
Cumulative incidence measured by serosurveillance

Reductions in commuting mobility predict geographic differences in SARS-CoV-2 prevalence in New York City

Conclusions

• Consistency in finding that messaging and orders unlikely to have been driving factor in behavior change

• Lockdowns were highly effective at reducing growth rate of epidemics

• Nonlinearities and variable timing intrinsic to epidemic dynamics important

• Testing and mobility data both have limitations, not necessarily appropriate to use them quantitatively as indicators

• We are very far from herd immunity. This is going to be a long haul.