

# COVID-19 Webinar: Fiscal, monetary and health policy responses and implications for the economic outlook



**Thursday, April 2, 2020 11 a.m. ET**

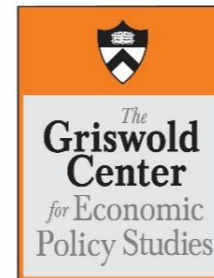
**A discussion with**

**Alan Blinder, Bill Dudley, Jessica Metcalf**

**Moderated by Senator Bill Frist, M.D.**

Webinar recording will be available  
at <https://gceps.princeton.edu/events/>

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# COVID-19: Current health trajectory, policy implications

**C. Jessica Metcalf & Bryan T. Grenfell**

# Early outbreak

Two key quantities:

$R_0$ , here = 2 ↖ ↗

Serial interval: I

initial case



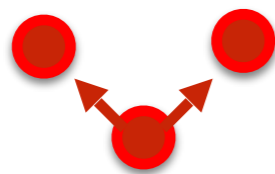
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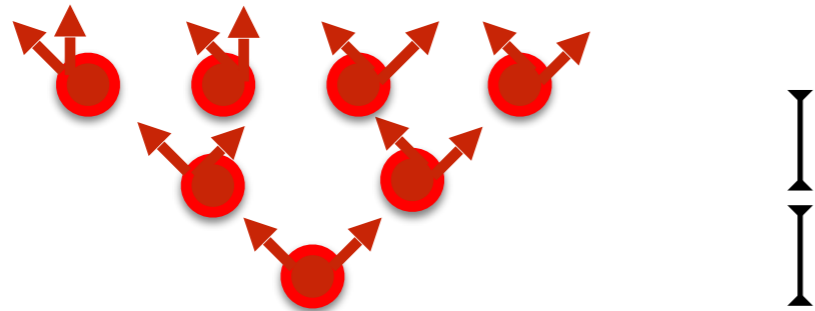
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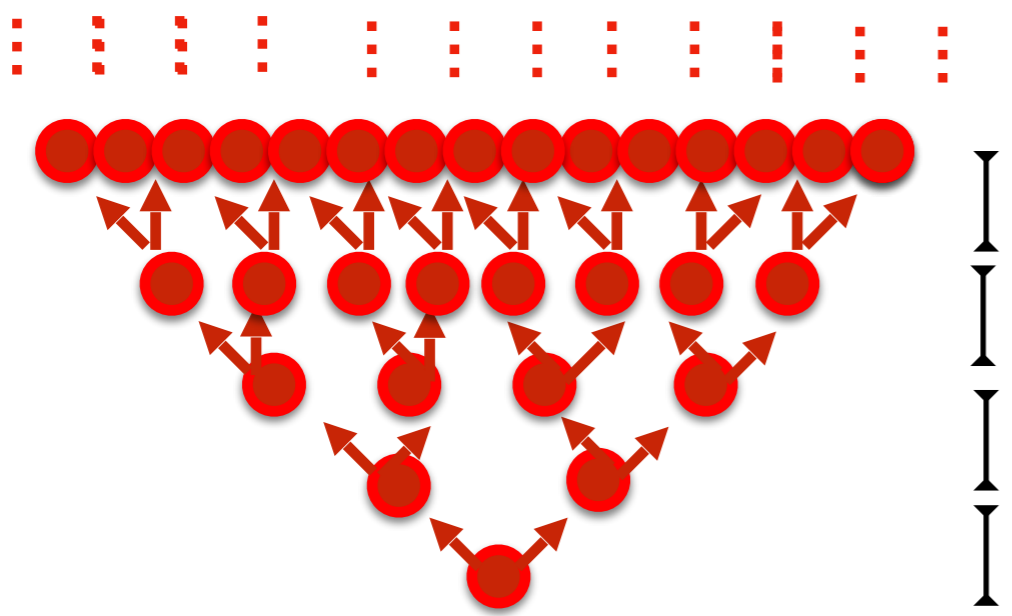


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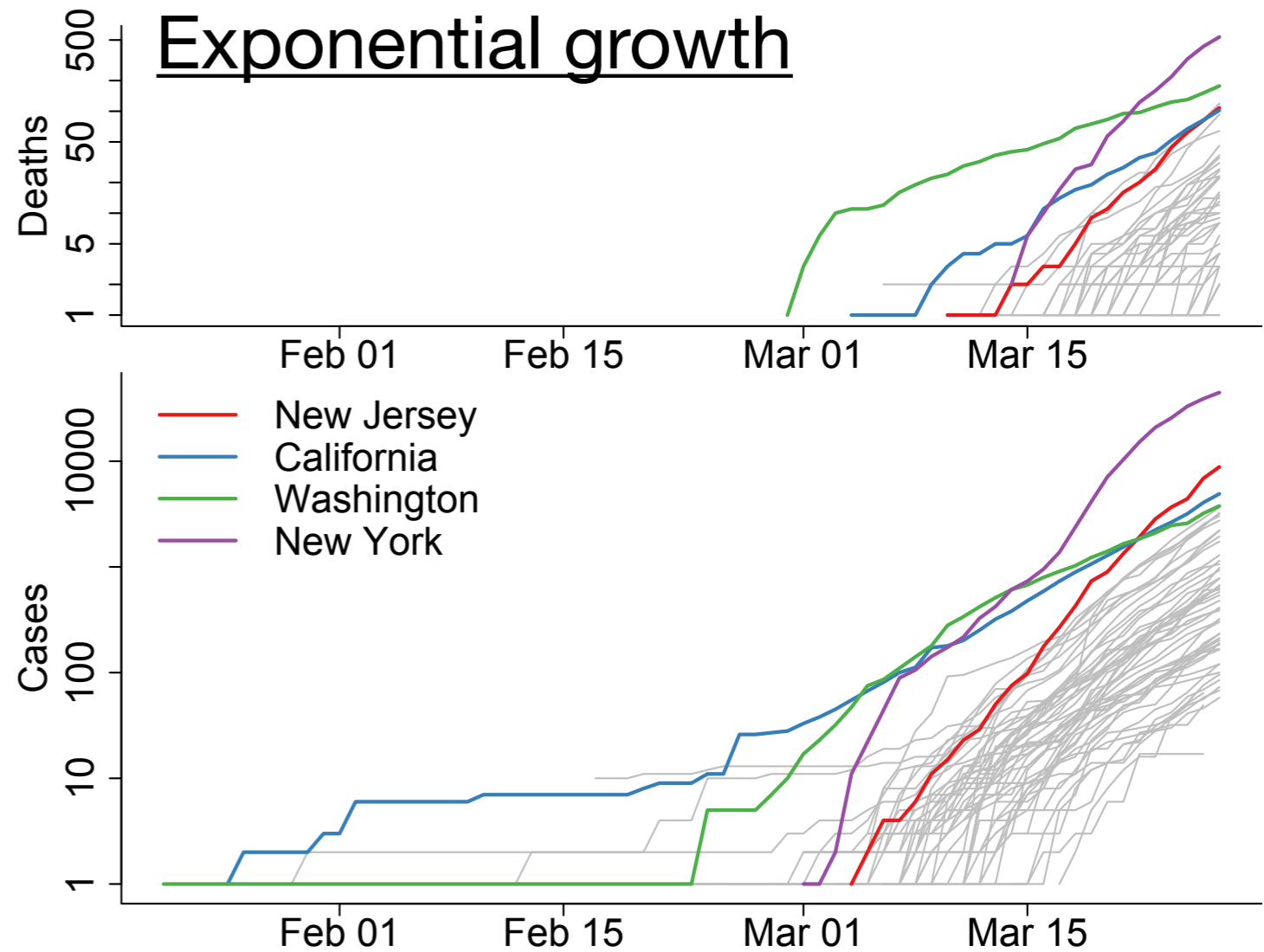
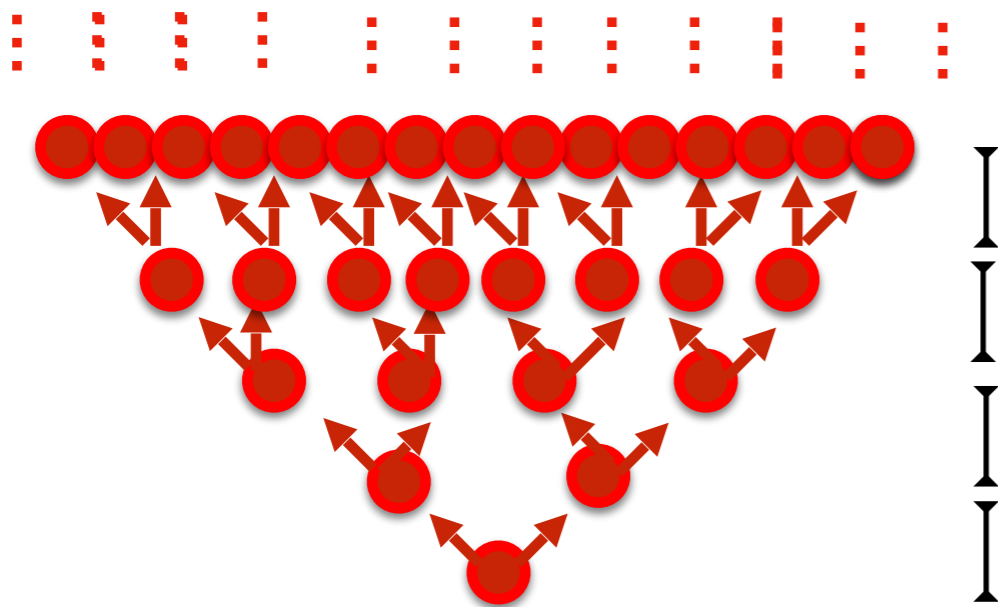


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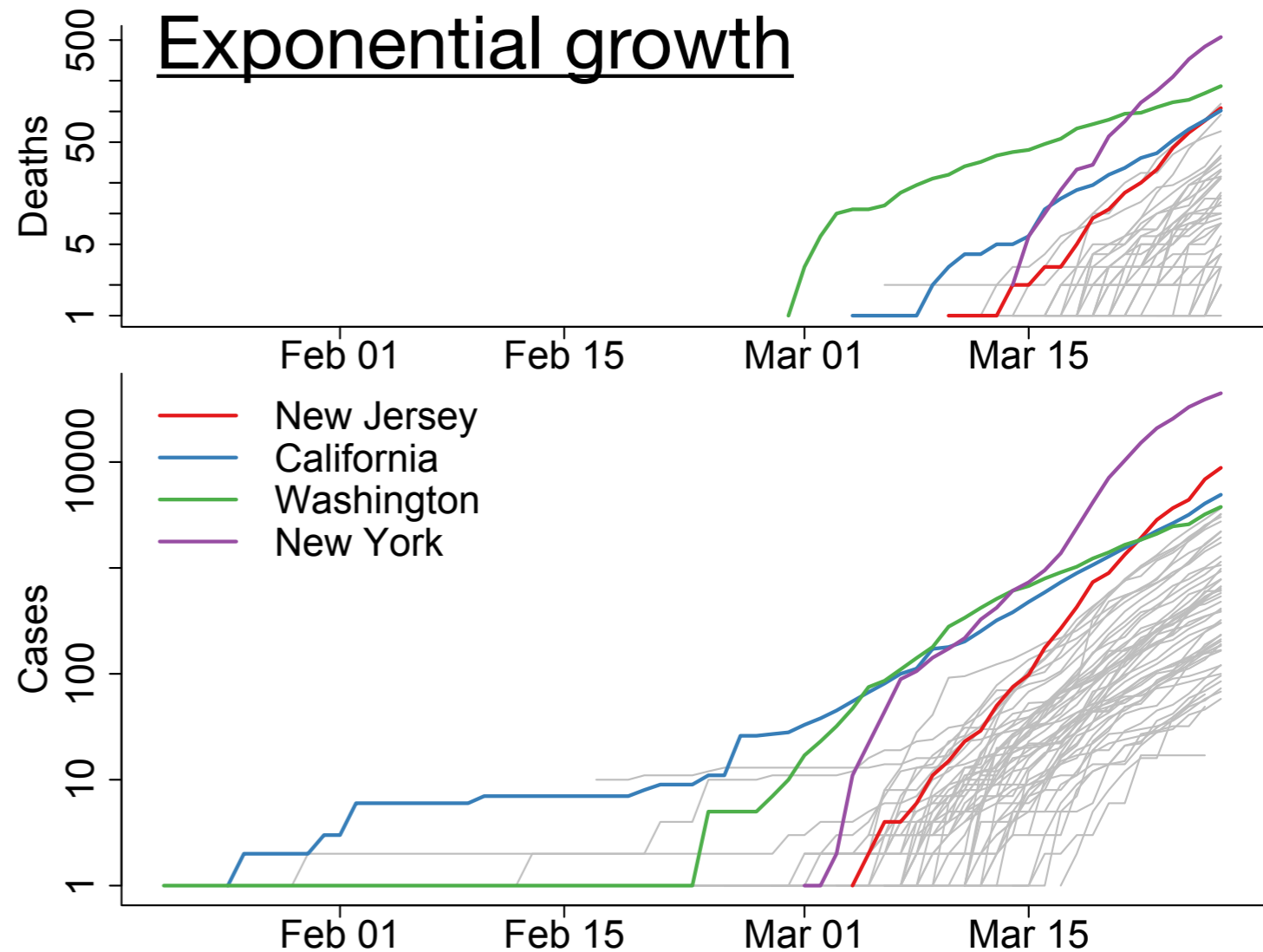
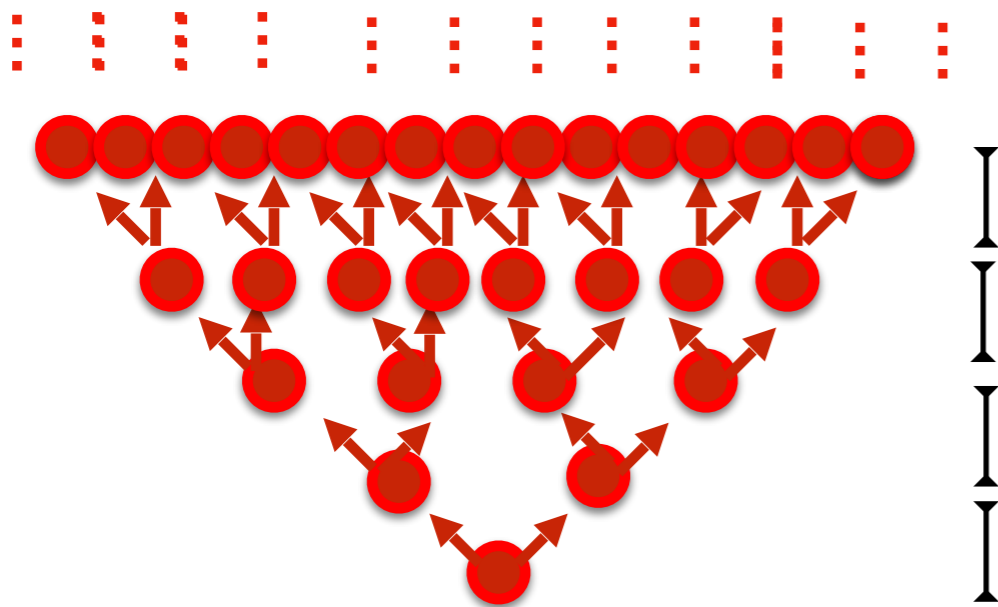


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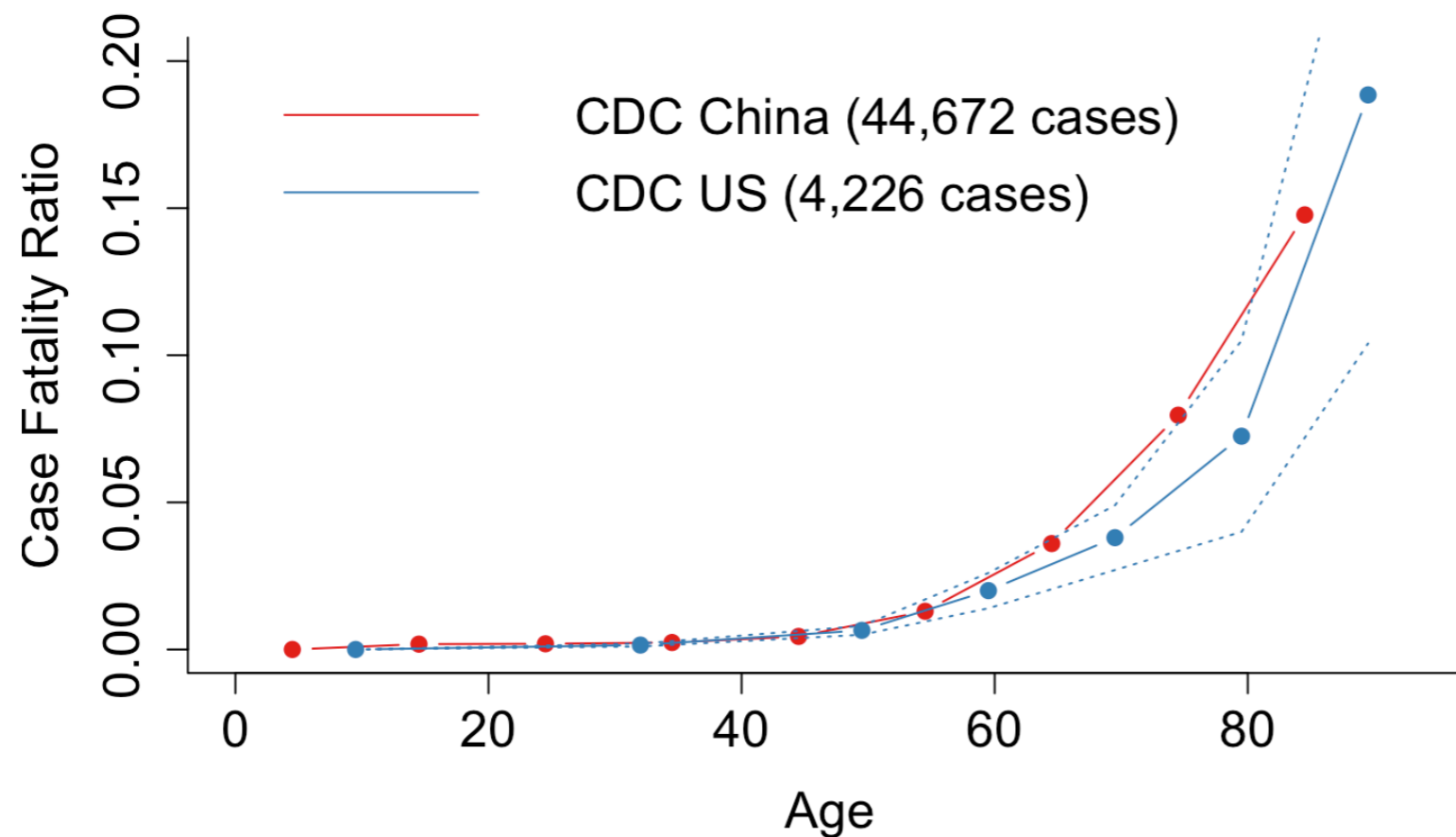
← Intervention impacts appear **2-3 weeks** in the future.



# Early outbreak

A major public health issue:

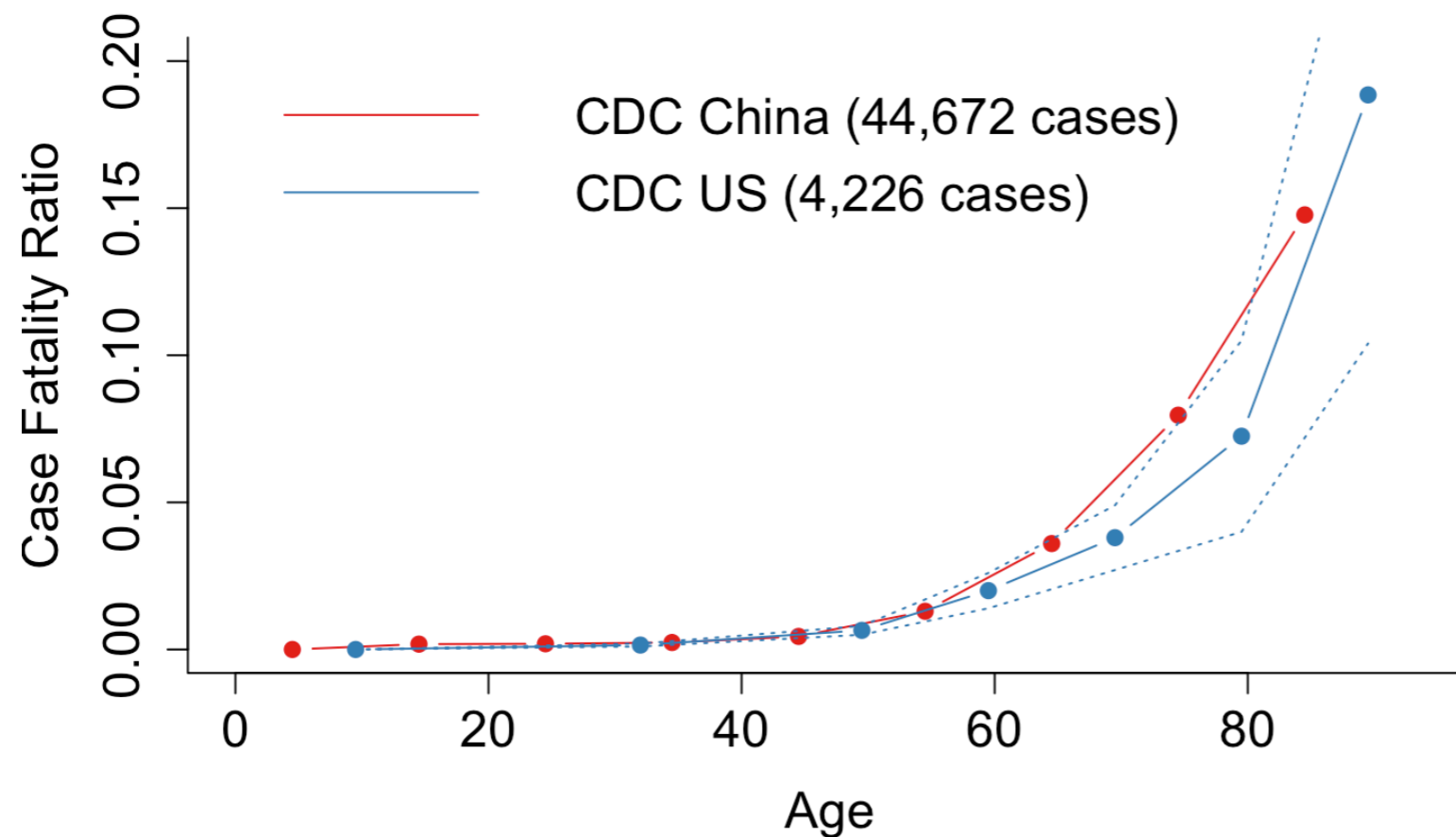
- asymptomatic** transmission (?30-80%), impedes containment
- severe outcomes** for many, overwhelming health systems



# Early outbreak

A major public health issue:

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- severe outcomes** for many, overwhelming health systems



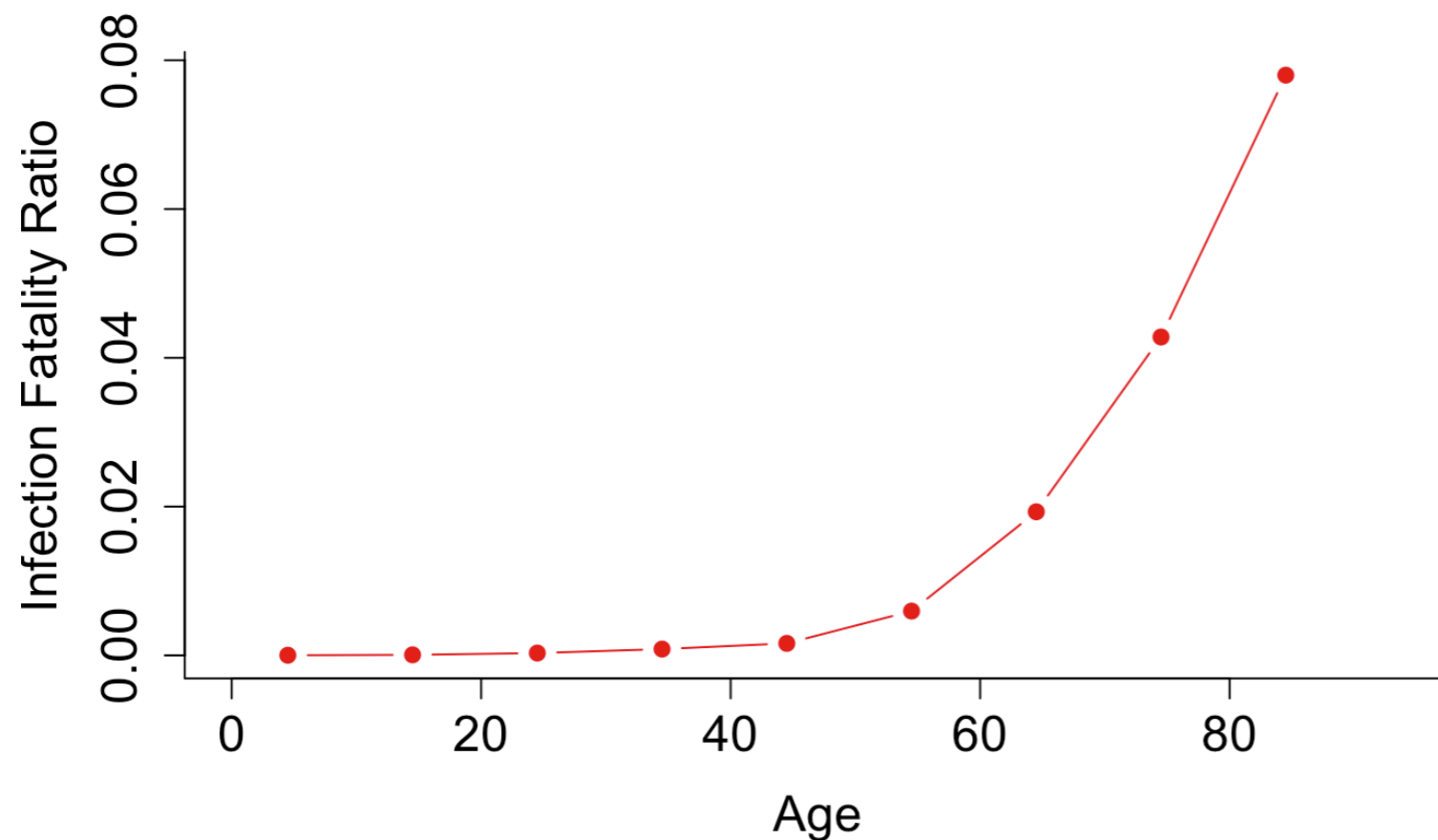
**Cases are not  
infections**

**IFR  $\ll$  CFR**

# Early outbreak

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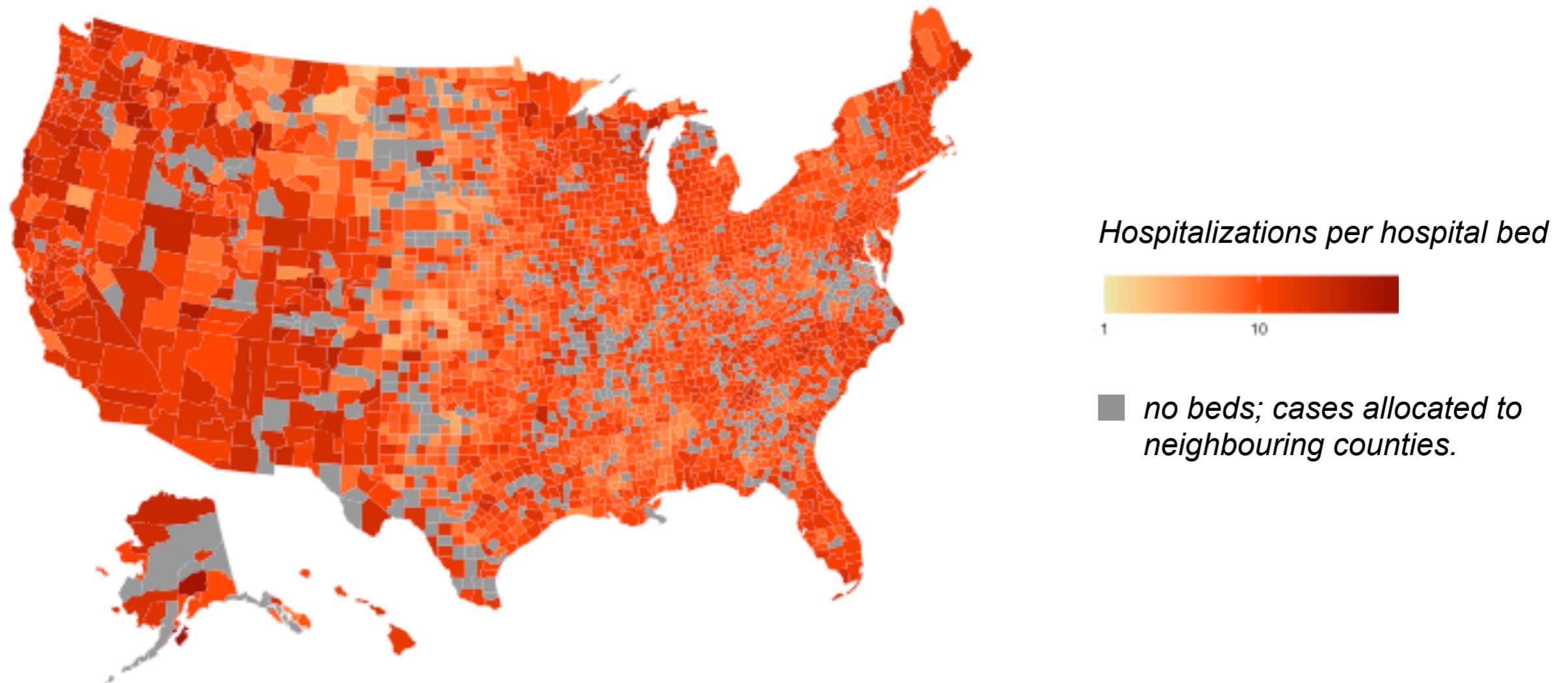


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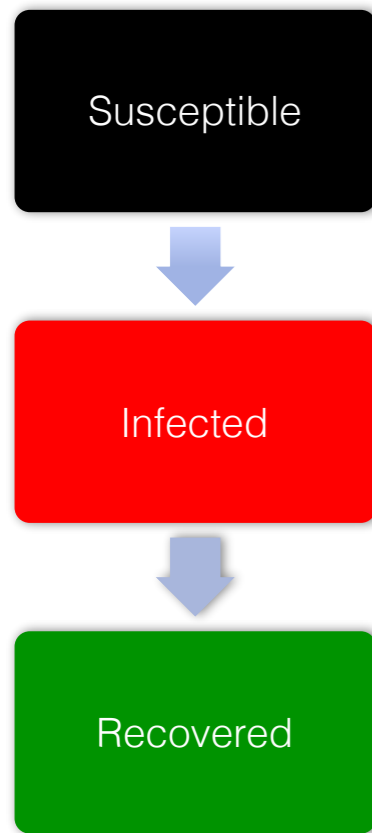
# Over time

Combine county level **demography** (Census data) and # of **hospital beds** (American Hospital Association), assume **40%** of the pop. is infected; **80%** show symptoms:

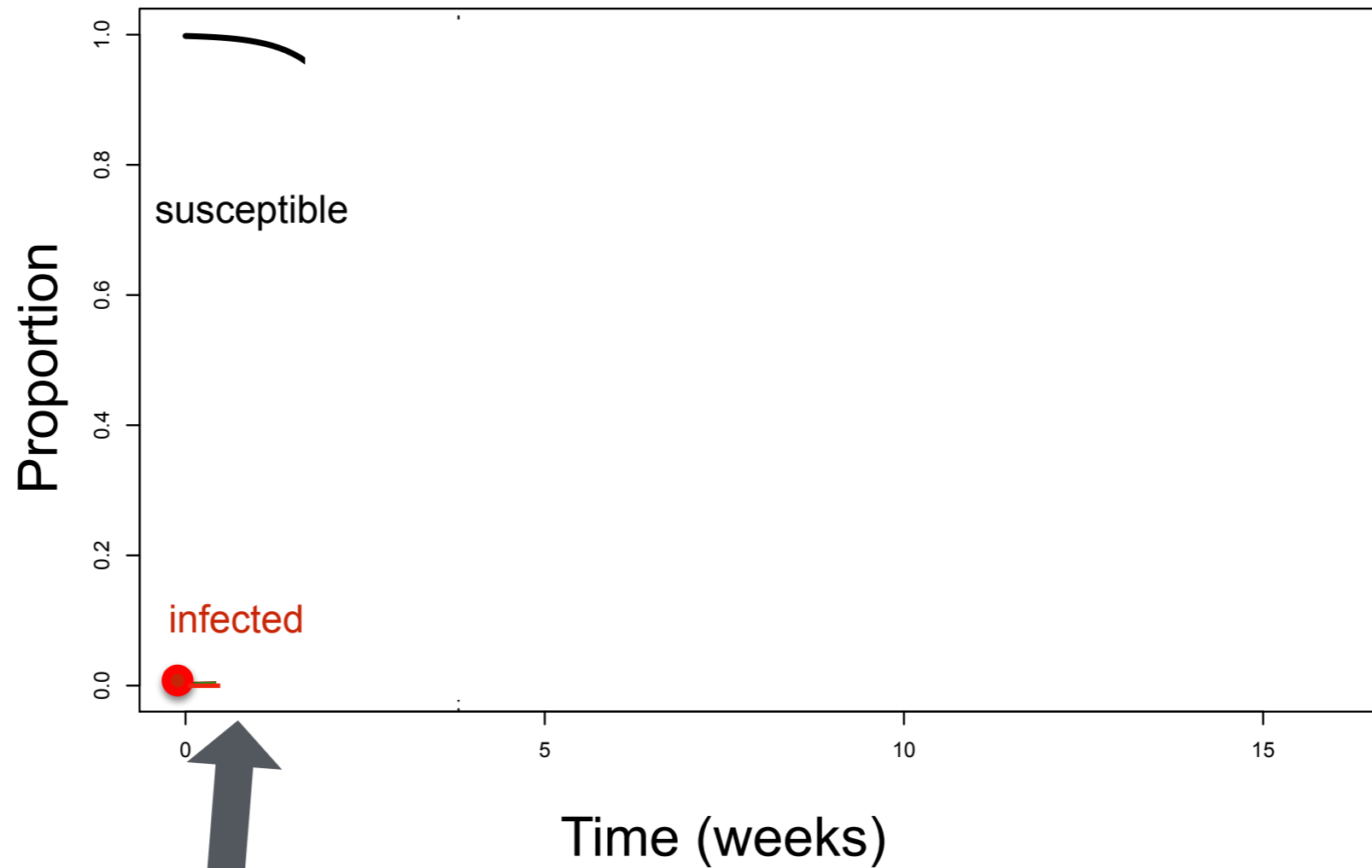




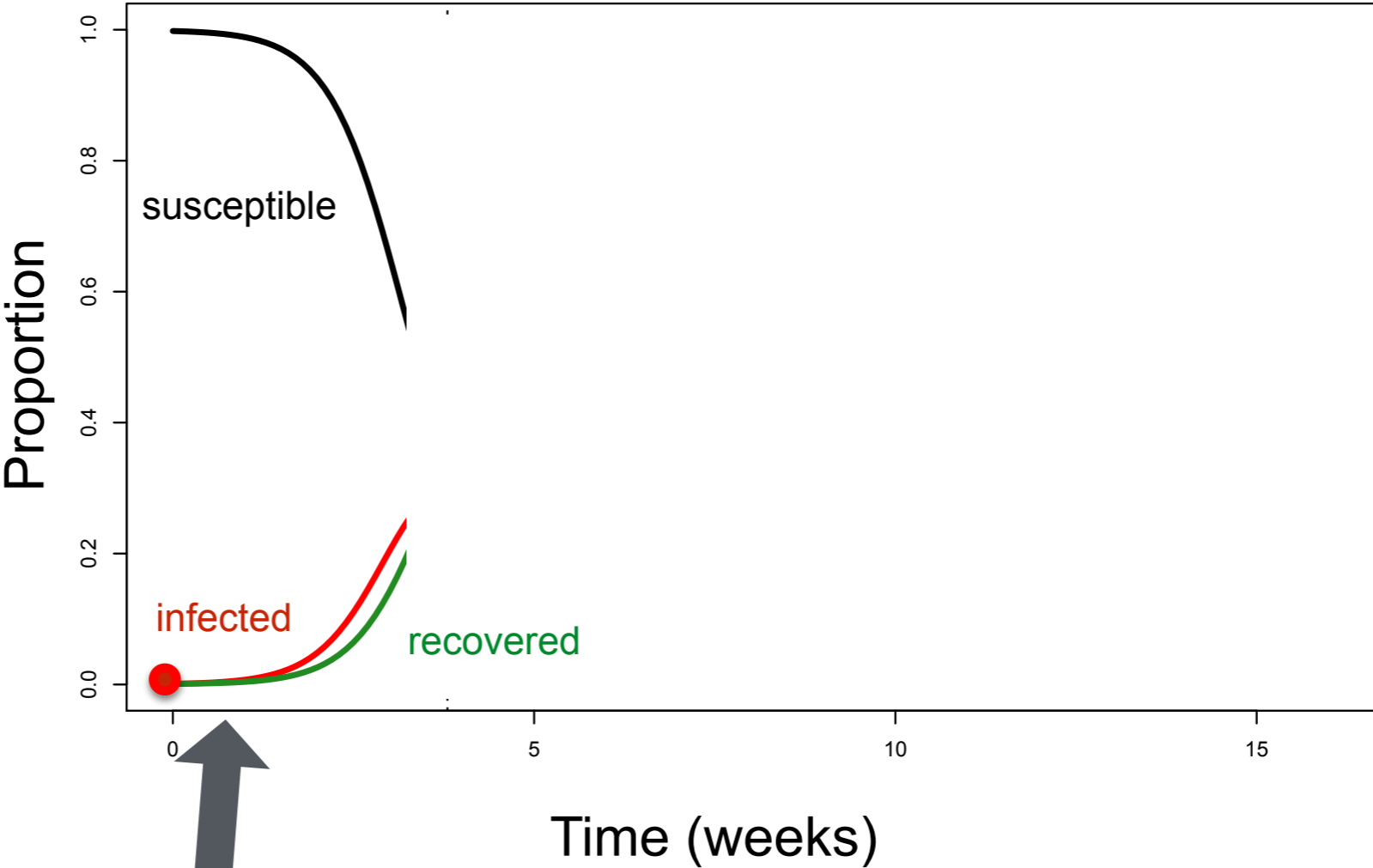
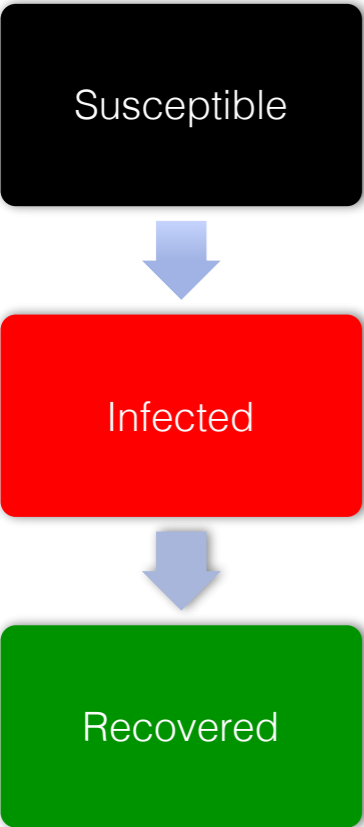
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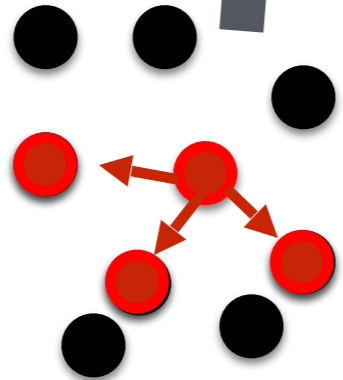
$$R_0 = 3$$



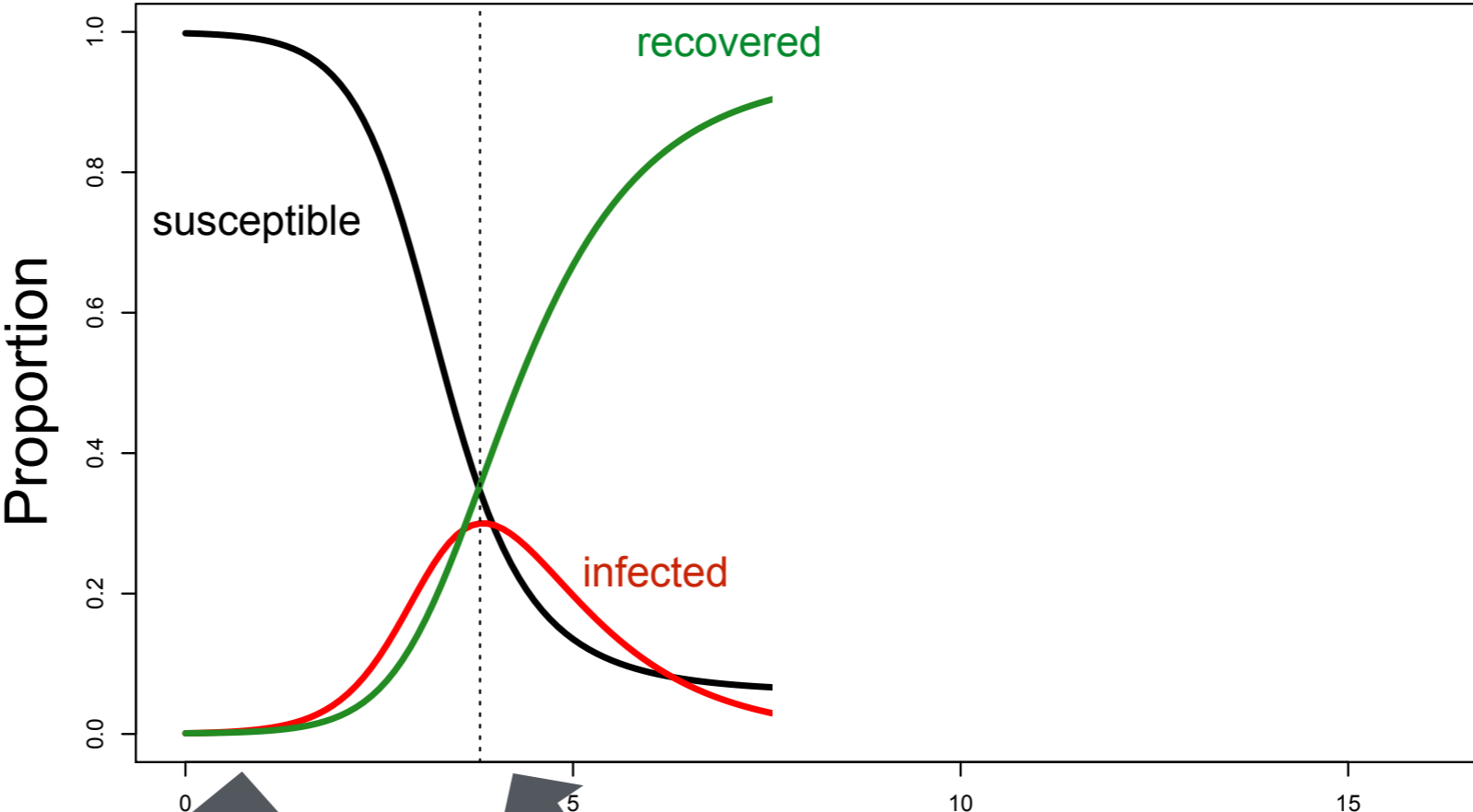
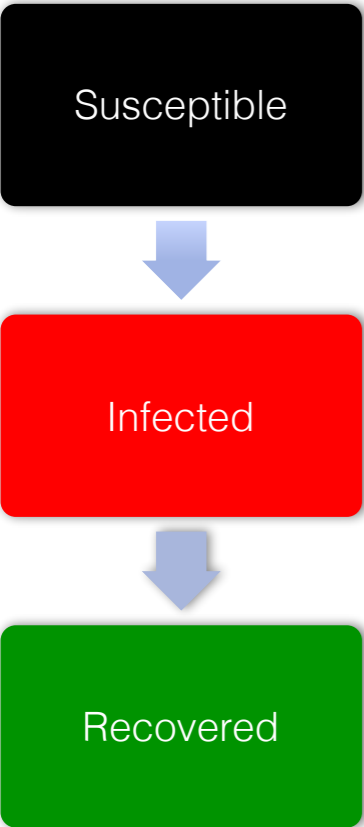
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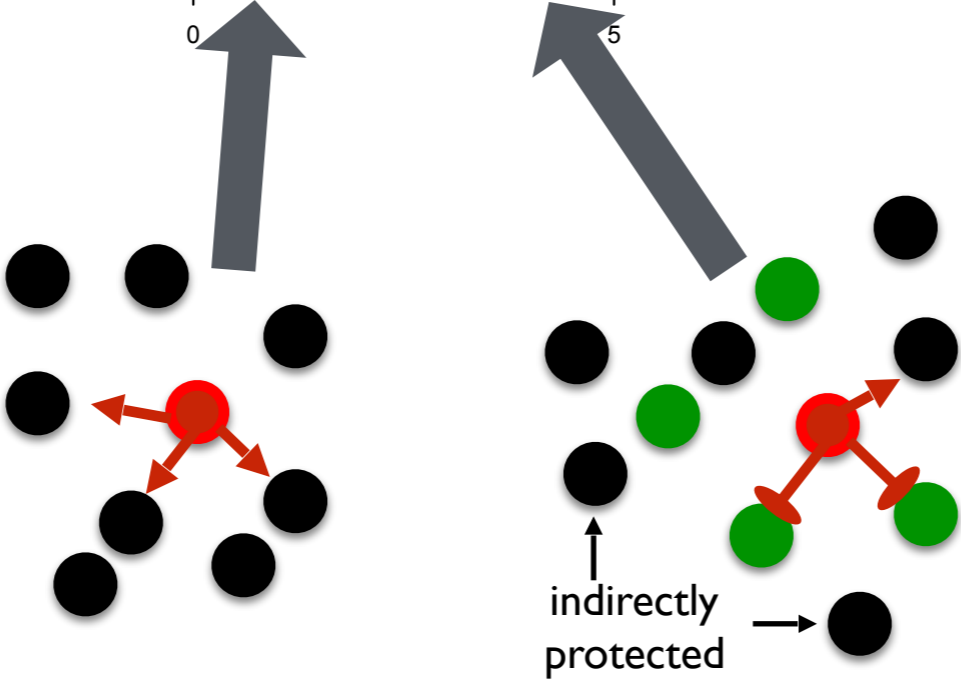
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# Over time

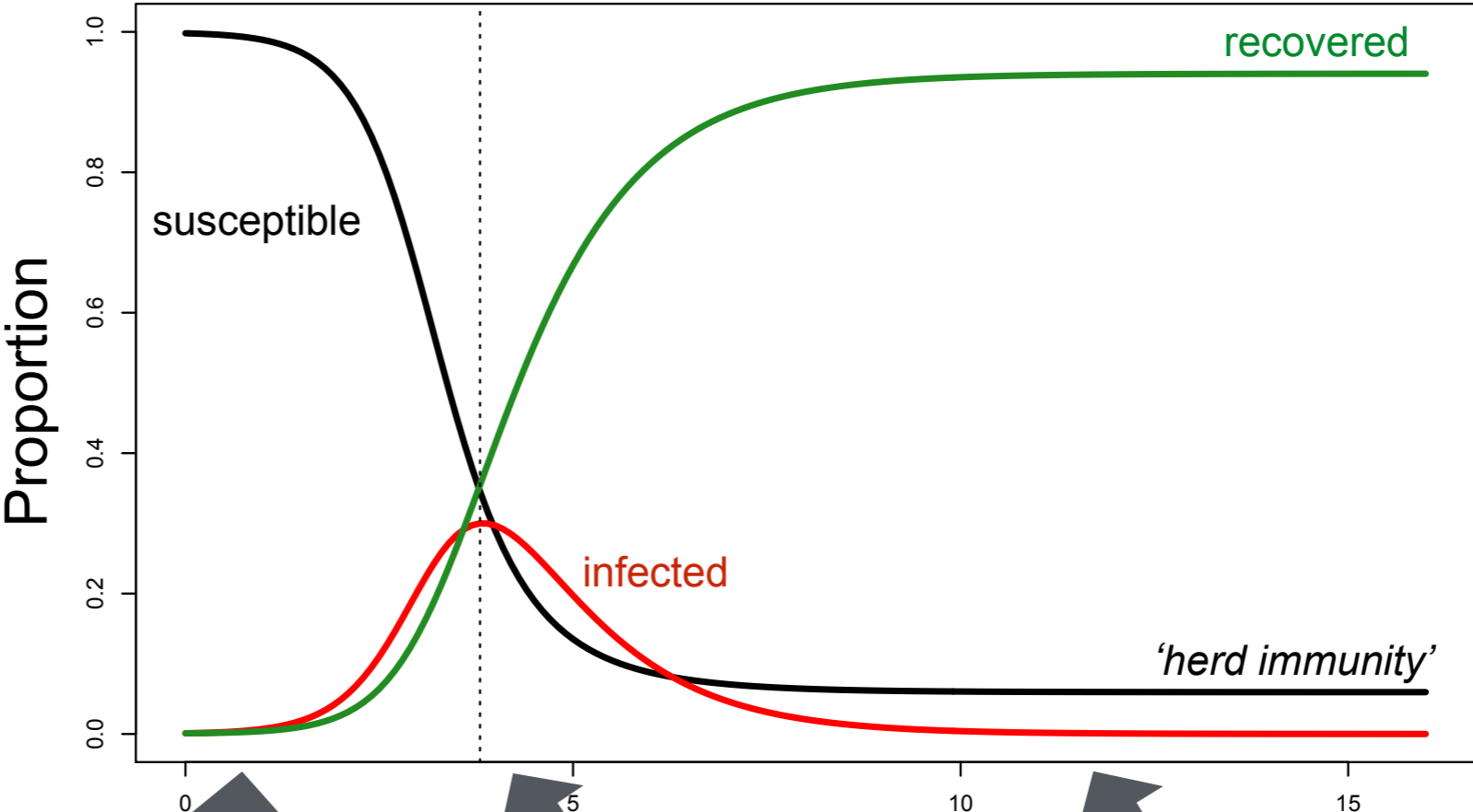
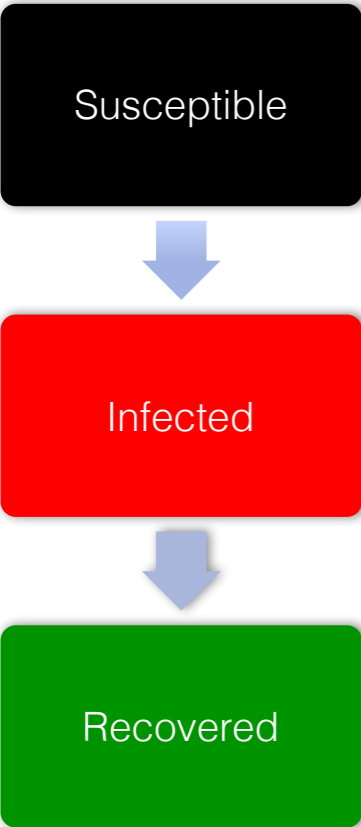


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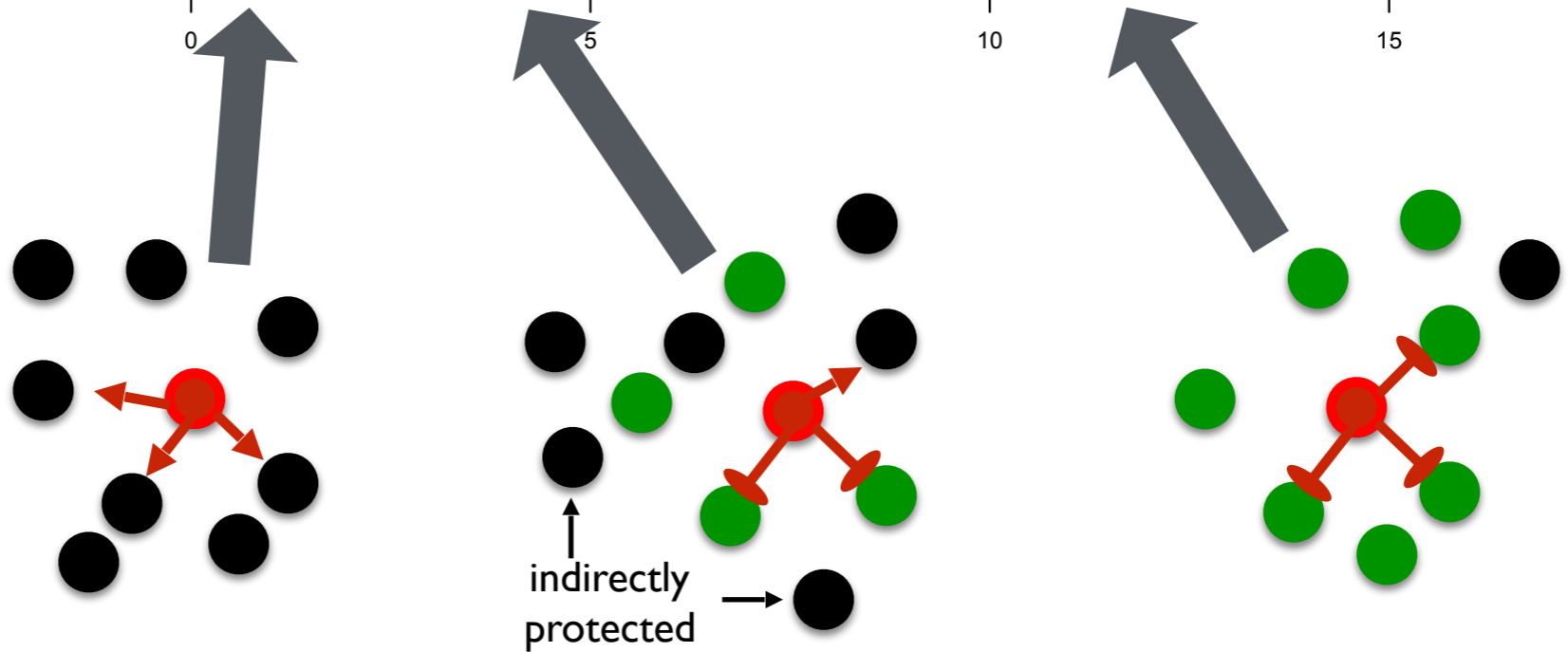




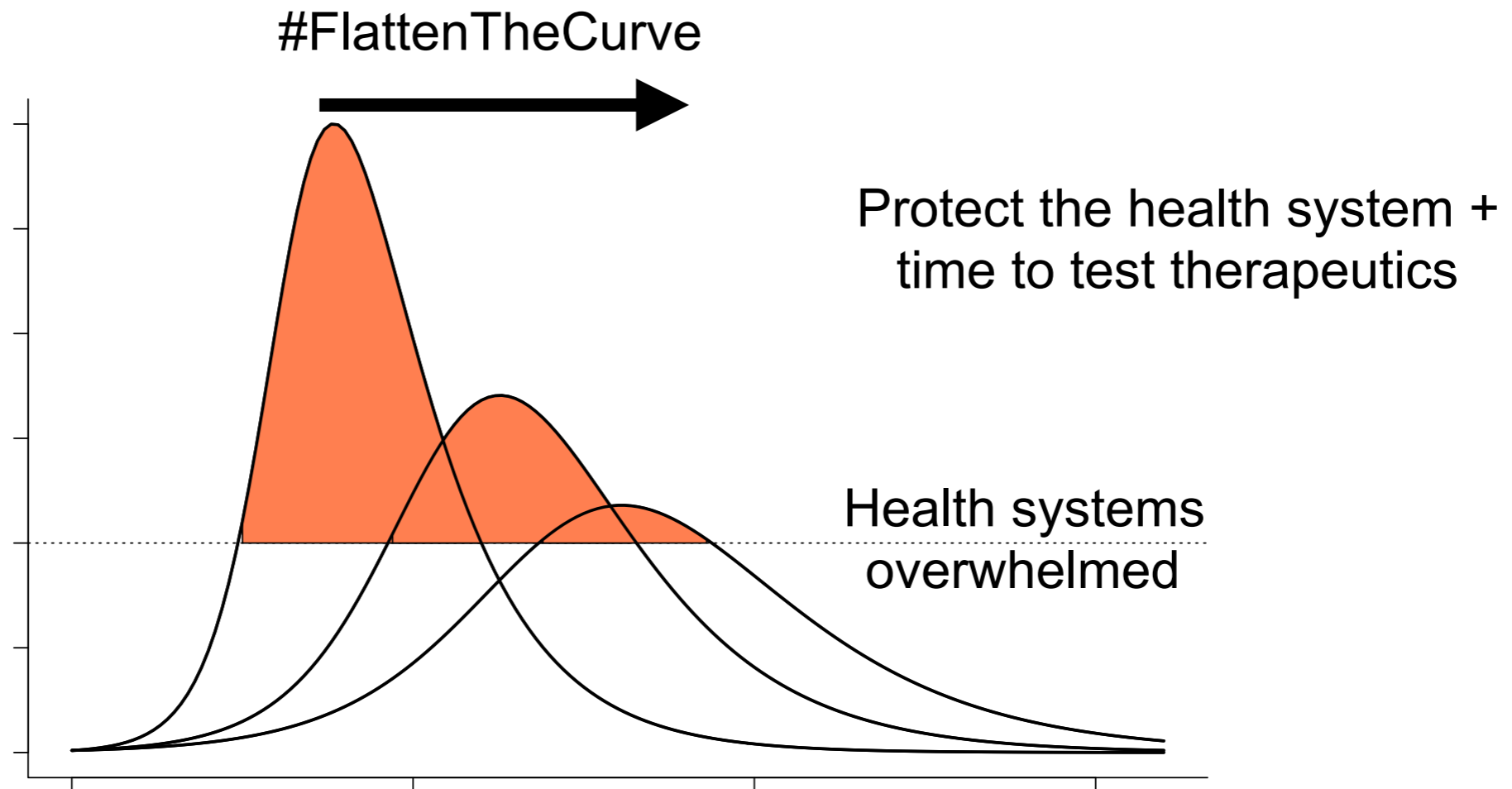
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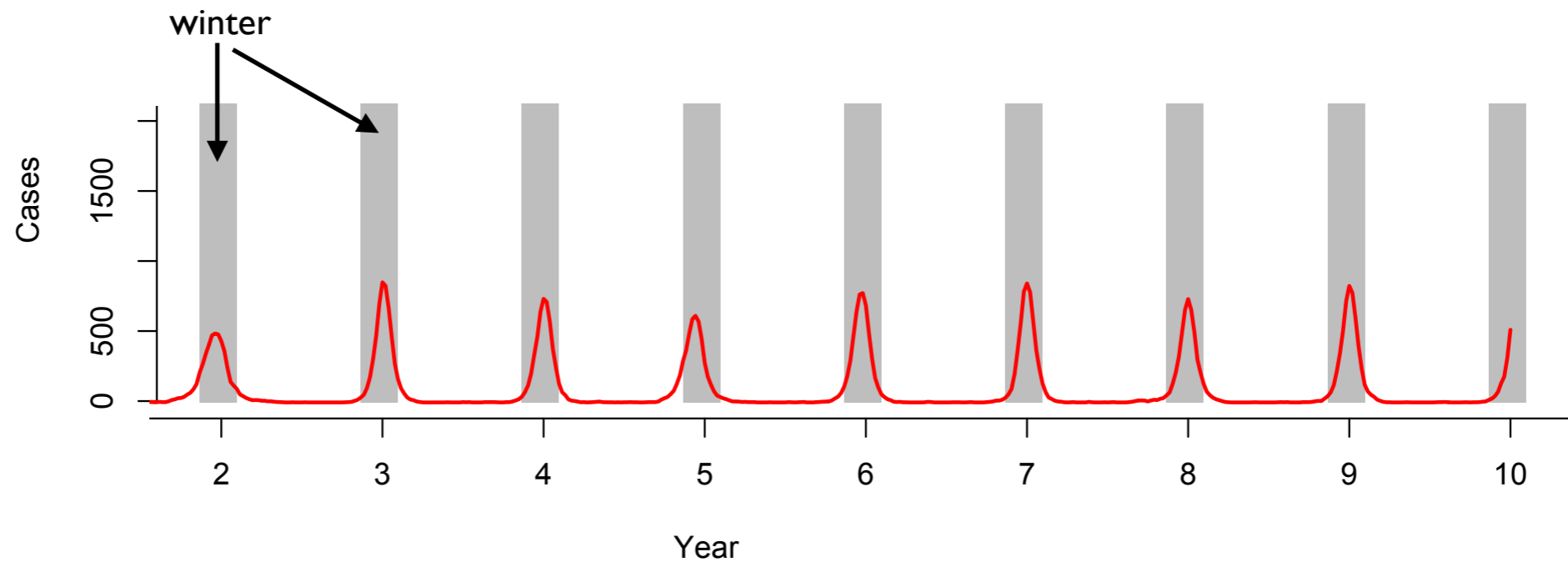


## **Policies implemented:**

- Case based self-isolation mandated
- Social distancing encouraged
- Public events banned
- School closure ordered
- Lockdown ordered

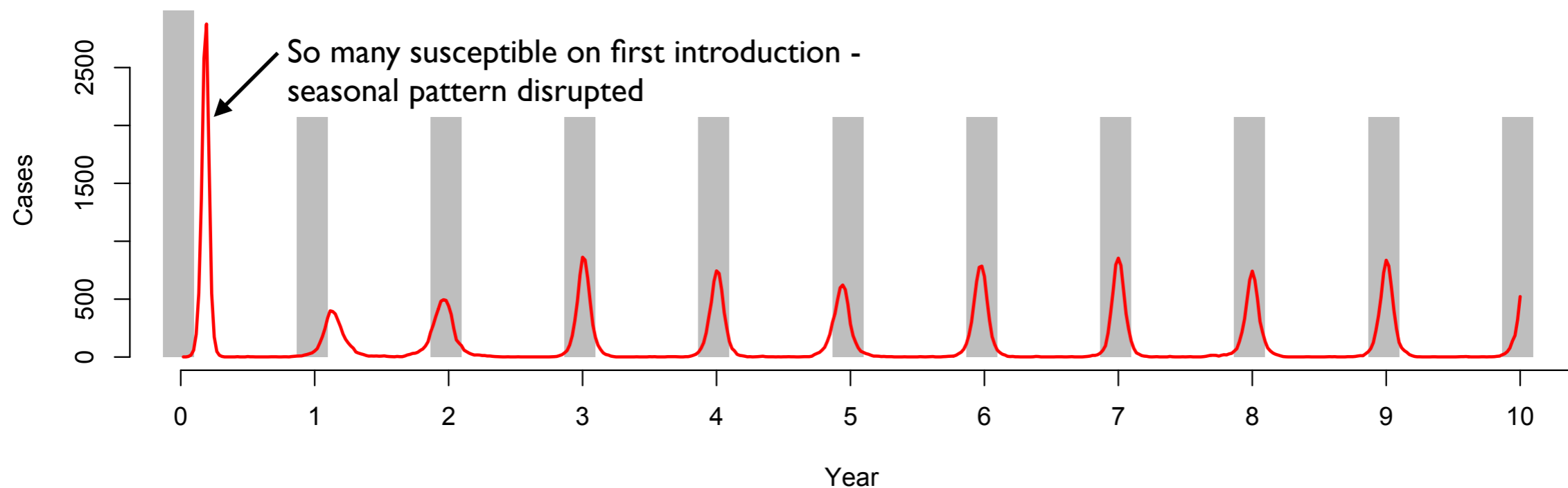
# Seasonality

Coronaviruses are '**winter**' pathogens: reduced humidity / lower temperatures may increase transmission



# Seasonality

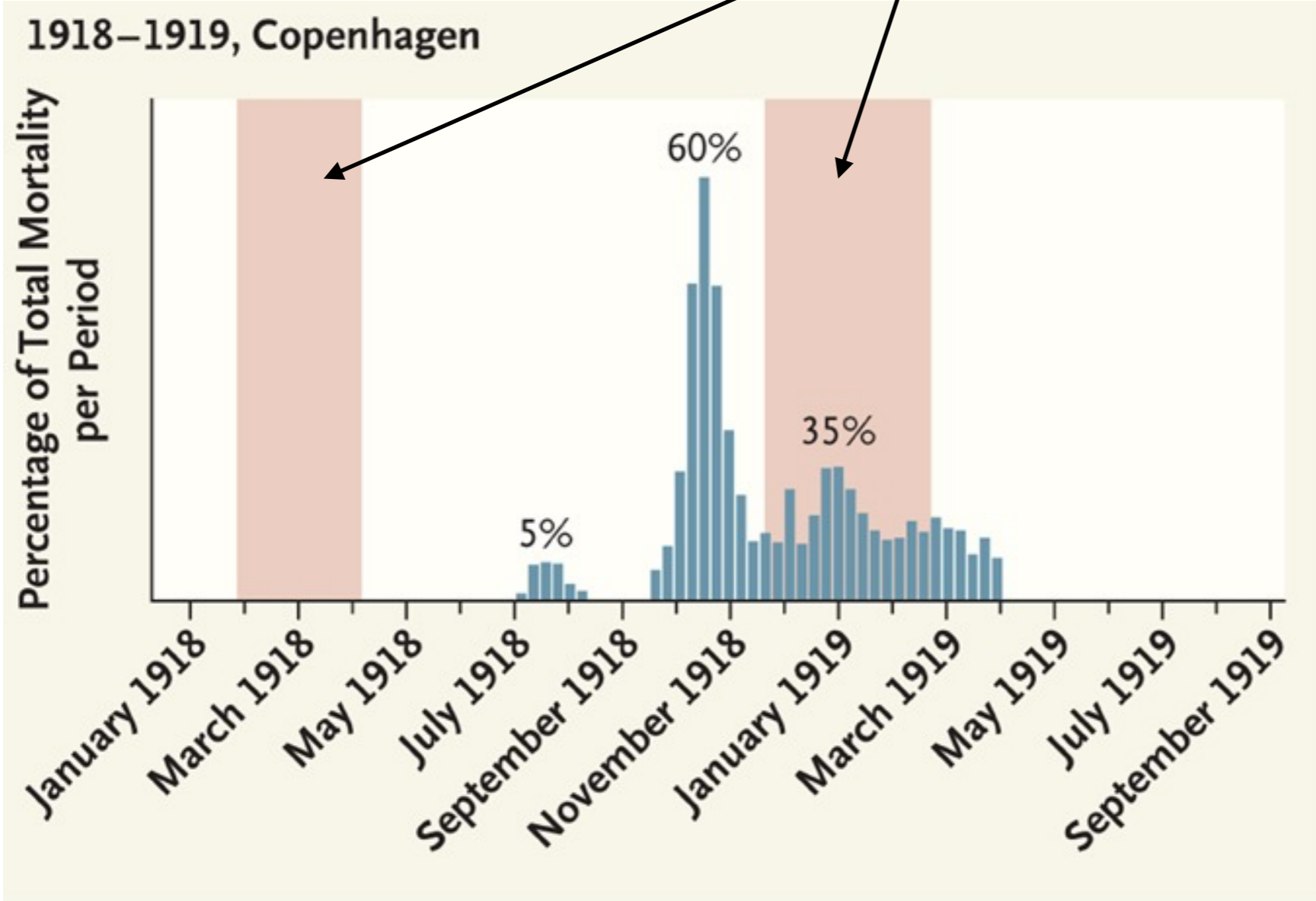
Coronaviruses are '**winter**' pathogens: reduced humidity / lower temperatures may increase transmission



But magnitudes unlikely to overwhelm the effects of the large **pool of susceptible individuals.**

# Seasonality

typical flu season





# Serology: a Global Immunological Observatory

Susceptible



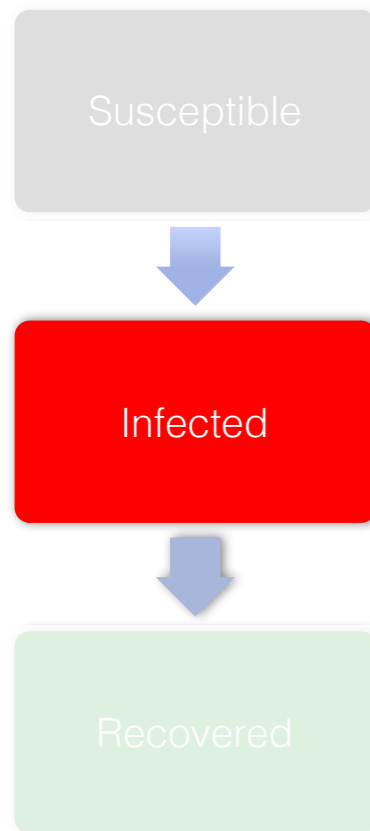
Infected



Recovered

Cases and deaths:

# Serology: a Global Immunological Observatory



Cases and deaths:

Provide an incomplete window onto the epidemic

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Use of serological surveys to generate key insights into the changing global landscape of infectious disease





# Serology: a Global Immunological Observatory

Susceptible



Infected



Recovered

Cases and deaths:

Provide an incomplete window onto the epidemic

Serology:

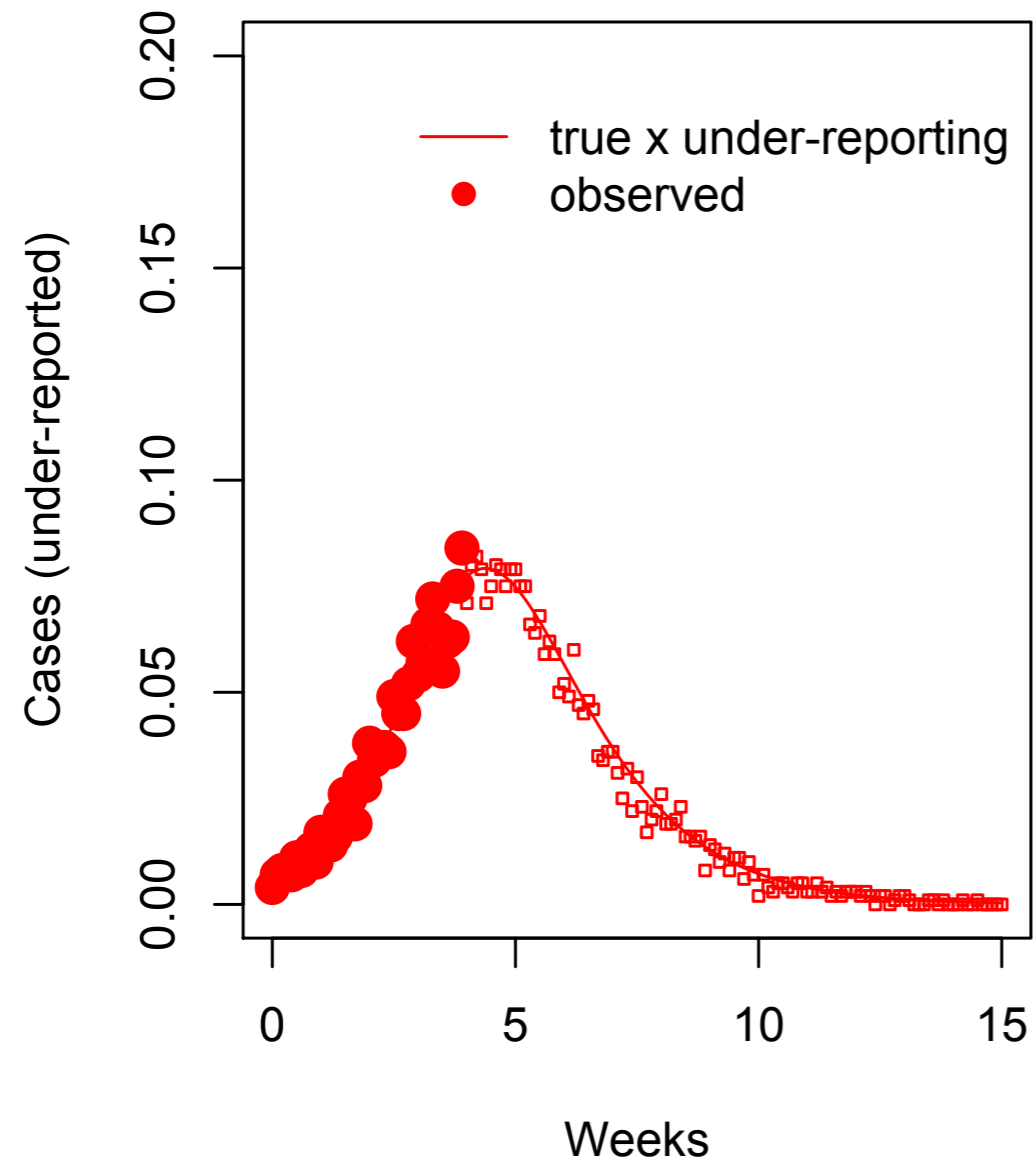
Measurement of antibodies can complete the picture

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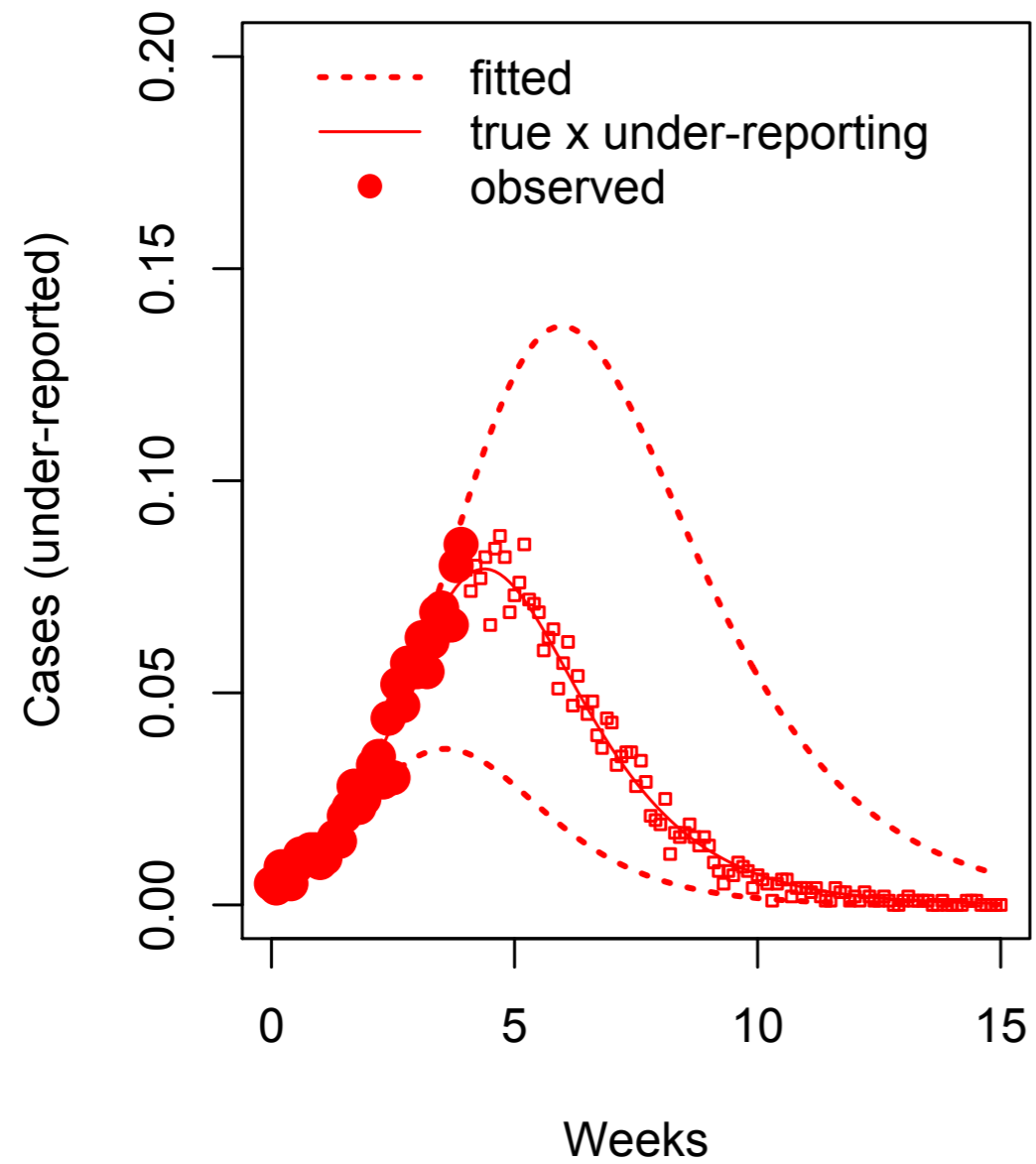
Use of serological surveys to generate key insights into the changing global landscape of infectious disease



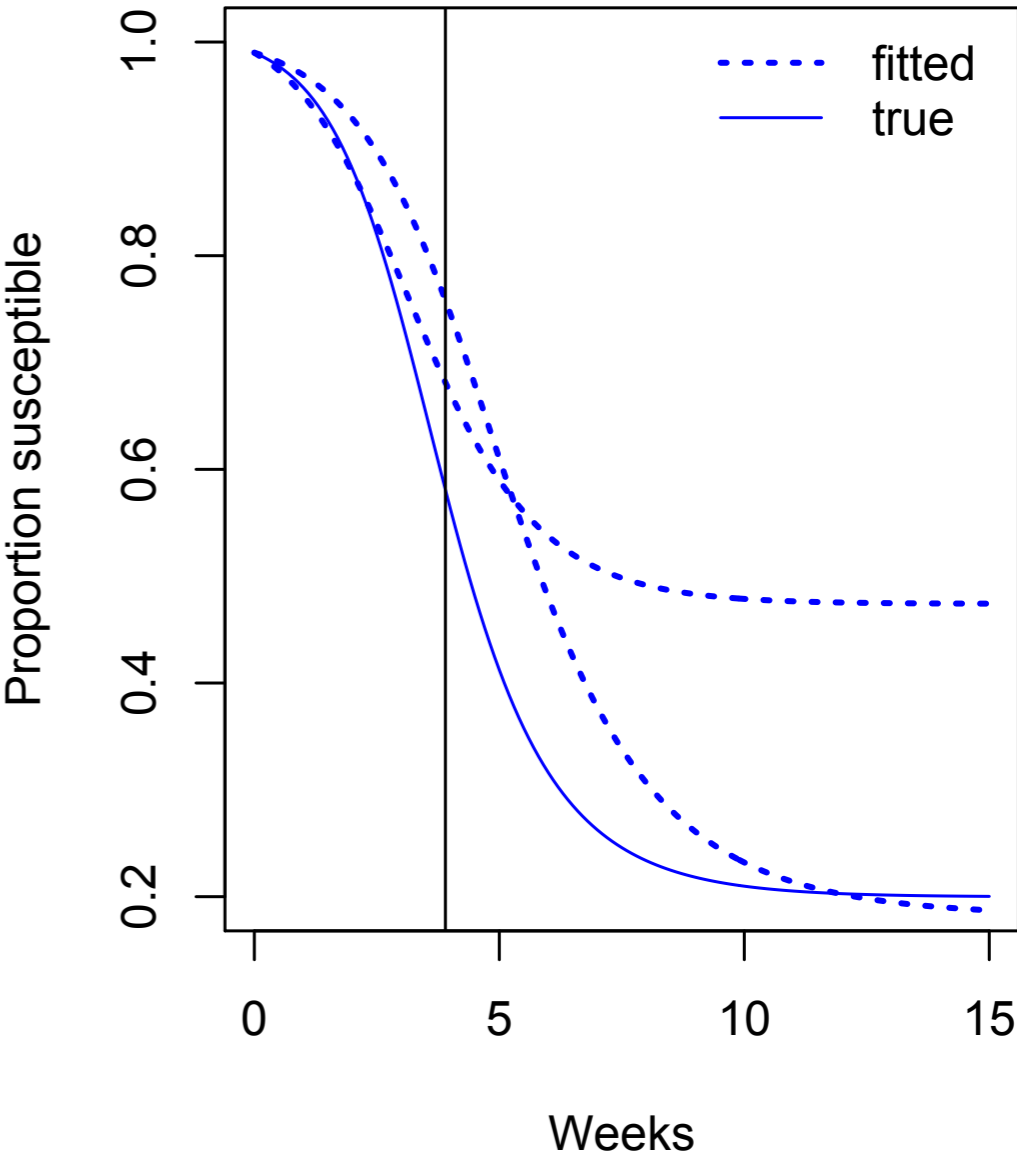
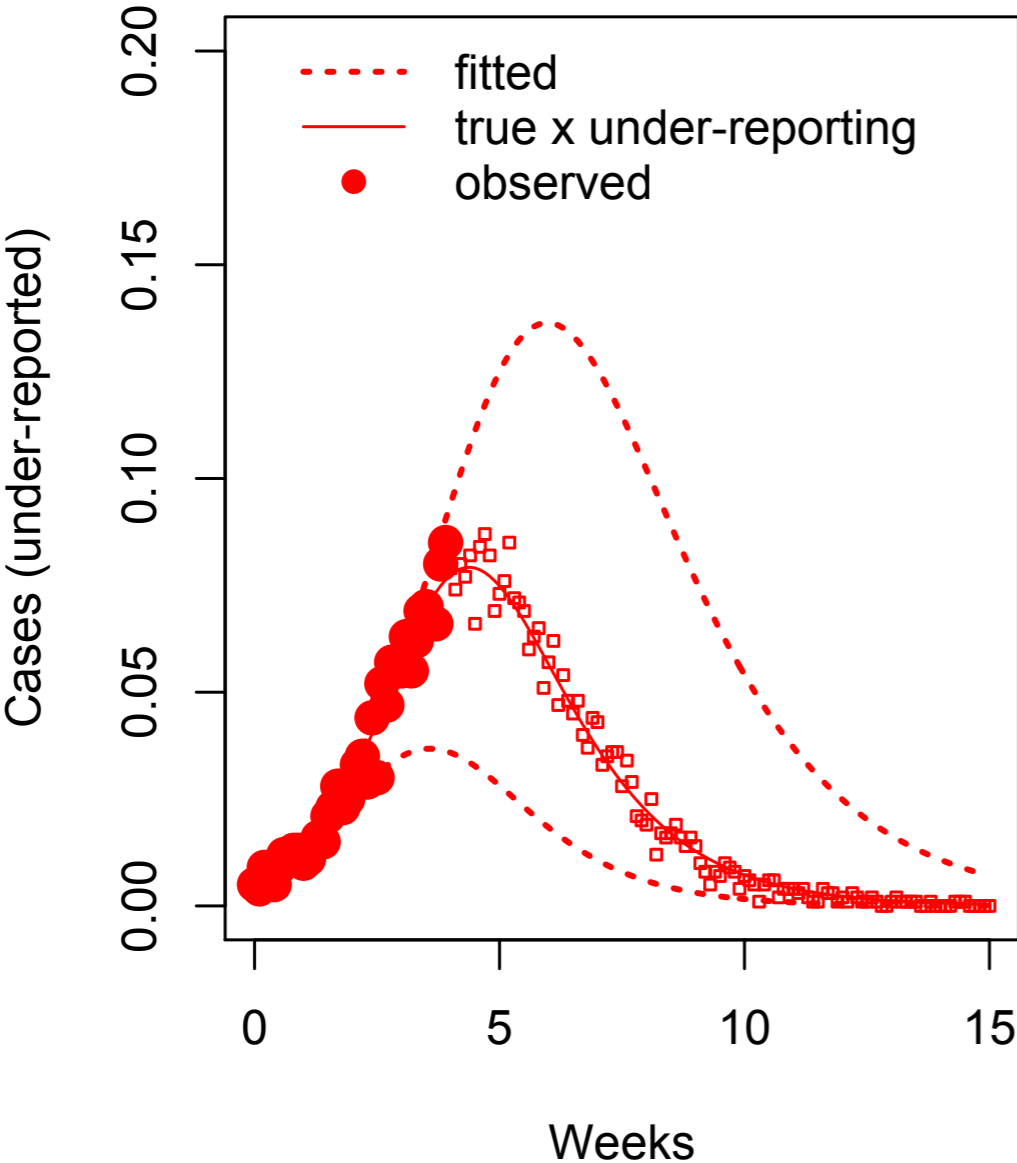
# Serology: understanding the early phase



# Serology: understanding the early phase



# Serology: understanding the early phase



# Serology: the step-down

Susceptible



Infected



Recovered

## What will 'seropositive' mean?

'Recovered' **may** be recalcitrant to re-infection for at least a season, based on:

- Experimental evidence from beta-coronaviruses
- Indirect math models for alpha-coronaviruses
- Profile of immunity following COVID-19 infection

Testing health care workers, other essential professions could be part of movement to moving back to normality.



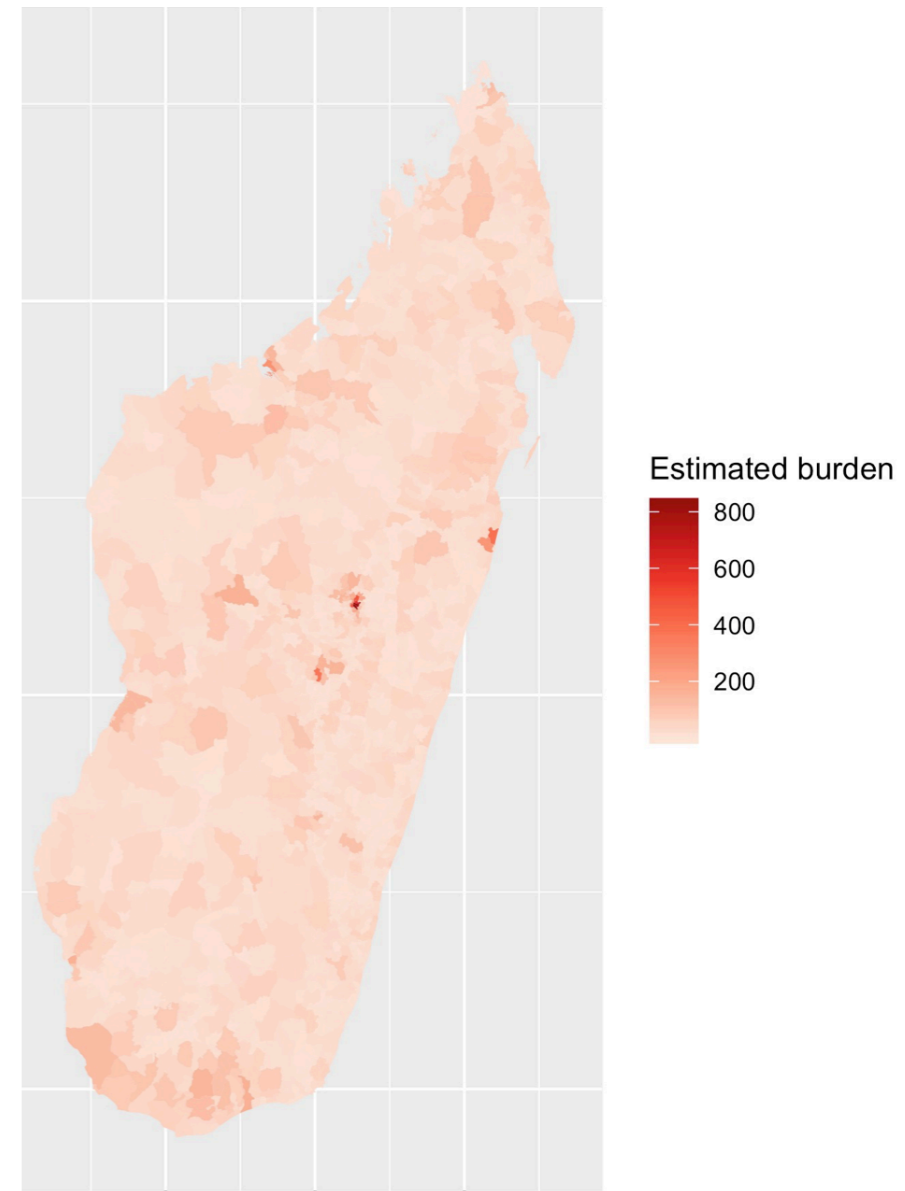
# Low and Middle Income Countries

**Social distancing** may be **impossible**.

Engineering **efficient spread of trusted information** is essential.

**Economic safety nets** are urgent.

The **backdrop of infection** that the pandemic is spreading across is poorly understood.







# Open questions

What will be **social and economic impact vs. epidemiological advantages** of different shut down strategies be?

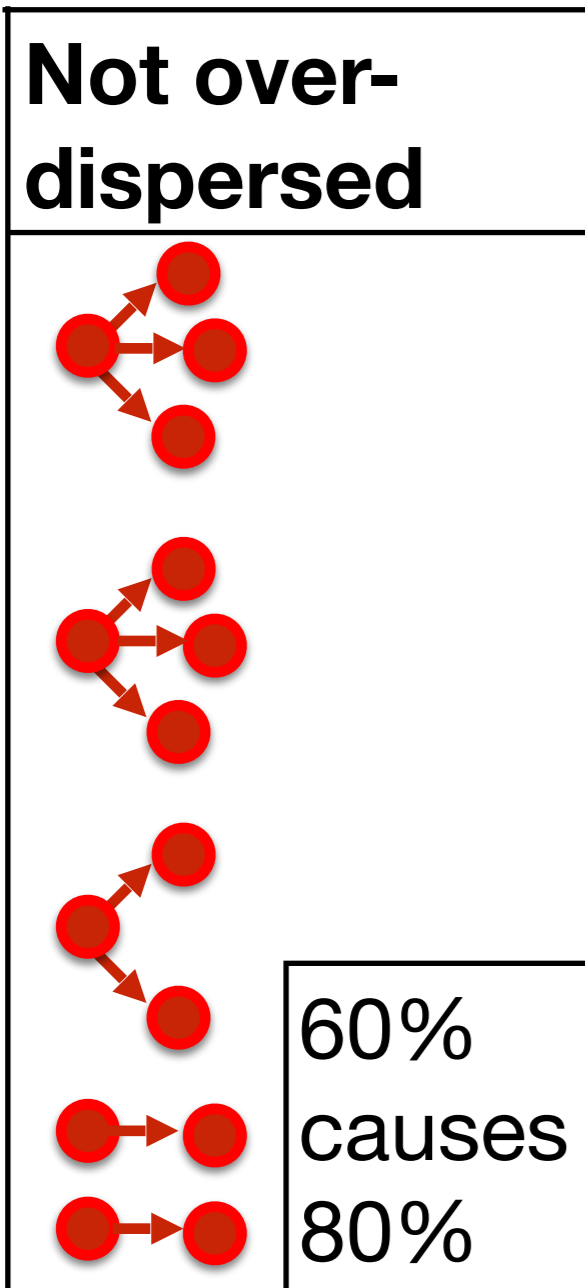
Will **combinations of testing, registration and tracking** open the way to advancing the Pandemic Recovery Trajectory?

What can we **learn for next time**?

EXTRA SLIDES



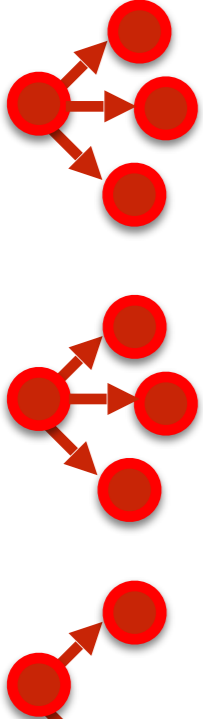
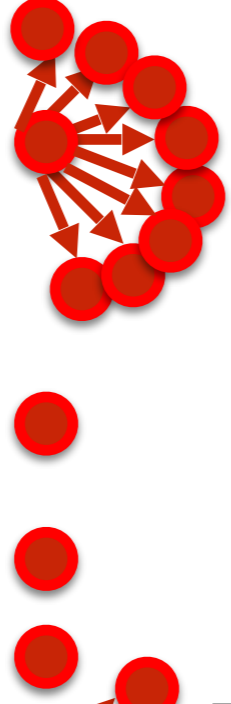
# Over-dispersion



Estimates from Hubei:  
 $R_0$  between 2 and 3  
Serial interval  $\sim$  1 week

Note! this assumes that  
new infections per  
infected individuals are  
 $\sim$  **consistent.**

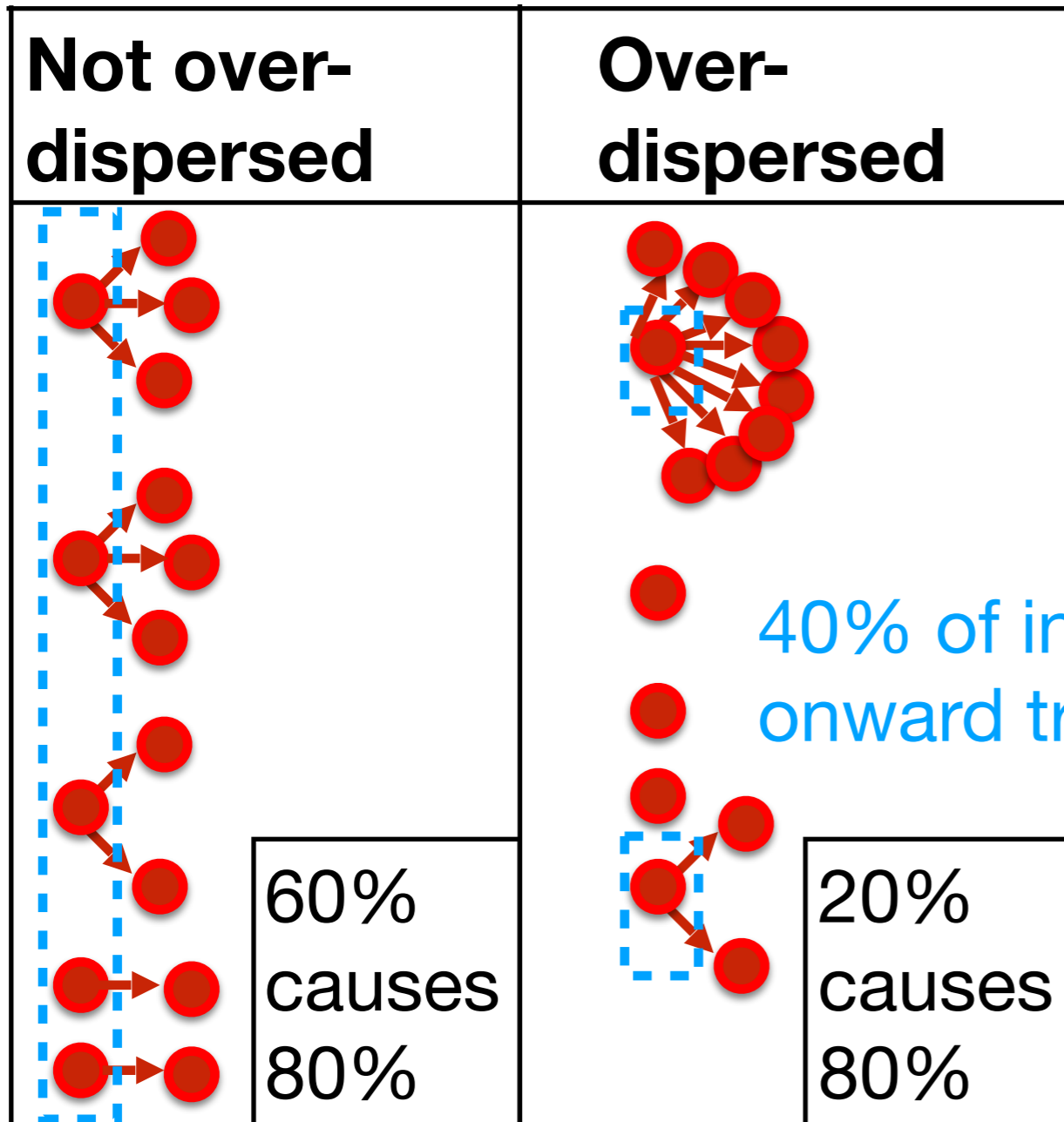
# Over-dispersion

Not over-dispersed	Over-dispersed
	
60% causes 80%	20% causes 80%

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**Over-dispersion** =  
rarer onward  
transmission but  
potentially more  
explosive outbreaks.

# Over-dispersion



Estimates from Hubei:  
 $R_0$  between 2 and 3  
Serial interval ~ 1 week

100% of introductions  
cause onward transmission