

# Modeling to mitigate COVID-19

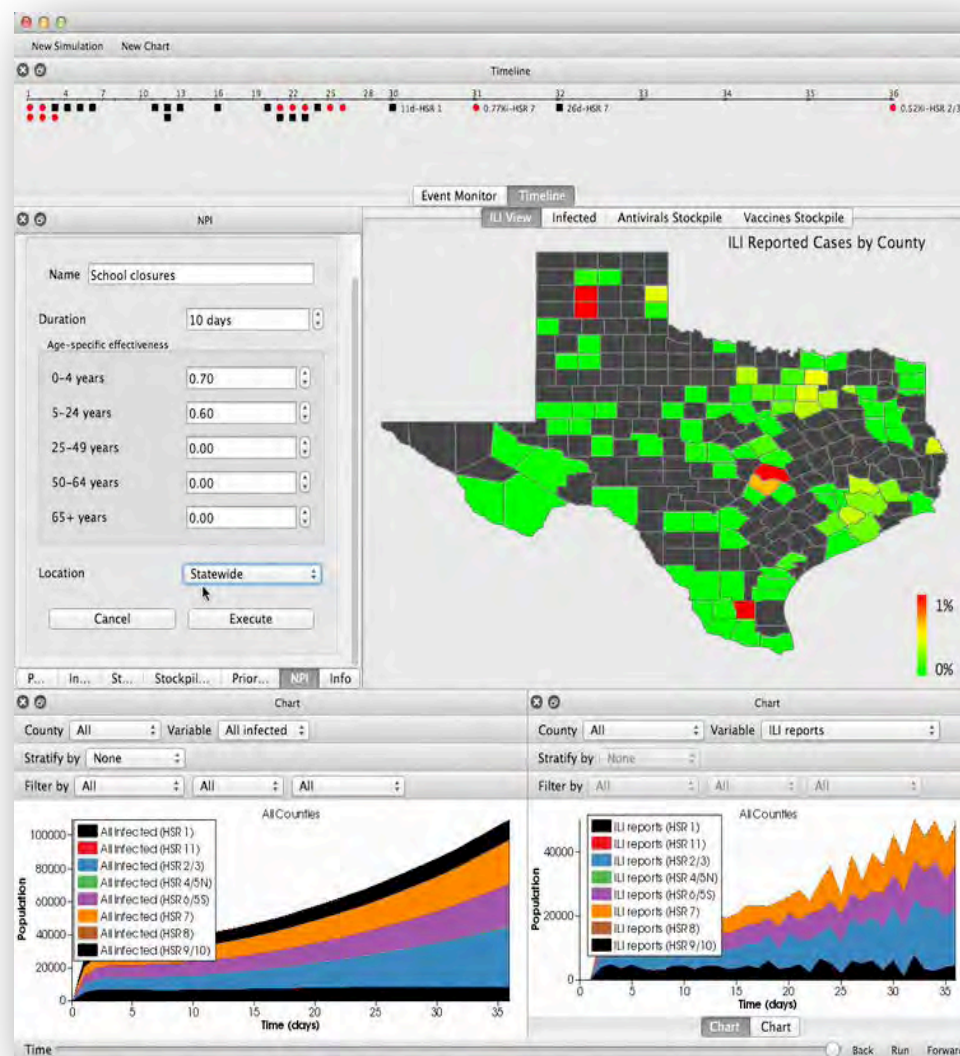
Lauren Ancel Meyers

April 29, 2020

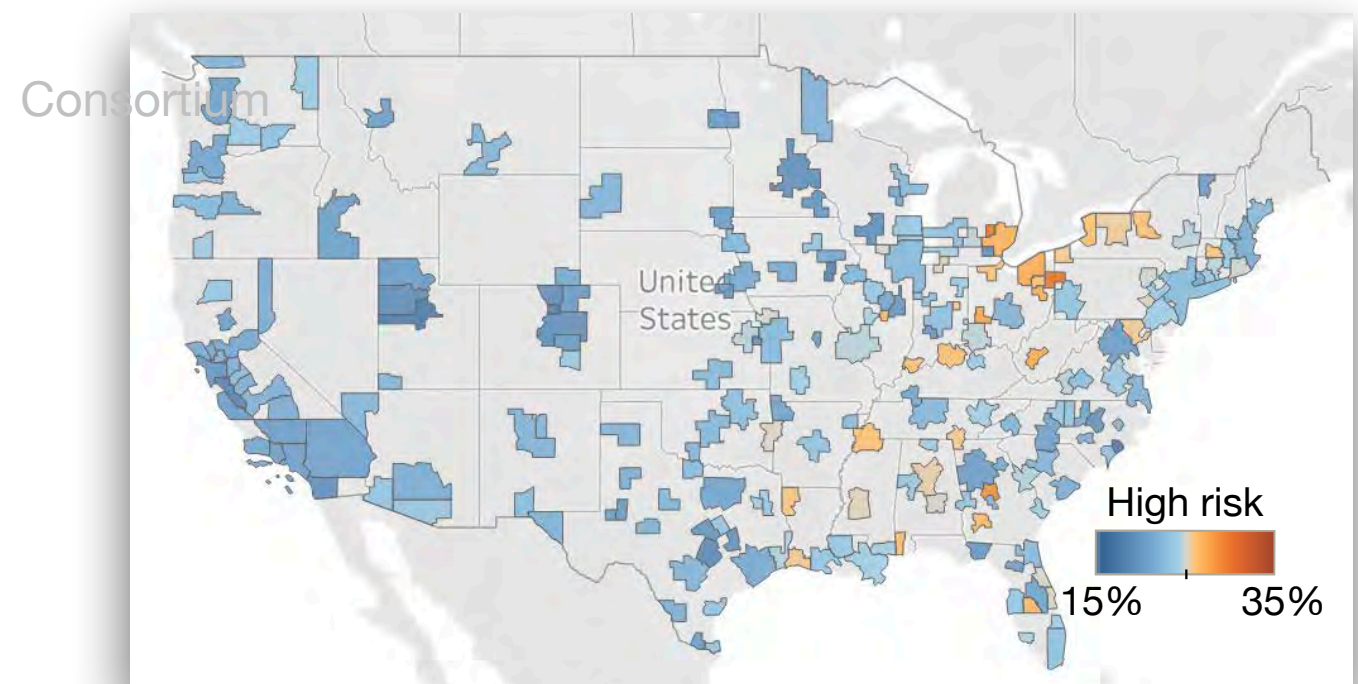


# Background

## Texas Pandemic Exercise Tool




## US Pandemic Model — CDC FluCode



# National response

**Subject:** Urgent modeling request

This will be a time sensitive and urgent request. Below please see the series of parameters and outcomes we would like you to model. We will need whatever results you can achieve by the close of business Wednesday, east coast US time, or opening of business on Thursday. Your results in that timeframe will inform US policies.

  
RADM, USPHS

+++++

SCEI

**Transmission:**

- R0 ranging from 1.4



**CENTERS FOR DISEASE  
CONTROL AND PREVENTION**

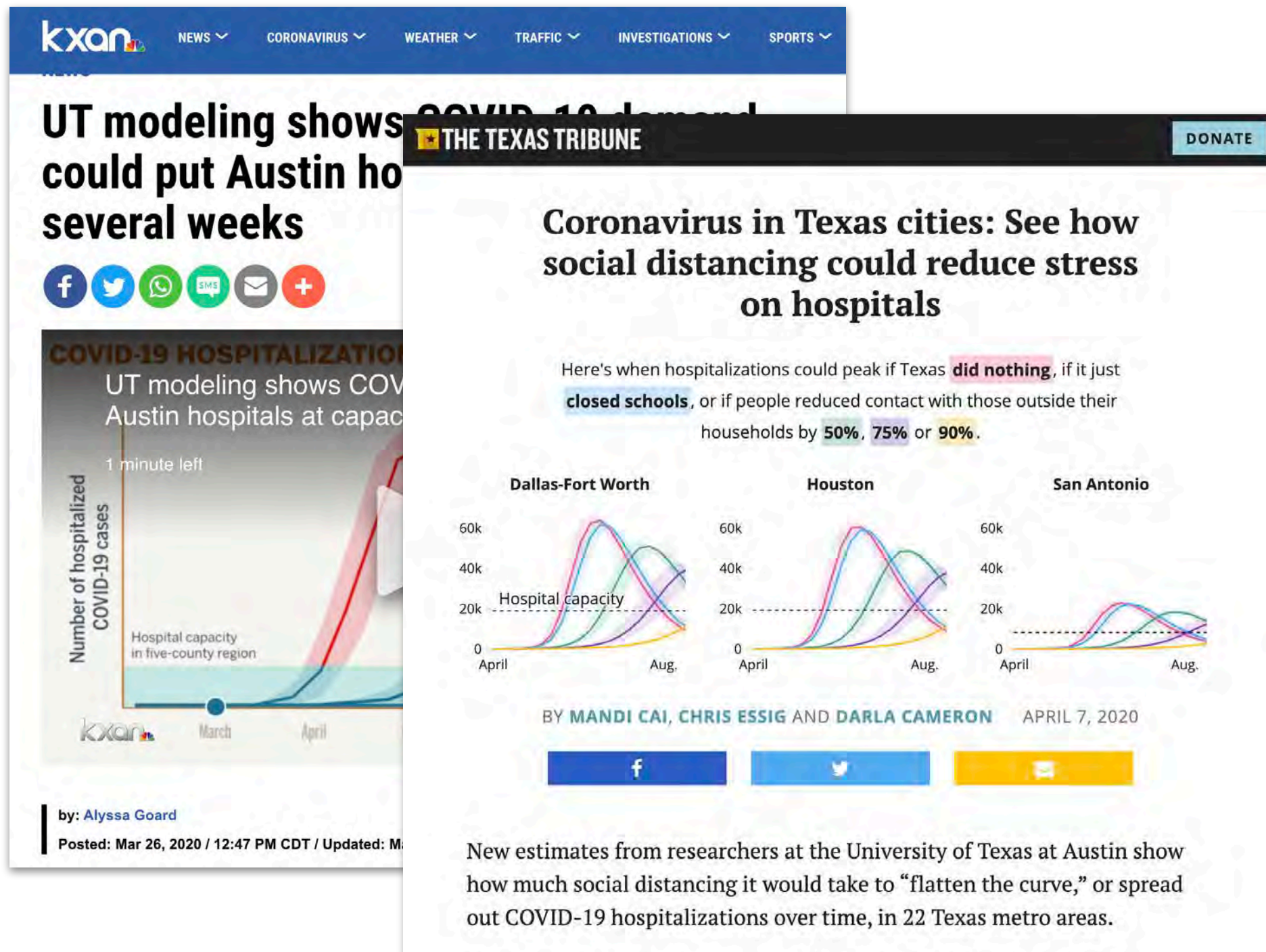
**Centers for Disease Control and Prevention**

National Center for Immunization and Respiratory Diseases Extramural Research Program  
Office

Network of Modeling Centers to Improve Evidence Base for Seasonal and Pandemic Influenza  
Prevention and Control  
RFA-IP-20-003



# Austin & Texas





# Out to the public

Monday, April 6, 2020

ENGLISH ESPAÑOL 中文

PLAY THE CROSSWORD Account

The New York Times

Today's Paper

World U.S. Politics N.Y. Business Opinion Tech Science Health Sports Arts Books Style Food Travel Magazine T Magazine Real Estate Video

**Listen to 'The Daily'**  
A historic unemployment crisis.

**'On Tech With Shira Ovide'**  
It's now Amazon's turn in the spotlight.

**Listen to 'Still Processing'**  
Why 'High Fidelity' is the TV reboot we've needed.

S&P 500 +5.64%  
Dow +5.70%  
Nasdaq +5.68%

75°F  
77° 65°  
Austin, TX

## Hospitals Face Severe Shortages as U.S. Toll Nears 10,000

As confirmed cases in the U.S. surged past the combined numbers in Italy and Spain, signs that the virus was peaking in some places helped lift stocks.

Staff and patients are put at risk by the lack of available protective gear, a Health and Human Services watchdog report said.

Japan was set to declare a state of emergency as new cases rapidly increased in Tokyo and other large cities. Here's the latest.

Live 4m ago 506 comments

### How Coronavirus Attacks the Body

5:27 HD

### Delays and Shortages Exacerbate Testing Gaps in the U.S.

A lack of supplies and delayed results are causing problems for many hospitals, even as new and faster tests come onto the market.

17m ago

### A New Covid-19 Crisis: Domestic Abuse Rises Worldwide

Movement restrictions may be making violence in homes more frequent, more severe and more dangerous.

1h ago

The Times is providing free access to the coronavirus crisis. Start here for a guide to all our coverage.

4m ago

## New York Updates: Deaths Remain Flat, but Crisis Is Still Dire, Cuomo Says

Gov. Andrew Cuomo said that 599 people had died in the state — about the same as the 594 deaths reported the previous day.

Live 17m ago 28 comments

## Business Updates: Markets Rally as Wall Street Thinks Positively

Investors were cheered by numbers showing that the pace of the virus's spread was slowing in some places in Europe.

Live 45m ago 128 comments

Free access: Full coronavirus coverage The best mask fabric Guidance on breastfeeding How to help the helpers

## Does My County Have an Epidemic? Estimates Show Hidden Transmission

Even counties that have few reported cases probably already have sustained, undetected outbreaks, a study has found.

3h ago



## Acting Navy Secretary Slams Fired Captain as 'Stupid'

Thomas B. Modly's address to the crew of a coronavirus-stricken aircraft carrier was described by one sailor as "whiny, upset, irritated, condescending."

12m ago

## The Open Road Calls, but the Authorities Say 'Stop'

The U.S. Constitution ensures the "right to travel," but state and local officials are increasingly telling drivers to stay home.

31m ago

## Opinion: Lockdown Can't Last Forever. Here's How to Lift It.

Gabriel Leung

We need to hit and release the brakes on physical distancing, again and again, until we safely get to immunity.

9h ago 257 comments

## Has Anyone Found Trump's Soul? Anyone?

Frank Bruni

He's not rising to the challenge of the coronavirus pandemic. He's shriveling into nothingness.

## Don't Freak Out About Quarantine Screen Time

Andrew Przybylski and Pete Etchells

## Join Jennifer Senior to chat about Trump's personality in a time of crisis

## In Las Vegas, the Coronavirus Odds Are Not in Our Favor

Brittany Bronson

## 'I Have Been Wearing This Surgical Mask for Two Days'

Sanya Dosani

Via Cisco Webex  
Austin, Texas  
1:35 PM CT

**CORONAVIRUS PANDEMIC**

**GLOBALLY**

TOTAL CASES  
**2,766,611**

DEATHS  
**194,456**

**IN THE UNITED STATES**

TOTAL CASES  
**883,826**

DEATHS  
**50,373**

SOURCE: JOHNS HOPKINS UNIVERSITY

**CNN**

2:35 PM ET  
**NEWSROOM**

Professor Lauren Ancel Meyers | Dept. of Integrative Biology, Univ. of Texas at Austin  
2:58 21K views

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## CORONAVIRUS IN CENTRAL TEXAS

### Travis County confirmed COVID-19 cases up to 484

Austin health officials reported Sunday that 24 more people in Travis County have tested positive for COVID-19 since Saturday.

Apr 5, 2020 at 8:08 PM

- + Coronavirus in Texas: What we know, latest updates.
- + FAQ: What are the rules during a 'shelter in place'?
- + Complete coverage: Texas prepares for coronavirus

### Austin health officials recommend everyone wear face masks in public

Apr 5 at 8:45 PM

### Texas tabs Mississippi State's Vic Schaefer to coach its women's...

Apr 5 at 2:57 PM

### Coronavirus in Texas: 22 more deaths reported statewide: total cases climb...

Apr 5 at 1:10 PM

### Why are more young people testing positive for COVID-19 in Austin?

Apr 4 at 7:03 PM

### How to get help in Austin with food, health care, and other coronavirus-related needs

## Coronavirus creeping undetected through Texas and U.S.

For the 102 Texas counties that, as of Sunday, have not yet reported a confirmed case of COVID-19, there exists a 9% chance that an outbreak of the disease is already underway, according to an analysis of the disease's...

### Adult Coed Soccer Leagues - Better Refs and Facilities

Apr 3 at 10:18 AM

## CORONAVIRUS

A coronavirus vaccine is being developed in record time. But don't expect that technology...

Posted at 8:01 AM

### Bronx Zoo tiger becomes first of its kind to test positive for coronavirus, officials say

Posted at 8:01 AM

### If you're traveling between states, here's where you'll have to self-quarantine

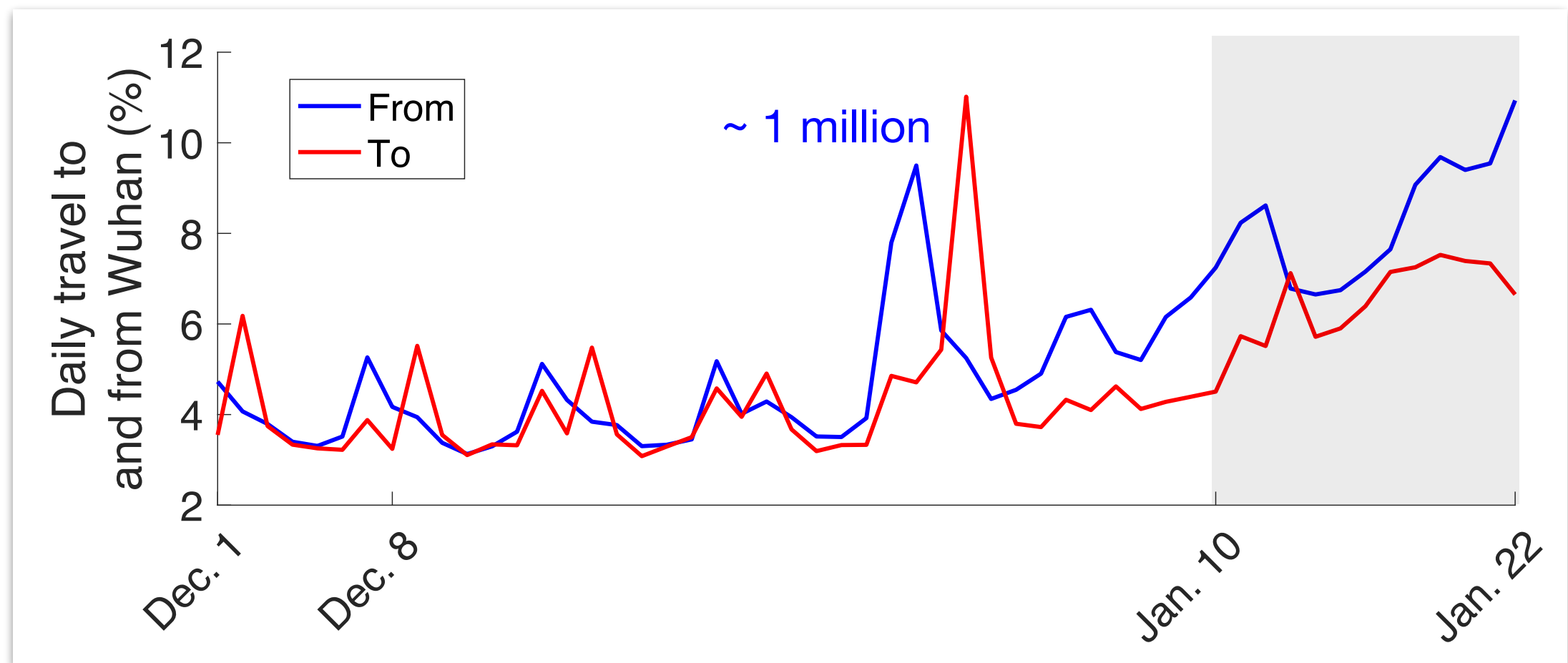
Posted at 7:51 AM

### Matthew McConaughey plays virtual bingo with Round Rock senior living facility

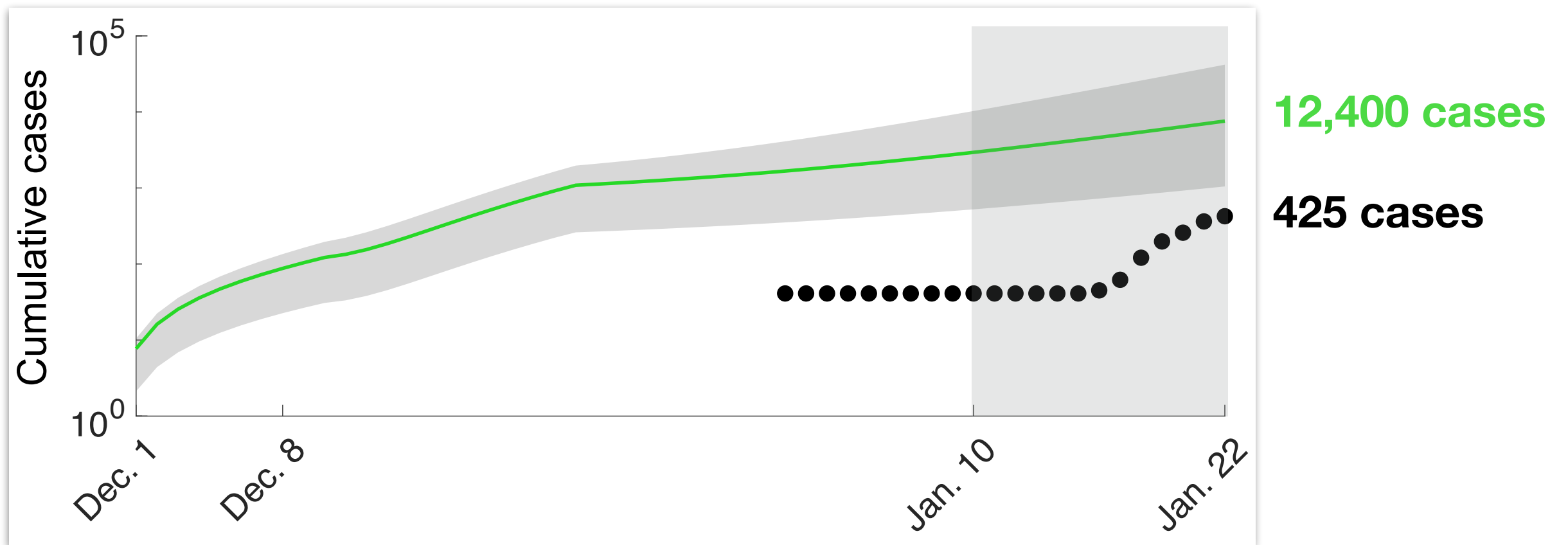
# Outline

- Ground zero in Wuhan
- Pace of transmission
- Forecasting
- How to relax social distancing if you must

# Early spread in Wuhan

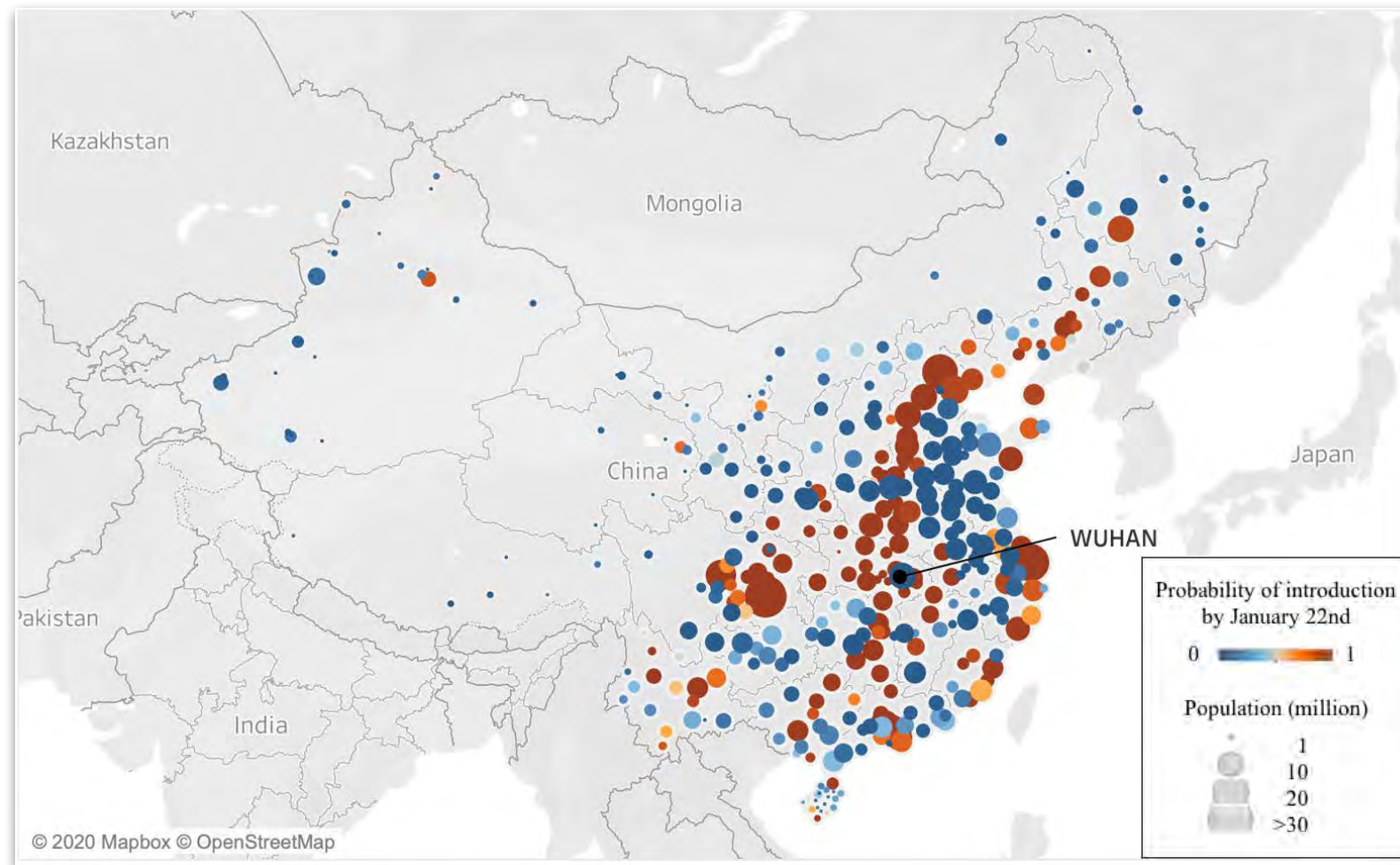


# Undetected COVID-19





# Lockdown too late

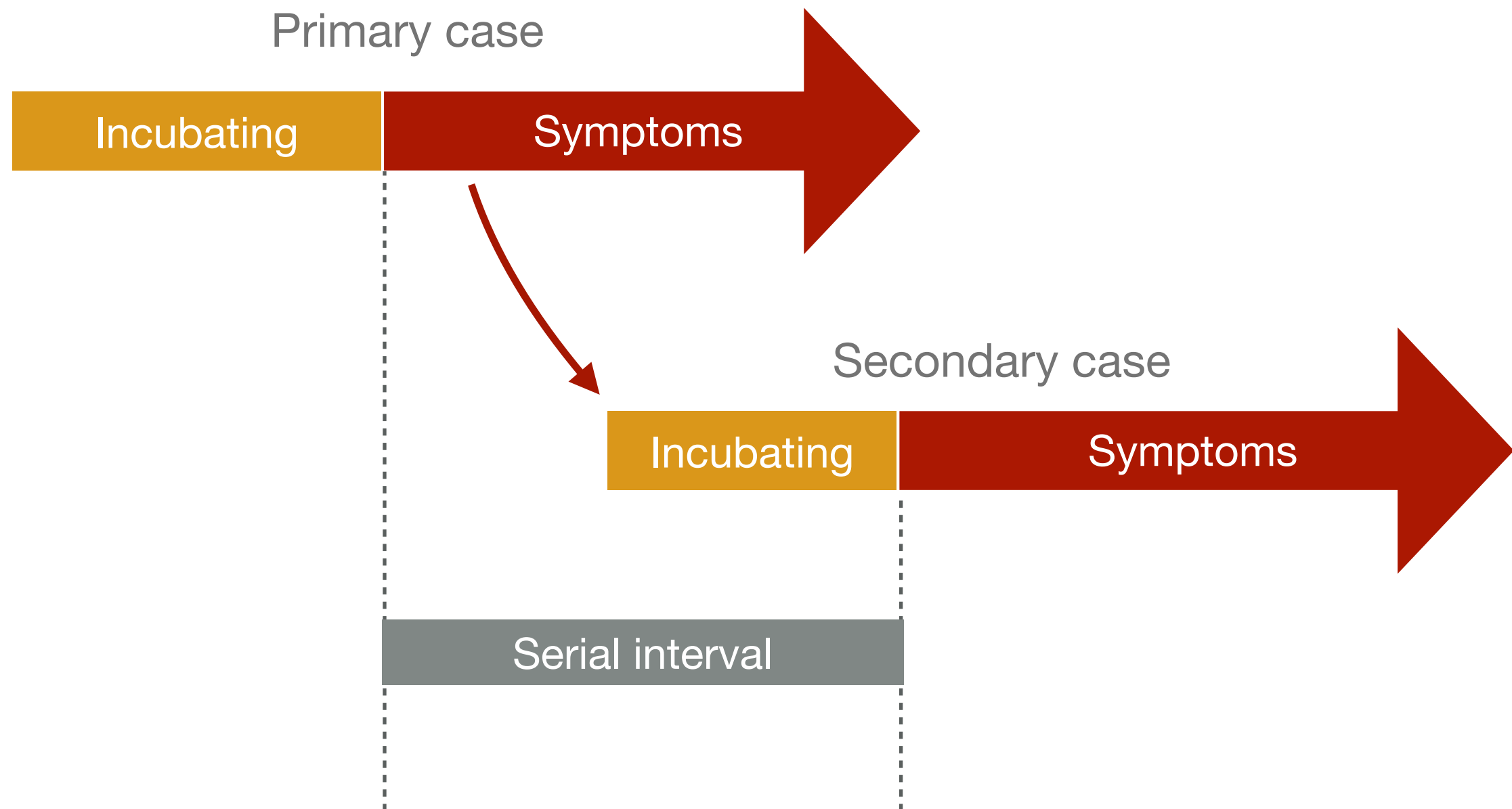


Du et al. (2020) Risk for Transportation of 2019 Novel Coronavirus Disease from Wuhan to Other Cities in China. *Emerging Infectious Diseases*

# Outline

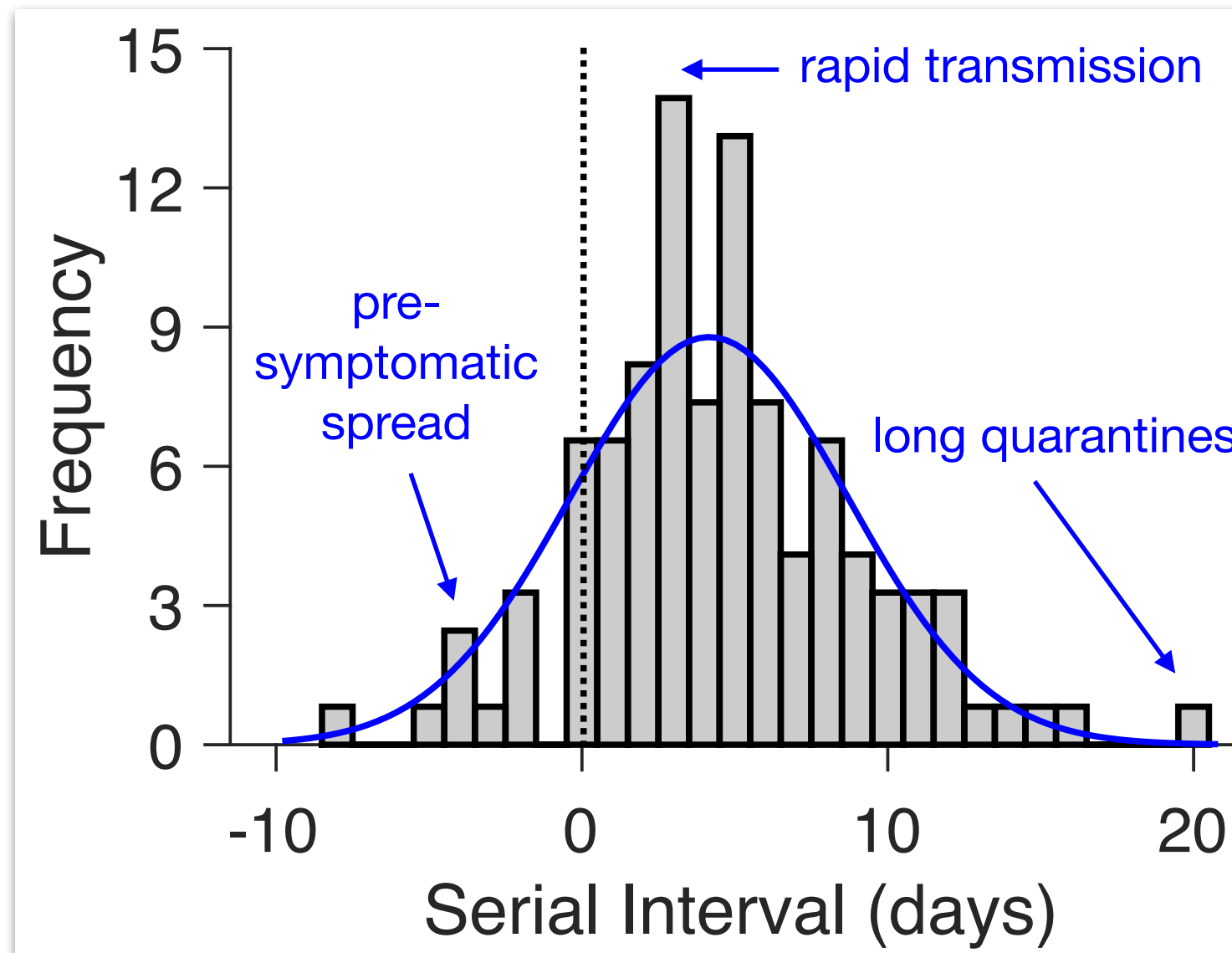
- Ground zero in Wuhan
- **Pace of transmission**
- Forecasting
- How to relax social distancing if you must

# Serial interval





# Serial interval distribution

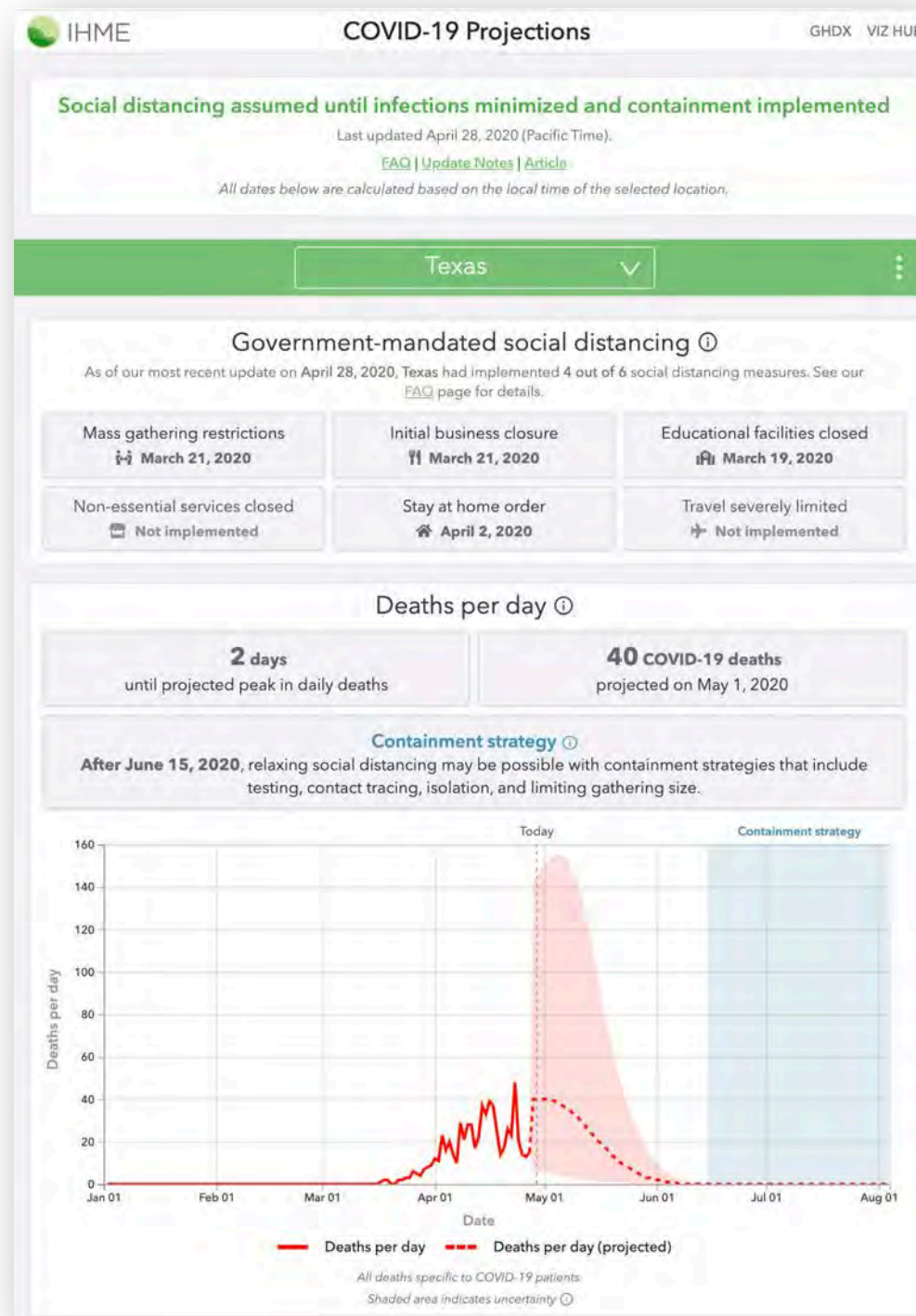


Du et al. (2020) Serial Interval of COVID-19 among Publicly Reported Confirmed Cases. *Emerging Infectious Diseases*

# Outline

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# Forecasting deaths



## The University of Texas COVID-19 Modeling Consortium

### COVID-19 Mortality Projections for US States

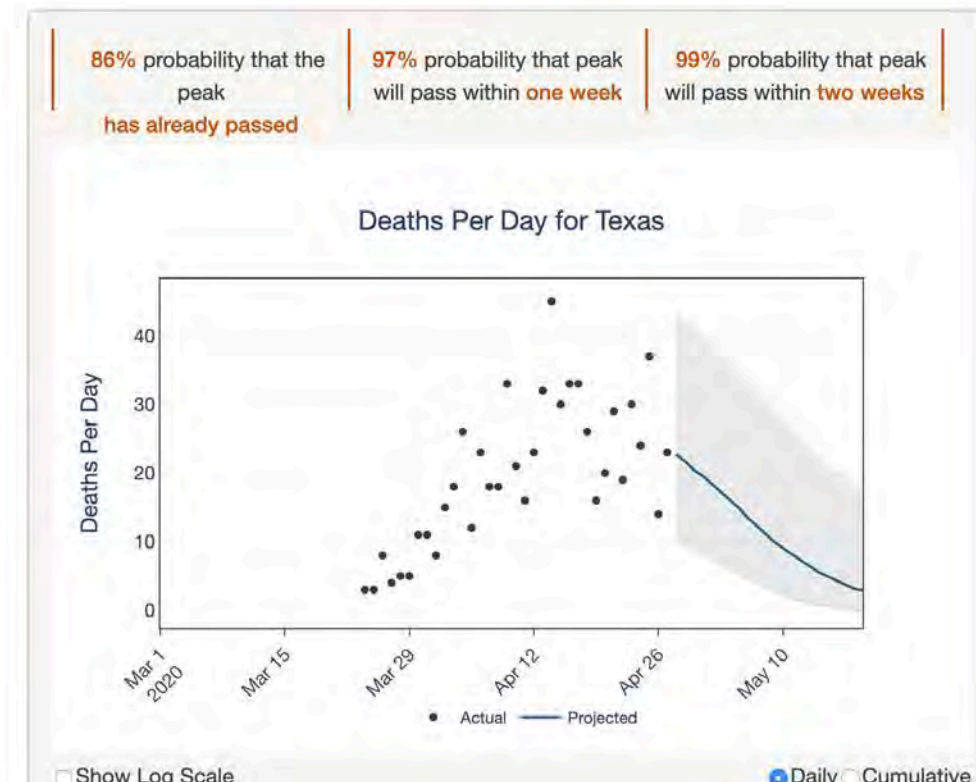
These graphs show both the reported and projected number of COVID-19 deaths per day across the US and for individual states and metropolitan areas. For each US state, we use local data from mobile-phone GPS traces to quantify the changing impact of social-distancing measures on "flattening the curve."

For more information, please visit our [model FAQ](#).

Click and drag on the plot to **zoom-in** and double-click to **zoom-out** completely. The icons at the top right of each graph will provide you with additional options.

Select your state (and, optionally, your metropolitan area) in the dropdown menu below.

**Texas** **Texas (Entire State)**



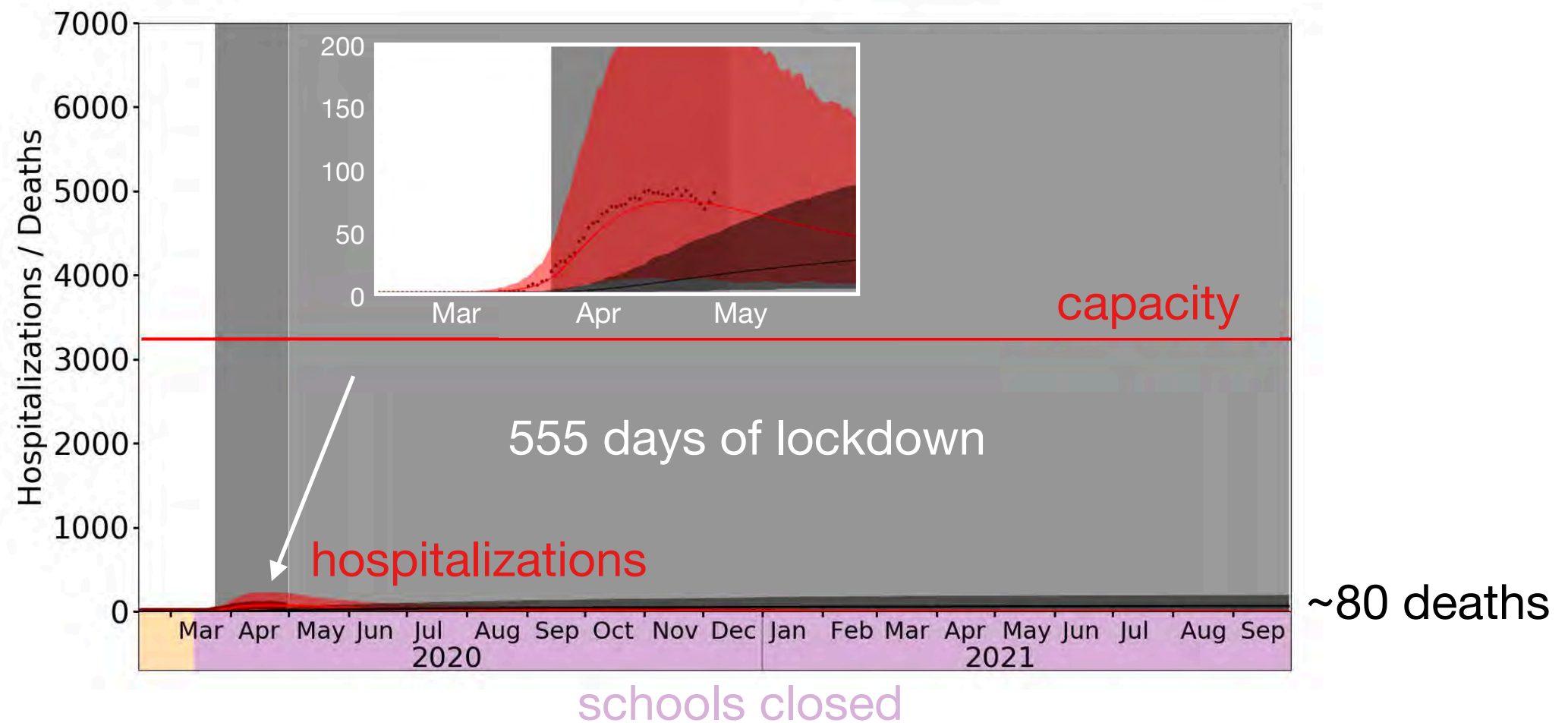


# Outline

- Ground zero in Wuhan
- Pace of transmission
- Forecasting
- **How to relax social distancing if you must**

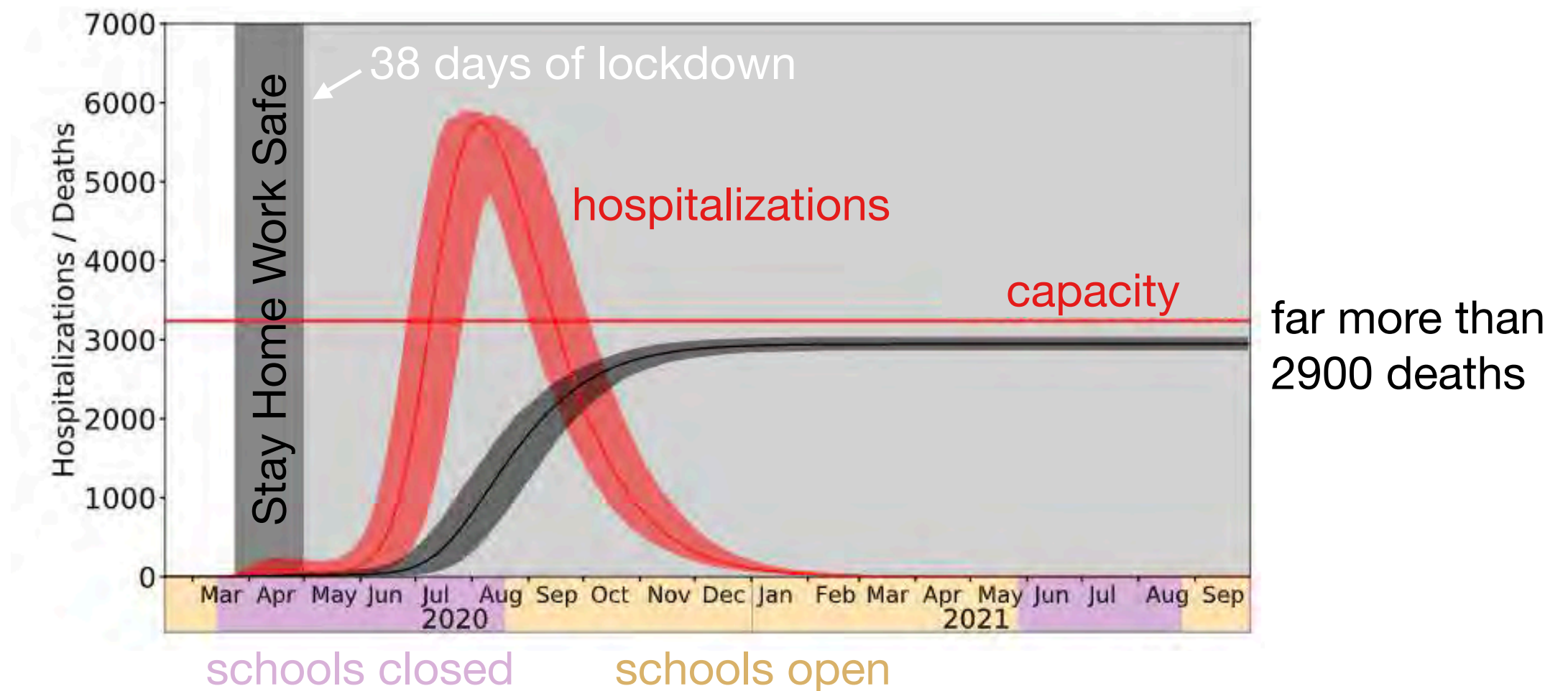
# Indefinite sheltering

Maintain 90% reduction in transmission



# Indefinite relaxation

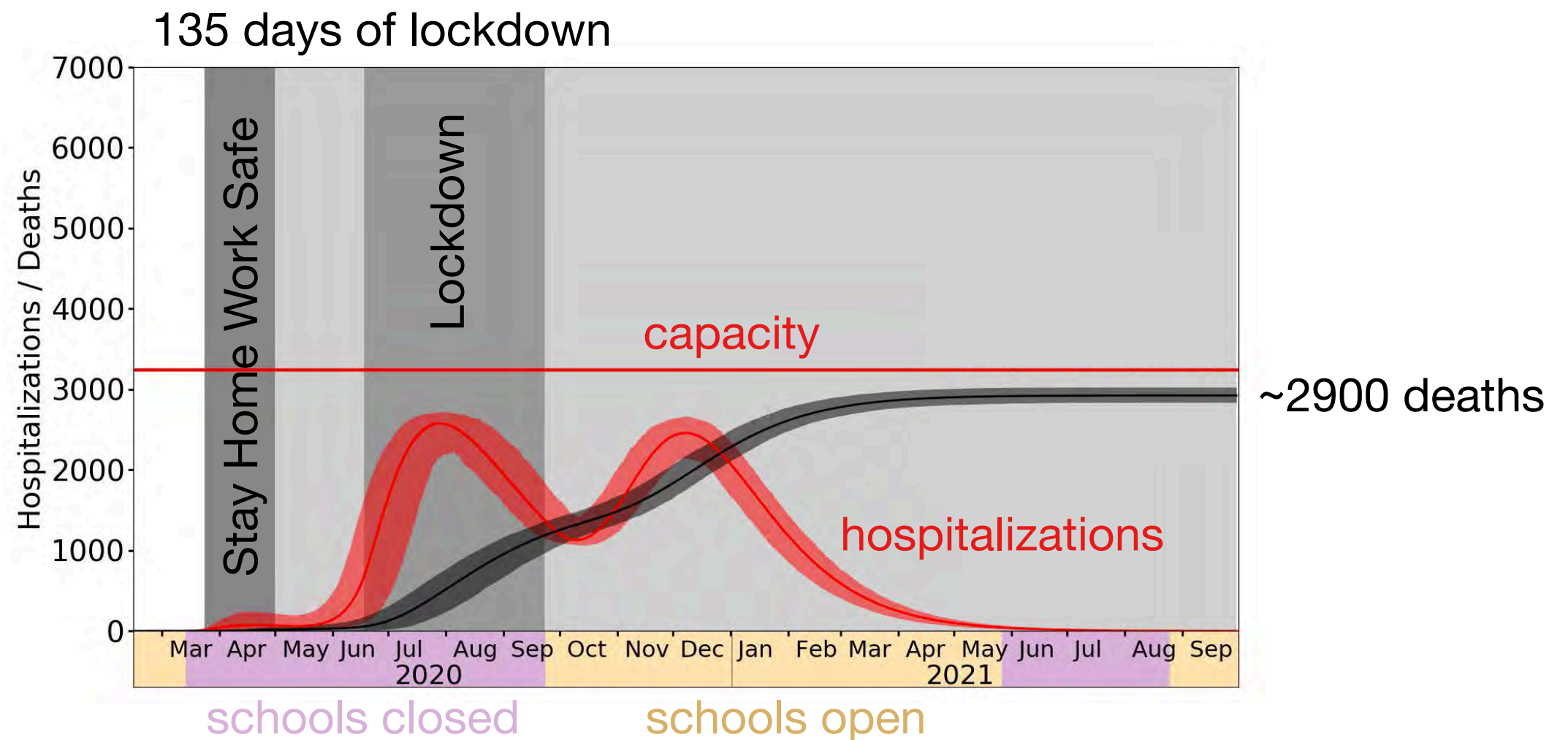
Maintain only 40% reduction in transmission





# An optimized strategy

Shortest lockdown to avert overwhelming hospitalizations

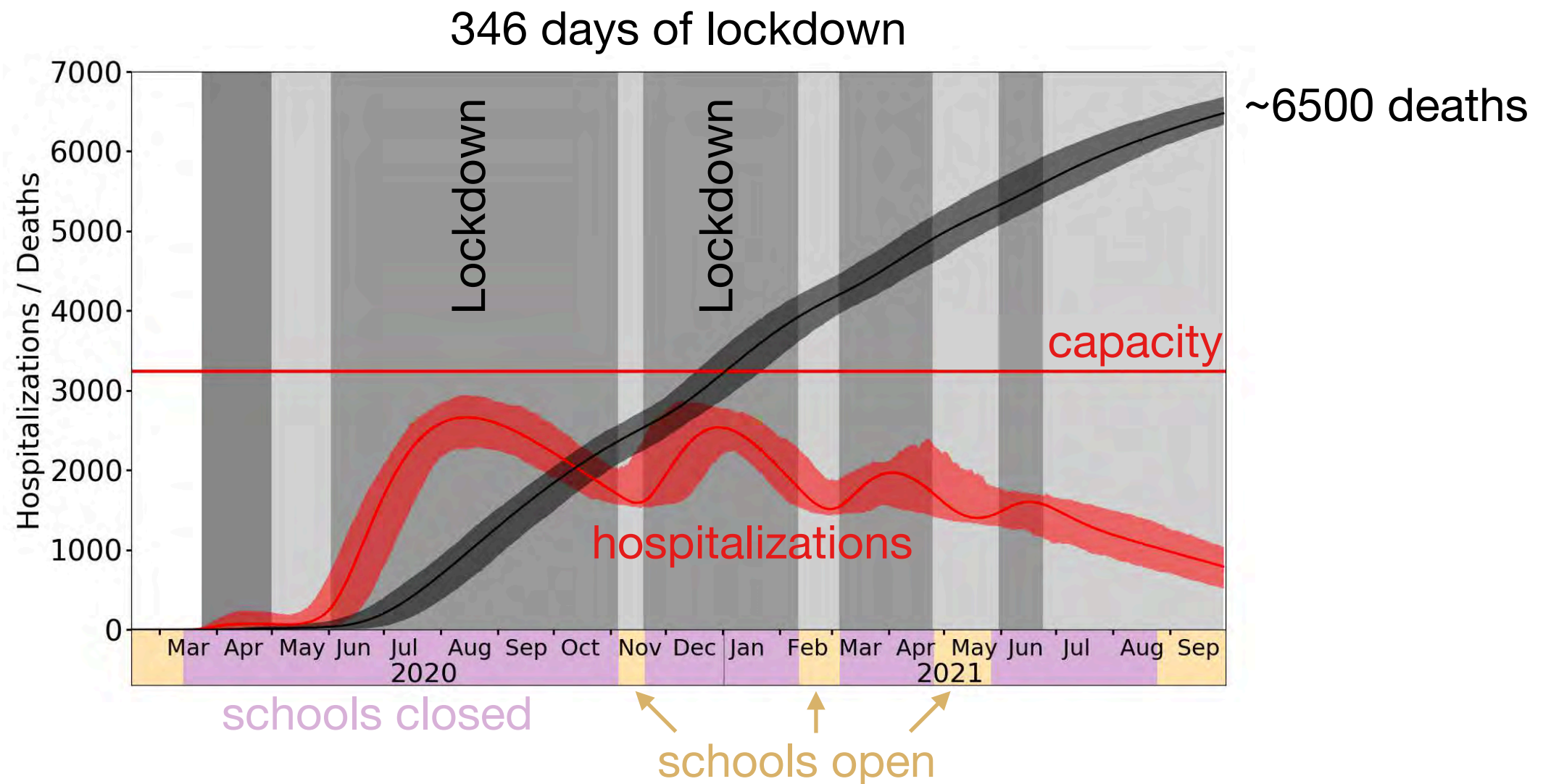


# An optimized strategy



# Cocooning non-negotiable

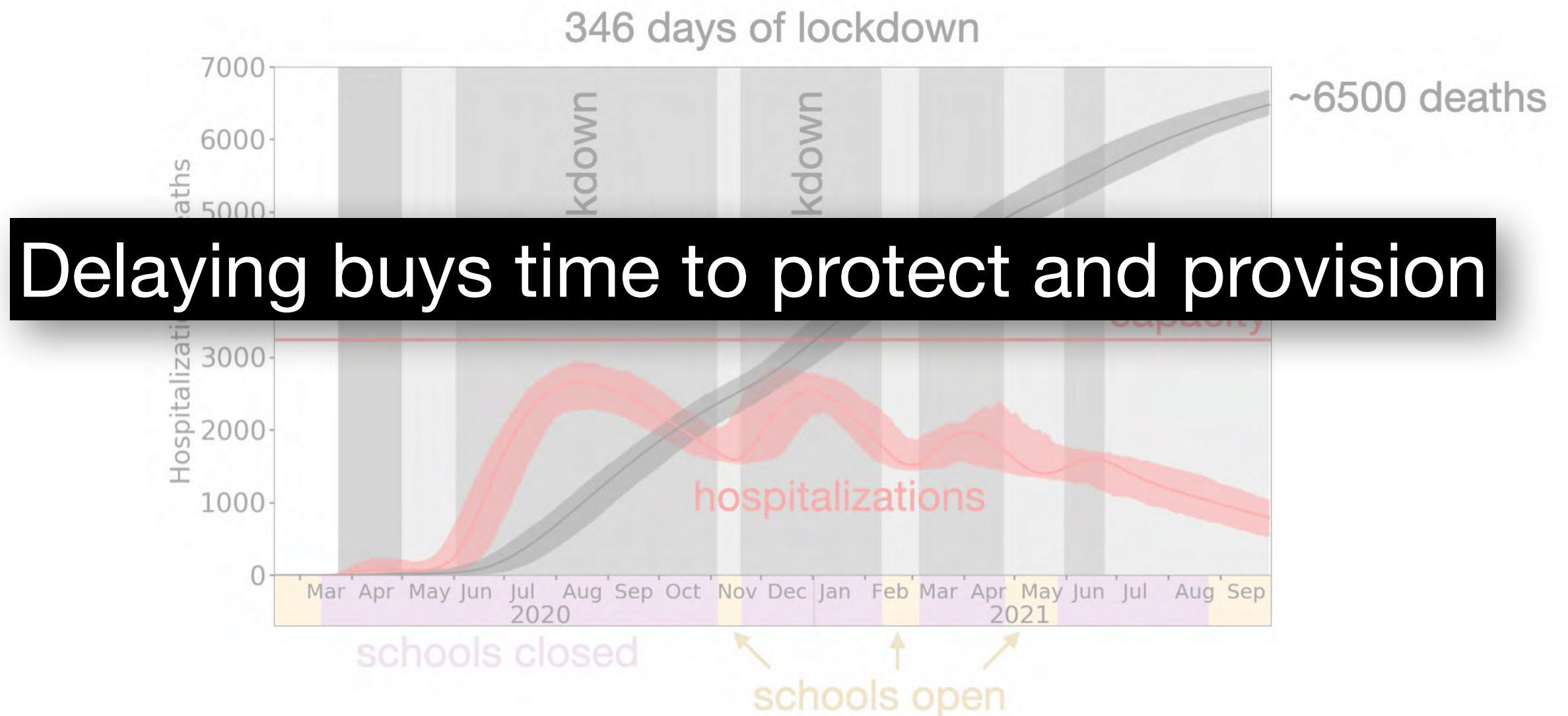
Sheltering high risk drops from 95% to 80% efficacy



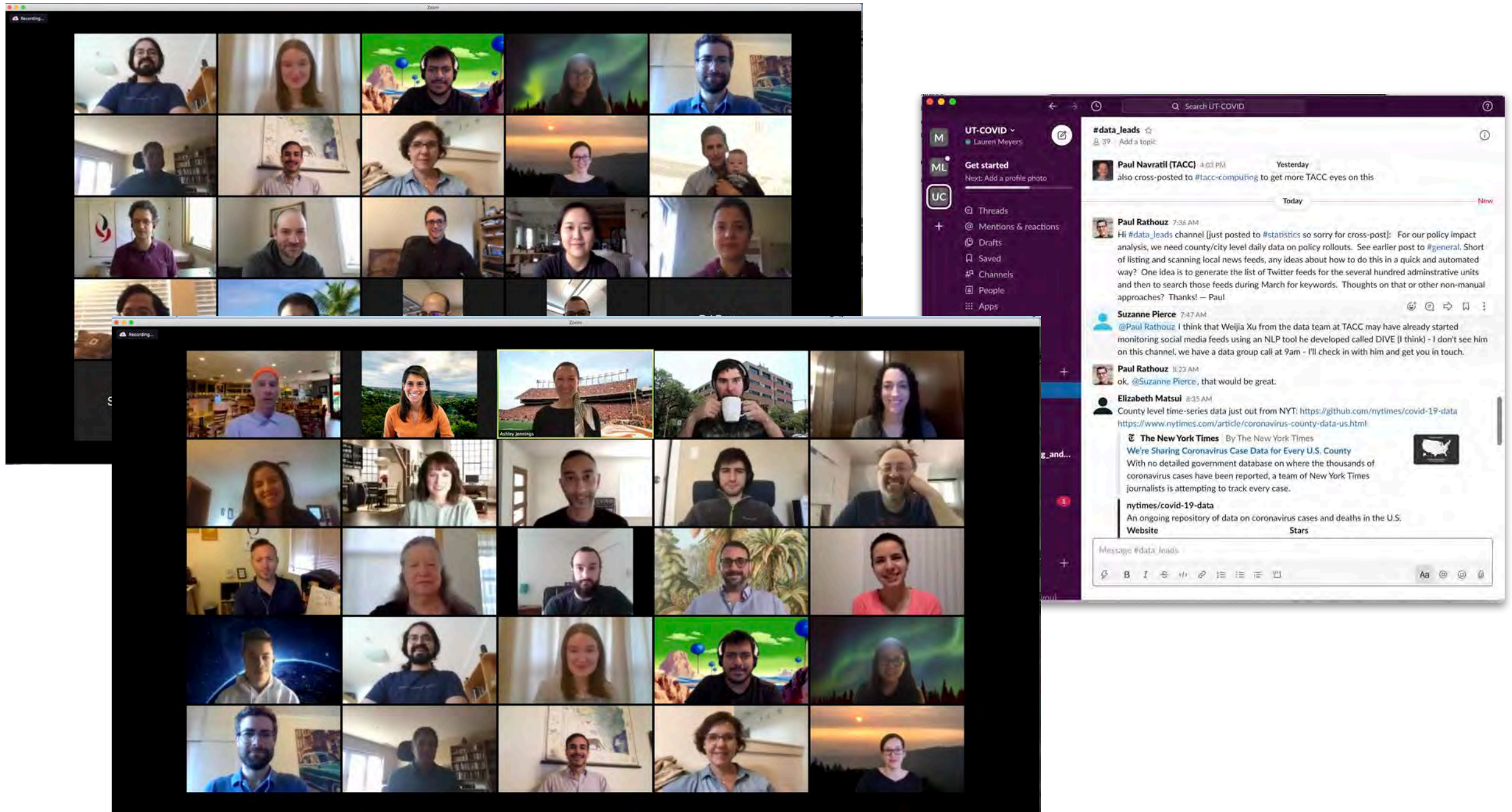


# Cocooning non-negotiable

Sheltering high risk drops from 95% to 80% efficacy



# UT COVID-19 Modeling Consortium



# Funding and team

US Centers for Disease Control and Prevention  
National Institutes of Health  
National Science Foundation  
Texas Advanced Computing Center

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