

## **Excess mortality in Karnataka during the COVID-19 pandemic: A factsheet<sup>1</sup>**

### *What death registration data is available?*

Monthly registered deaths are available from January 2015 to May 2021 [on github](#). The data was reported in [The Hindu](#). It is currently unclear whether the data is recorded according to date of registration or date of occurrence. Totals for 2015-2019 *exactly* match totals in the [2019 CRS report](#). Figures for 2020 and 2021 are liable to reconciliation, and should be regarded as provisional.

Some provisional data for June 2021 (upto June 29) from the [state portal](#) is also available<sup>2</sup>.

### *What do we know about delays in registration?*

According to the [2019 CRS report](#), 67% of registrations occurred within 21 days, and 79% within 30 days. There were thus, even in pre-pandemic times, relatively large delays in registration.

### *What do we know about registration coverage and trends in the state/within this system?*

According to the [2019 CRS report](#), during 2017, 2018 and 2019 Karnataka saw complete death registration, while registration was 97.5% in 2016. [According to NFHS-5](#), however, registration levels were only 86.6% during the three years prior to the NFHS (which was conducted between July 2019 and December 2019 in the state). This suggests that the CRS-SRS based estimates may overestimate death registration in the state.

Total registered deaths in the available data for 2015-19 exactly match values in the 2019 CRS report. 2018 and 2019 saw year-on-year increases in registered deaths of 0% and 5%, respectively.

### *Are there risks of bias in using this data?*

The exact match with total deaths recorded in the CRS bulletin suggests that this data accurately reflects registered deaths in the state. The main uncertainties are associated with:

- baseline levels of registration being perhaps lower than assumed
- large fluctuations in registration during early 2020 (see below)
- how to choose baseline mortality.

### *Were there unusual fluctuations in registration during the early part of 2020?*

2020 saw some major fluctuations in registered deaths. Looking at 3-month periods, March-May 2020 saw 21% fewer deaths registered than the same period in 2019. Looking at 6-month periods: Feb-July 2020 saw 7% fewer registered deaths than the same period in 2019.

### *What are possible choices for baseline deaths and hence excess deaths?*

We could use 2019 registrations, although with the risk of overestimating baseline mortality, and underestimating excess mortality, especially during the early days of the pandemic. Alternatively, we could use an average over 2017-2019, or a rescaled average.

### *What do monthly excess deaths look like relative to various baselines?*

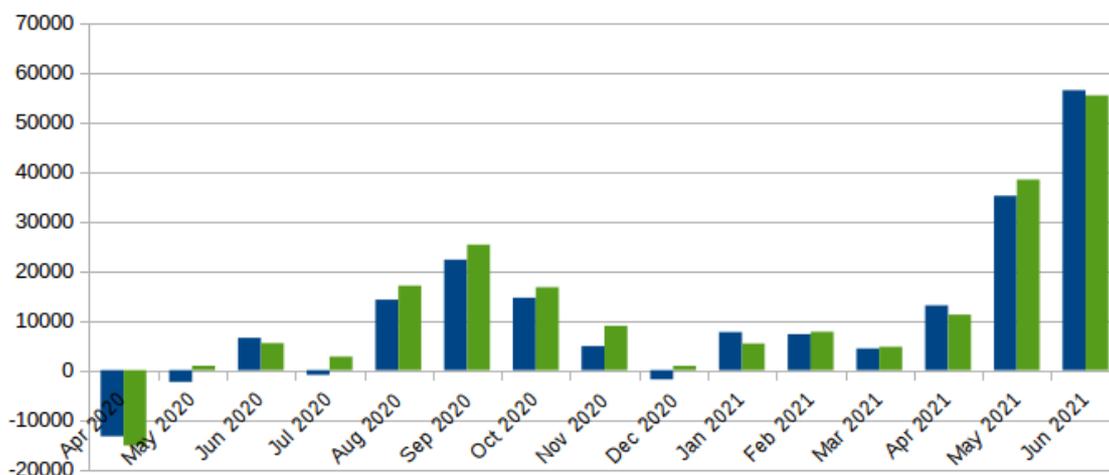
Below is a plot of excess deaths, relative to a 2019 baseline, and a 2017-19 average baseline. No rescaling has been carried out and cumulative excess deaths (using either baseline) are negative until August, 2020. The death registration data for June 2021 is upto June 29, 2021 when the state portal listed a total of 93797 deaths registered during the month.

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1 Prepared on 22<sup>nd</sup> August 2021, by Murad Banaji and Aashish Gupta.

2 Many thanks to Dr Christopher T. Leffler for sharing this data

Karnataka: excess deaths relative to 2019 (blue) and 2017-19 (green)



What is the scale of first and second wave excess deaths relative to various baselines?

We have the following estimates (official COVID-19 deaths are from [covid19india.org](https://covid19india.org)):

	excess deaths (to nearest 1000)		excess deaths per 1000 population		surge relative to baseline		ratio of excess deaths to official COVID-19 deaths	
	2019 baseline	2017-19 baseline	2019 baseline	2017-19 baseline	2019 baseline	2017-19 baseline	2019 baseline	2017-19 baseline
<b>Apr 2020-Feb 2021</b>	59	76	0.9	1.1	13%	17%	4.8	6.1
<b>March-May 2021</b>	53	54	0.8	0.8	45%	43%	3.1	3.2
<b>*March-June 2021</b>	109	110	1.6	1.6	71%	72%	4.8	4.8
<b>Apr 2020-May 2021</b>	111	130	1.7	2.0	19%	23%	3.8	4.5
<b>*Apr 2020-Jun 2021</b>	168	185	2.5	2.8	27%	31%	4.8	5.3

(\* = based on additional data for June 2021 from the [state portal](#).)

The first wave accounts for 35-40% of the excess mortality recorded upto the end of June. This suggests that Karnataka was hit more evenly in the two waves of the epidemic than some states.

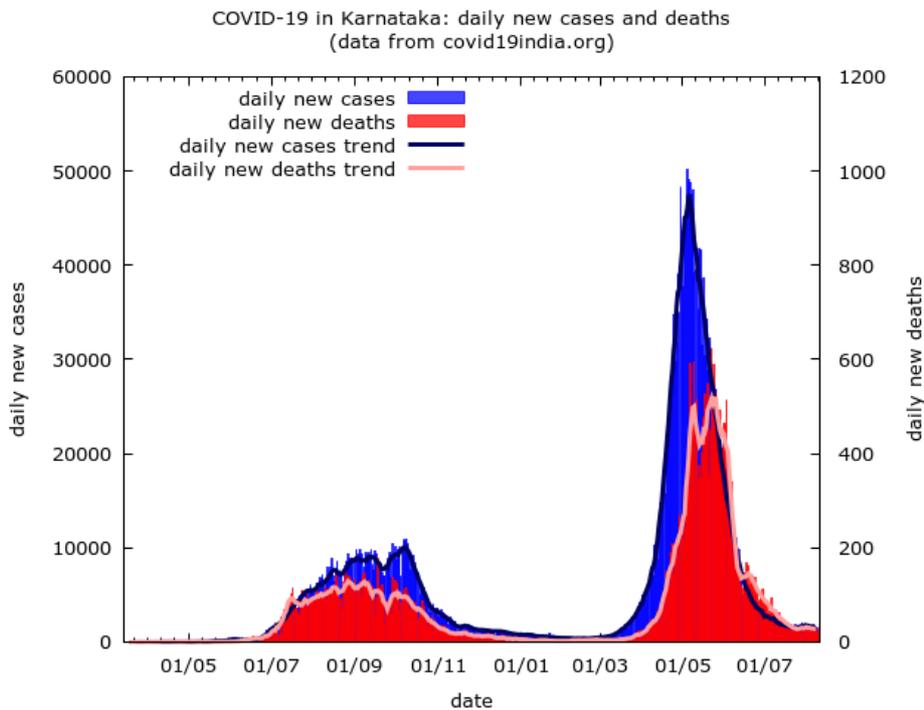
*Are there other notable features in the death registration data?*

Most notable is the marked drop in registrations around March-May, 2020, followed by significant first wave excesses during August to October, 2020. For example, September 2020 saw 49% more death registrations than September 2019.

Also notable are excess deaths in January and February, 2021, a period when recorded COVID-19 cases and deaths in the state were few (see below). It is unclear whether this reflects delays in registration, undetected COVID-19 spread, or trends in registration which could occur as a consequence of baseline registration in 2019 having been overestimated.

*What are the broad features of the state's COVID-19 epidemic so far?*

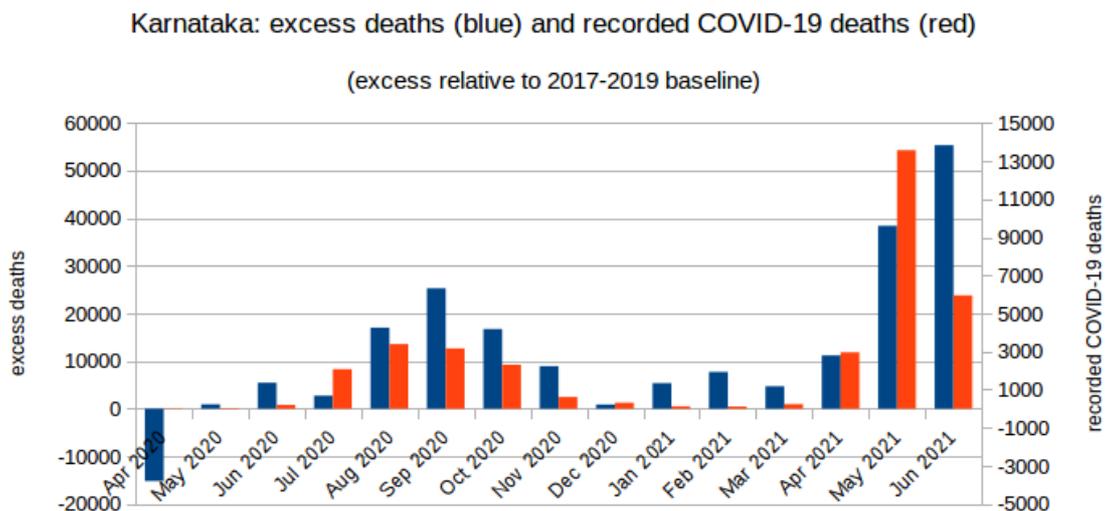
The trajectory of recorded COVID-19 cases and deaths, using data from [covid19india.org](https://covid19india.org), is shown below.



The first-wave COVID-19 peak in daily cases occurred around October 7, 2020 at just over 10K daily cases. The rise to peak was gradual with daily cases crossing 2.5K as early as July 12 (almost three months before peak). The second wave peak occurred around May 6, 2021 at around 47.5K daily cases.

*How does the mortality data align with official COVID-19 data?*

Excess deaths relative to 2017-19 average values, alongside recorded COVID-19 deaths from [covid19india.org](https://covid19india.org), are plotted below.



The picture relative to a 2019 baseline is qualitatively similar. It seems possible that delays in death registration account for the fact that although recorded COVID-19 deaths in June 2021 are many fewer than in May 2021, excess mortality in June is considerably greater than in May.

Relative to a 2019 baseline: there is a reasonable correlation (correlation coefficient: 0.68) during April 2020-February 2021 between monthly recorded COVID-19 deaths and monthly excess deaths. This rises to 0.81 if we consider the period April 2020-May 2021, or 0.73 if we consider the period April 2020-June 2021.

Relative to a 2017-19 baseline: there is an improved correlation (correlation coefficient: 0.74) during April 2020-February 2021 between monthly recorded COVID-19 deaths and monthly excess deaths. This rises to 0.82 if we consider the whole period April 2020-May 2021, or 0.76 if we consider the period April 2020-June 2021.

#### *Other notes*

It is possible that Karnataka's baseline registration coverage prior to the pandemic was incomplete, and further dropped during the early days of the pandemic. It may have recovered to or beyond 2019 levels by early 2021; this would be one possible explanation for the significant excess in registrations in the early part of 2021. Taking such trends into account would have an unclear effect on total excess deaths during the pandemic. For example, relative to a 2017-19 baseline, total excess deaths during Jan-March 2021 are close in absolute value to the *negative* excess during April 2020.