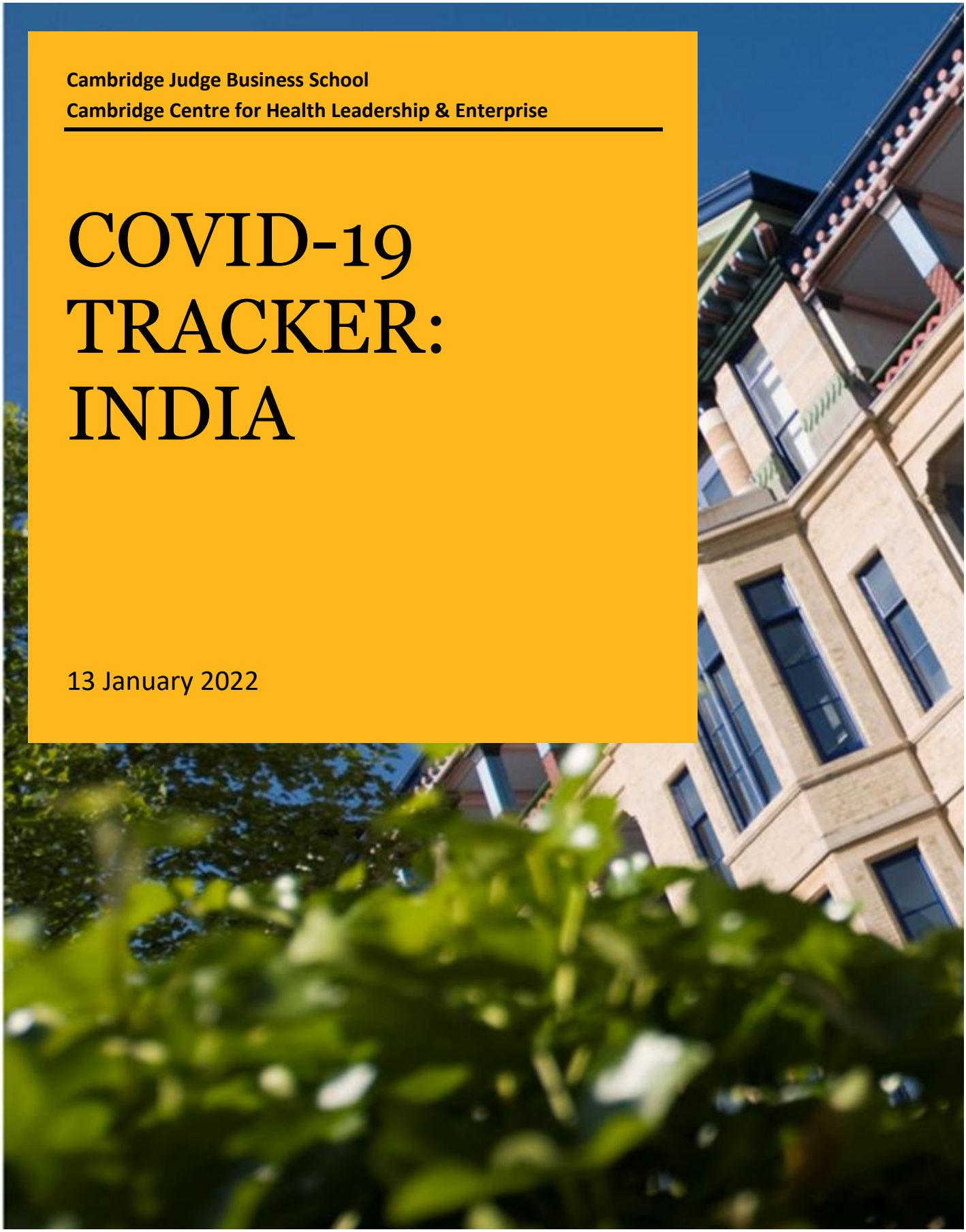
Cambridge Judge Business School
Cambridge Centre for Health Leadership & Enterprise

# COVID-19 TRACKER: INDIA

13 January 2022



Centre for Health Leadership & Enterprise
UNIVERSITY OF CAMBRIDGE Judge Business School
HSTP Health Systems Transformation Platform
National Institute of Economic and Social Research

The national level reproduction number stood at 2.24 on 13 January, down from 4.03 on 9 January. The filtered daily growth rate of national level cases was 20.2% on 13 January, dropping from 34.9% on 9 January. The filtered daily growth rates of cases are in sharp decline in a majority of states and union territories.

*National level daily cases can be expected to peak in the early part of the fourth week of January in terms of its underlying trend.*

Daily cases have already peaked in Jharkhand, and is presently cresting in Maharashtra in terms of underlying trends.

Bihar, Chandigarh, Karnataka, Punjab, Rajasthan and West Bengal are likely to see their maximum daily cases in the third week of January.

Daily cases in Chhattisgarh, Delhi, Goa, Gujarat, Tamil Nadu and Telangana can be expected to peak towards the end of the third week, bridging into the fourth week of January.

Arunachal Pradesh, Haryana, Madhya Pradesh, Odisha, Tripura, Uttar Pradesh and Uttarakhand are likely to peak in the fourth week of January.

The filtered growth rates of their daily cases have plateaued in Assam, Himachal Pradesh, Meghalaya and Puducherry, and are edging into the decline phase. A secure assessment of their daily cases peaks will be possible in a few days.

Peaks are not yet in clear sight for Andhra Pradesh, Jammu and Kashmir, Kerala, Manipur, Nagaland and Sikkim, where the super exponential growth phase continue.

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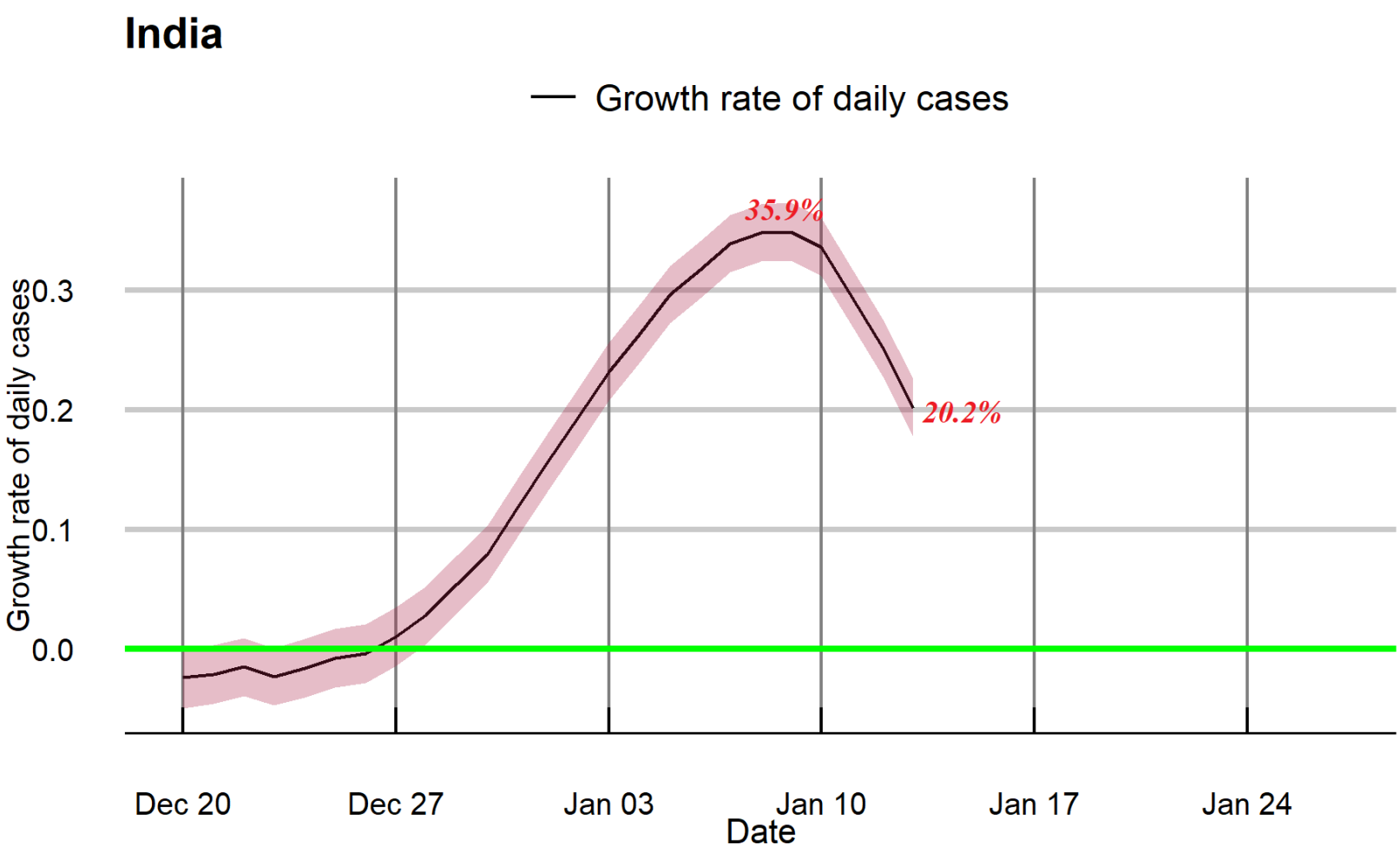
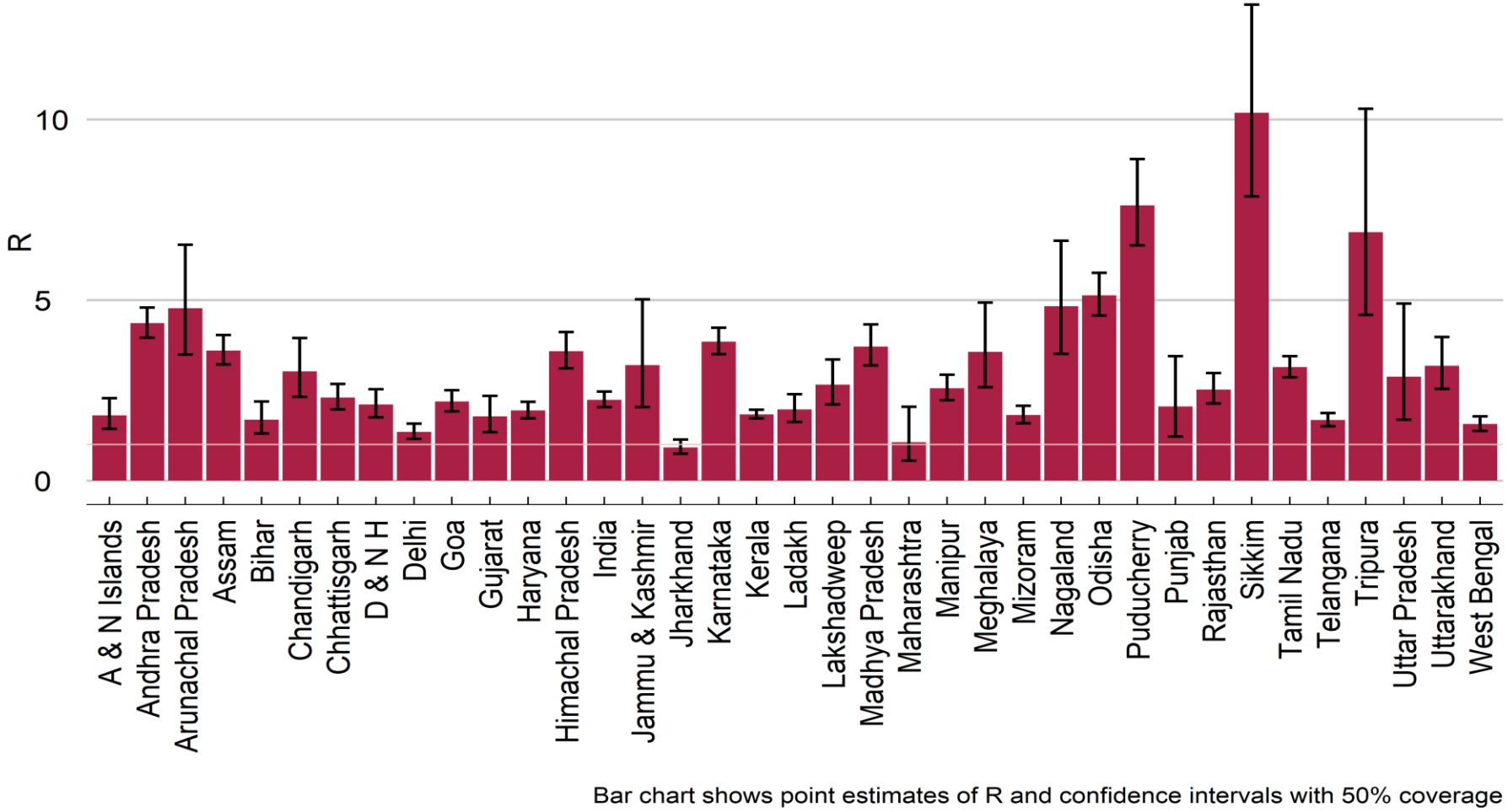
This tracker can be accessed at: www.jbs.cam.ac.uk/covid-india

Contact: Paul Kattuman <p.kattuman@jbs.cam.ac.uk>

**Filtered daily growth rates of new cases: days leading up to 13 January 2022**



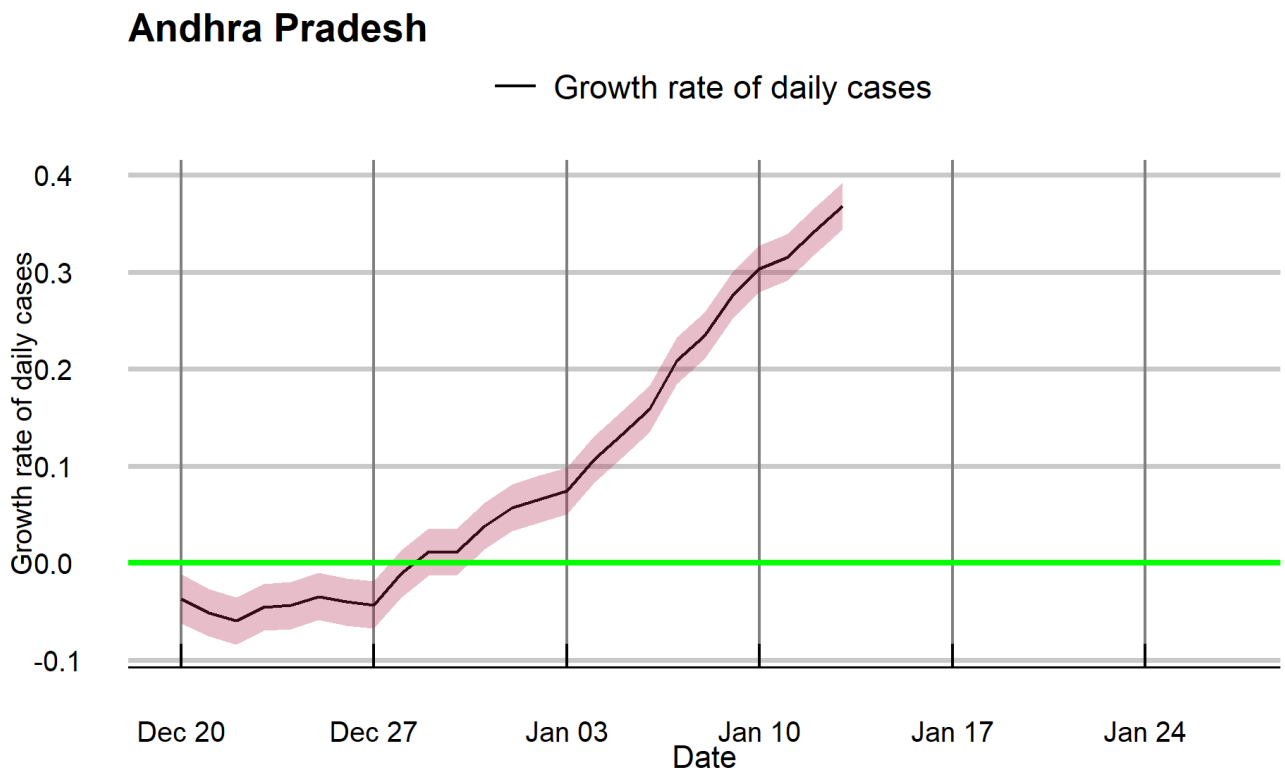
## Reproduction numbers on 13 January 2022

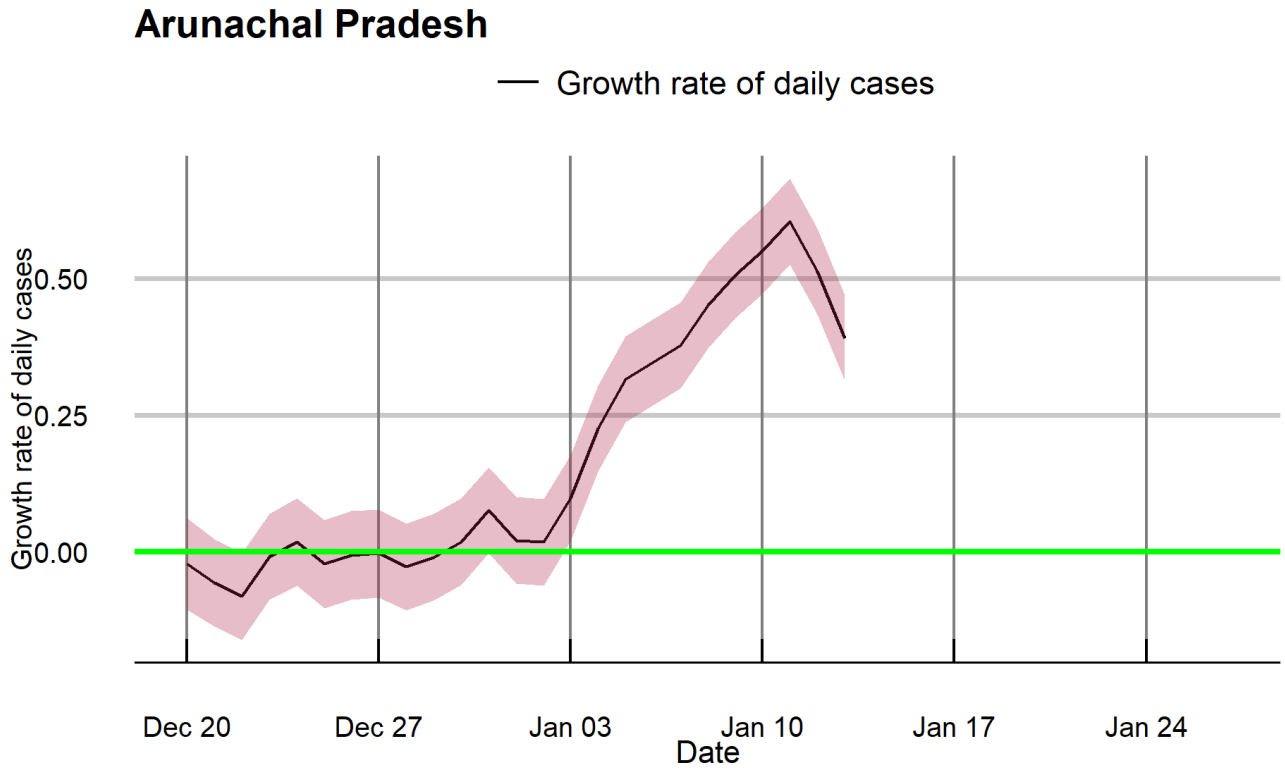



Bar chart shows point estimates of R and confidence intervals with 50% coverage

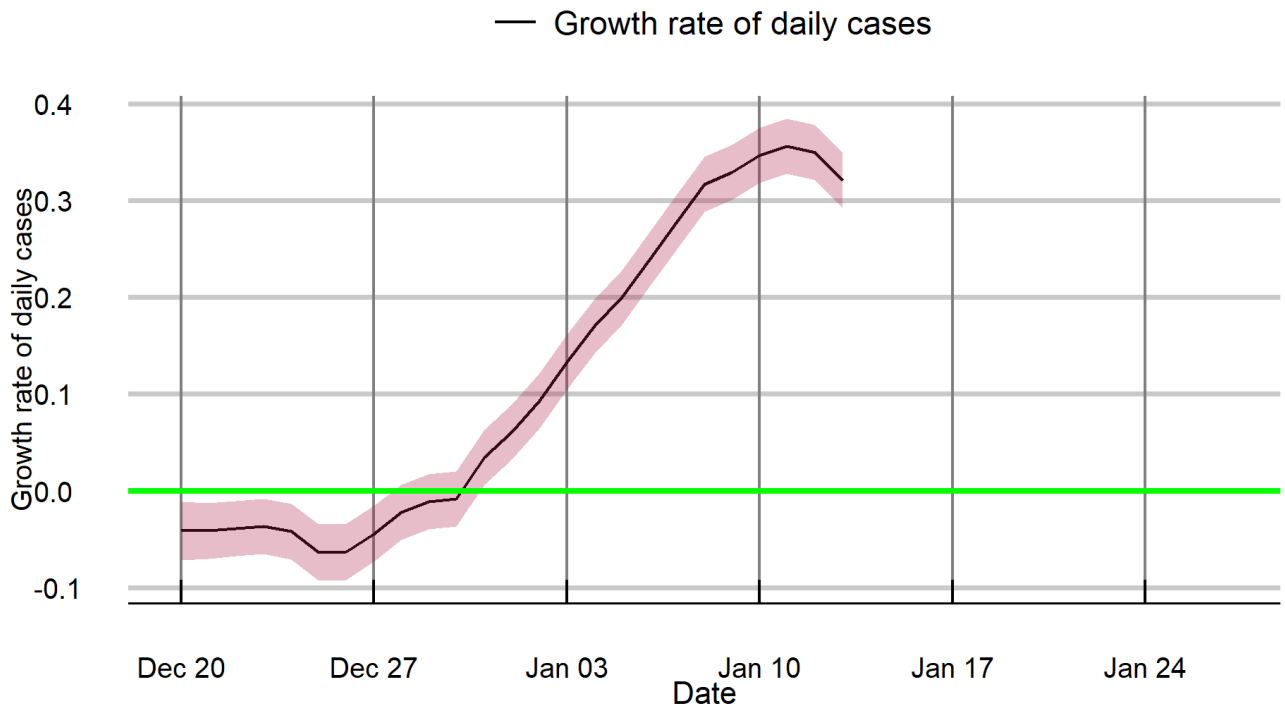
Note: Small numbers in Dadra and Nager Haveli and Lakshadweep, make their estimates less reliable.

**Filtered daily growth rates of new cases: days leading up to 13 January 2022**

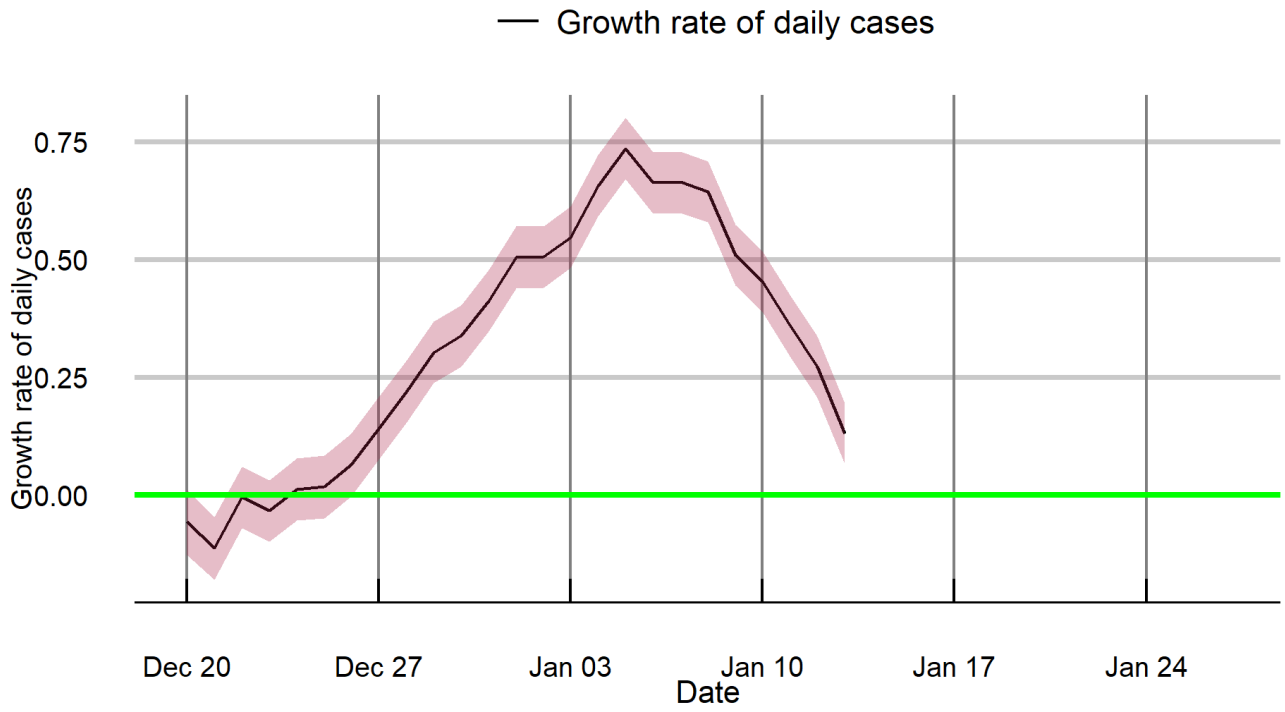


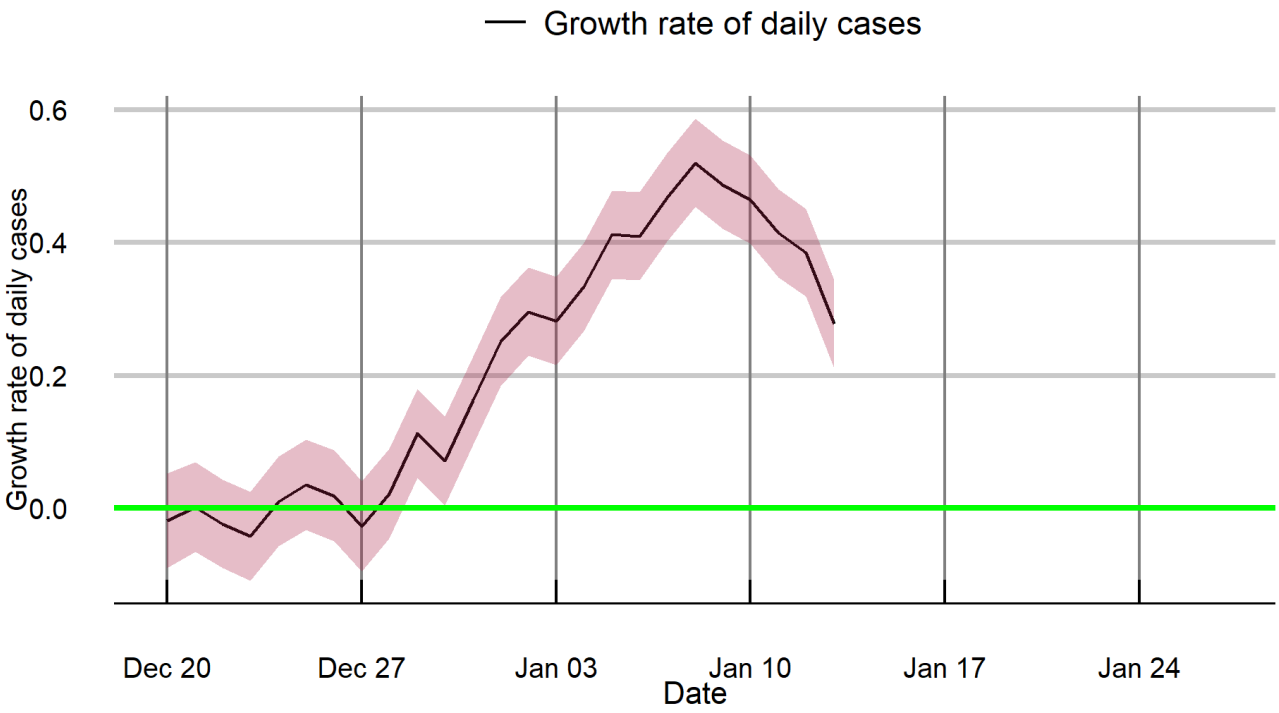
## Assam


Growth rate of daily cases
0.4
0.3
0.2
0.1
0.0
-0.1
Growth rate of daily cases
Dec 20
Dec 27
Jan 03
Jan 10
Jan 17
Jan 24
Date

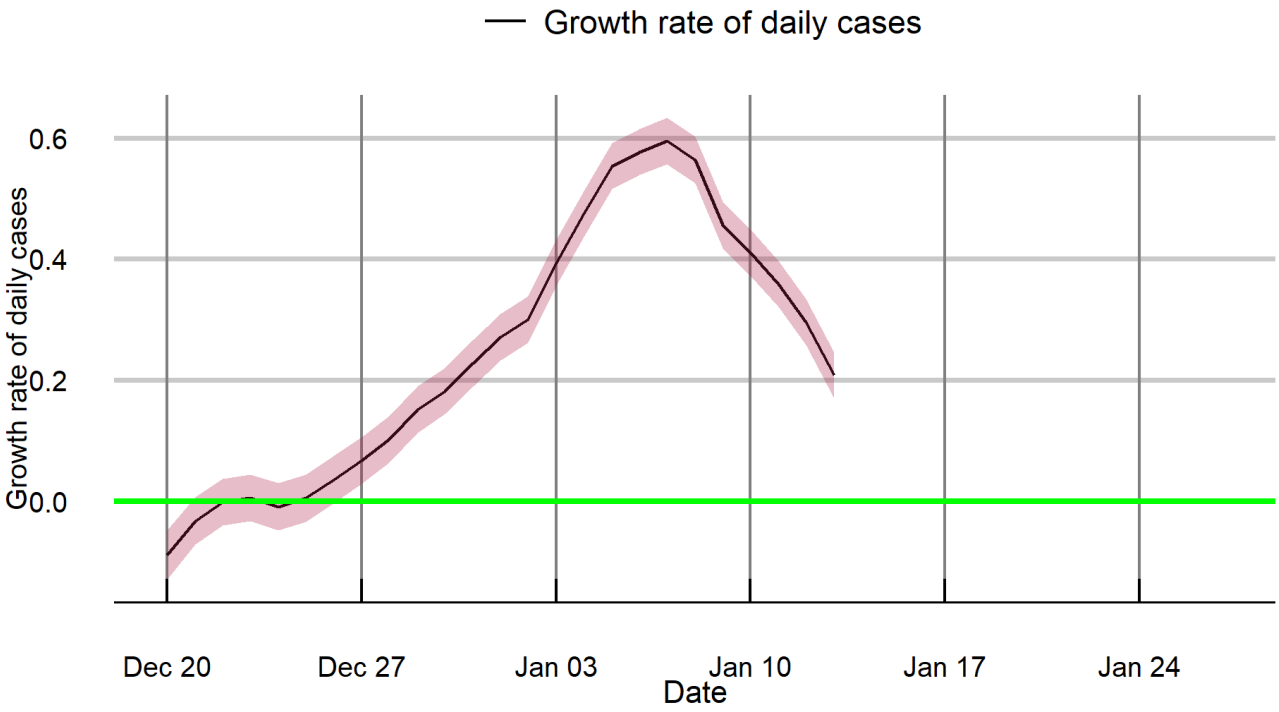
## Bihar


Growth rate of daily cases
0.75
0.50
0.25
0.00
Growth rate of daily cases
Dec 20
Dec 27
Jan 03
Jan 10
Jan 17
Jan 24
Date

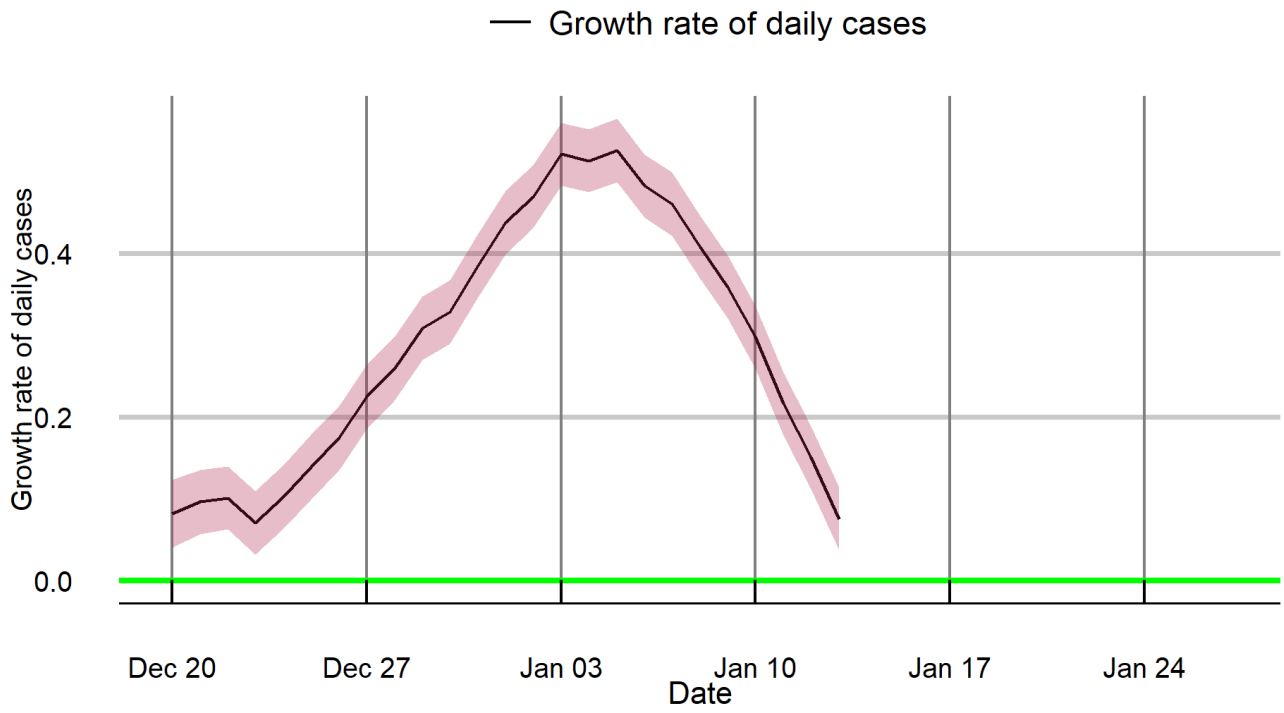
## Chandigarh



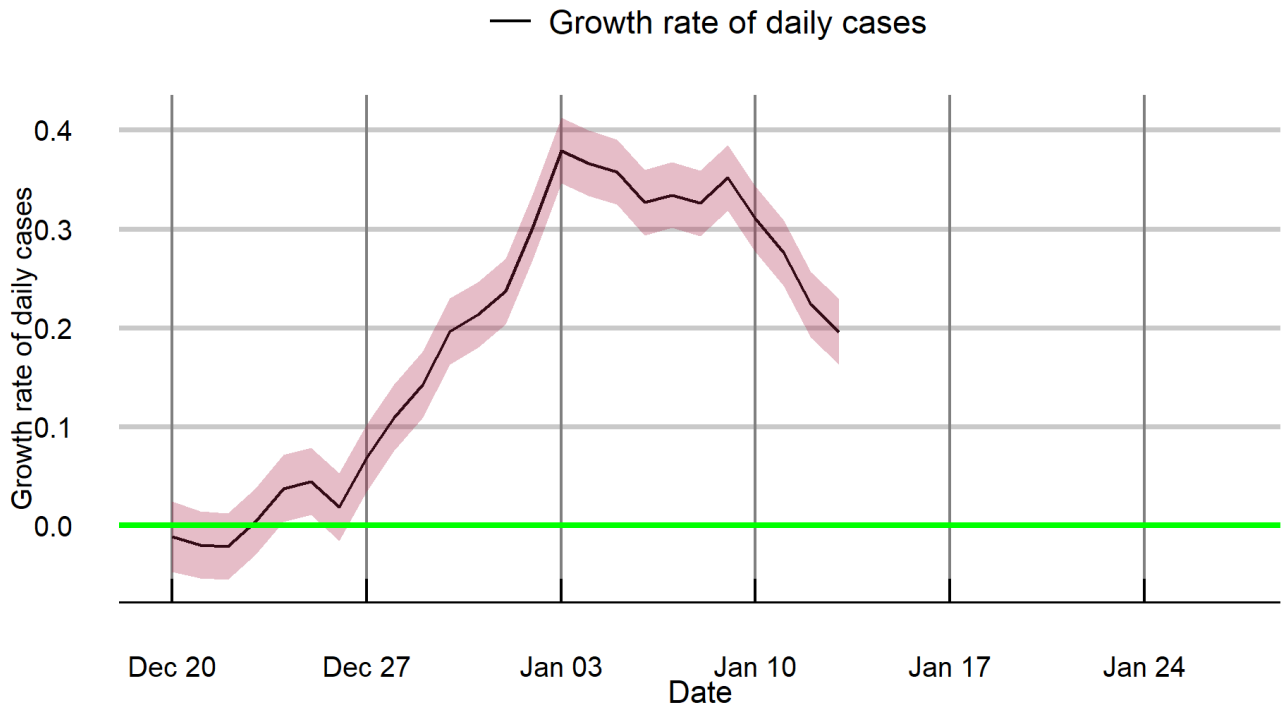

## Chhattisgarh



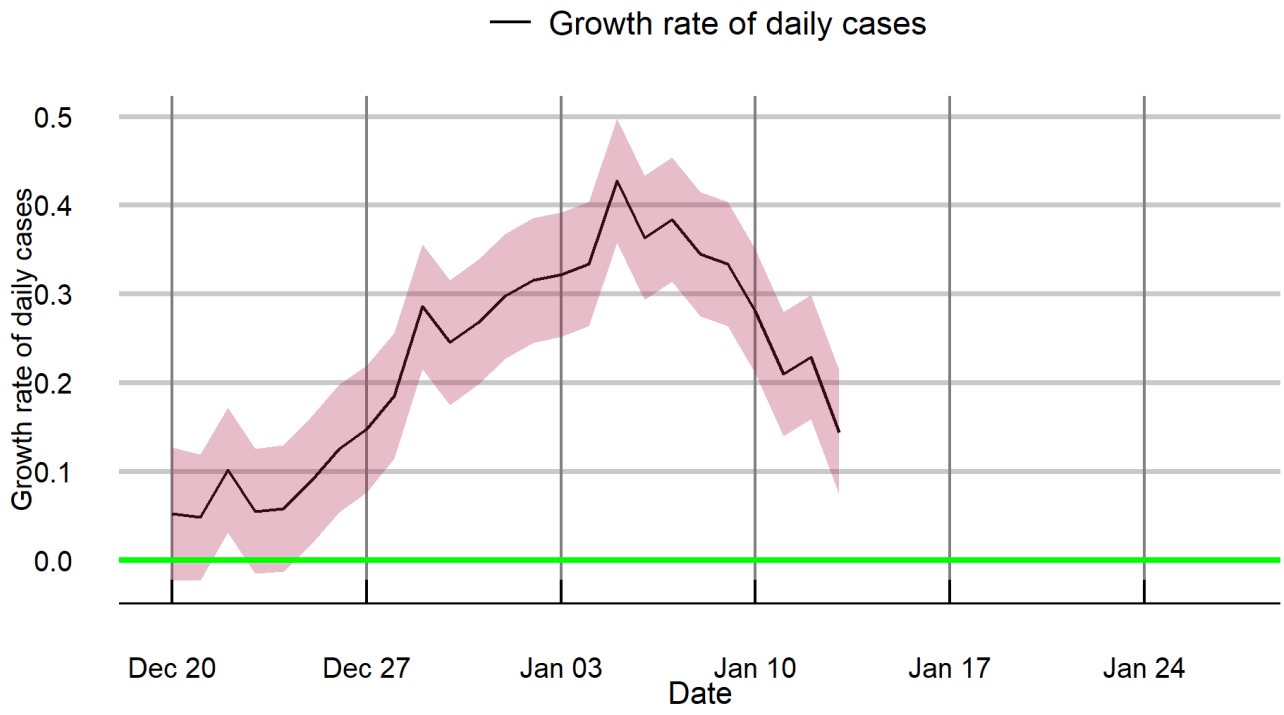
## Delhi


Growth rate of daily cases
Growth rate of daily cases
0.4
0.2
0.0
Dec 20
Dec 27
Jan 03
Jan 10
Jan 17
Jan 24
Date

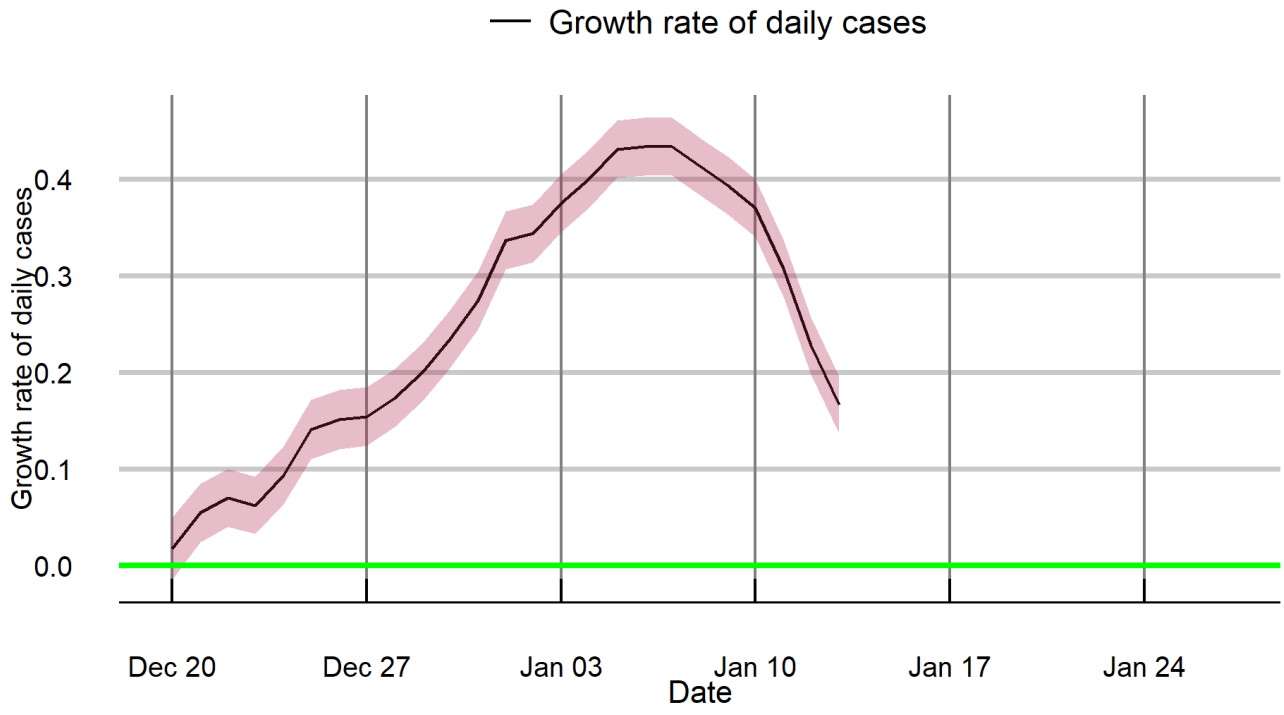
## Goa


Growth rate of daily cases
Growth rate of daily cases
0.4
0.3
0.2
0.1
0.0
Dec 20
Dec 27
Jan 03
Jan 10
Jan 17
Jan 24
Date

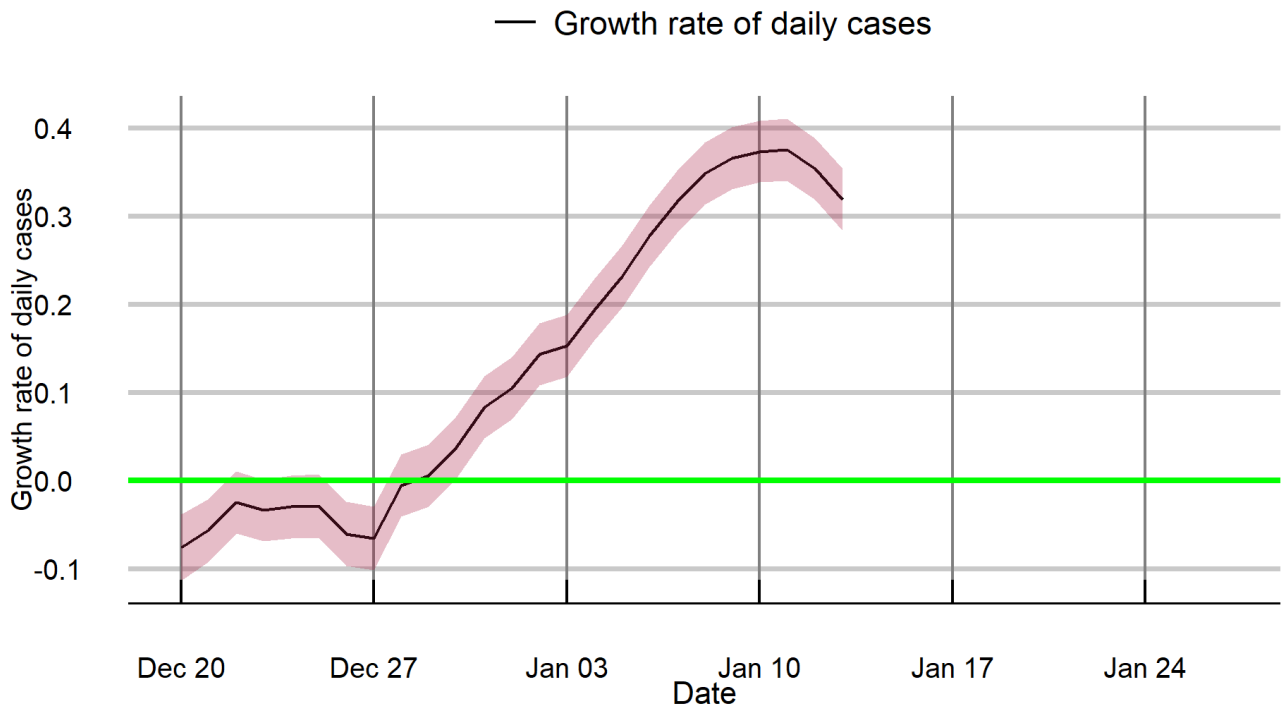
## Gujarat



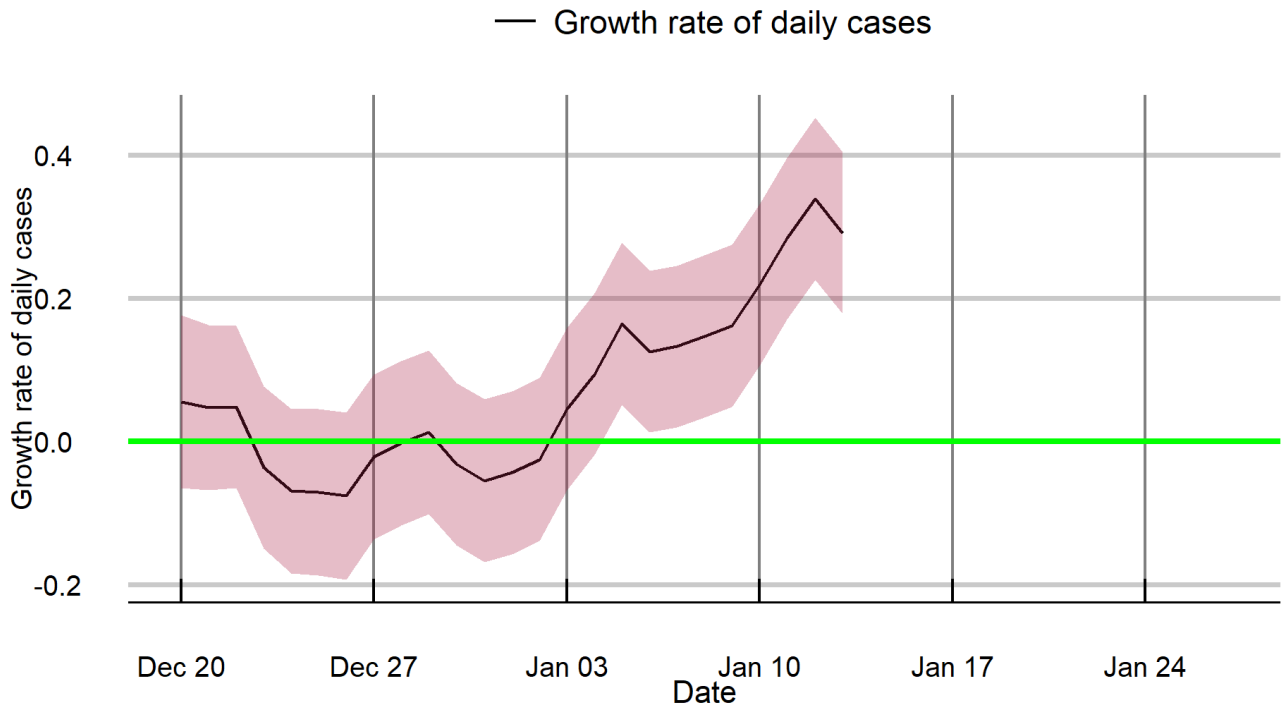

## Haryana



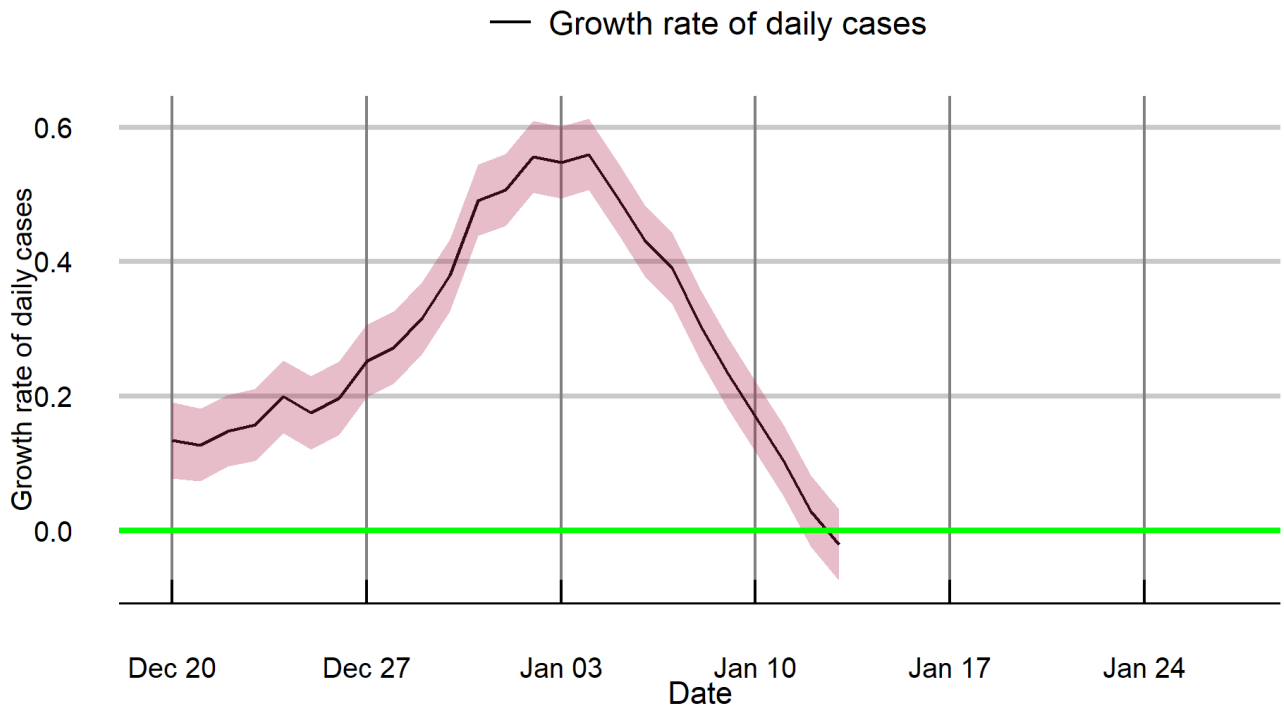
## Himachal Pradesh



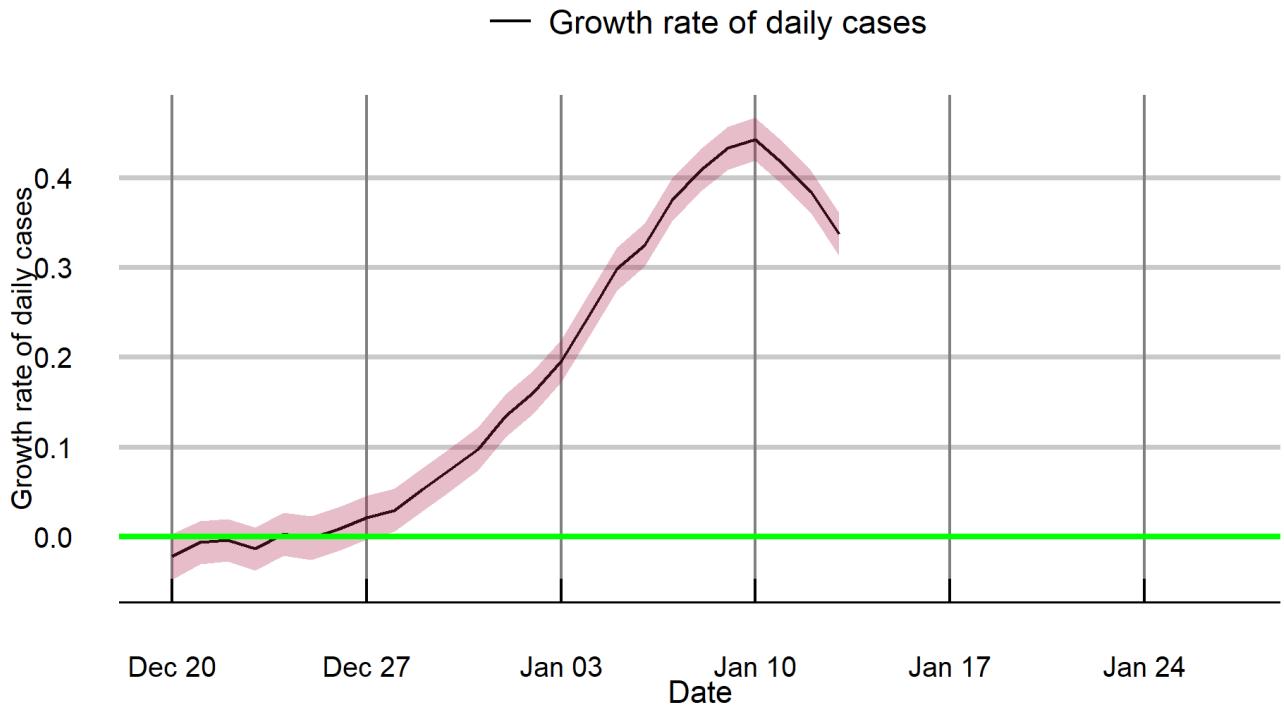

## Jammu & Kashmir



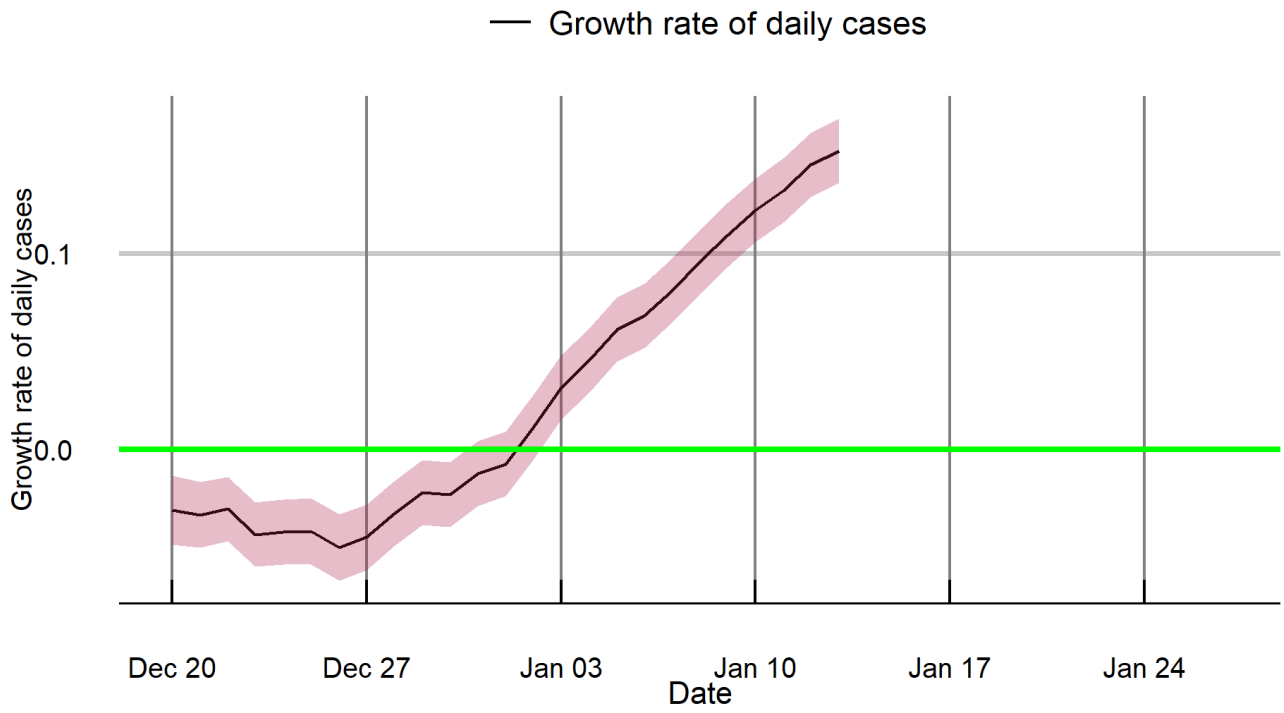
## Jharkhand



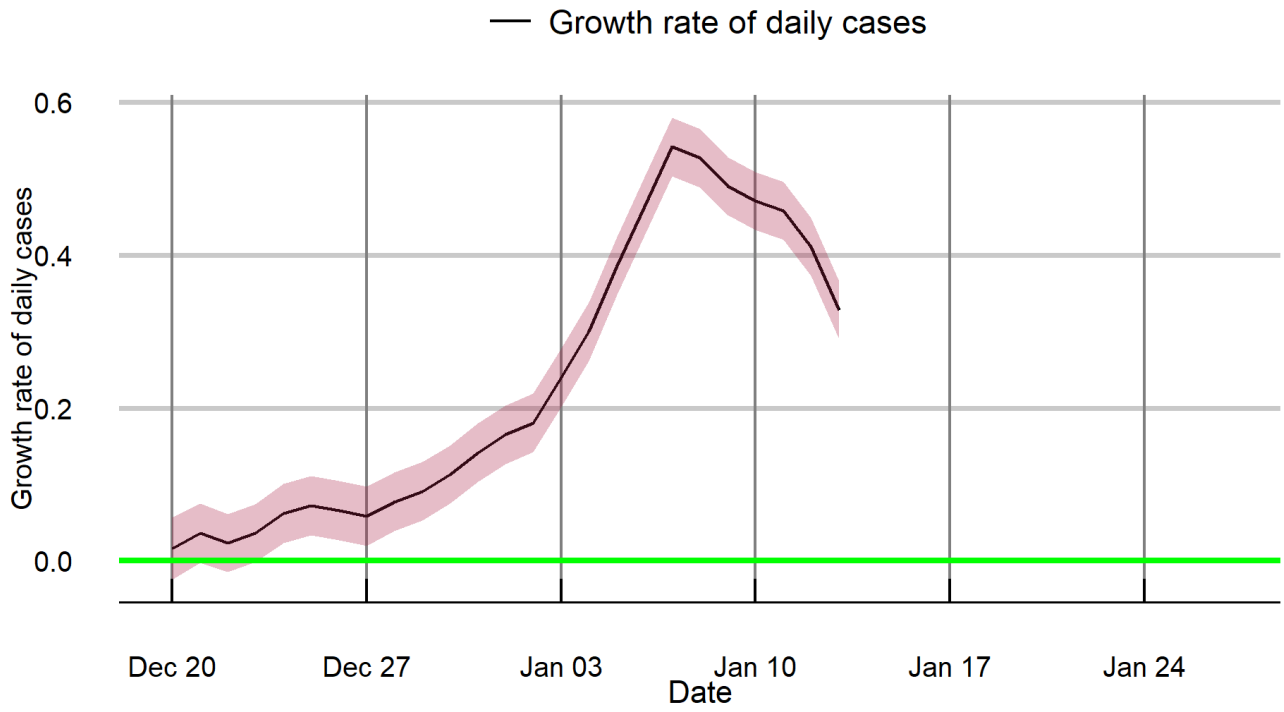

## Karnataka



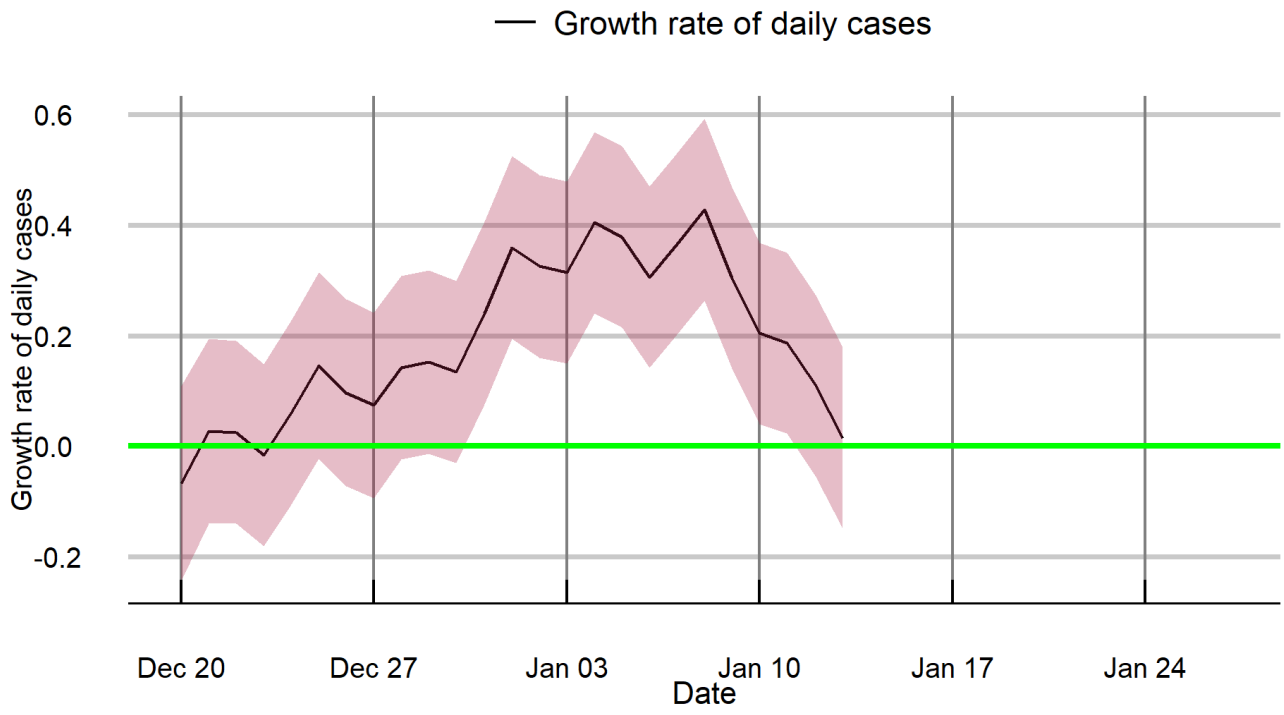
## Kerala



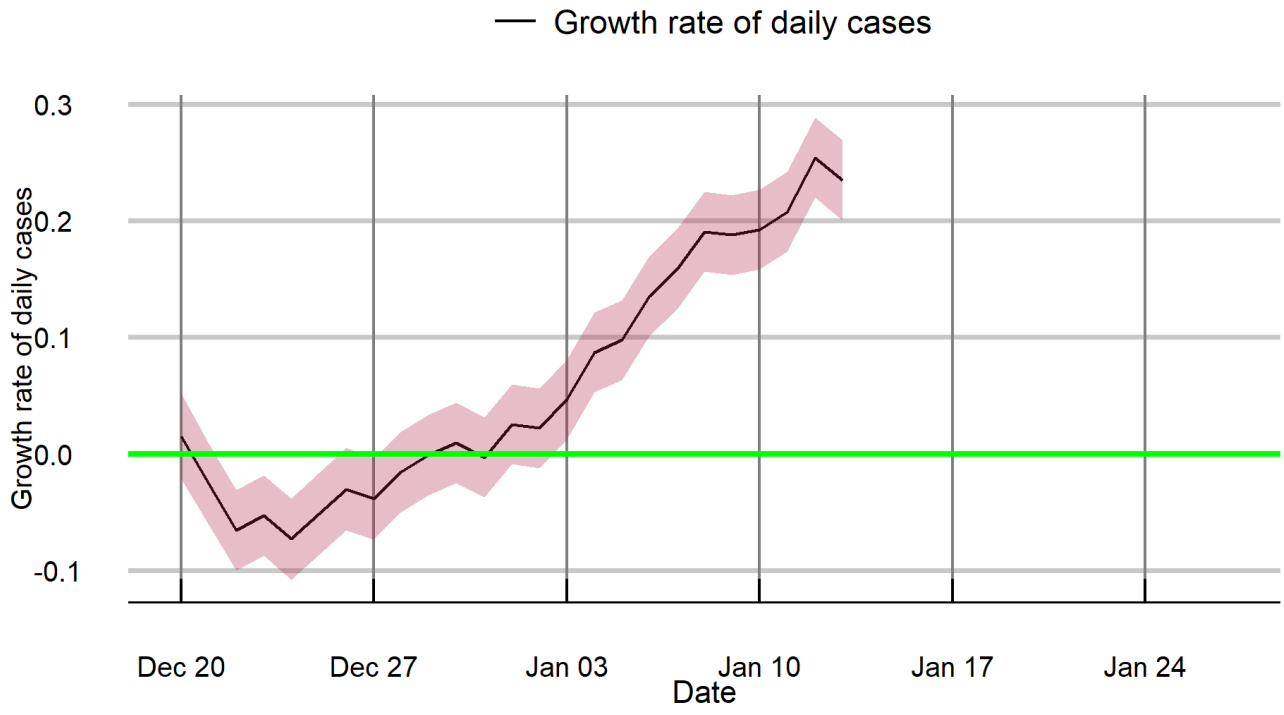

## Madhya Pradesh



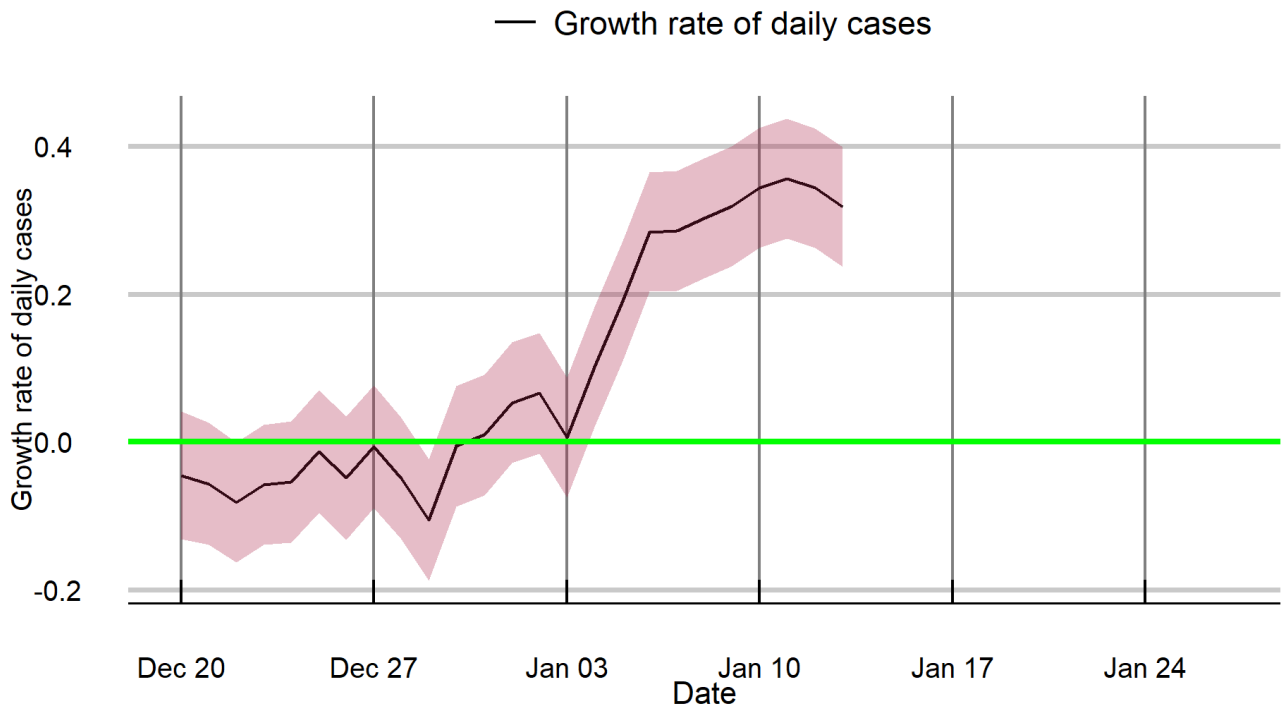
## Maharashtra



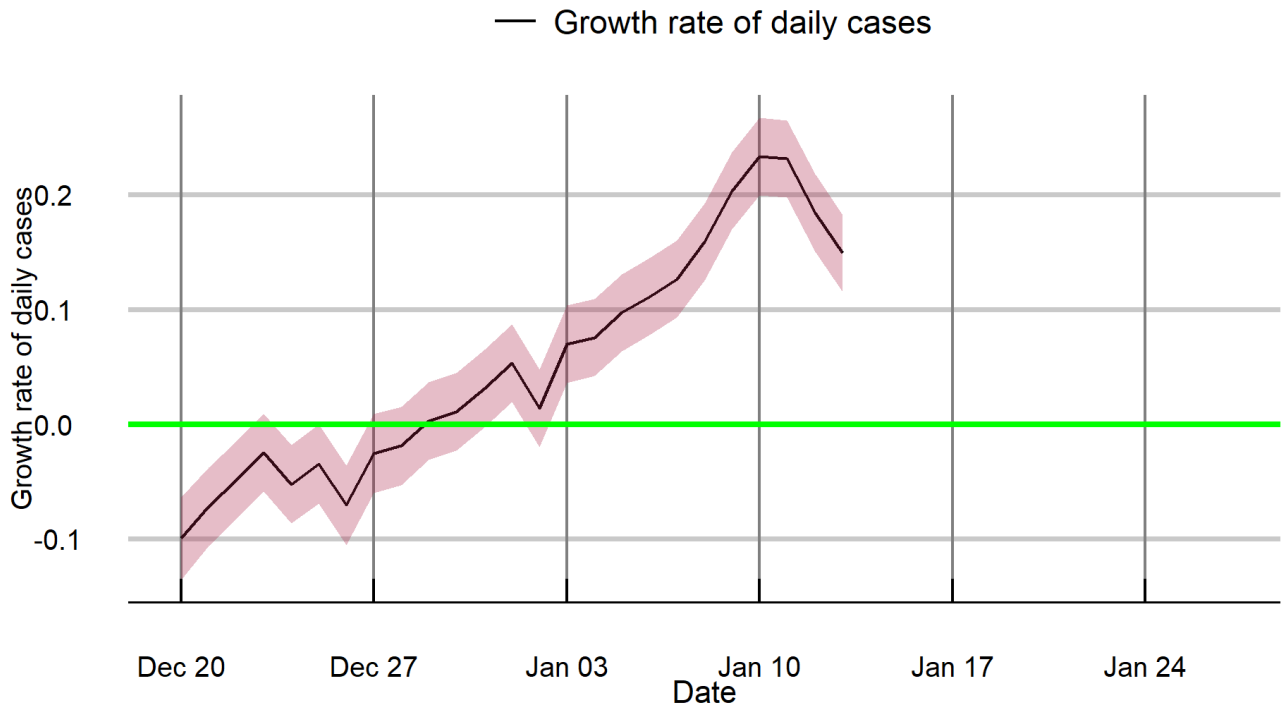

## Manipur



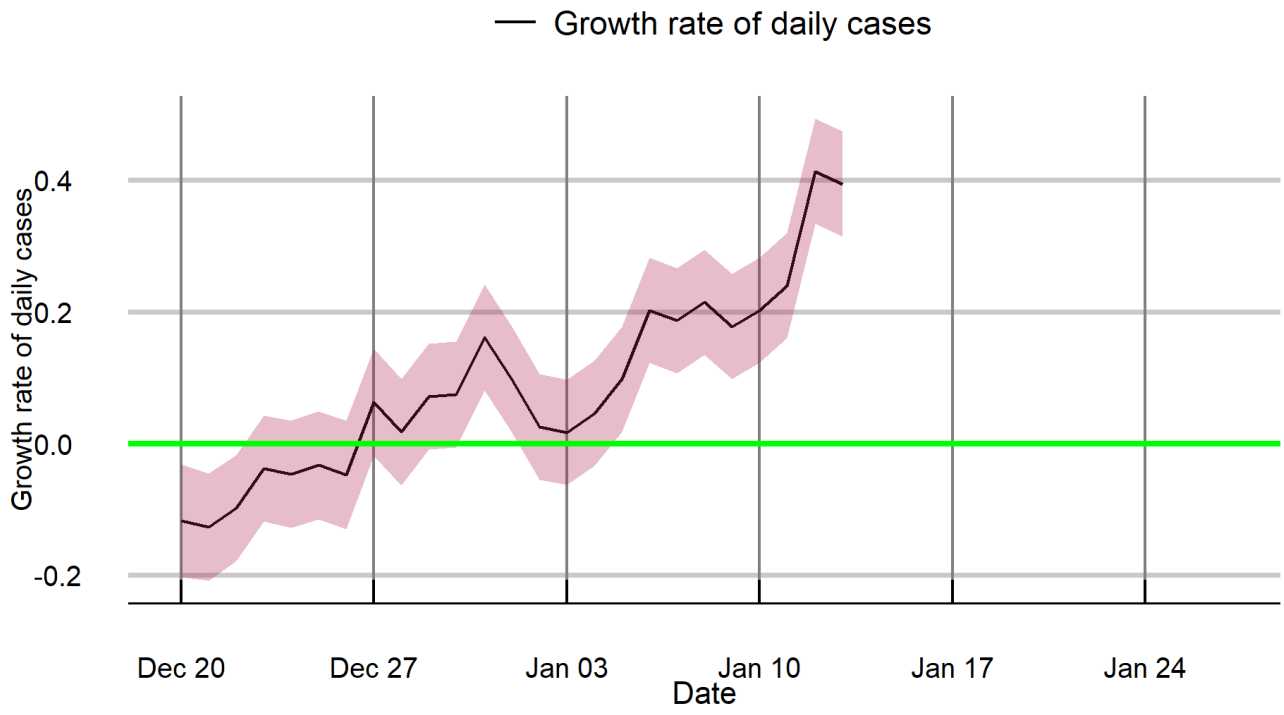
## Meghalaya



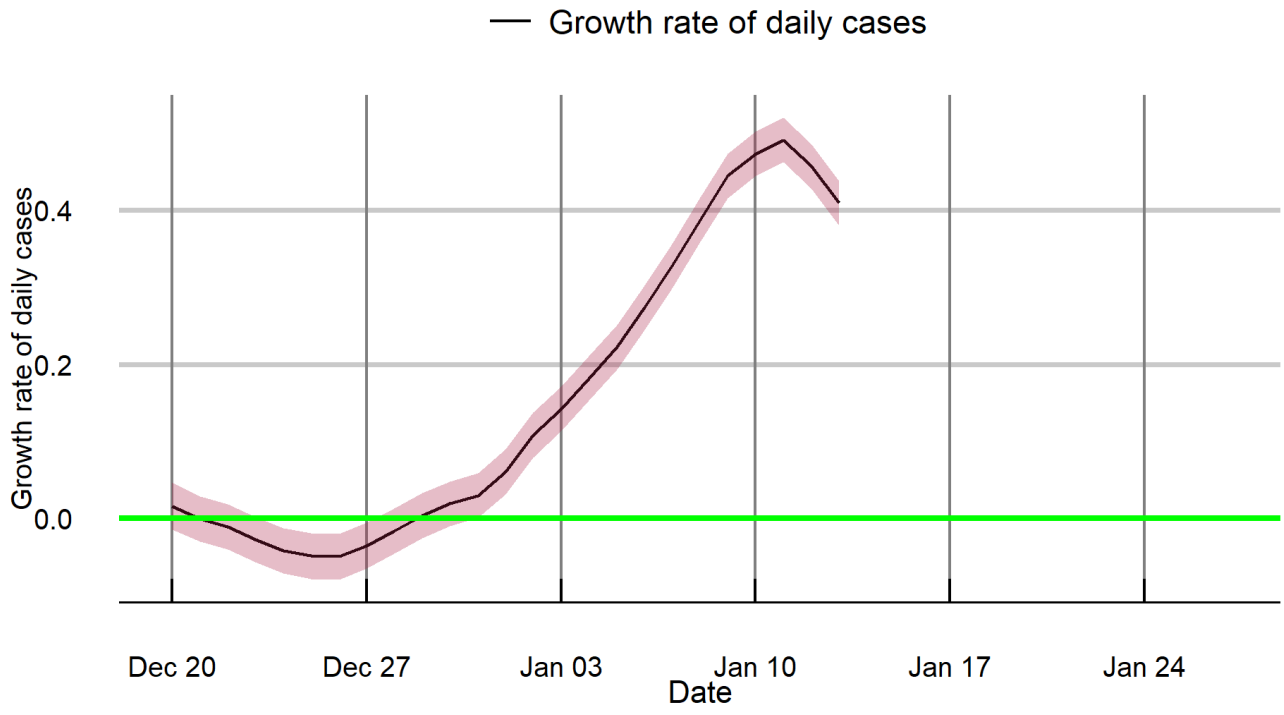

## Mizoram



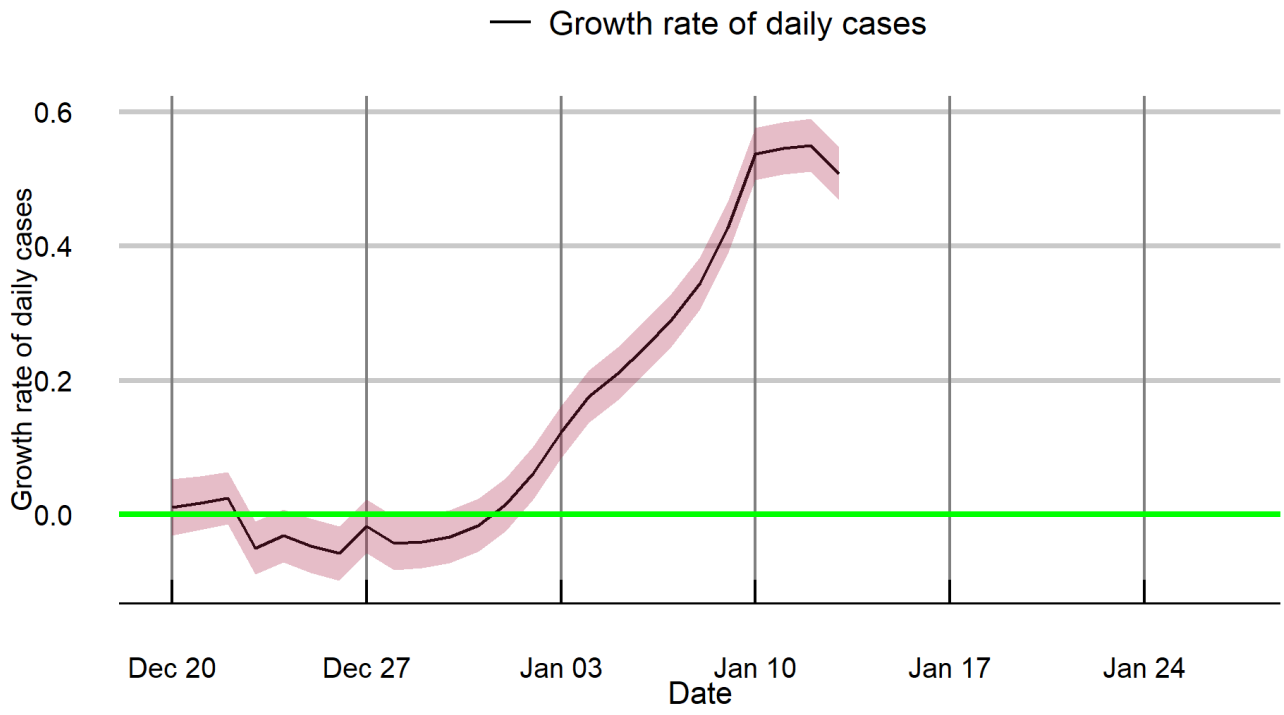
## Nagaland



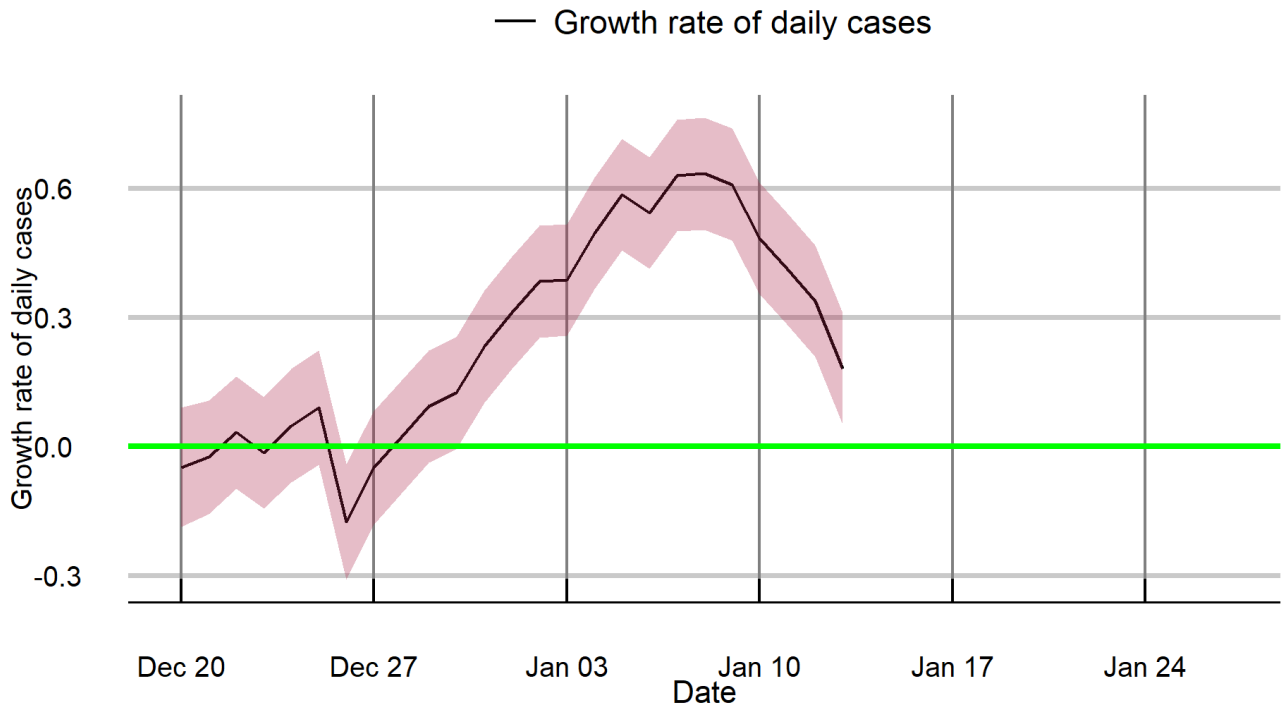

## Odisha



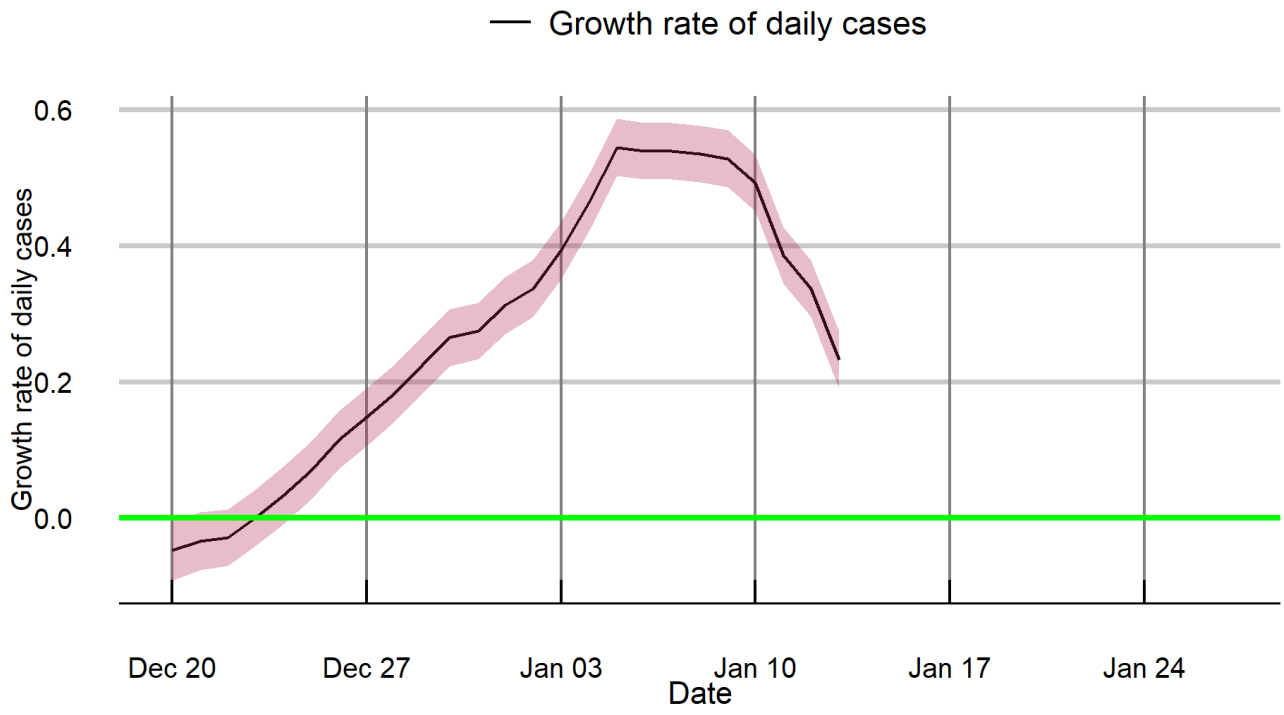
## Puducherry



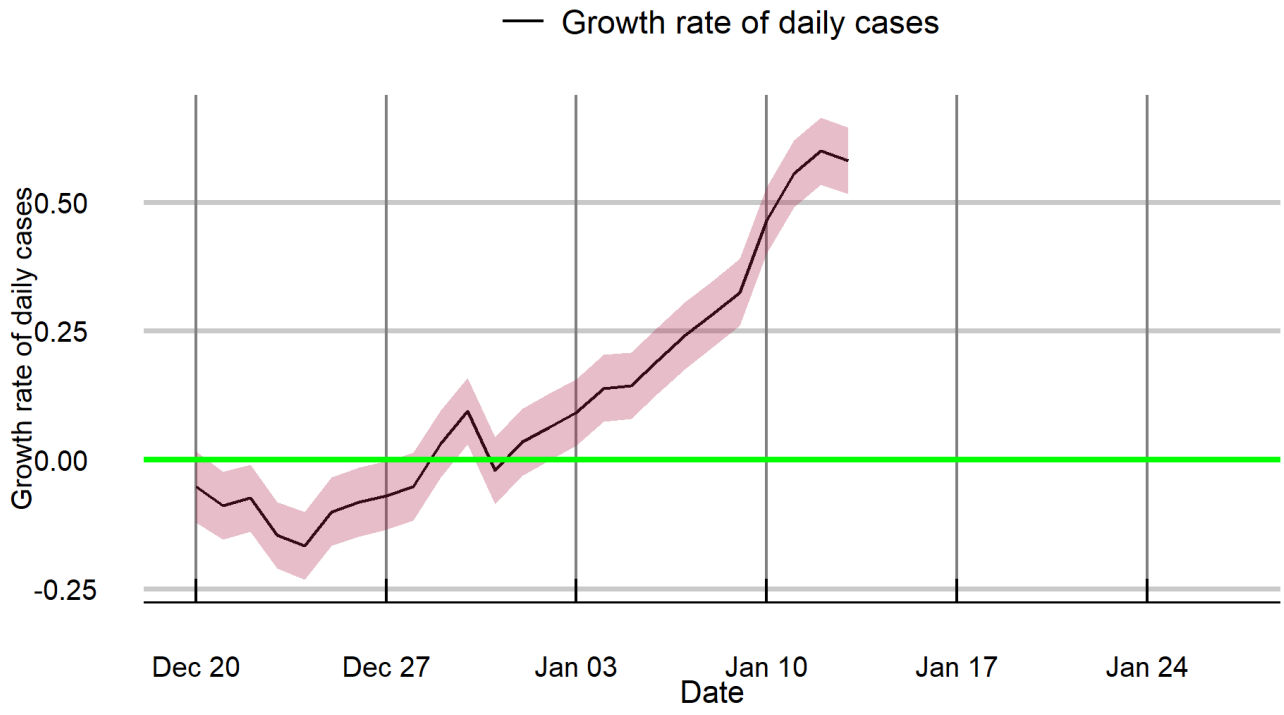

## Punjab



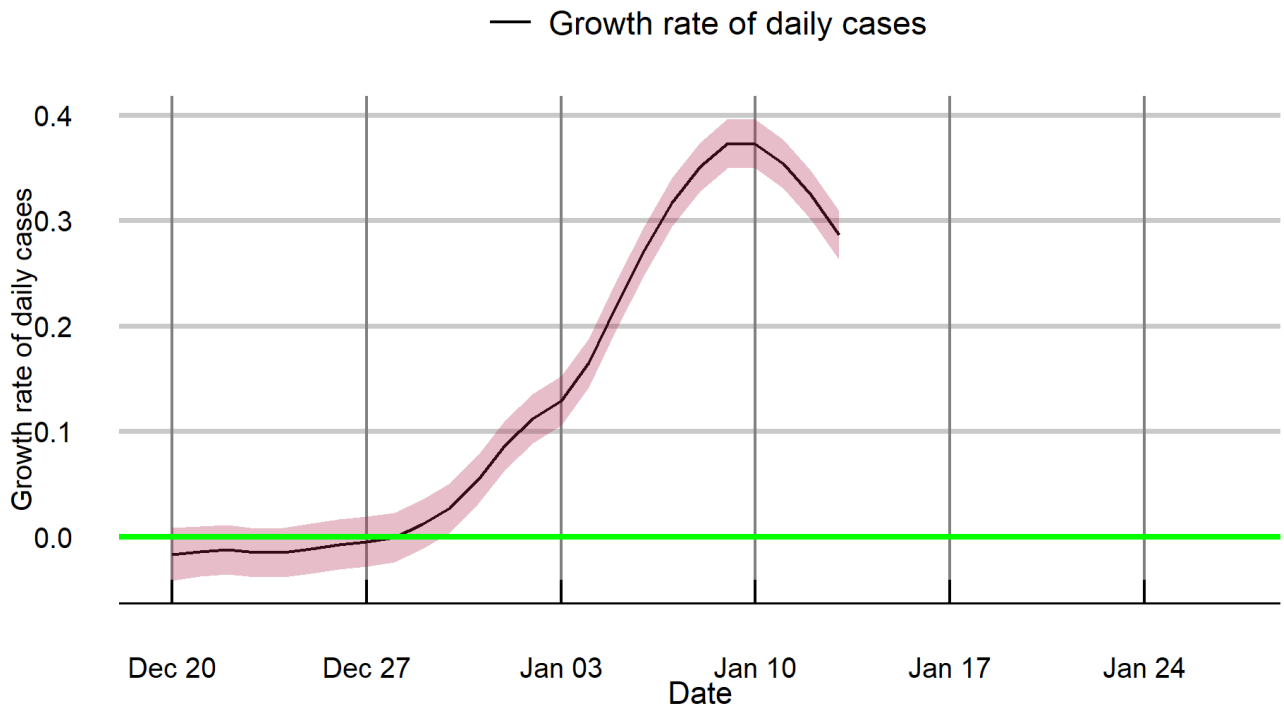
## Rajasthan



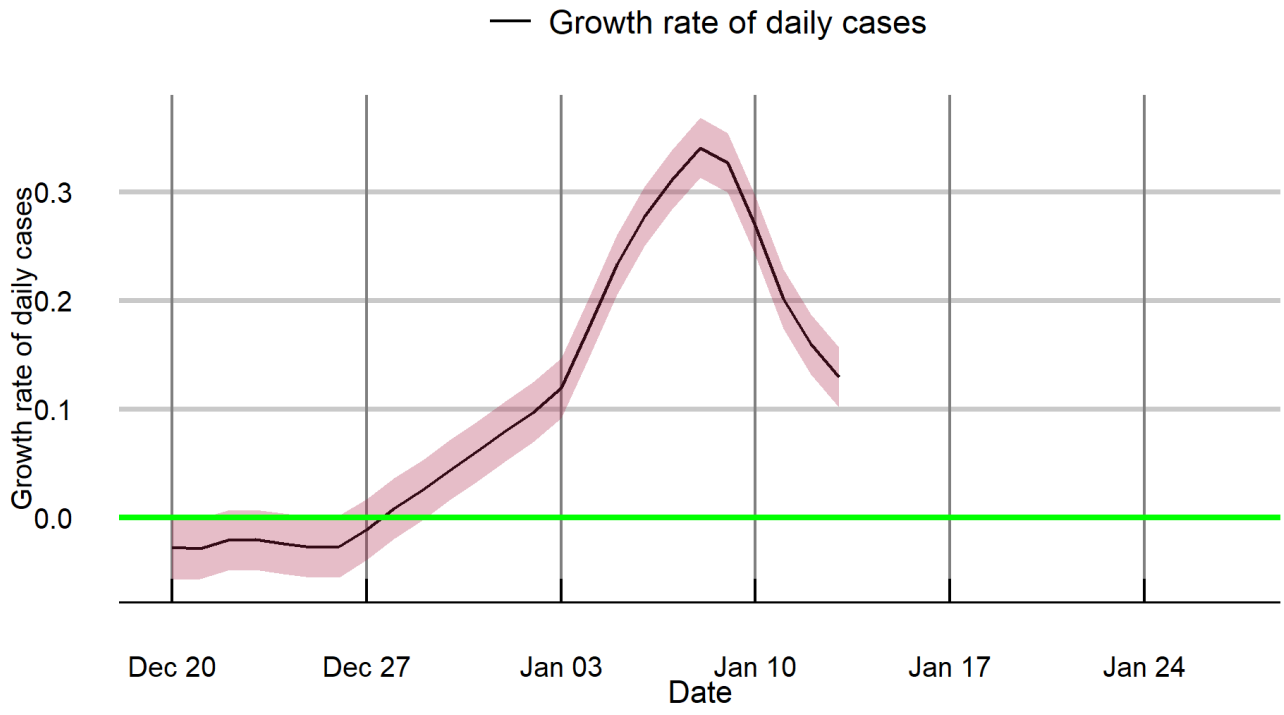

## Sikkim



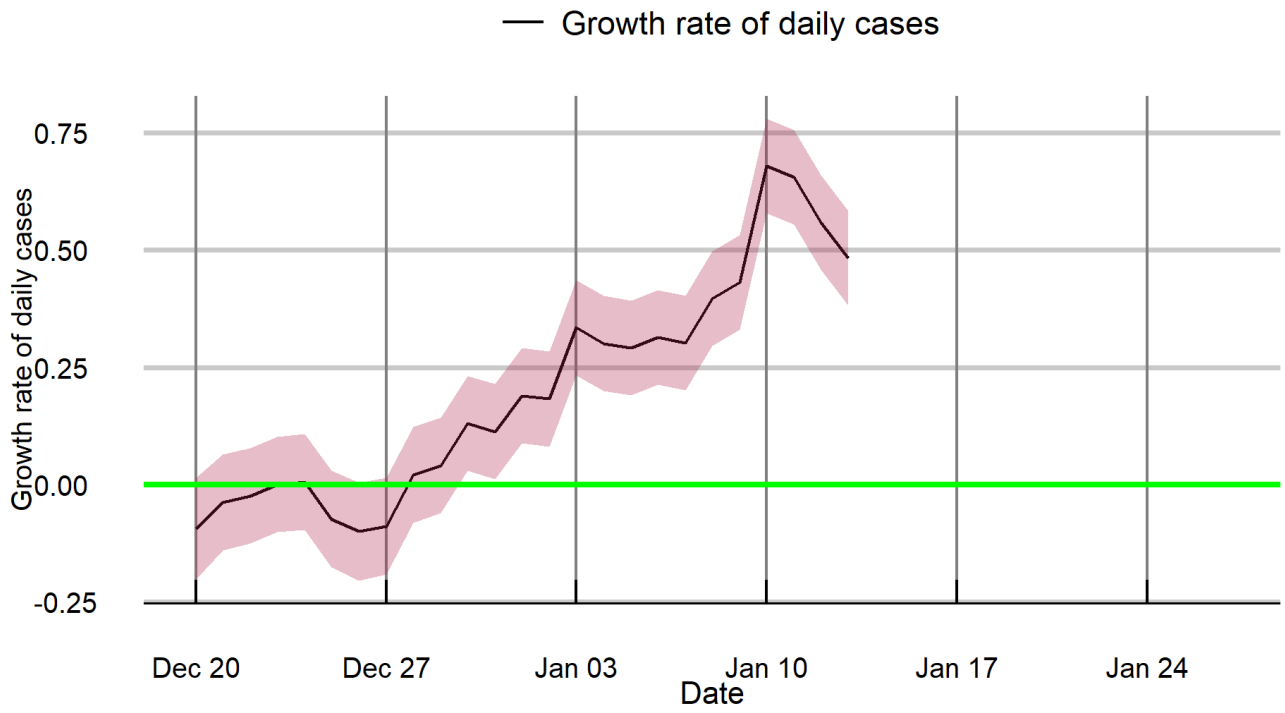
## Tamil Nadu



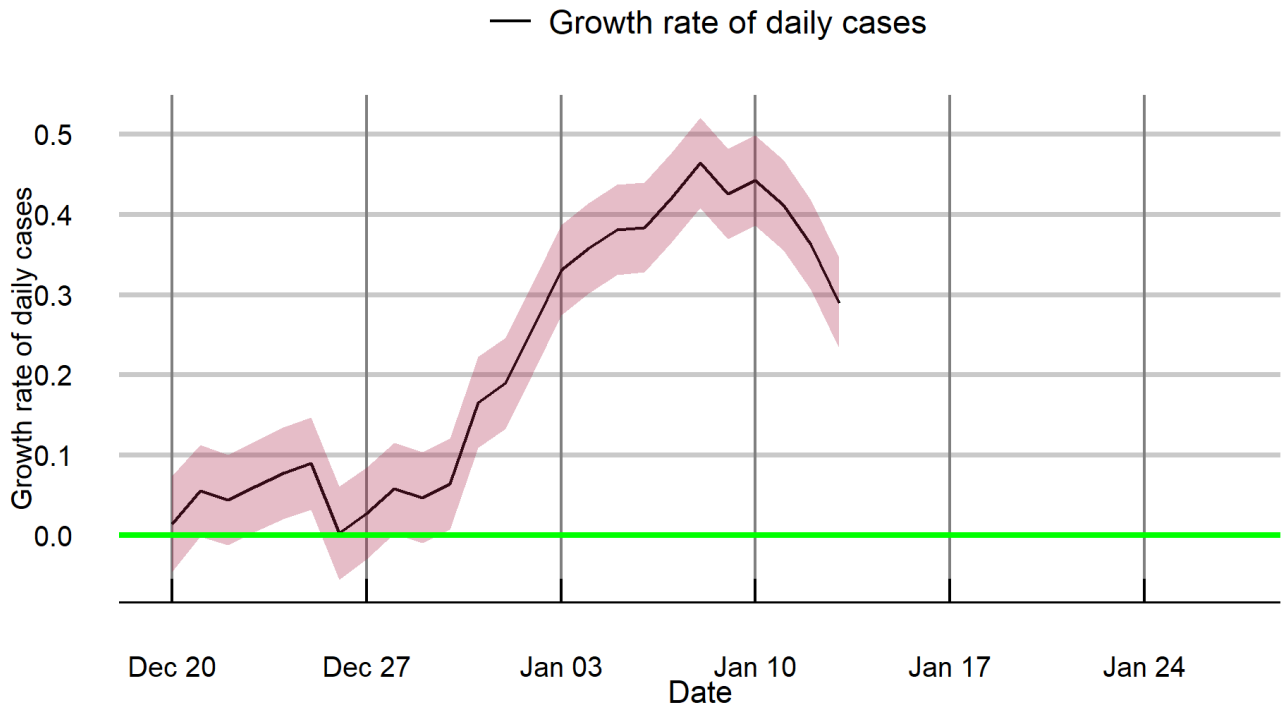

## Telangana



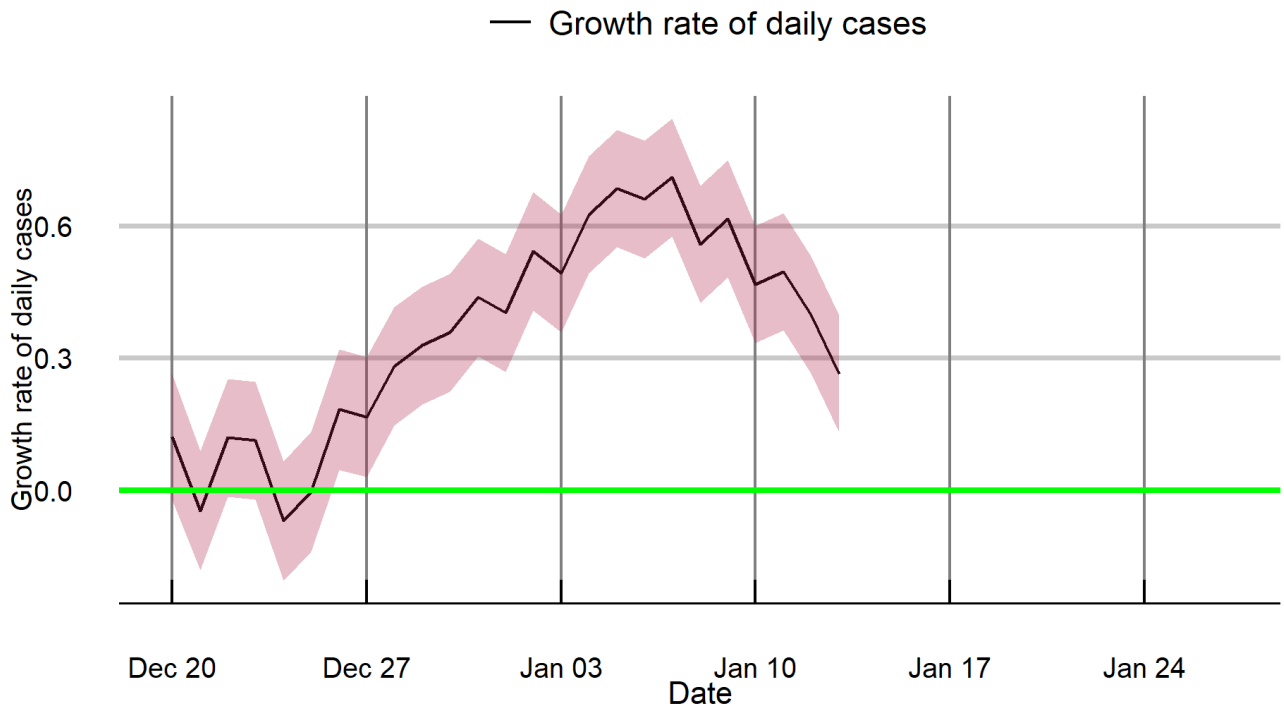
## Tripura



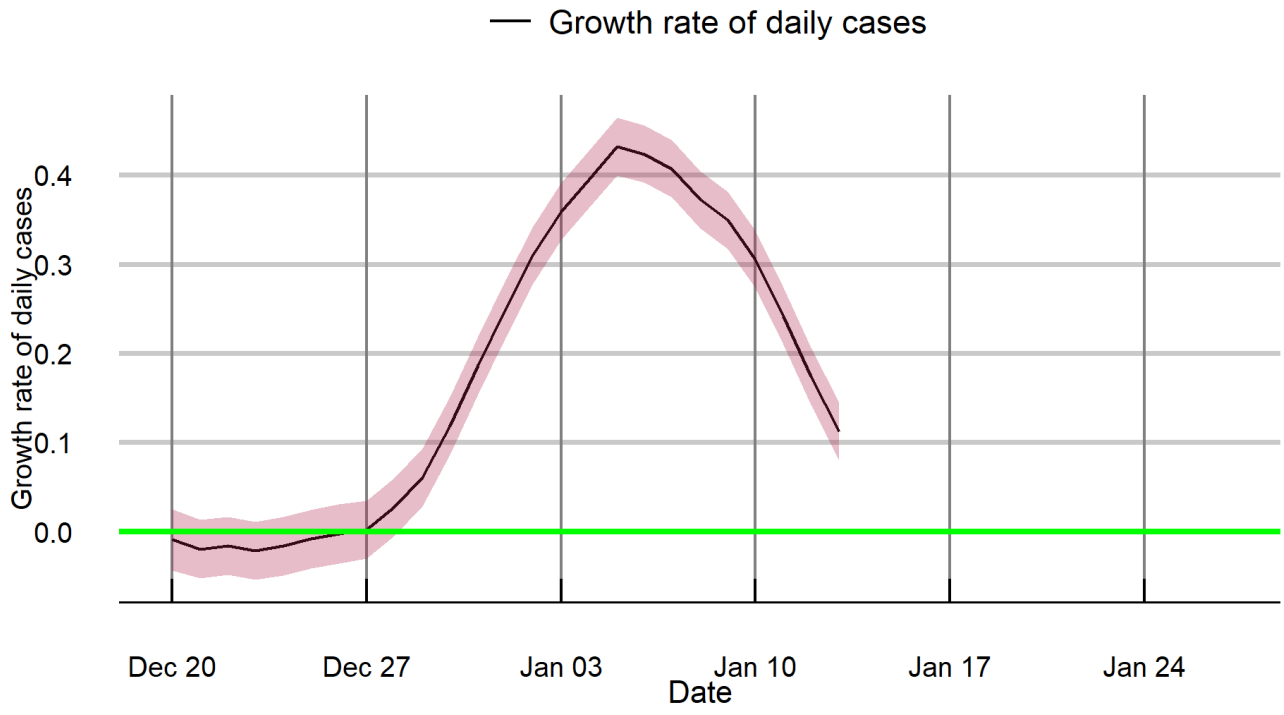

## Uttarakhand



## Uttar Pradesh




## West Bengal



## Notes

This tracker was developed by researchers at Cambridge Judge Business School and National Institute of Economic and Social Research, working with Health Systems Transformation Platform in India, as part of a pandemic monitoring series devoted to India and its states and union territories. It provides short term forecasts of the trajectory of the pandemic, identifying states and union territories that are at risk of increases in infection incidence.

**Data:** COVID-19 confirmed cases data are sourced from Johns Hopkins University (JHU), Center for Systems Science and Engineering (CSSE) and COVID19-Bharat API.

**New cases: forecasts**. Forecasts above are based on a structural time series model that uses all the data in estimation but adapts to the trend emerging in the most recent period.

The method is described in: Harvey, A. and P. Kattuman (2020). Time series models based on growth curves with applications to forecasting coronavirus. *Harvard Data Science Review*, Special issue 1 - COVID -19. https://hdsr.mitpress.mit.edu/pub/ozgjx0yn/release/2 , and Harvey, A., P. Kattuman, and C. Thamotheram (2021). Tracking the mutant: forecasting and nowcasting COVID-19 in the UK in 2021. *National Institute Economic Review*. 256, 110-126. doi:10.1017/nie.2021.12.

**New cases: growth rate.** The filtered trends presented for daily growth rates of cases are estimated using the Kalman filter, applied to the observed series. The method filters out day of the week effects and random noise to reveal the underlying signal. Unlike methods such as the moving average, this method adapts the trend to changes in real time and characterises underlying patterns of surges or attenuations that are hidden in the volatile series. The method is described in the papers listed above.

***R*:** The *R*-estimates are based on the nowcast of the growth rate; the estimation approach is described in Harvey, A. and P. Kattuman (2021). A farewell to R: Time series models for tracking and forecasting epidemics. Journal of the Royal Society Interface, 18, 20210179, https://royalsocietypublishing.org/doi/10.1098/rsif.2021.0179.The confidence interval is based on one standard deviation, with coverage of 68%.

**Note:** The accuracy of forecasts rely on the quality of the published data. Further, changes in government pandemic policies and in transmission relevant social behaviour may lead realised numbers to deviate from forecasts.

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