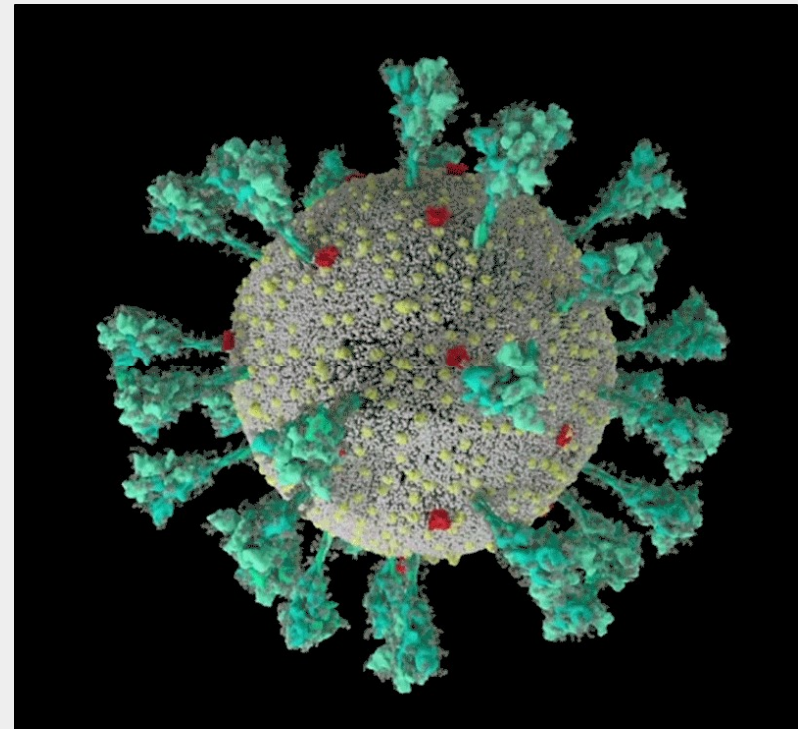


Pandemic, waves and variants

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DEFINITIONS

ENDEMIC is something that belongs to a particular people or country; e.g., malaria in some parts of Africa.

OUTBREAK is a greater-than-anticipated increase in the number of endemic cases; e.g., bird flu in domestic fowl and humans.

EPIDEMIC is a disease that affects a large number of people within a community, population, or region; e.g., Ebola 2014-15 in West Africa.

PANDEMIC is an epidemic that spreads to multiple countries on different continents; e.g., Spanish Flu 1918, Covid-19.

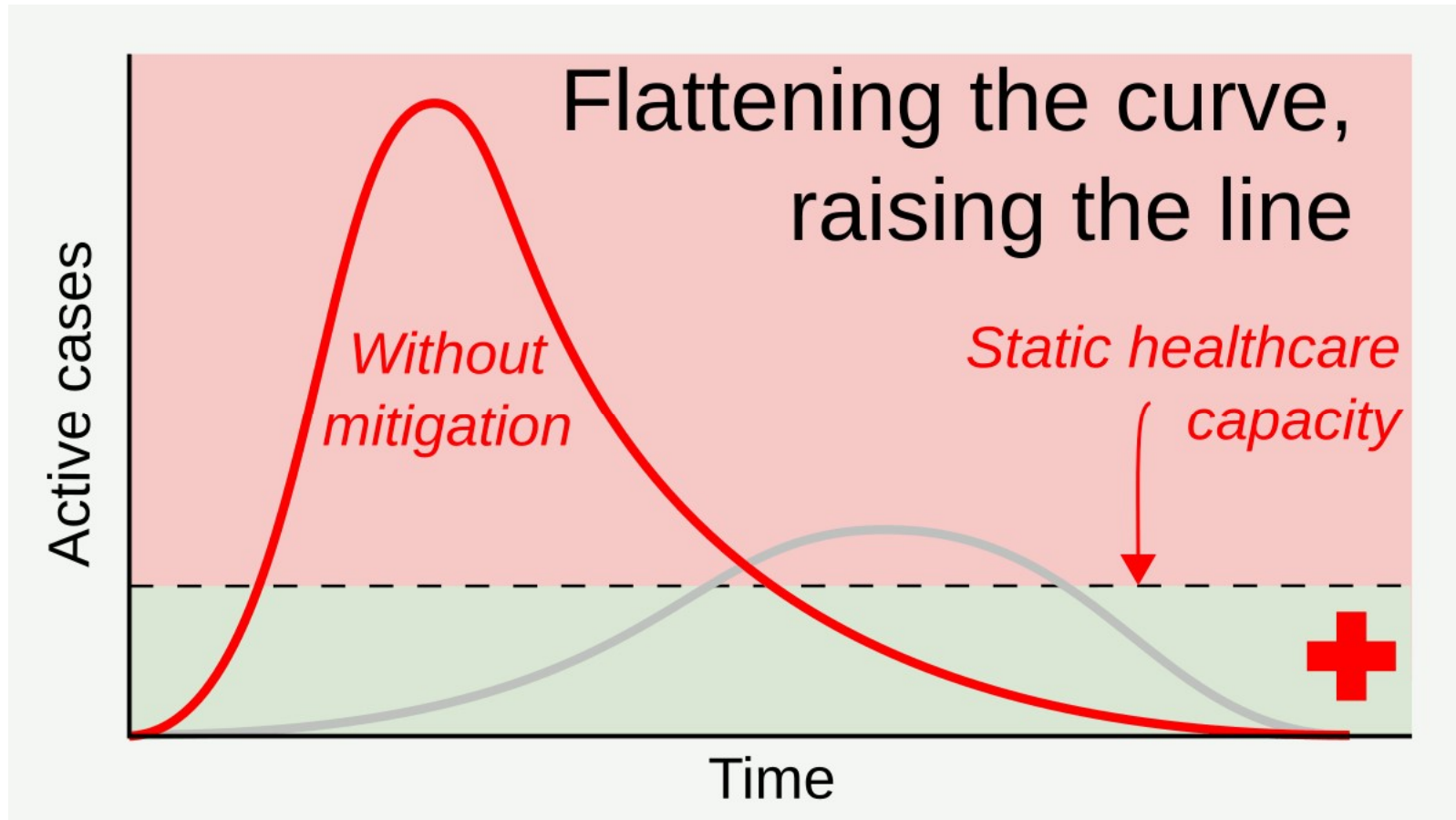


A pandemic is an epidemic that travels

P in pandemic = passport

COVID-19 in Wuhan, China was an **Epidemic**

COVID-19 after March 2020 became a **Pandemic**

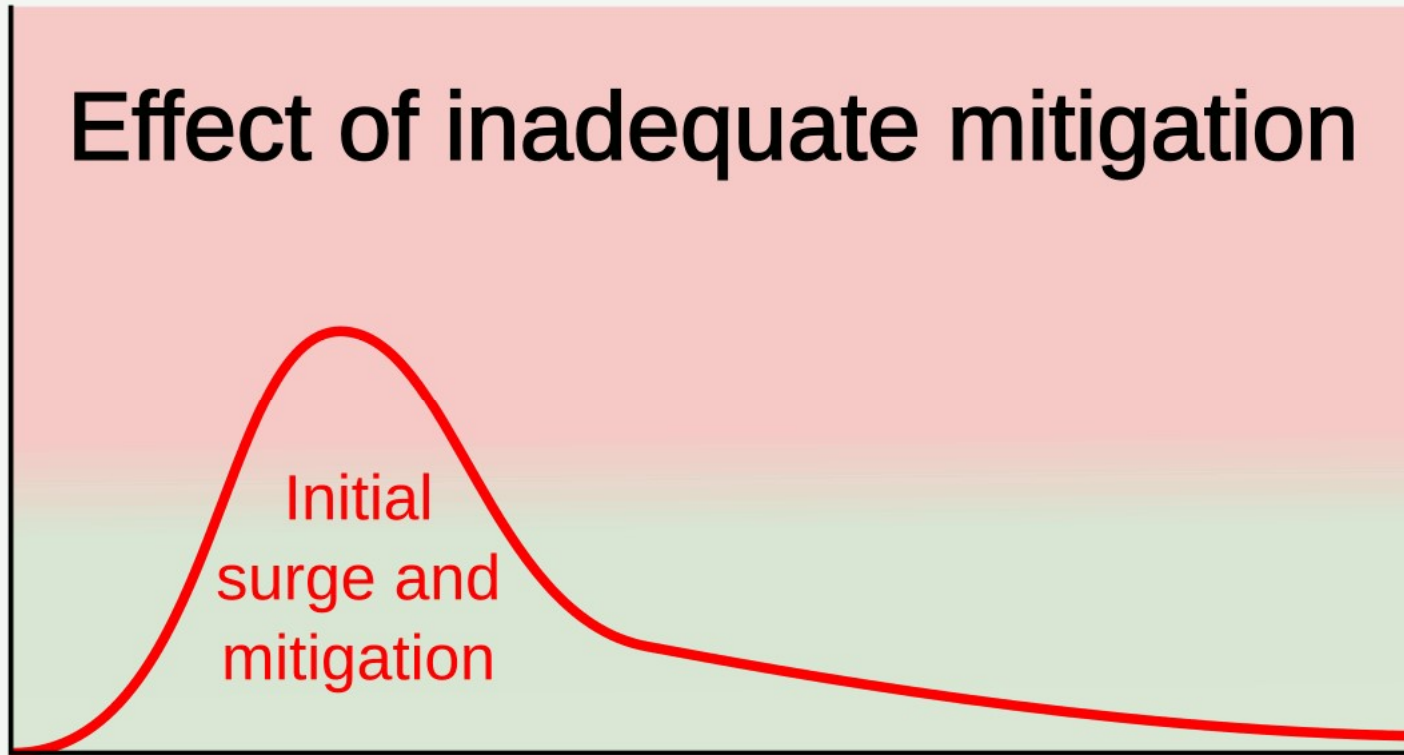


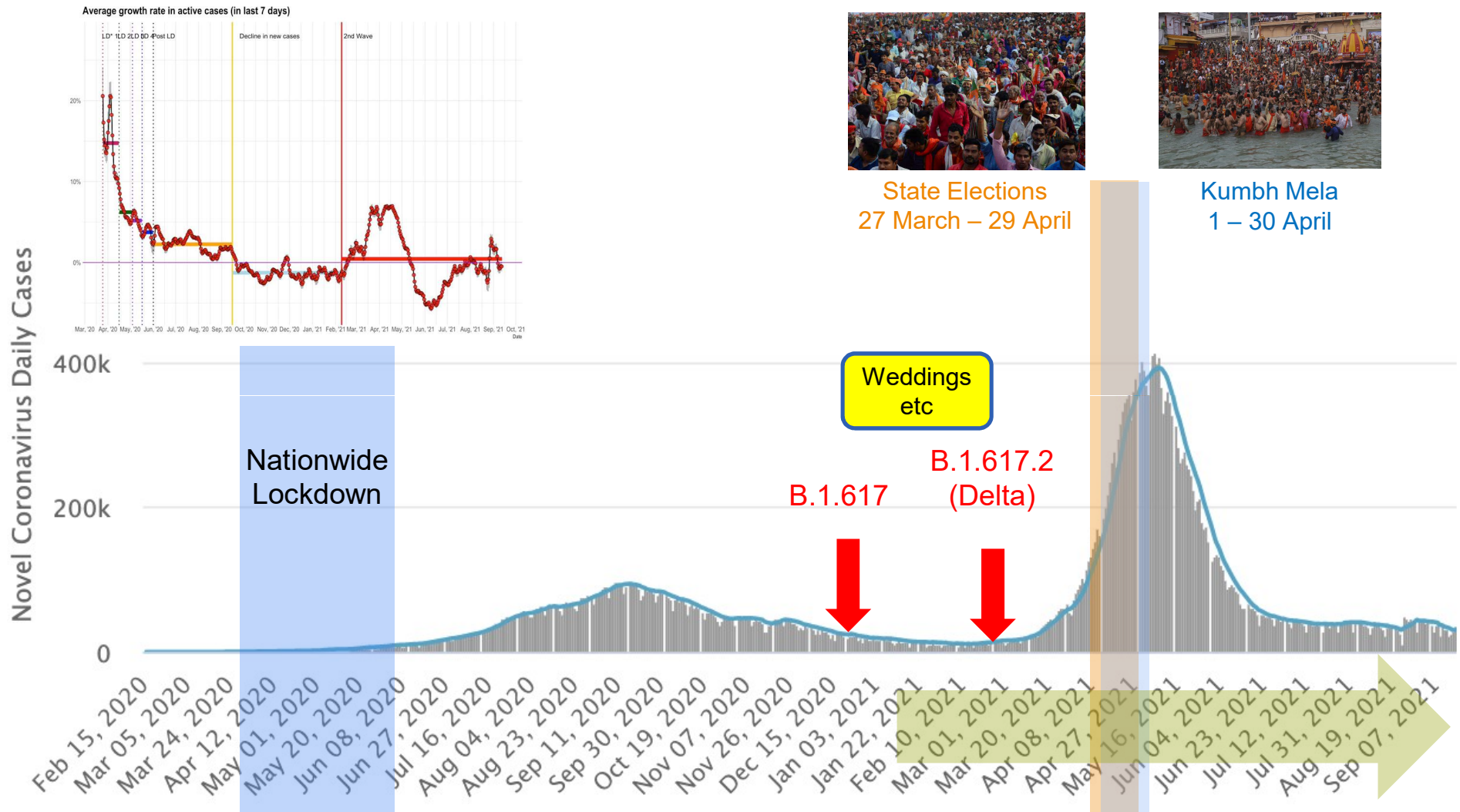
Effect of inadequate mitigation

Active cases

Initial
surge and
mitigation

Time



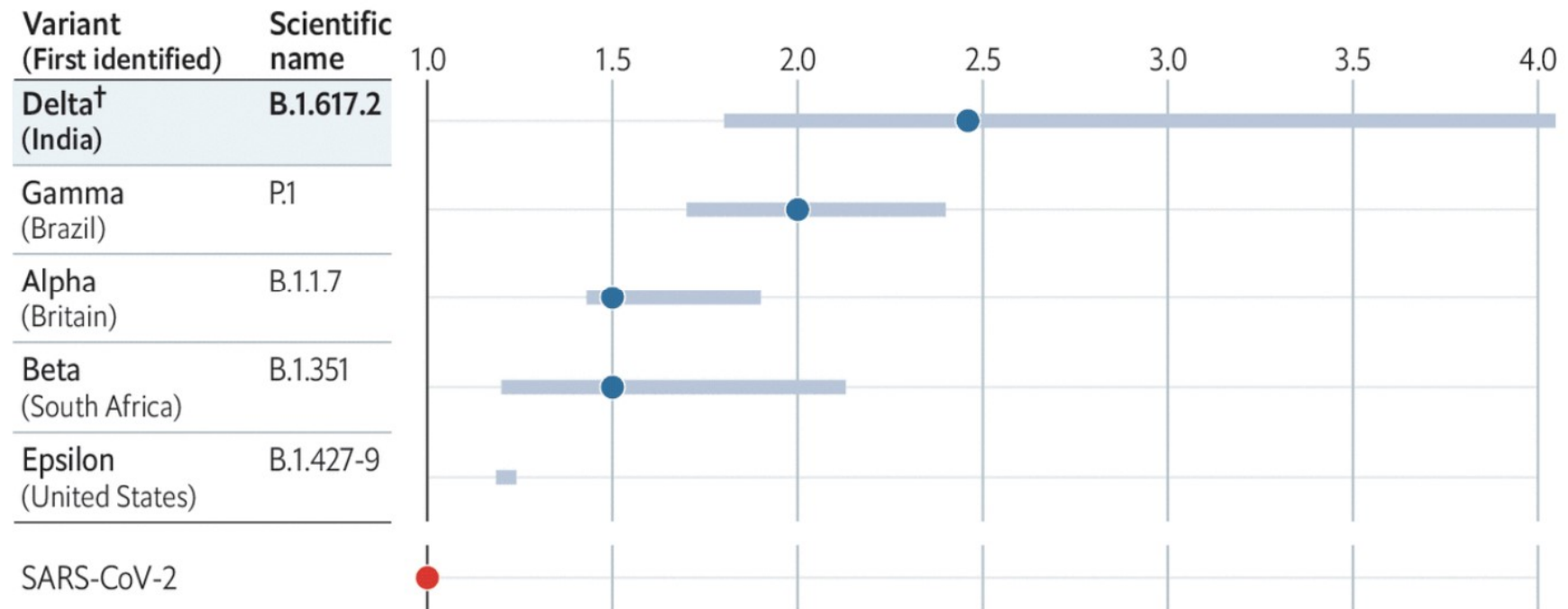


2nd wave

- Complacency – individuals, government and policy mechanisms
- Super spreader events – State elections, Kumbh mela, weddings, etc
- More infectious variants (Alpha and Delta)
- Insufficient vaccine coverage – about 4.2 million doses by February end (0.3% one dose)

Rate of change

Covid-19, estimated transmissibility* of variants compared with original SARS-CoV-2 virus

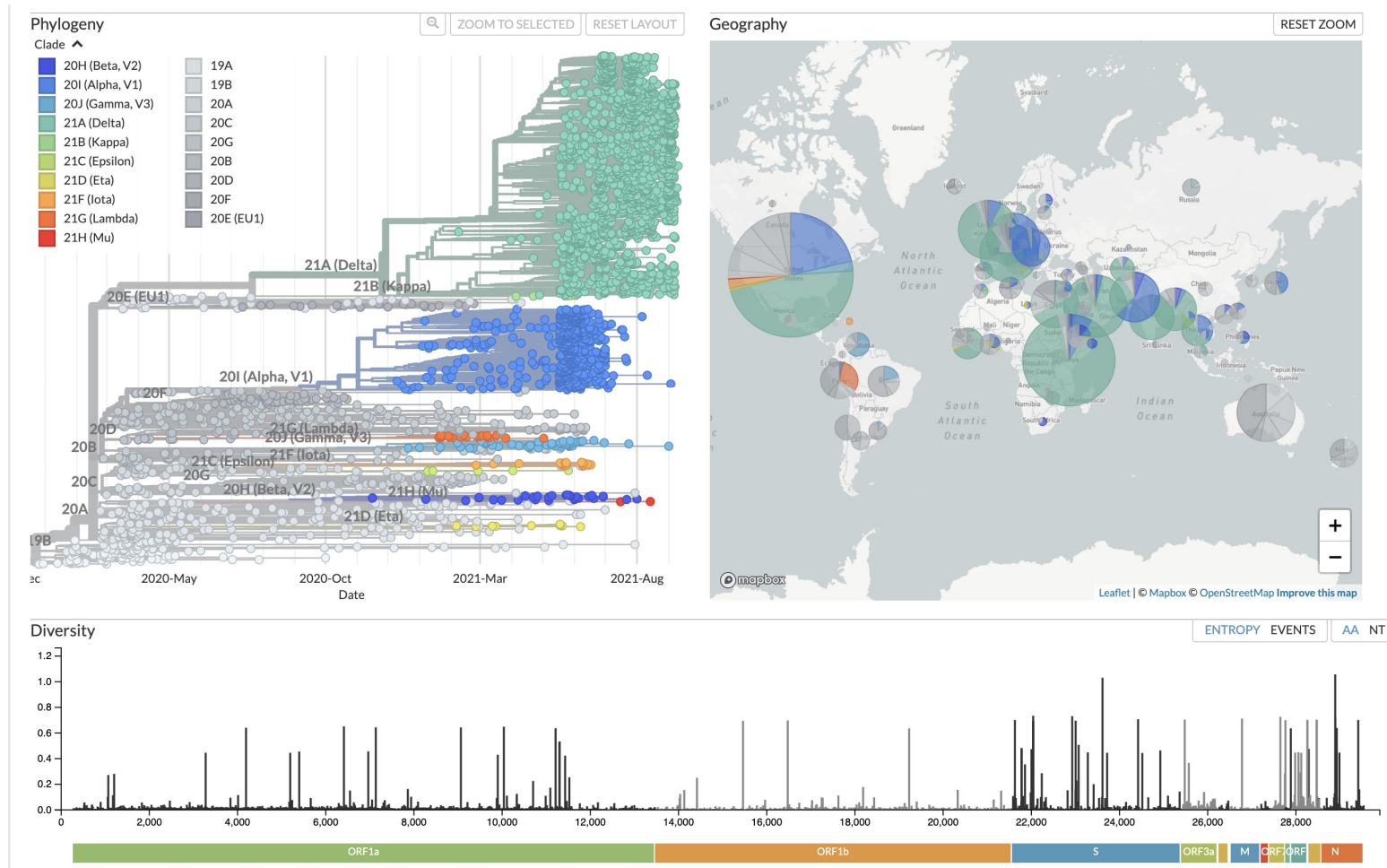


Sources: Davies et al. (2021); Pearson et al. (2021); Faria et al. (2021); Allen et al. (2021);
Centres for Disease Control and Prevention; Public Health England

*Odds ratio of infection or relative R number

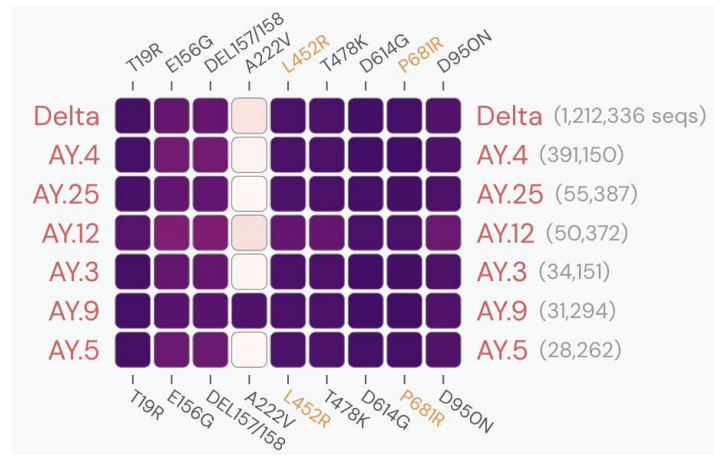
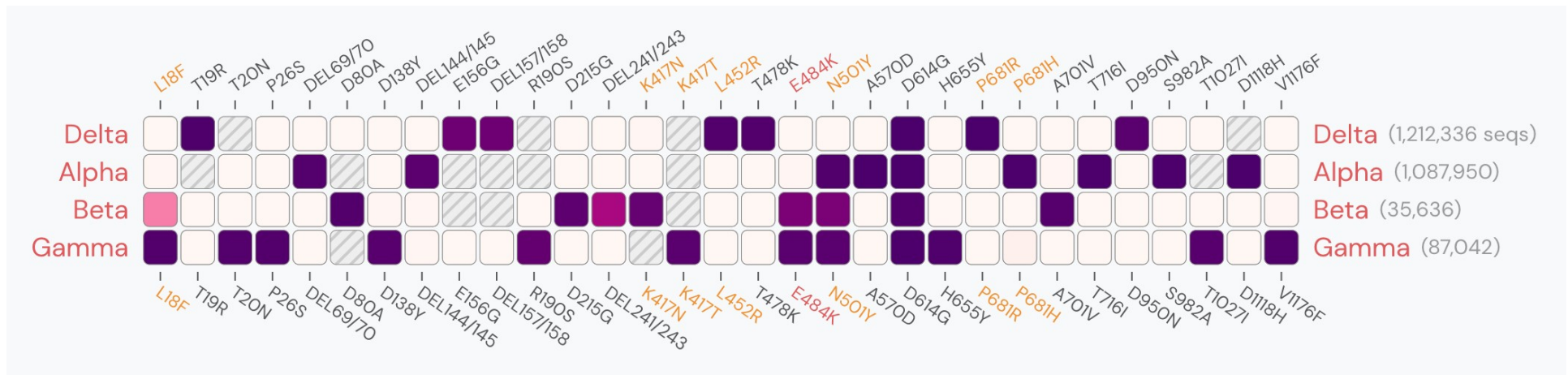
†Extrapolated from transmissibility relative to alpha variant

Genetic epidemiology of SARS-CoV-2



Source:
Nextstrain

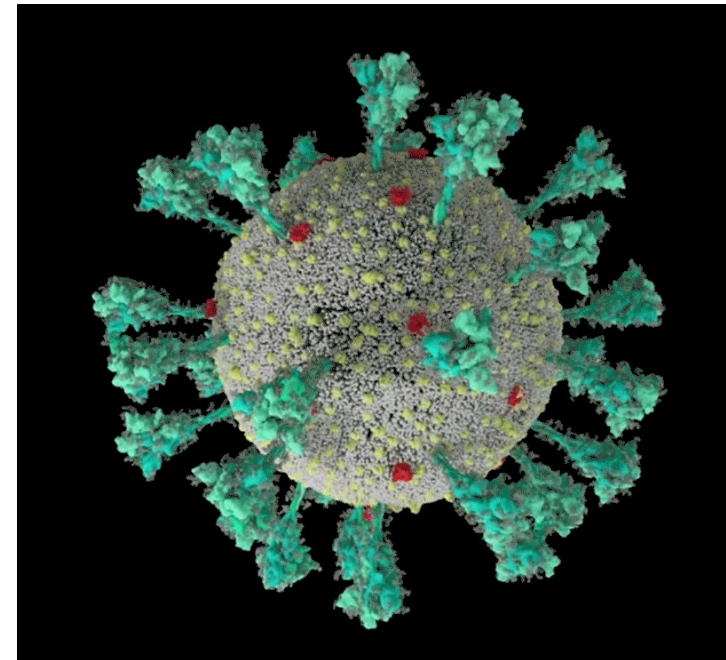
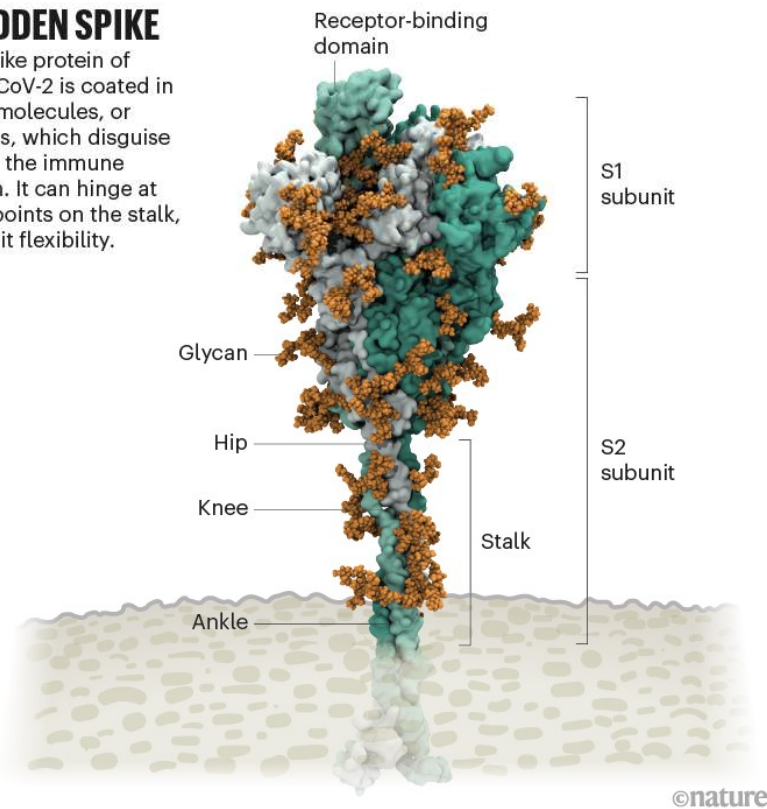
Spike mutations in variants of concern



SARS-CoV2 and its Spike protein

A HIDDEN SPIKE

The spike protein of SARS-CoV-2 is coated in sugar molecules, or glycans, which disguise it from the immune system. It can hinge at three points on the stalk, giving it flexibility.

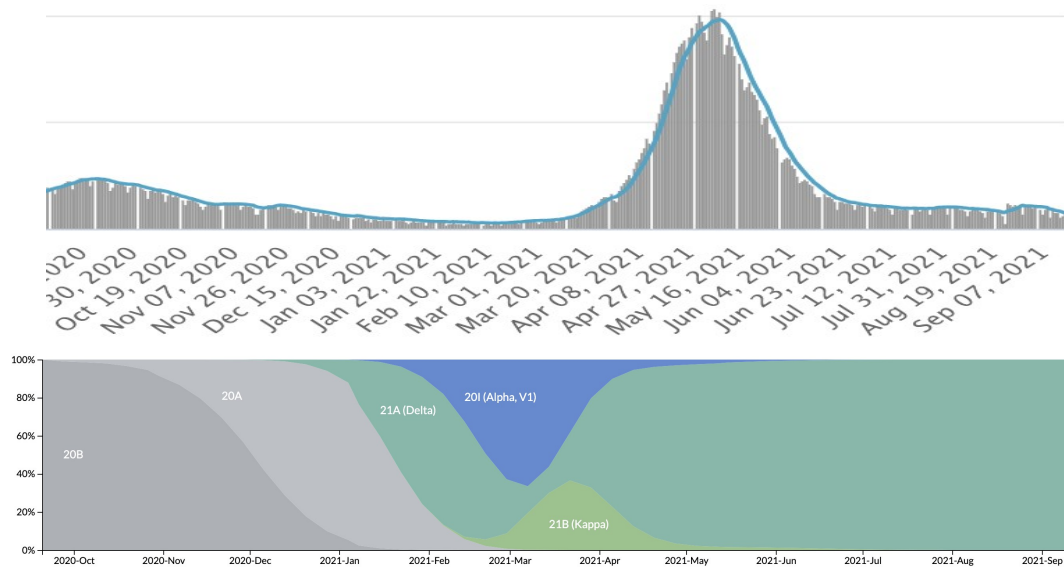
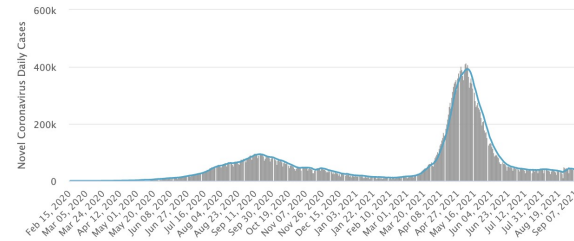


Credit: Janet Iwasa, University of Utah, USA

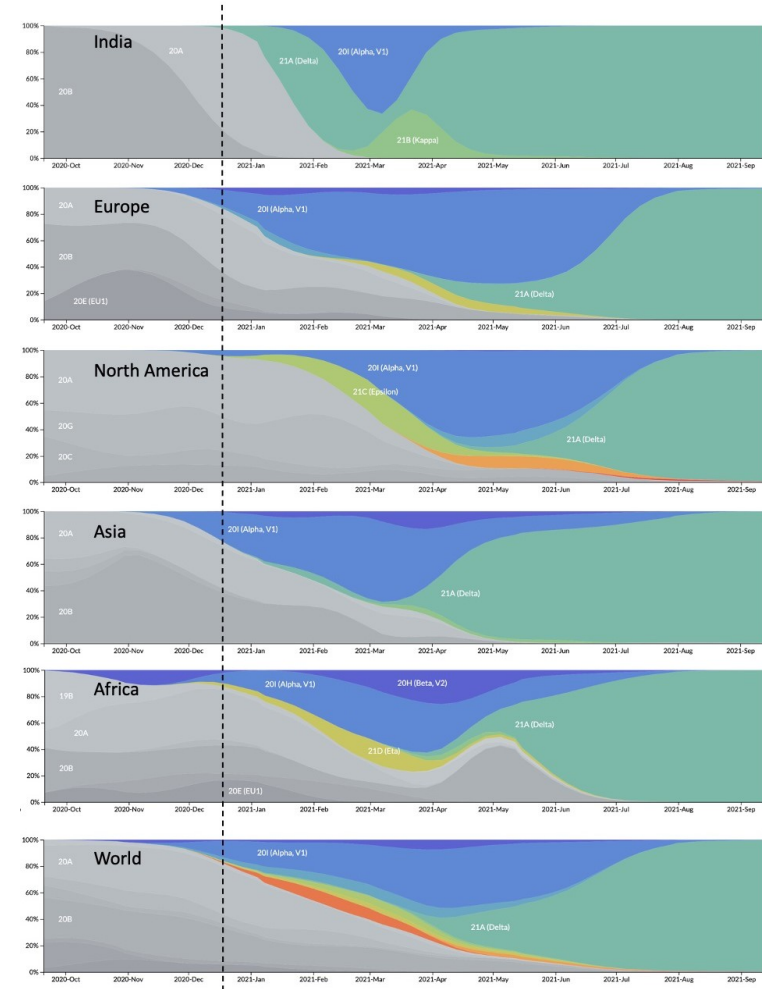
INDIA

33.56 mn cases

446,080 deaths



Frequency of variant viruses across the world; Oct 2020 to present



3rd wave?

- Population exposure?
- Individual behaviour – will people follow preventive measures?
- Vaccine coverage?
~833 million doses by 22 September (~60% adults with one dose)
- More infectious variants?



Summary

- Pandemics are the worldwide spread of infectious diseases.
- COVID-19 in India has been a mix of challenges, lost opportunities, denial, policy-based evidence making. The positives include healthcare workers, vaccine industry and researchers.
- Virus variants showed progressively improved transmission that led to fresh waves. But vaccines are holding up in mitigating severe disease.
- High levels of exposure during the devastating 2nd wave and increasing vaccination rates make a big 3rd wave improbable.