

The Emergence of Omicron and Its Impact

SUTRA Consortium

Key SUTRA Parameters: Contact Rate β

- 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 ϵ

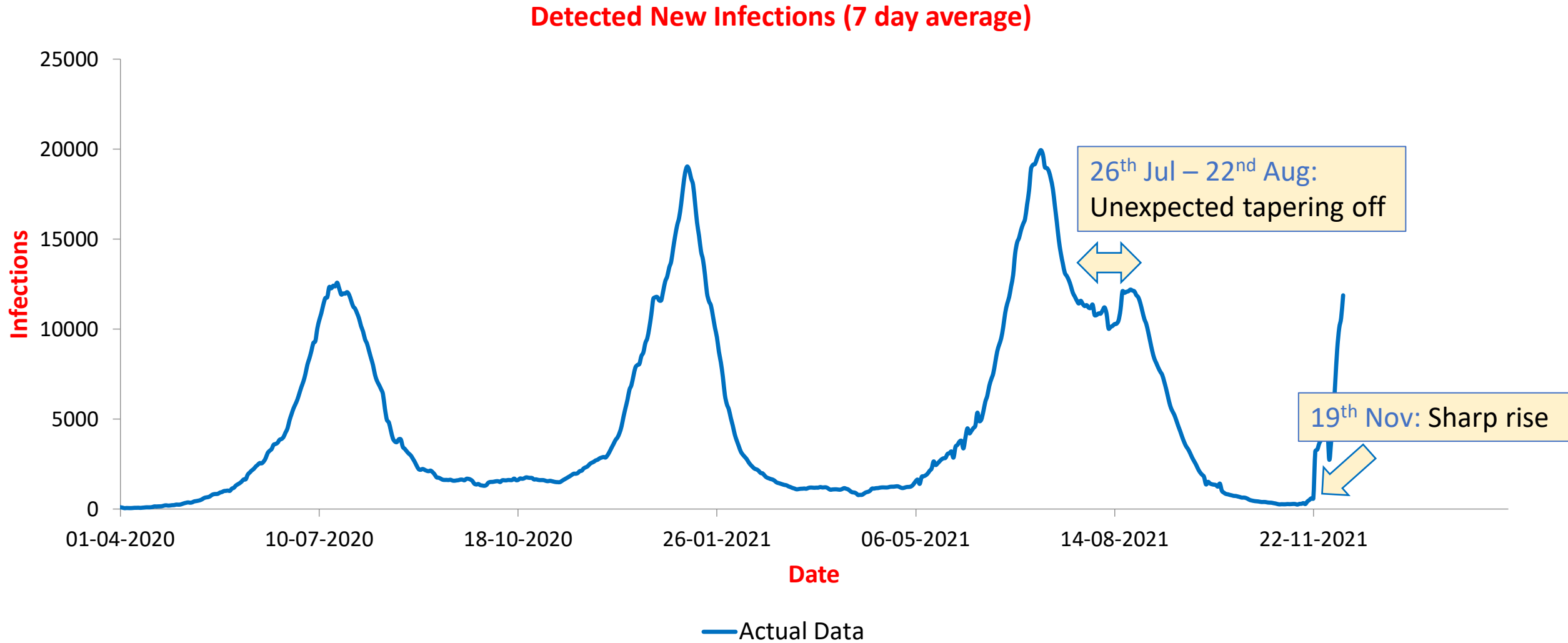
- Measures ratio between detected (tested +ve) and actual cases
 - Decreases when number of asymptomatic patients increase, pandemic reaches inaccessible regions, and testing reduces
 - Increases when testing rate goes up significantly

Key SUTRA Parameters: Reach ρ

- 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

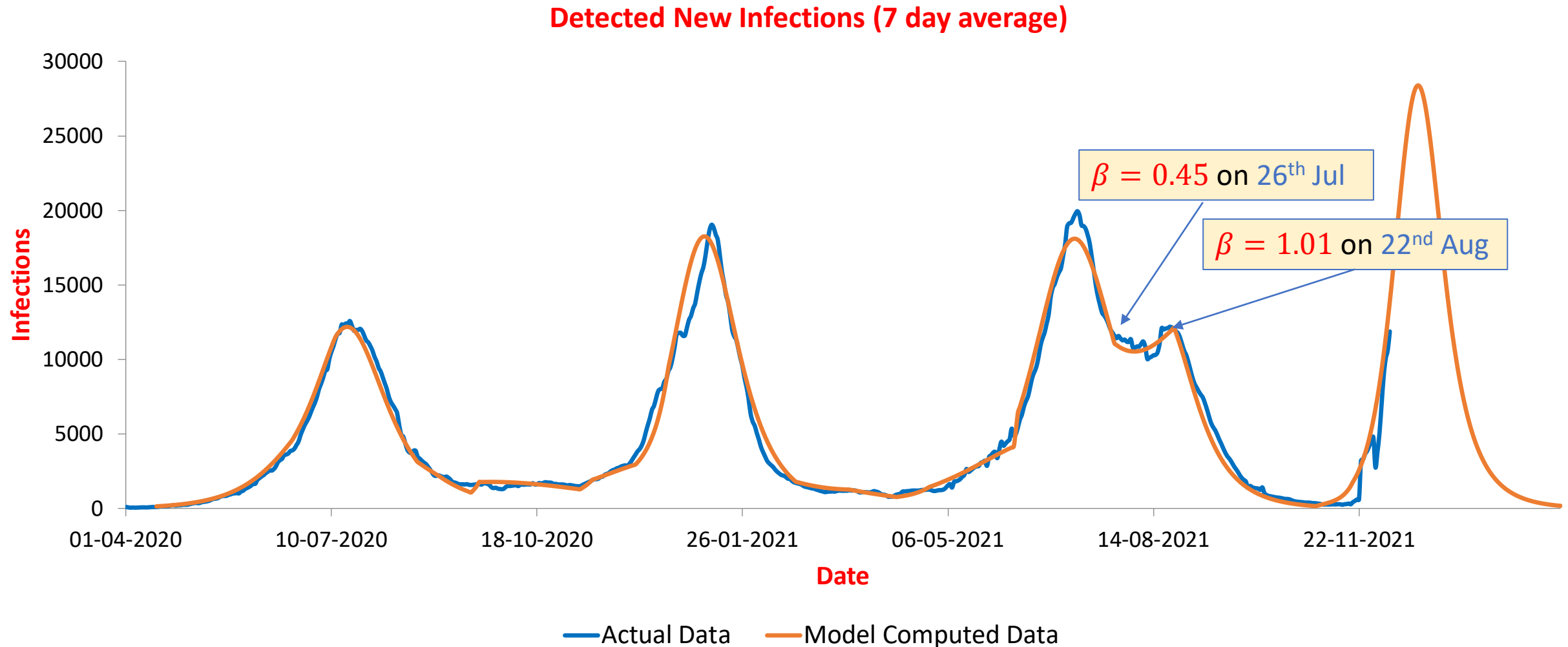
Omicron in South Africa



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 β 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 ρ
 - 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 ρ

- ρ started increasing in South Africa about **110** days after β started increasing
- This phenomenon was observed for delta variant too:
 - ρ started increasing in India about **50** days after β 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

$$\beta \approx 0.60$$

$$\epsilon \approx 1/33$$

$$\rho \approx 0.95$$

Natural immunity $\approx 83\%$

Assumptions: β

- Omicron increases β 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: ρ

- ρ increases from current ≈ 0.95 to

$$\rho = 1$$

during Feb

Assumptions: ϵ

- ϵ 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%

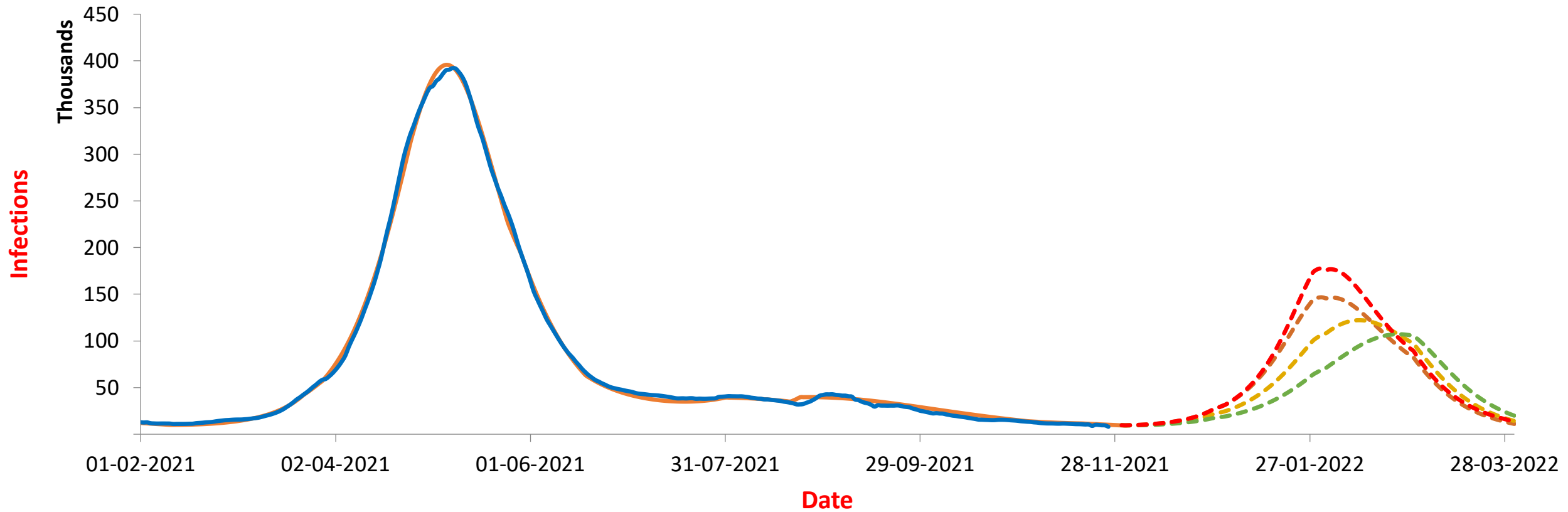
Intermediate Scenario: vaccine immunity is halved to 30%

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

India: Daily New Infections



Model Computed upto Nov

Actual

Omicron Pessimistic Scenario

Omicron Intermediate Scenario

Omicron Optimistic Scenario

Pessimistic + NIE Scenario

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 10th 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.