

Cambridge Judge Business School  
Cambridge Centre for Health Leadership & Enterprise

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# COVID-19 TRACKER: INDIA

28 November 2021



Centre for  
**Health Leadership  
& Enterprise**



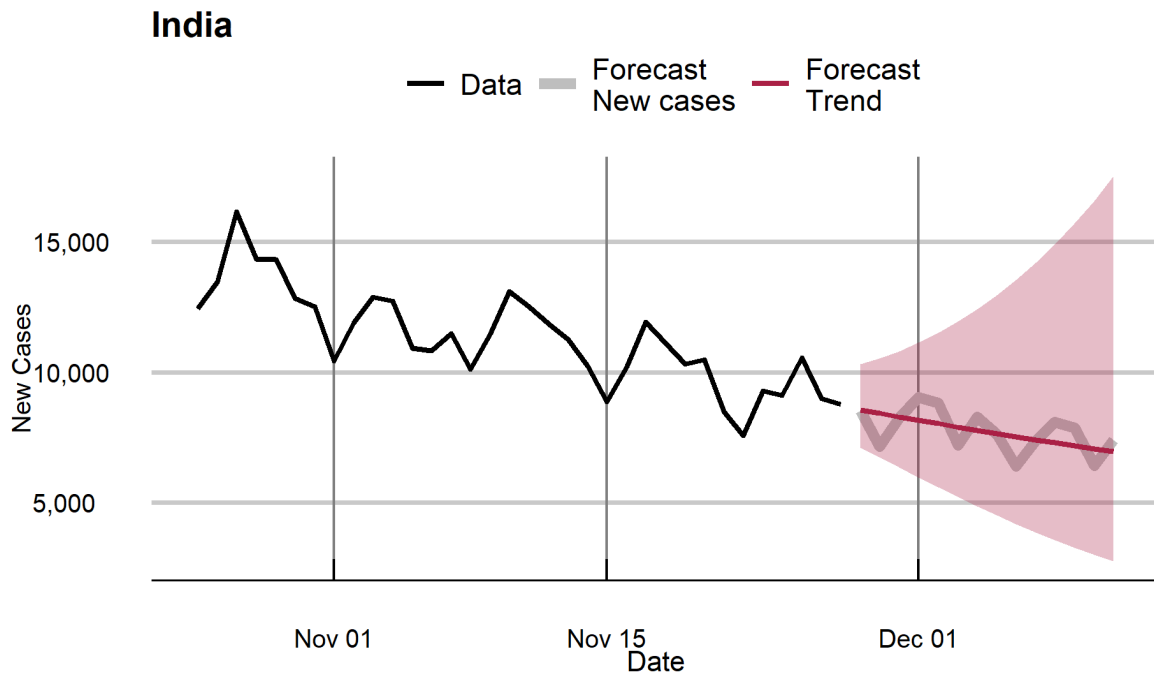
*Chandigarh, Ladakh, Madhya Pradesh, Rajasthan are the states currently seeing flare ups, with filtered daily growth rates of new COVID-19 cases exceeding 5%.*

*Karnataka and Odisha have relatively high infection incidences with daily cases continuing to grow.*

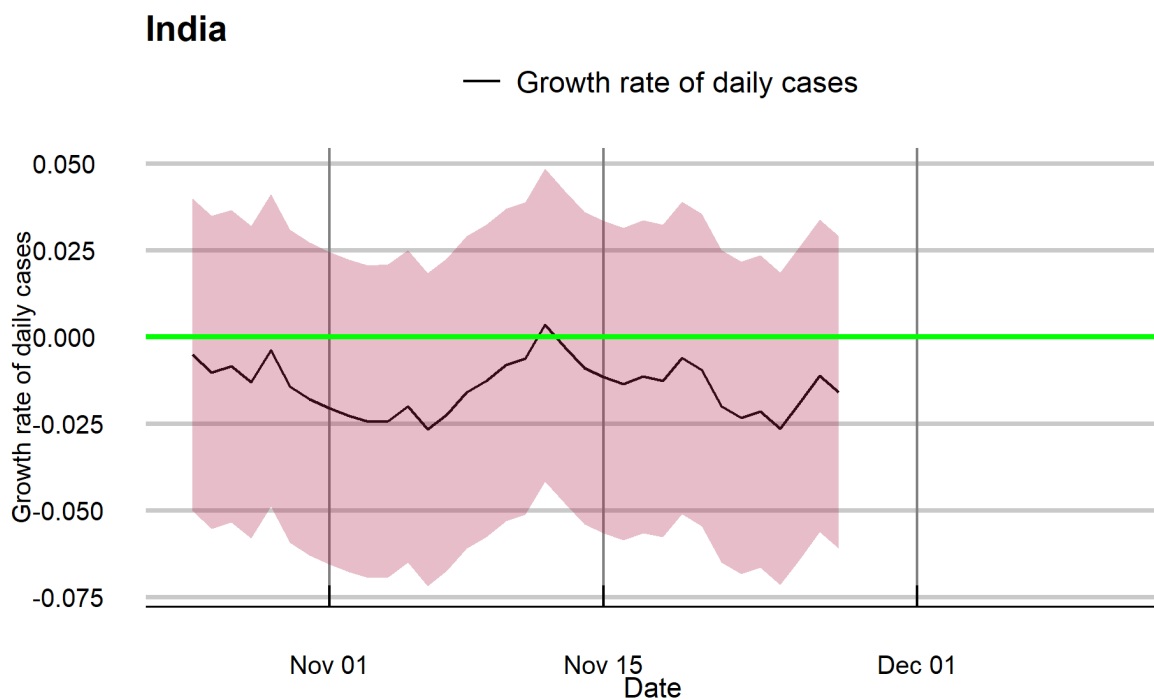
*India as a whole is on a declining trend at present. The trend value of new cases is likely to be about 7,000 per day in two week's time, by 11 December.*

## Daily Covid-19 cases in India: Forecast

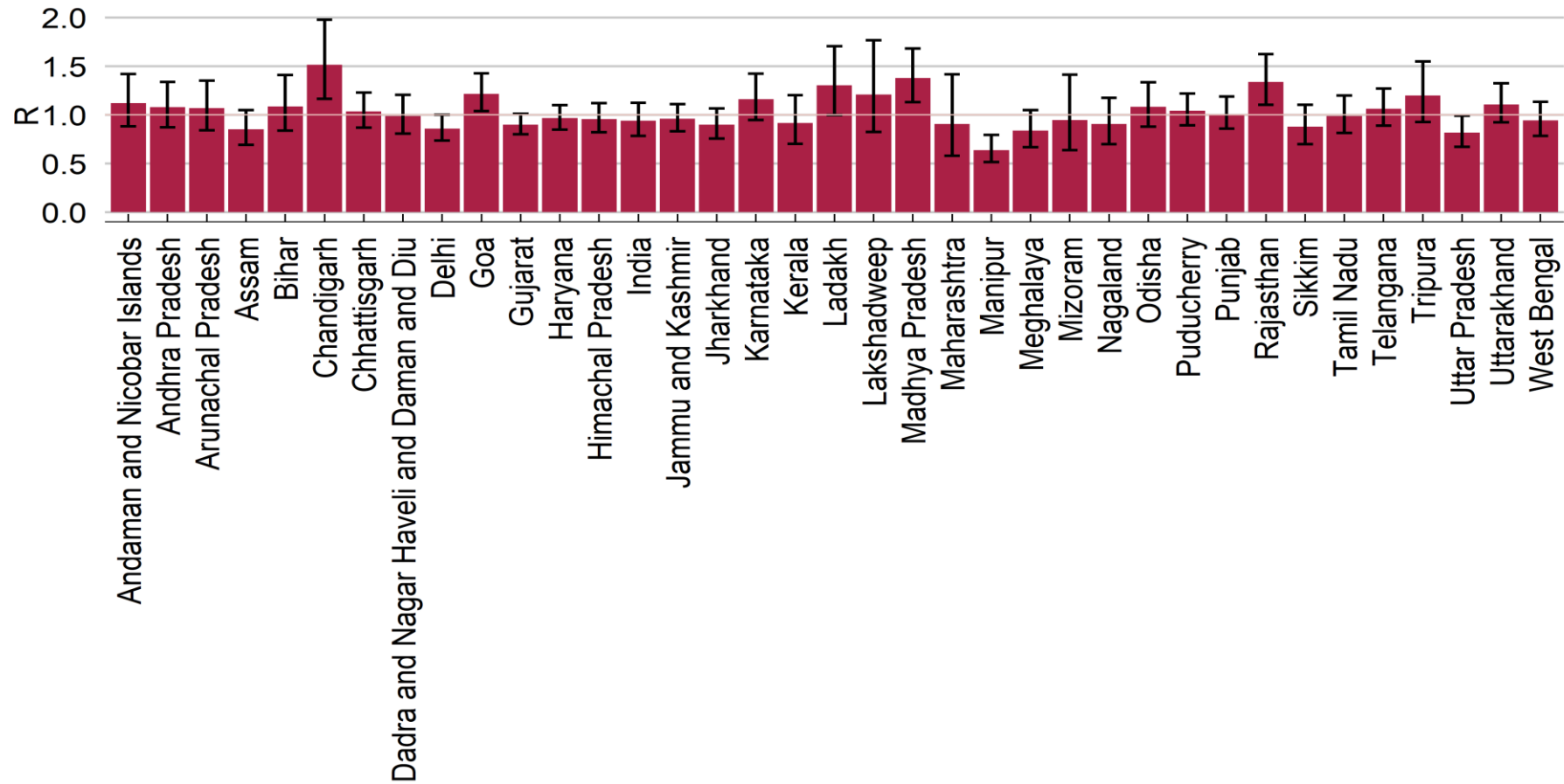
Forecasts of daily new cases for the period 28 November to 11 December 2021, based on data till 27 November 2021. The trend value of new COVID-19 cases is likely be about 7,000 per day by 11 December.



The filtered growth rate of daily new cases was -0.016 (-1.6 %) as on 27 November 2021.



R<sub>t</sub>: 27 November 2021



Bar chart shows point estimates of R and the ± 1 standard deviation confidence intervals

Note: Due to small numbers, estimates are not reliable for: Andaman and Nicobar Islands, Arunachal Pradesh, Bihar, Chandigarh, Dadra and Nagar Haveli and Daman and Diu, Haryana, Jharkhand, Lakshadweep, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Punjab, Sikkim, Tripura, Uttar Pradesh and Uttarakhand.

**Filtered daily growth rates of daily cases for States and Union territories currently seeing flare ups**

14 to 27 November 2021

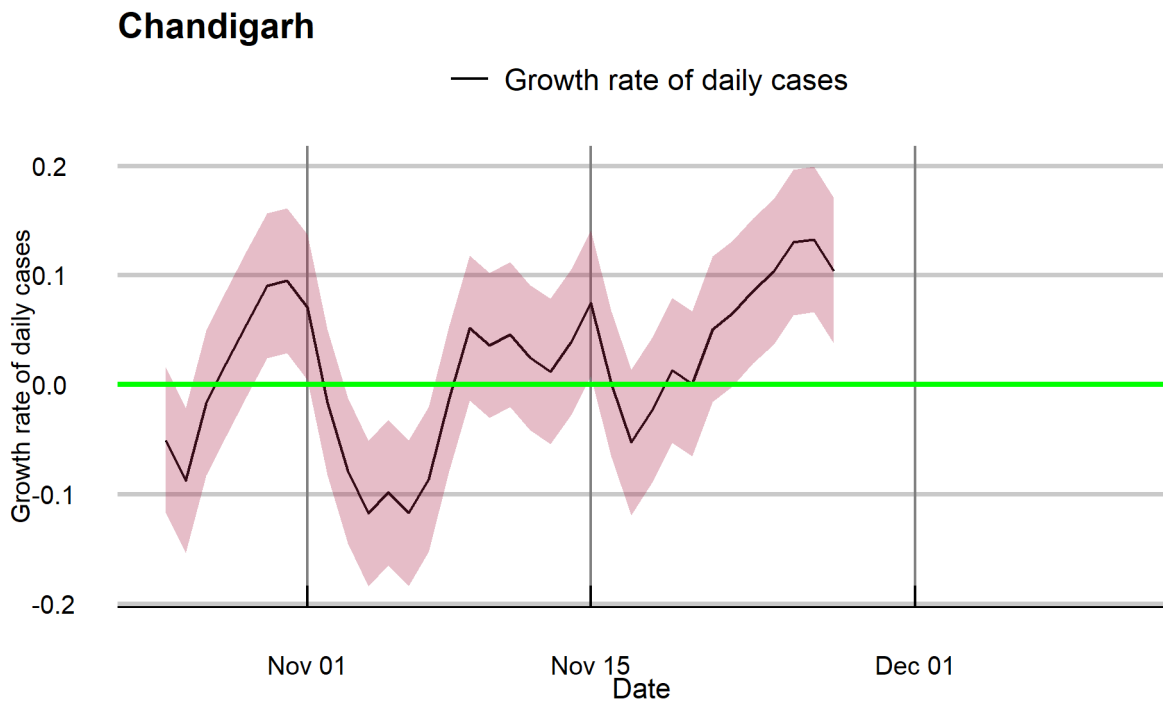
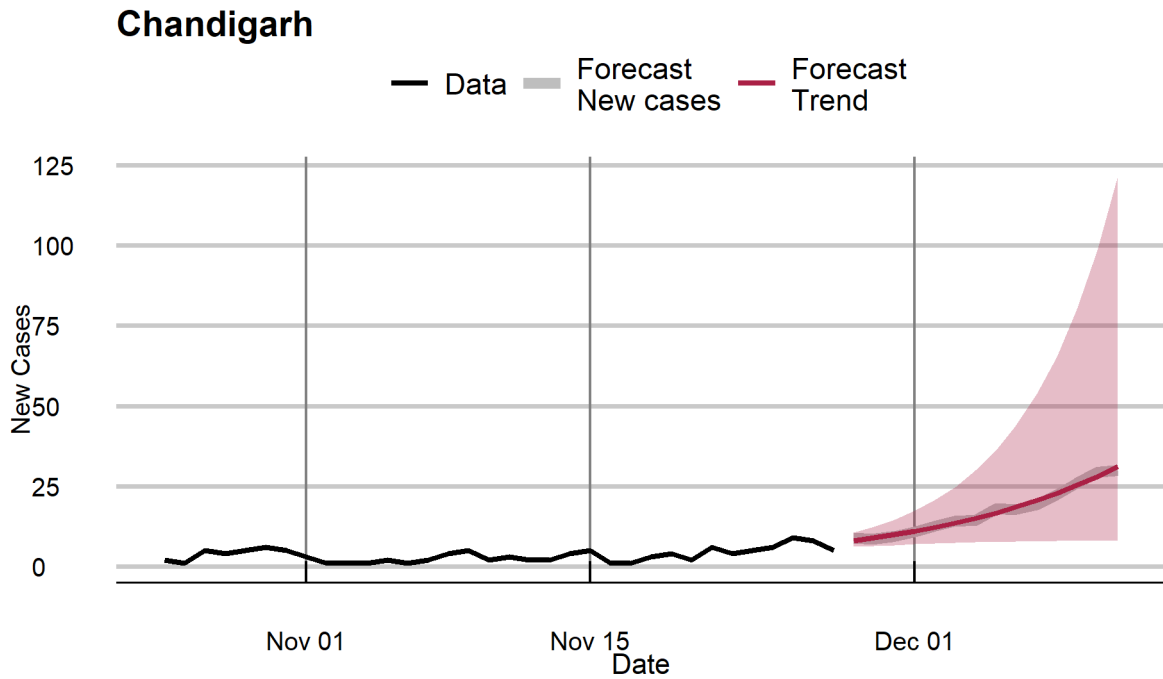
Date	Chandigarh	Ladakh	Madhya Pradesh	Rajasthan
14/11/2021	3.9%	13.2%	5.7%	17.2%
15/11/2021	7.4%	14.4%	4.3%	11.8%
16/11/2021	0.1%	12.7%	-0.5%	14.6%
17/11/2021	-5.3%	10.2%	-3.0%	13.0%
18/11/2021	-2.4%	5.7%	-2.7%	14.0%
19/11/2021	1.3%	6.7%	-2.7%	10.2%
20/11/2021	0.1%	5.2%	0.6%	7.3%
21/11/2021	5.1%	0.4%	5.2%	8.6%
22/11/2021	6.5%	0.4%	6.7%	9.9%
23/11/2021	8.6%	-0.4%	7.4%	11.2%
24/11/2021	10.3%	0.6%	10.4%	7.8%
25/11/2021	13.0%	2.4%	9.1%	9.1%
26/11/2021	13.3%	4.0%	5.7%	8.1%
27/11/2021	10.4%	6.6%	8.0%	7.3%

## Forecasts of daily cases for States and Union territories currently seeing **flare ups**

28 November to 11 December 2021

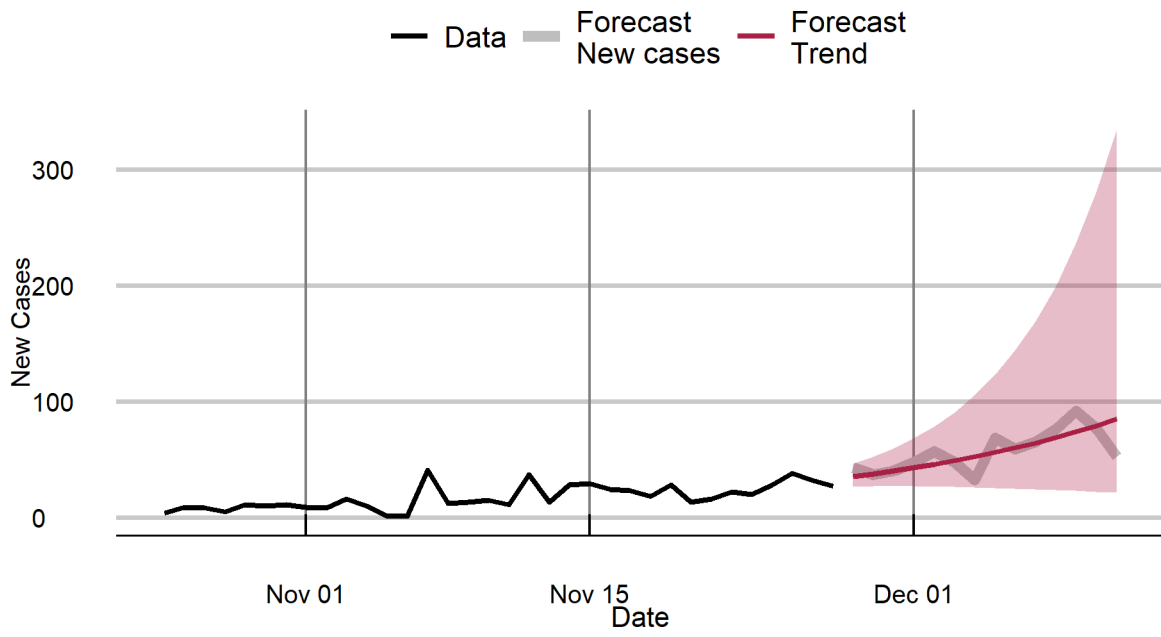
Date	Chandigarh: Forecast of new cases	Chandigarh: Forecast trend	Ladakh: Forecast of new cases	Ladakh: Forecast trend	Madhya Pradesh: Forecast of new cases	Madhya Pradesh: Forecast trend	Rajasthan: Forecast of new cases	Rajasthan: Forecast trend
28/11/2021	9	8	43	35	19	19	27	28
29/11/2021	9	9	37	37	21	20	30	30
30/11/2021	9	10	41	40	20	22	29	32
01/12/2021	11	11	47	43	24	24	35	34
02/12/2021	13	12	57	46	27	26	39	37
03/12/2021	14	14	48	49	26	28	38	40
04/12/2021	14	15	33	52	31	30	48	43
05/12/2021	18	17	69	56	34	33	45	46
06/12/2021	18	18	59	60	36	35	50	50
07/12/2021	19	21	65	64	36	38	48	53
08/12/2021	22	23	76	69	43	42	59	57
09/12/2021	26	25	92	74	47	45	64	62
10/12/2021	29	28	77	79	45	49	64	66
11/12/2021	30	31	53	85	54	53	79	71

**New cases forecasts (28 November to 11 December) and filtered daily growth rates (14 to 27 November) for States and Union territories currently of concern**

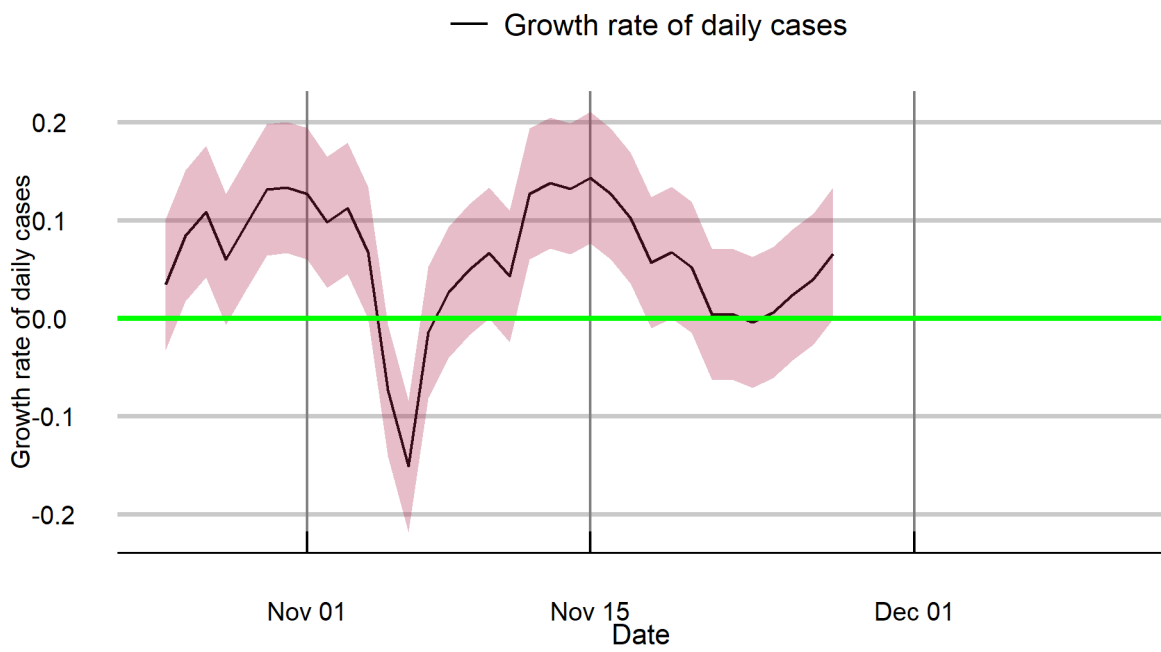


Note: If the decline in the filtered growth rate which began on 27 November continues, daily cases will fall below the forecasts in the days ahead.

## Ladakh

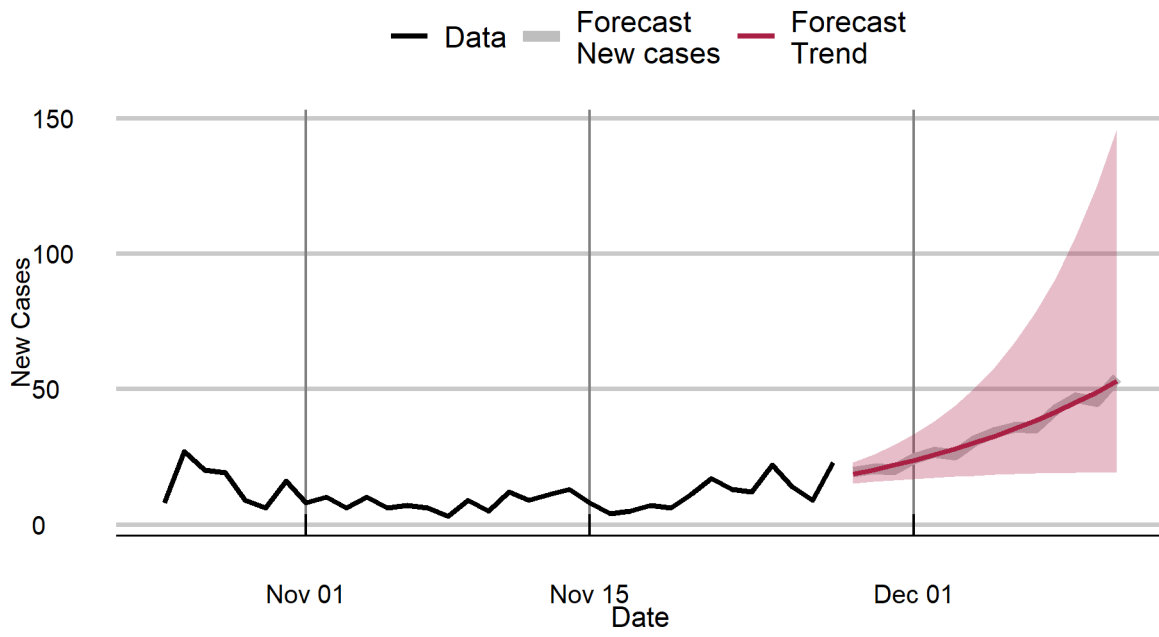


## Ladakh

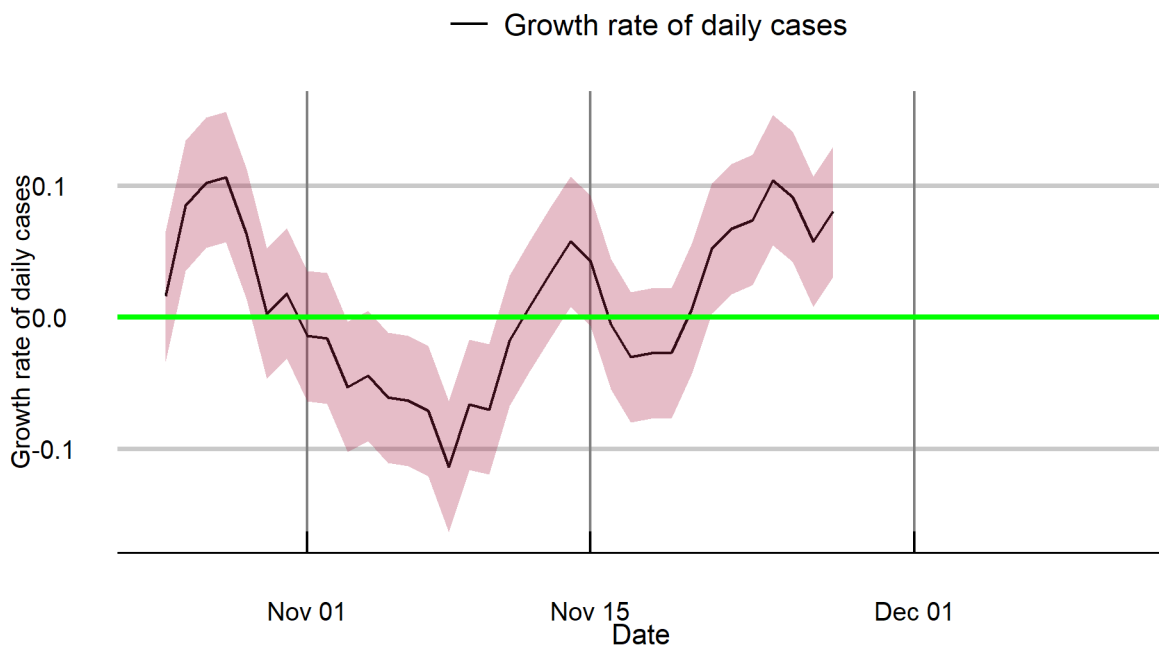




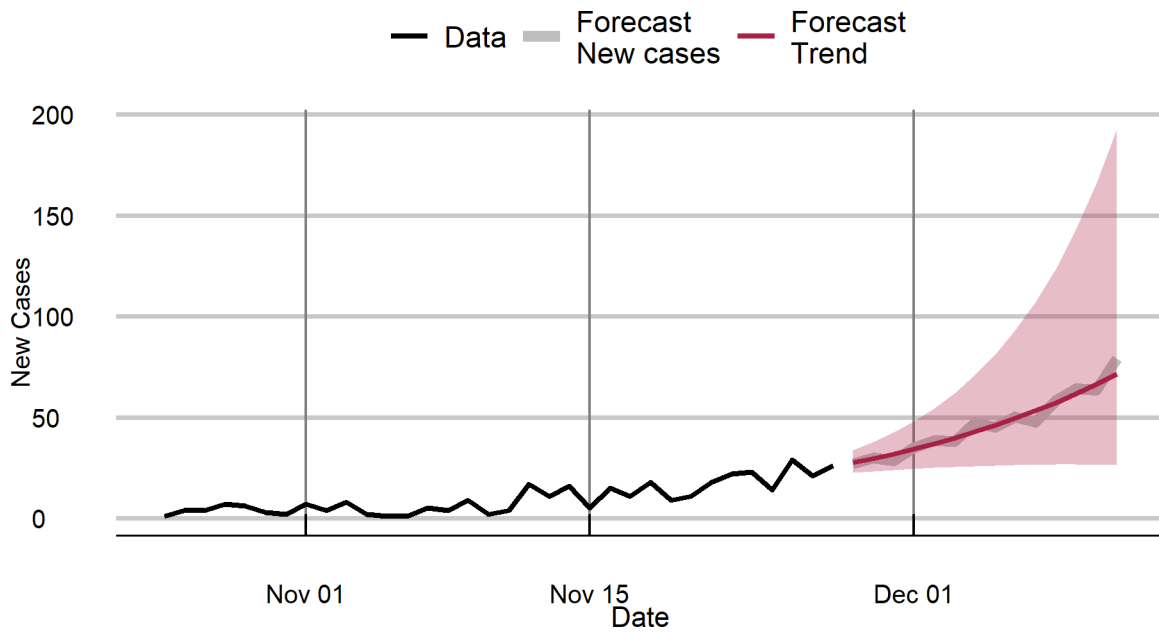
## Madhya Pradesh



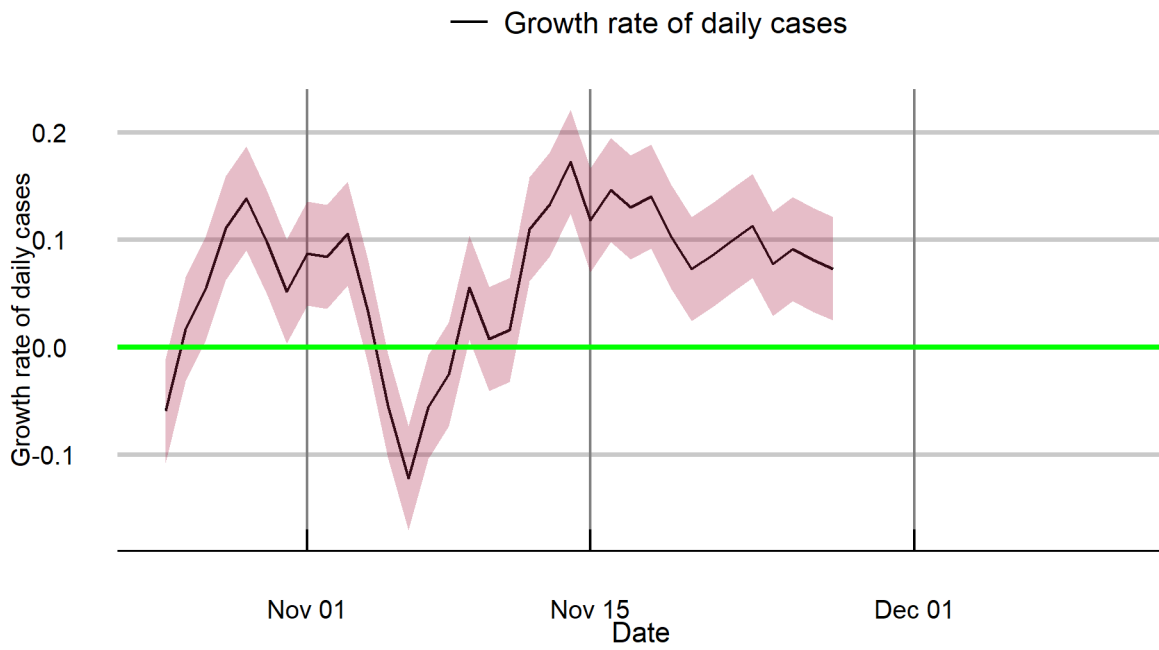
## Madhya Pradesh



## Rajasthan

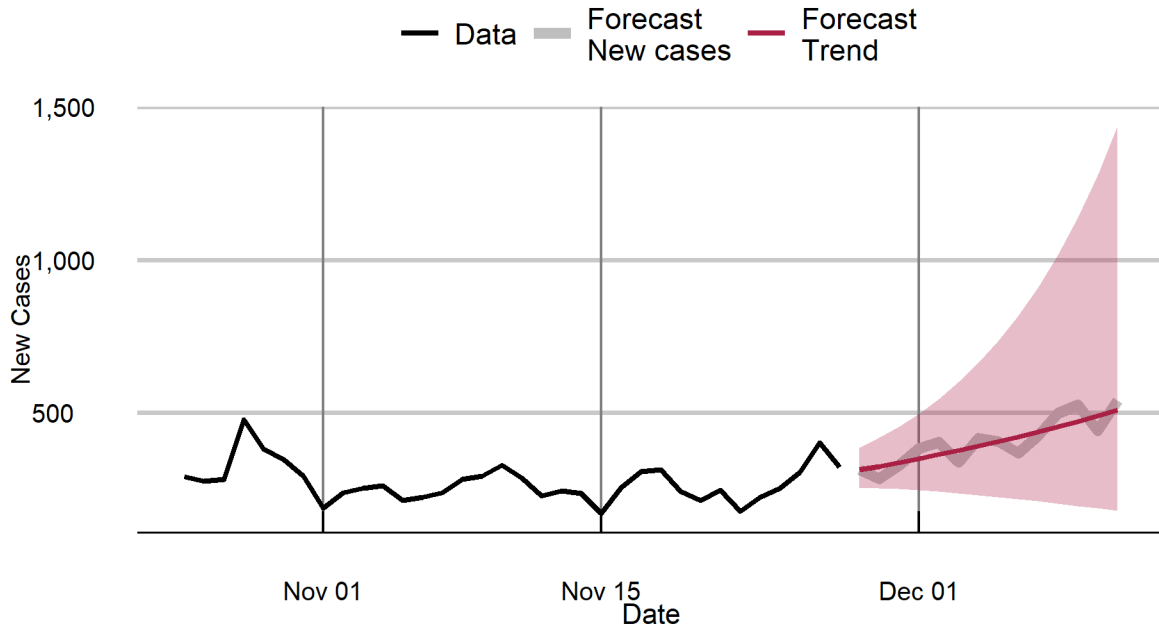


## Rajasthan

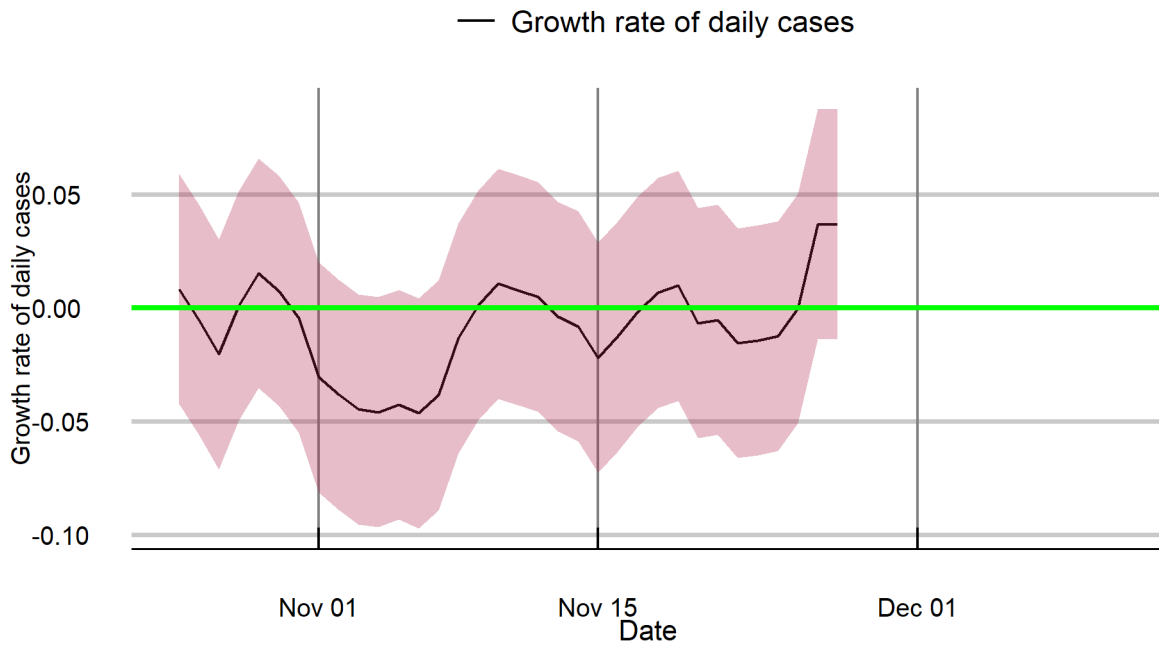


**New cases forecasts (28 November to 11 December) and filtered daily growth rates (14 to 27 November) for States with relatively high infection incidence and positive if mild growth rates**

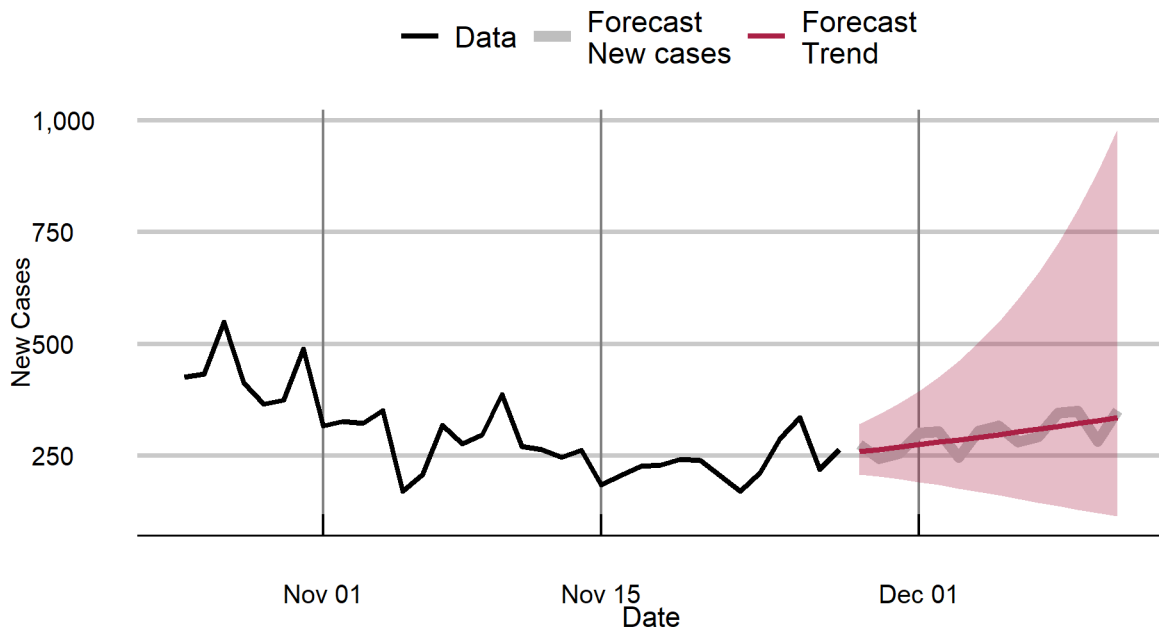
**Karnataka**



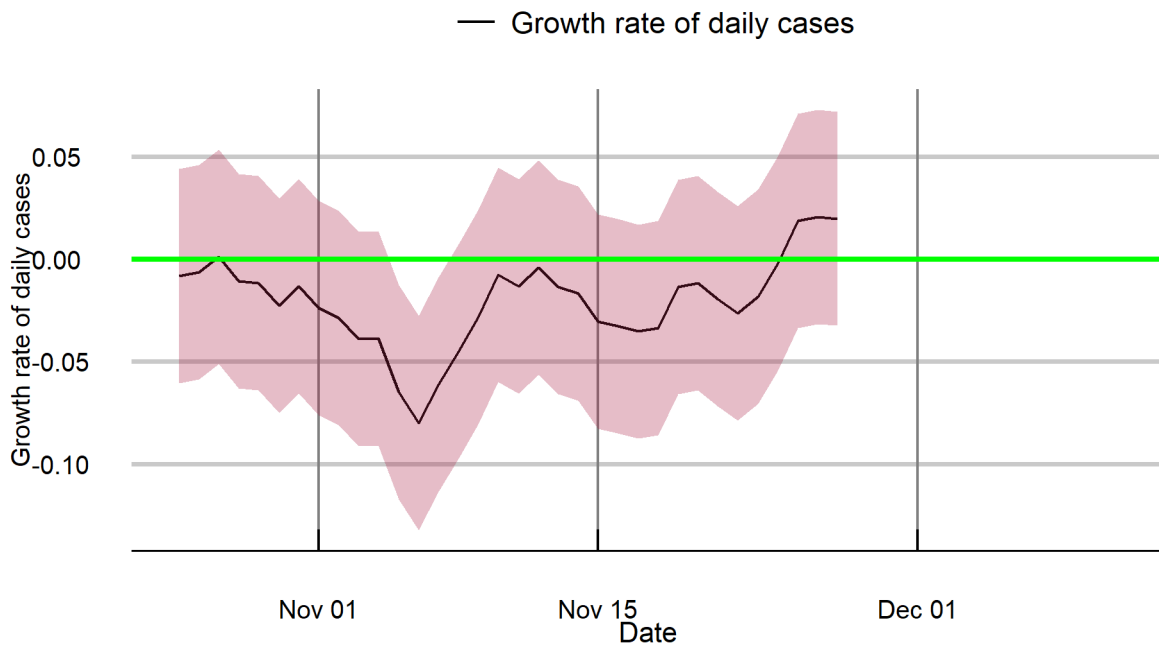
**Karnataka**



## Odisha



## Odisha



## Notes

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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 and deaths data are sourced from Johns Hopkins University (JHU), Center for Systems Science and Engineering (CSSE).

**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/ozgix0yn/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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#Health Systems Transformation Platform.

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