This tracker has been 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. The forecasts are based on a structural time series model that uses historical data in estimation but adapts to the trend emerging in the most recent period. The model is described in Harvey and Kattuman (2021) "Time series models based on growth curves with applications to forecasting coronavirus". *Harvard Data Science Review*, Special issue 1 - COVID-19.

The effective reproduction number ($R_t$) for India as a whole has dropped to 0.95. The trend value of the growth rate of new cases is negative, at -1.2%. Reported cases are likely fall below 30,000 per day by 29th August.

Surges that surfaced earlier in the month in some states have either settled or are settling, while others have sprung up. The downturn of the epidemic in Kerala, the state that currently accounts for half the national total of reported daily cases, has contributed to improvement of the national epidemic trajectory. At the same time, reported cases are expected to increase in 7 states / union territories (Chandigarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Puducherry and Punjab) where cases also appear to be accelerating at the present time (pages 41-44).

There are considerable differences between Indian states in terms of growth and decline of infection. The geographic contiguity of some states currently experiencing increases — Himachal Pradesh, Punjab, Haryana, Chandigarh — underscores the importance of policies to contain spatial spillover of infection.

Mean absolute percentage error of the forecasts of daily cases in India given in the July 25 tracker, for the period August 2 to 7, was 14.2%. Changes in government pandemic policies and in transmission relevant social behaviour may cause realised numbers to depart from forecasts.

1 CJBS COVID-19 Tracker for India can be accessed at: [www.jbs.cam.ac.uk/covid-india](http://www.jbs.cam.ac.uk/covid-india)
The companion spreadsheet contains all the estimates and forecasts.

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Forecasts of daily new cases for the period 16th to 29th August 2021, based on data till 14th August 2021. New COVID-19 cases is likely to be about 29,500 per day by 29th August 2021.

The filtered trend in the growth rate of daily new cases was -0.4% as on 7 August 2021.
R: 15 August 2021

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

Note: Small numbers currently for Andaman and Nicobar Islands, Chandigarh, Dadra and Nagar Haveli, Haryana, Ladakh, Lakshadweep, Madhya Pradesh, Rajasthan and Uttarakhand make the forecasts and estimates less precise.
Daily growth rates of cases (%)  
Trend values as on 15 August 2021
Daily growth rates of cases (%)
Trend values as on 07 August 2021
Daily growth rates of cases (%)
Trend values as on 01 August 2021
Case forecasts and growth rates: States and Union territories

Andhra Pradesh

Data
Forecast
New cases
Trend

New Cases
Aug 01
Aug 15

Growth rate of daily cases
Aug 01
Aug 15
The nature of growth in new cases:
States/UTs with high odds that case numbers are currently accelerating

Chandigarh:
Probability that cases are accelerating.
Probability on 2021-08-15 : 0.91

Gujarat:
Probability that cases are accelerating.
Probability on 2021-08-15 : 0.74
Haryana:
Probability that cases are accelerating.
Probability on 2021-08-15 : 0.46

Himachal Pradesh:
Probability that cases are accelerating.
Probability on 2021-08-15 : 0.76
Jharkhand:
Probability that cases are accelerating.
Probability on 2021-08-15 : 0.66

Puducherry:
Probability that cases are accelerating.
Probability on 2021-08-15 : 0.61
Punjab:
Probability that cases are accelerating.
Probability on 2021-08-15: 0.8
2021-08-02 / 2021-08-15
Notes

Data: COVID-19 confirmed cases and deaths data are sourced from COVID19-India API: https://api.covid19india.org/

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.


Forecast accuracy: is assessed using mean absolute percentage error of the forecasts of cases over the past week. Forecast accuracy will in general be lower for the smaller states / union territories. It is important to pay attention to the confidence intervals around the forecasts. The coverage of the confidence intervals presented is 68%, implying there is 16% probability of the upper bound being exceeded.

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 (2020b). A farewell to R: Time series models for tracking and forecasting epidemics. *Center for Economic Policy Research* (CEPR) working paper, 51. https://cepr.org/content/covid-economics. The confidence interval is based on one standard deviation, with coverage of 68%.

Probability: The probability that the growth of new cases is increasing at an increasing rate is extracted from the statistical model. The pandemic phase is of extreme concern when this probability exceeds 0.5.

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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