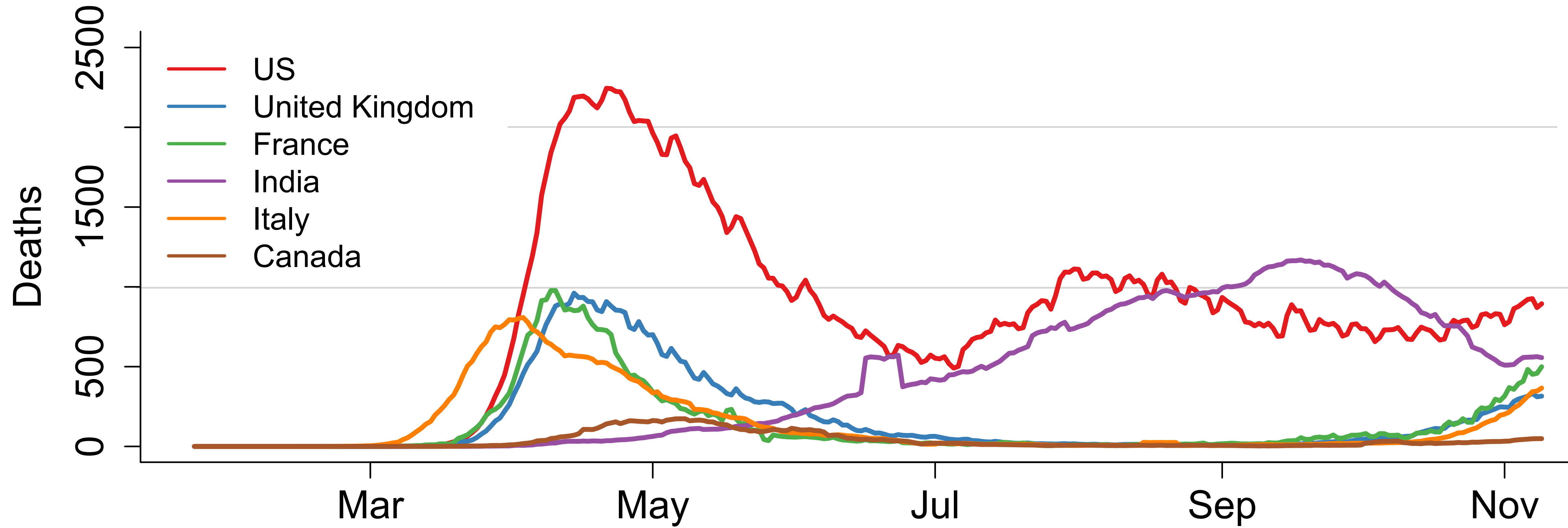


SARS-CoV-2 - state of the pandemic

12th Nov 2002



Drivers of spread

Contact patterns

residential, workplace, travel

Context of contacts

microclimate, ventilation

Immunity

duration, nature

Drivers of spread

Contact patterns

residential, workplace, travel

Context of contacts

microclimate, ventilation

Immunity

duration, nature

Data sources: Contact tracing, experiments on viral persistence, analysis of aggregate data on cases and mobility, policies, etc.

Policies to control spread

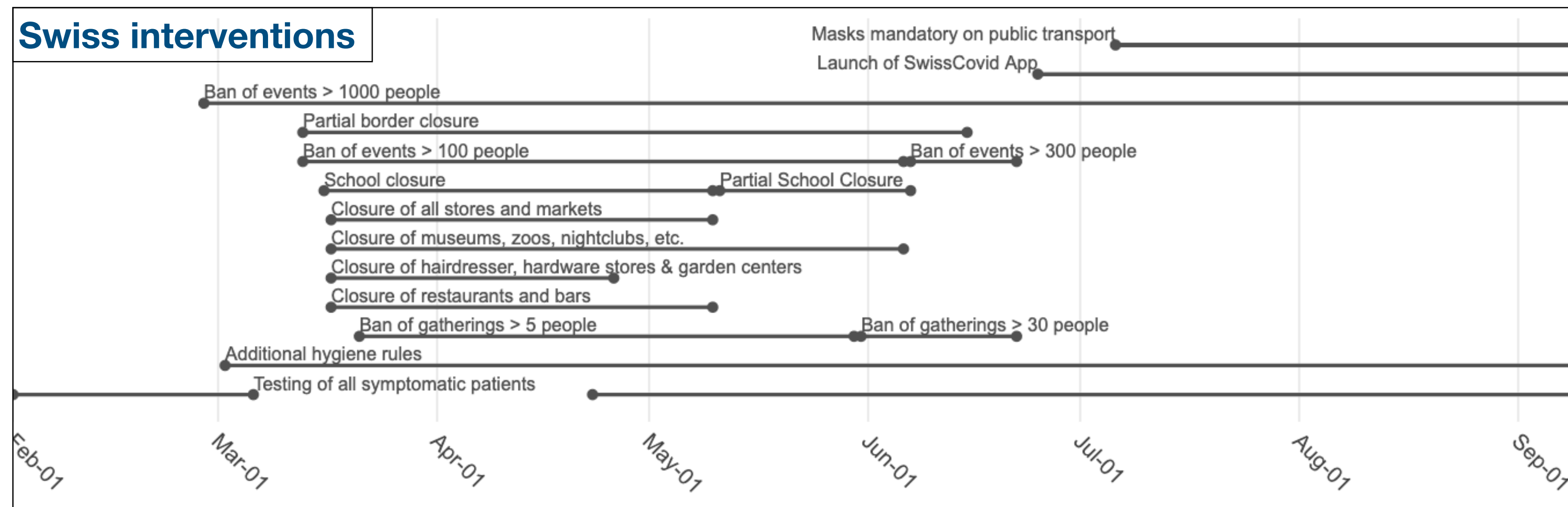
- Test, trace and isolate
- Case based self-isolation
- Social distancing
- Public events ban
- Location occupation capped
- School closure ordered
- Lockdown ordered
- ...

Which interventions work best?

Retrospective modelling: take counts of cases or deaths, and map to changes in policy, mobility, etc, accounting for the known mechanisms of transmission.

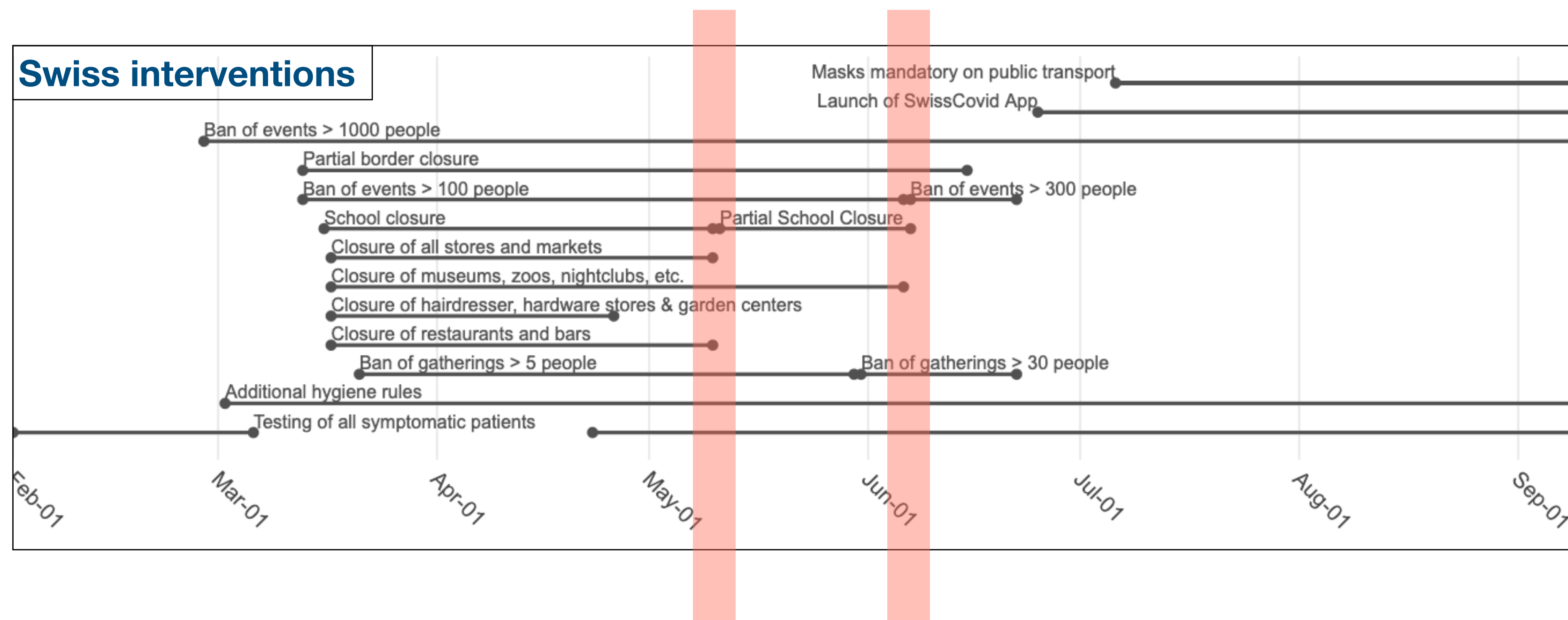
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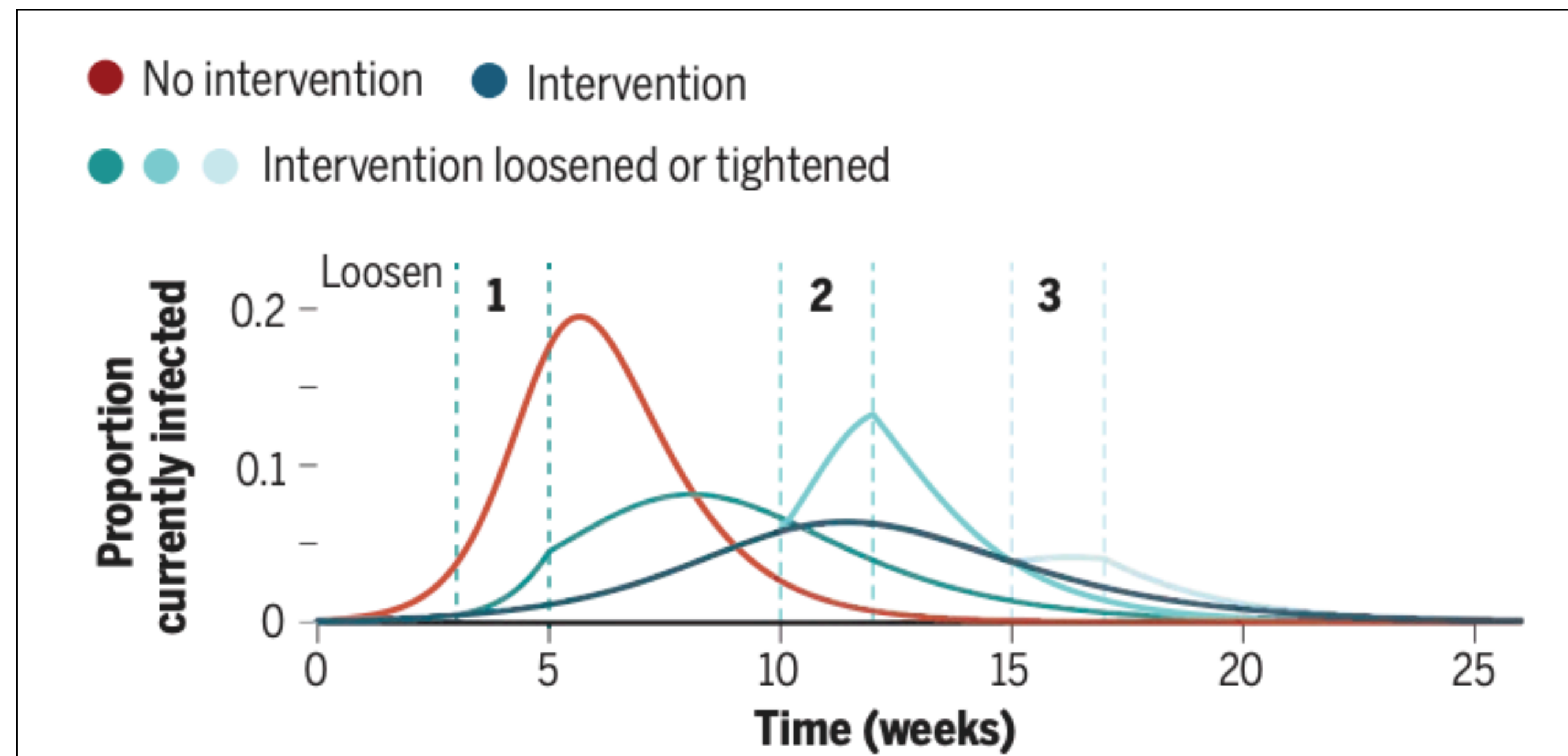
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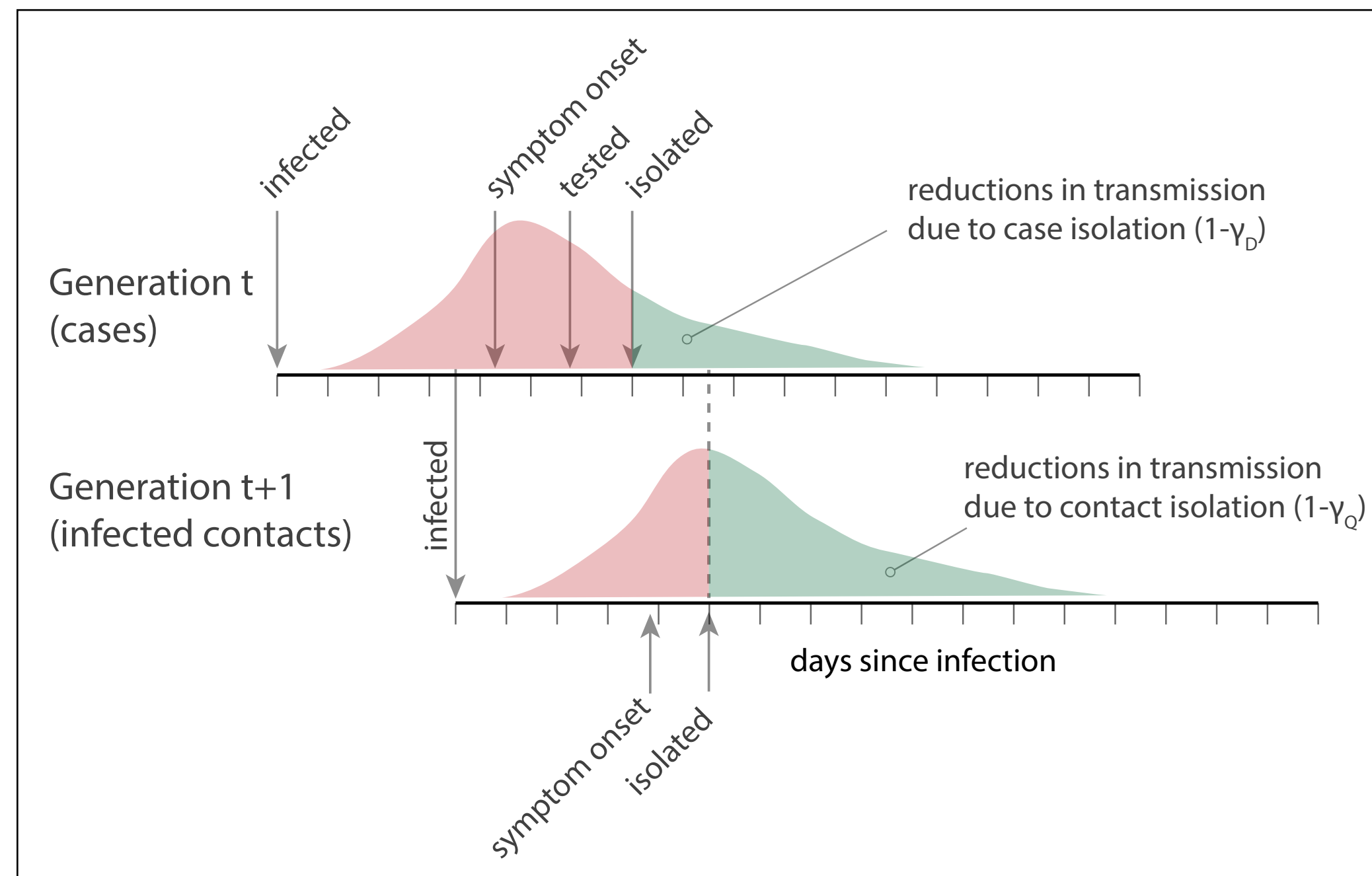
Which interventions work best?

Randomised Controlled Trials: pilot tightening or loosening interventions over a short time-frame, and compare treatment and controls



Which interventions work best?

Scenario comparison: project different interventions using known mechanisms for comparison of impact.



Which interventions work best?

Data is key, including outcomes **beyond** cases and deaths

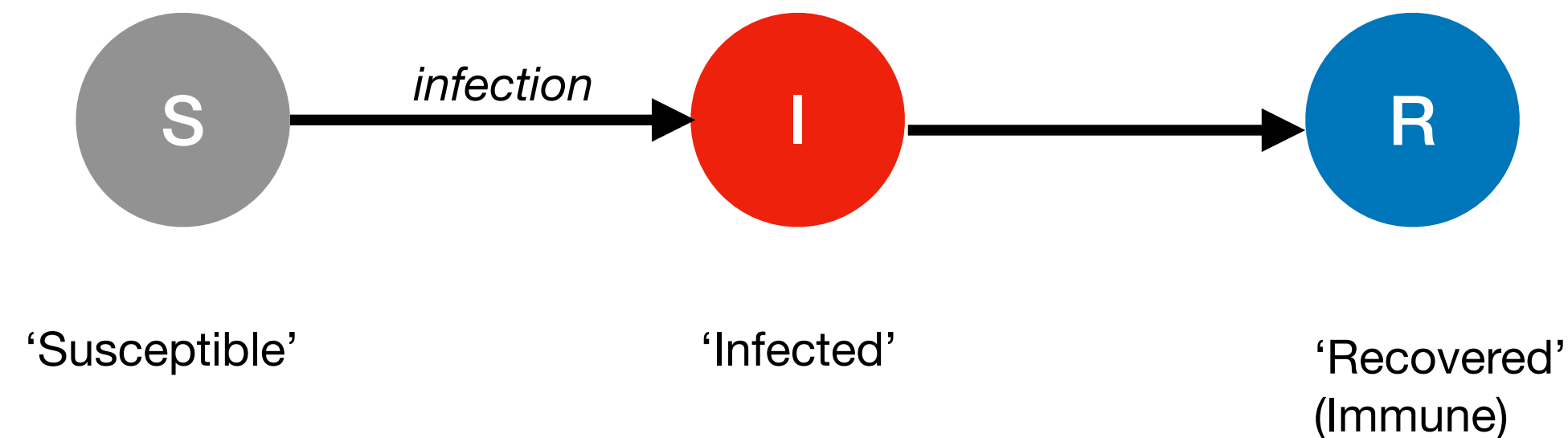
Some **new interventions** (inexpensive home tests (Michael Mina);
'shielding' by immune individuals (Weitz et al.)) may expand our options
BUT

Combinations of interventions are likely to be important, including efforts to make it as easy as possible for people to conform AND

Data is key

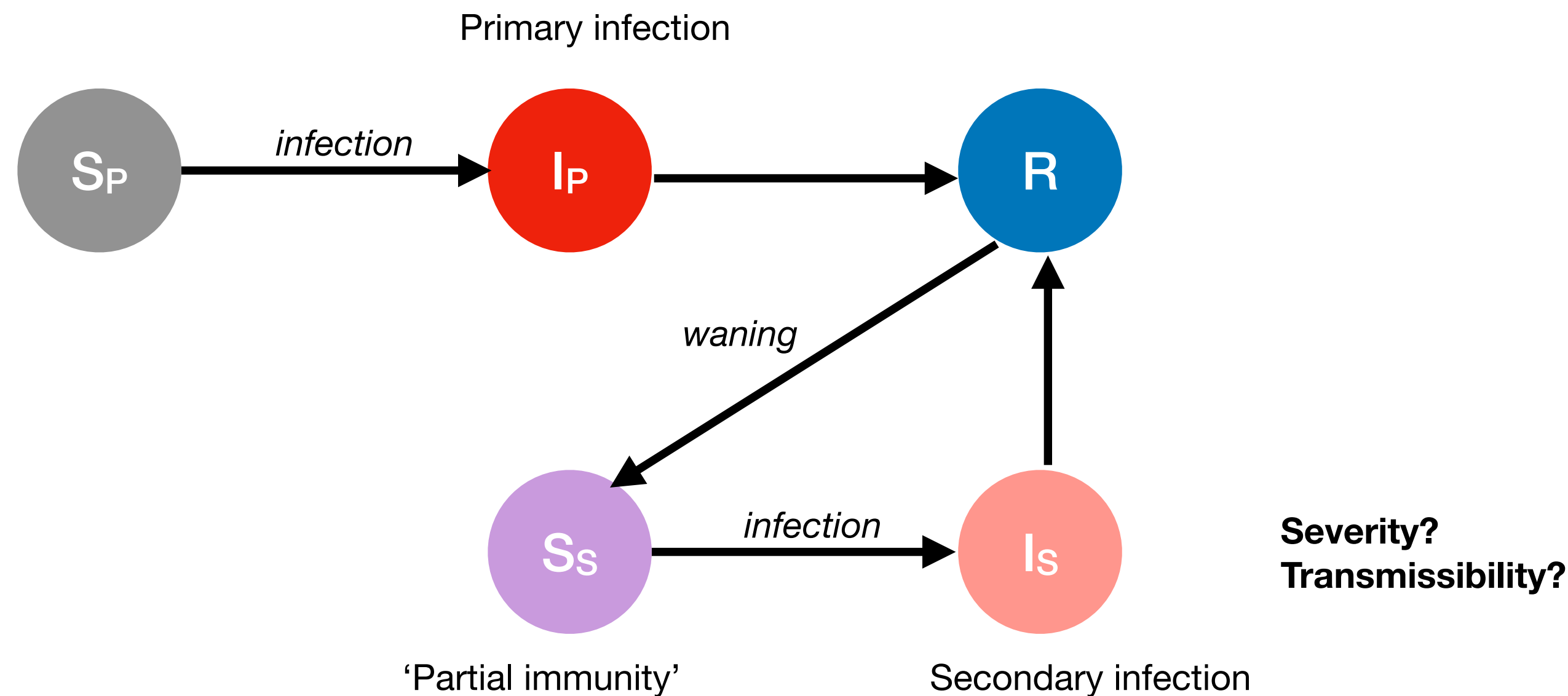
Projecting the future

Both natural and vaccines immunity to SARS-CoV-2 may affect **transmission, or **symptoms**, or **both**, and may be variably durable.**



Projecting the future

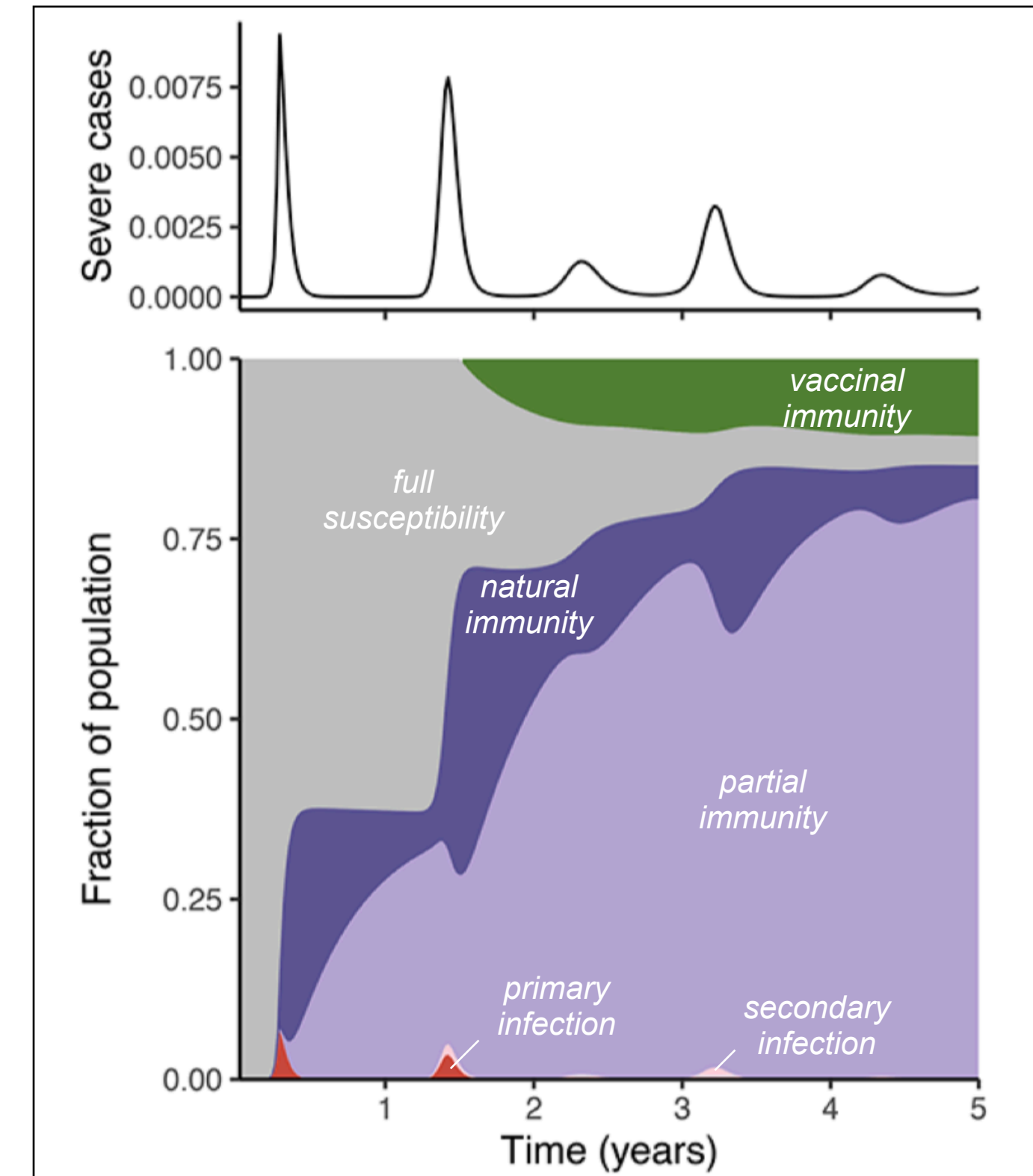
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Projecting the future

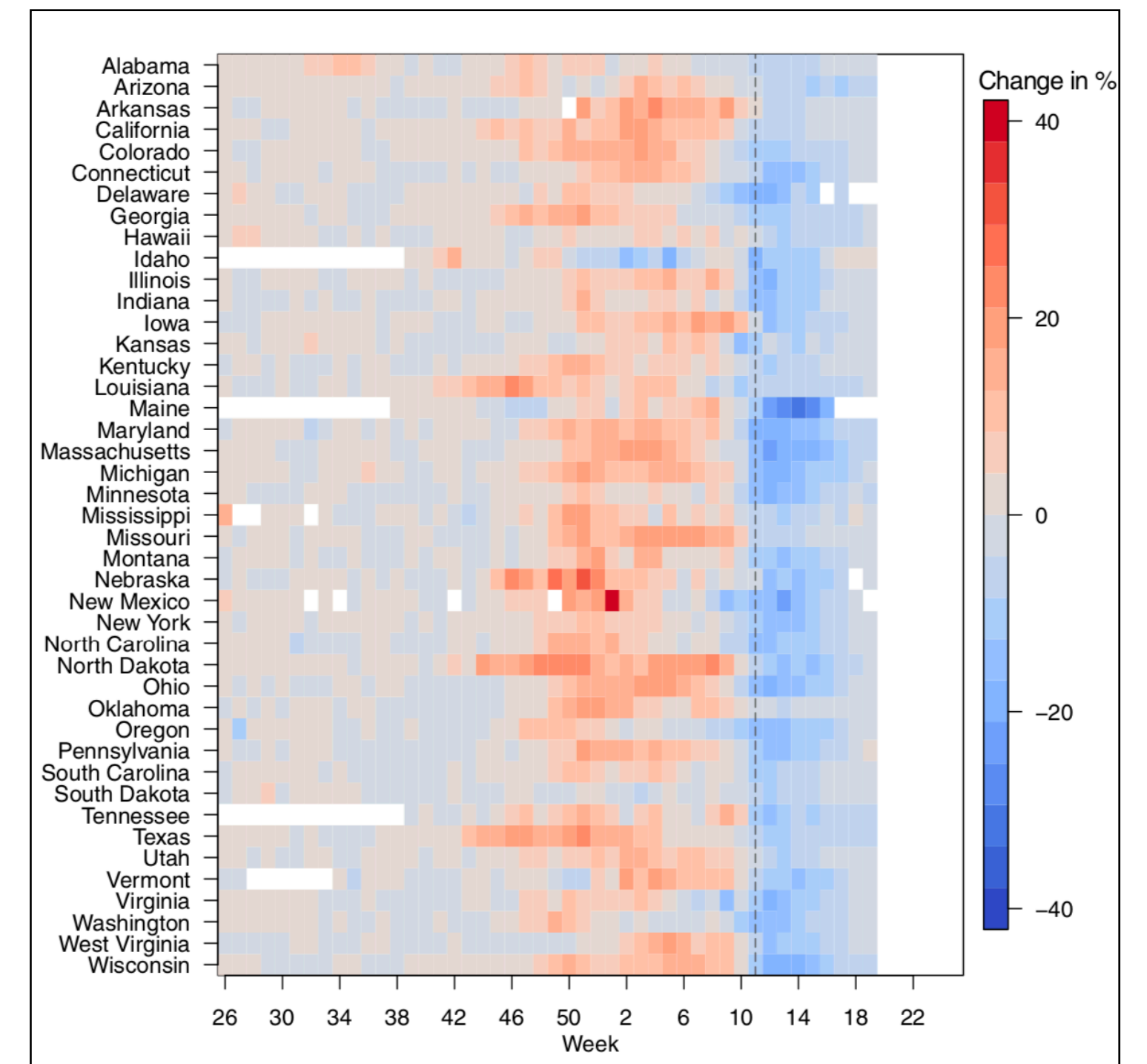
Both natural and vaccines immunity to SARS-CoV-2 may affect **transmission**, or **symptoms**, or **both**, and may be variably durable.

These characteristics will define the **future trajectory of the burden** of the infection and how long it plays out.



Projecting the future

A range of **other directly transmitted infections** are affected by the impact of **social distancing efforts** - with declines in incidence of influenza, RSV, etc.

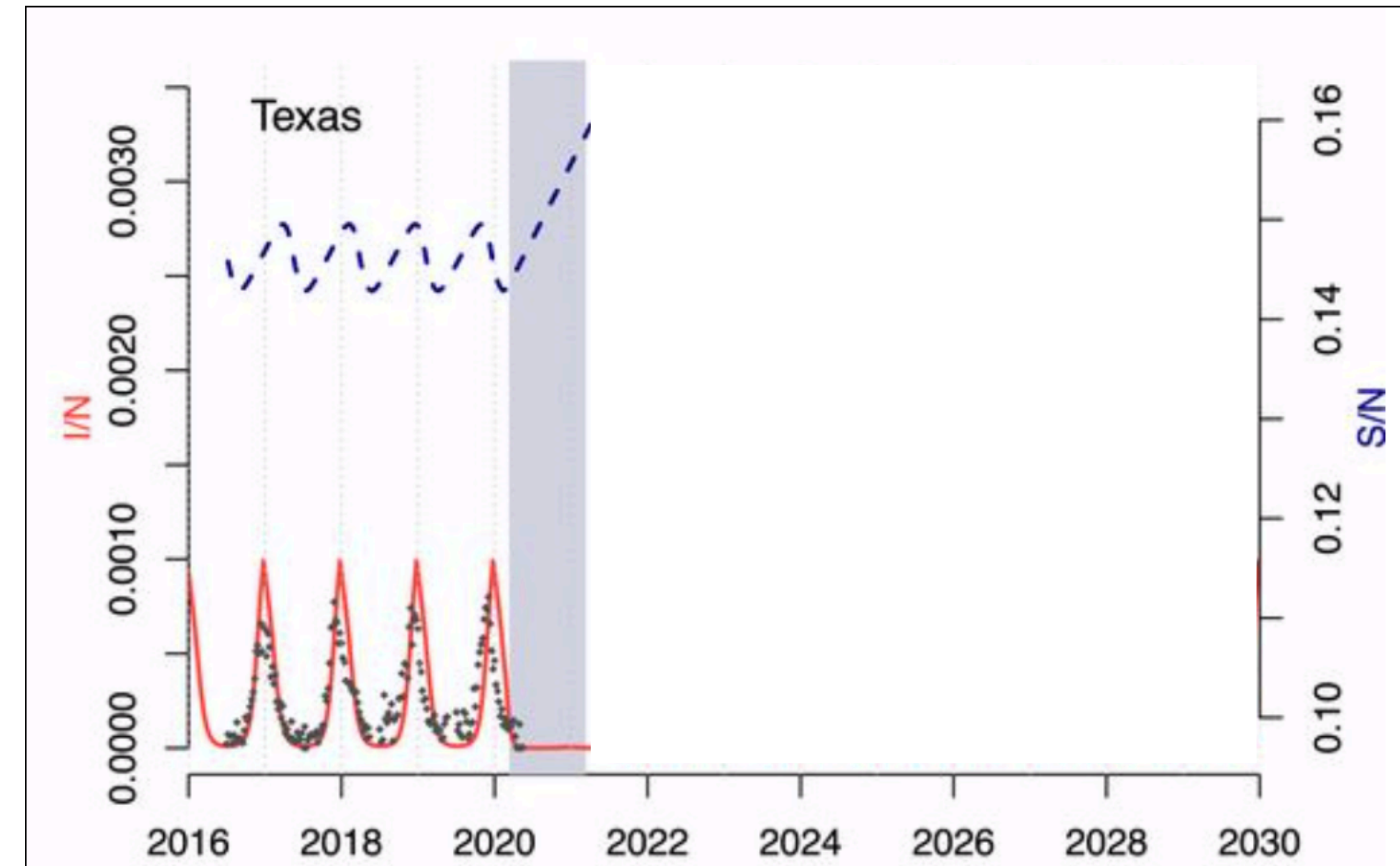


Δ flu from seasonal mean

Projecting the future

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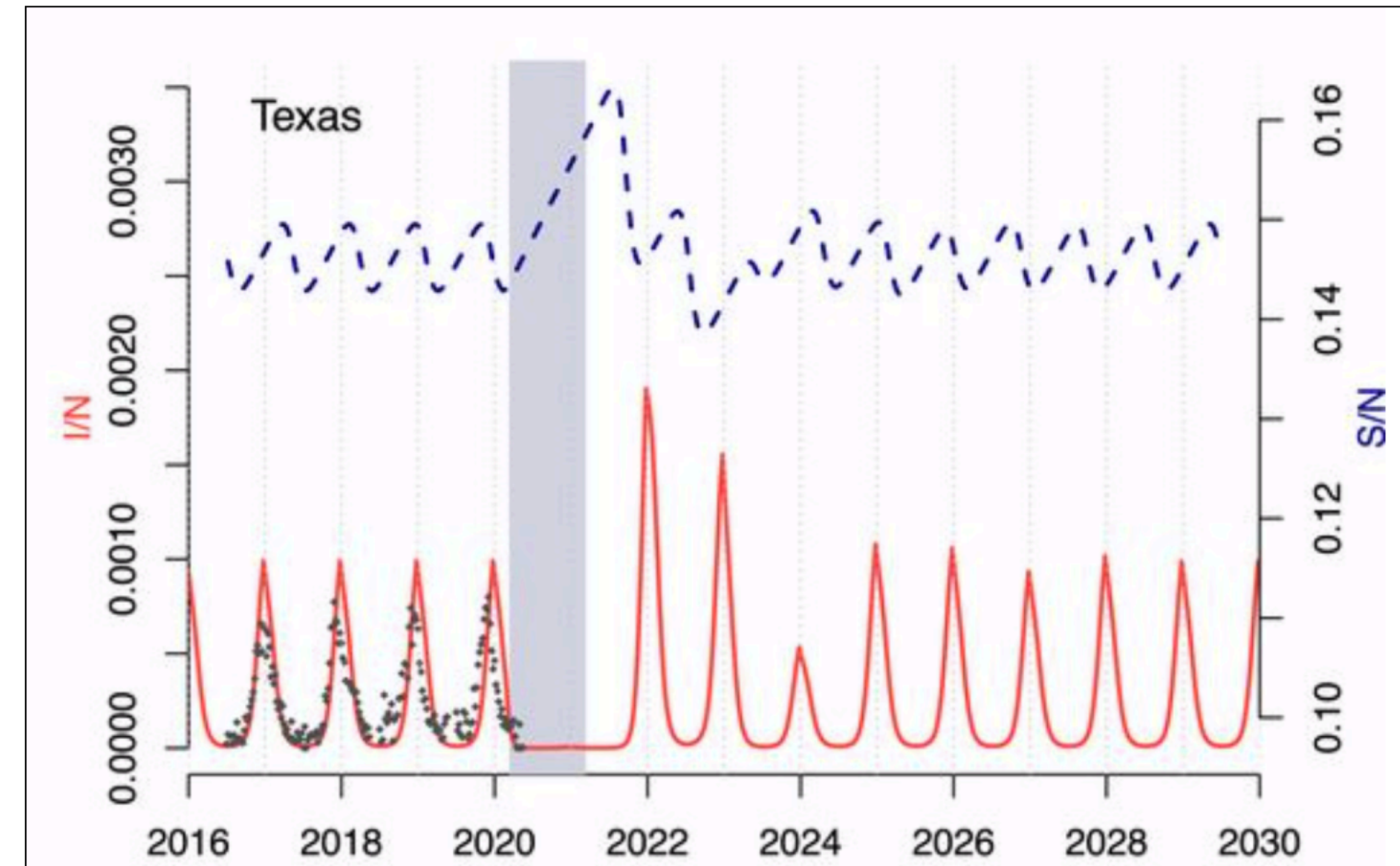
The **numbers of susceptible individuals** for these infections are accumulating leading to potentially large outbreaks in coming winters.



Projecting the future

A range of **other directly transmitted infections are affected by the impact of social distancing efforts** - with declines in incidence of influenza, RSV, etc.

The **numbers of susceptible individuals** for these infections are accumulating leading to potentially large outbreaks in coming winters.



Future pandemics

- We need to better prepared.
- A **Global Immunological Observatory** could characterise the landscape of immunity, ground our understanding of transmission (of natural infections, but also potentially associated with the vaccine) and be a foundation for translational work, associated with vaccine design.

References

Mathematical models for a pandemic response:
<https://science.sciencemag.org/content/369/6502/368>

Evaluating interventions:
<https://science.sciencemag.org/content/early/2020/05/20/science.abb6144>

Future SARS-CoV-2 landscape of immunity:
<https://science.sciencemag.org/content/early/2020/09/18/science.abd7343>

Effects on other infections:
<https://www.pnas.org/content/early/2020/11/06/2013182117>

An Immune Observatory to meet a time of pandemics
<https://elifesciences.org/articles/58989>

Thank you

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