

# The Emergence of Omicron and Its Impact

SUTRA Consortium

# Key SUTRA Parameters: Contact Rate $\beta$

- Measures how fast pandemic spreads in a region
  - Increases due to people not following safety protocols and more infectious mutants
  - Decreases due to lockdowns, people following safety protocols
- Closely related to **Basic Reproduction Number  $R_0 \approx 10\beta$**

# Key SUTRA Parameters: Detection Factor $\epsilon$

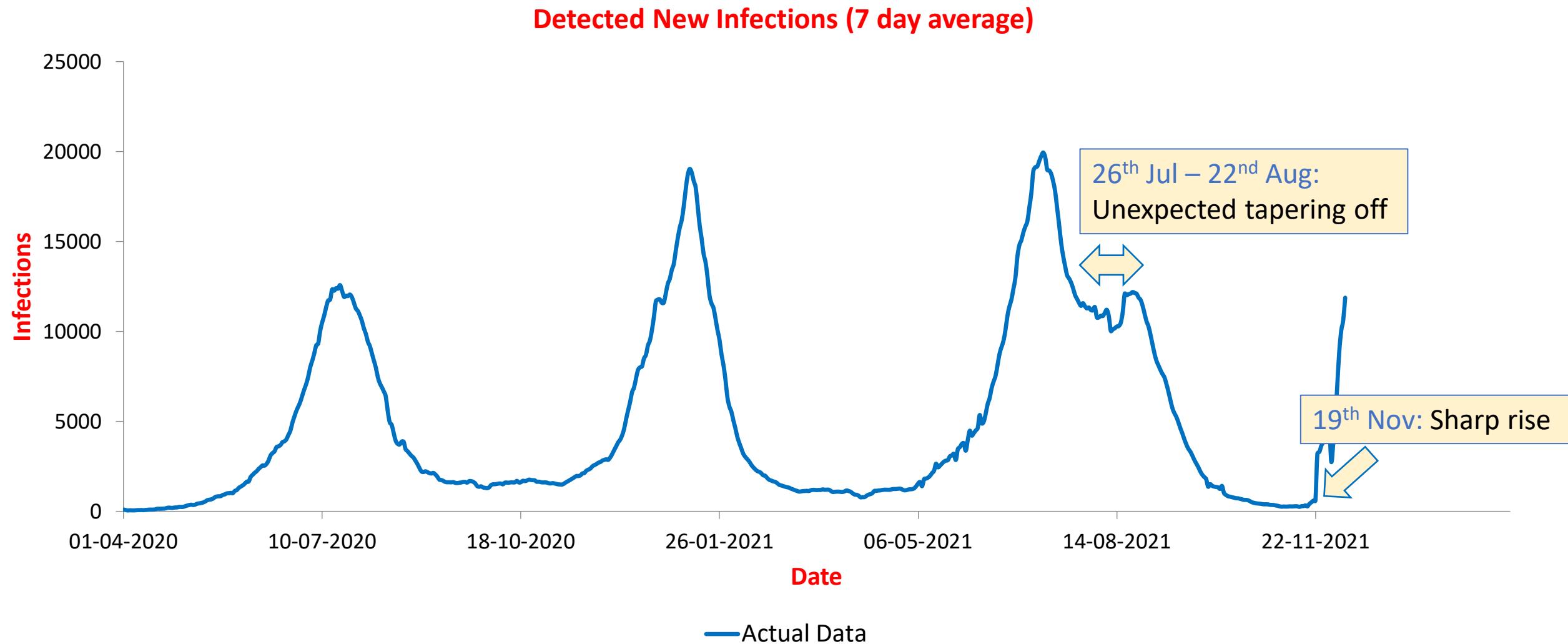
- Measures ratio between detected (tested +ve) and actual cases
  - Decreases when number of asymptomatic patients increase, pandemic reaches inaccessible regions, and testing reduces
  - Increases when testing rate goes up significantly

# Key SUTRA Parameters: Reach $\rho$

- Measures fraction of population over which the pandemic is active
  - It is very small initially and typically increases with time
  - Increases rapidly when there is a lot of movement across regions, many people come out of isolation
  - Captures **loss of immunity** and **vaccination-induced immunity**

# Post-Omicron Scenarios

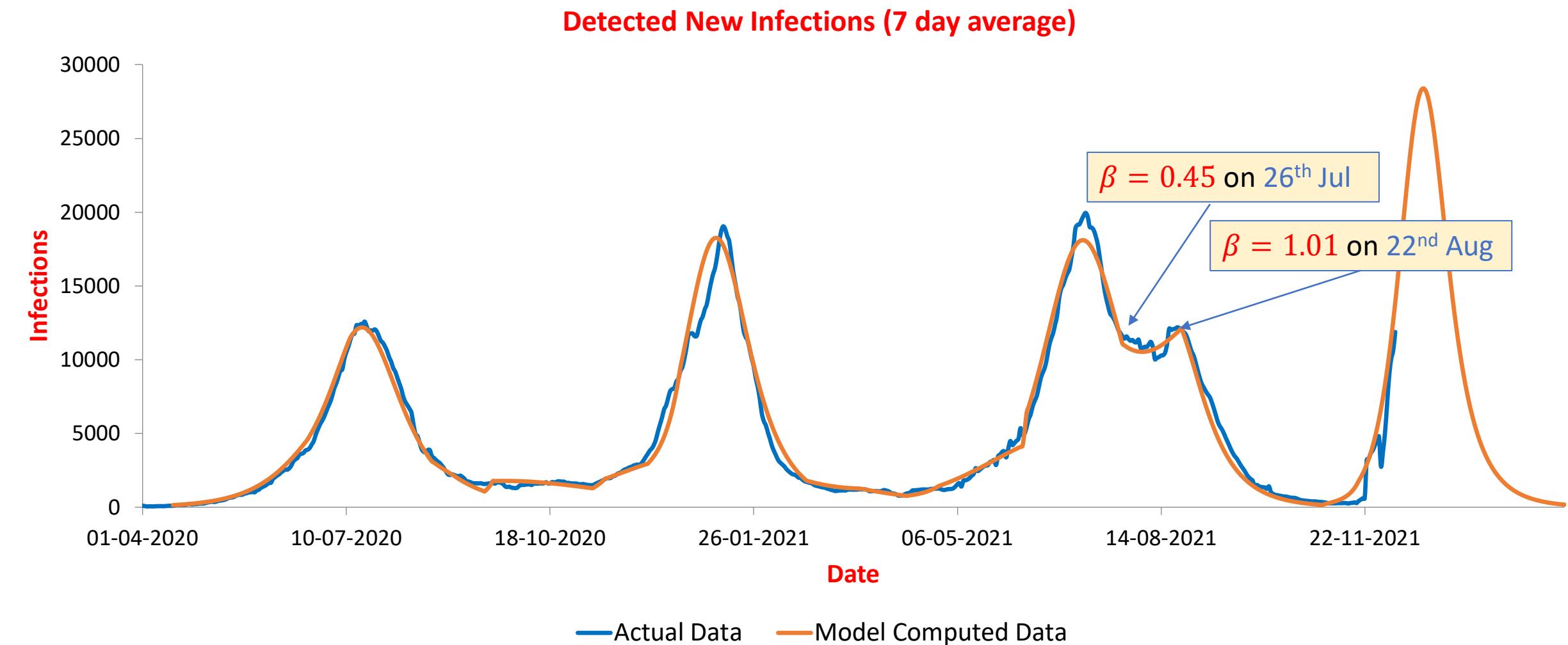
# Omicron in South Africa



# Omicron in South Africa: Questions

1. Why did trajectory level-off at **> 50%** of third-wave peak for one whole month in [August](#)?
2. When did the mutant become active in SA?
3. What impact did it have?
4. Does it bypass natural immunity?

# SUTRA Simulation of South Africa



# Observations

- Contact rate  $\beta$  went up by a factor of 2.2 in August
  - Only part of this rise can be explained by relaxations of restrictions
  - It is not clear what else contributed to the rise
- Numbers continued coming down despite  $\beta \approx 1$  due to high immunity
  - Natural immunity in September was  $\approx 77\%$
- Rise in November is due to increase in  $\rho$ 
  - It was  $\approx 85\%$  until October and is  $\approx 110\%$  now
  - Reach at  $100+x\%$  means at least  $x\%$  of population has lost immunity

# Delayed Increase in $\rho$

- $\rho$  started increasing in South Africa about 110 days after  $\beta$  started increasing
- This phenomenon was observed for delta variant too:
  - $\rho$  started increasing in India about 50 days after  $\beta$  started increasing
  - Gap was smaller since susceptible fraction in India was  $\approx 0.45$  as opposed to  $\approx 0.08$  in South Africa
  - For different states in India, the gap varied between 40 to 110 days

# Implications for India

# Current Status

$$\beta \approx 0.60$$

$$\rho \approx 0.95$$

$$\epsilon \approx 1/33$$

Natural immunity  $\approx 83\%$

# Assumptions: $\beta$

- Omicron increases  $\beta$  by a factor of 2.2 to:

$$\beta \approx 1.33$$

over the Dec-Jan period.

- There are no lockdowns or any other restrictions

# Assumptions: $\rho$

- $\rho$  increases from current  $\approx 0.95$  to

$$\rho = 1$$

during Feb

# Assumptions: $\epsilon$

- $\epsilon$  remains the same:

$$\epsilon = 1/33$$

# Assumptions: Immunity Loss

- Natural immunity is not bypassed.
  - And that natural immunity is lost at the rate of **6%** per month
- Vaccinated people, on getting infected, spread infection for half the period of unvaccinated people

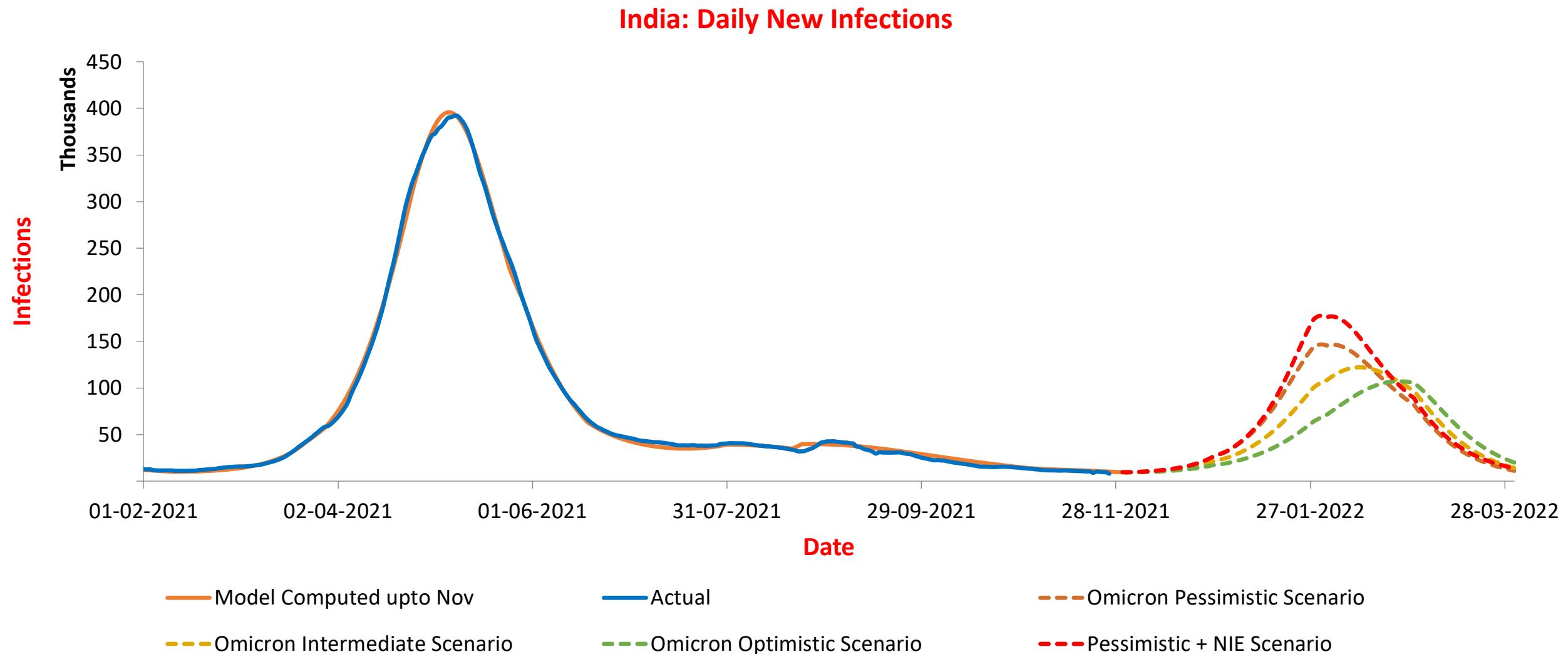
**Optimistic Scenario:** vaccine immunity remains at **60%**

**Intermediate Scenario:** vaccine immunity is halved to **30%**

**Pessimistic Scenario:** vaccine immunity is completely lost

**Pessimistic + NIE Scenario:** vaccine immunity is completely lost, and natural immunity is lost at **15%** per month

# Future Projections



# Updates from South Africa

- Mix of Delta and Omicron has changed dramatically in SA:
  - October: 596/706 (84.4%) Delta, zero Omicron
  - November: 493/630 (78%) Omicron; Delta 21 and 21A: 113/630
  - Up to 10<sup>th</sup> December: 61/61 (100%) Omicron
- Cases rising sharply and already higher than previous peak
- Hospitalizations: 5-fold increase in two weeks
- Severity of disease is still unfolding

# Recommendations

- Omicron has likely already spread worldwide; so no point in blanket ban on incoming air traffic.
- Screening of incoming air passengers to be 100%; positive test outcomes to be sequenced for Omicron.
- Avoid knee-jerk reactions for Indian public, e.g., shutting down schools, imposing lockdowns etc.
  - They are not needed at the current state of the pandemic, even *after* the advent of Omicron.