

Excess mortality in Maharashtra during the COVID-19 pandemic: A factsheet¹

What death registration data is available?

Monthly registered deaths from the online civil registration system from Jan 2018 to May 2021, broken down by gender, are [available on github](#). The data was reported in [The Hindu](#). The data is recorded according to date of death.

What do we know about delays in registration?

Data on registration delays in Maharashtra is not available in the [2019 CRS report](#).

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

According to the 2019 CRS report, Maharashtra saw complete death registration in 2018 and 2019. [According to NFHS-5](#), however, registration levels were only 89.7% during the three years prior to the NFHS (which was conducted between June 2019 and December 2019 in the state). This compares to a 98.1% assumed coverage over 2017-19 and a 97.3% assumed coverage over 2016-19 based on the 2019 CRS report. This suggests that the CRS-SRS based estimates may considerably overestimate death registration in the state.

Total registrations for 2018 and 2019 in the online system are 64% and 67% of the registrations recorded in the 2019 CRS report respectively. The 2019 total in the online system is 8% greater than the total in 2018.

There is a slight increasing trend in monthly registrations in the online system during 2019 which is not, however, statistically significant.

Are there risks of bias in using this data?

There are risks associated with the fact that baseline levels of registration based on SRS-CRS data may have been overestimated, and the fact that the online system covered only around 67% of registrations in 2019. There is also a slight increasing trend of registrations in the online system, which might affect calculations.

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

No three month period of 2020 saw fewer registrations than in 2019; however February to April, 2020 saw around the same number of registrations as this period during 2019, even though the pandemic hit Maharashtra quite early and Mumbai recorded around 12% more death registrations in April 2020 compared to April 2019. So, it is possible that there was indeed a drop in registrations compared to baseline, offset by a rise in mortality.

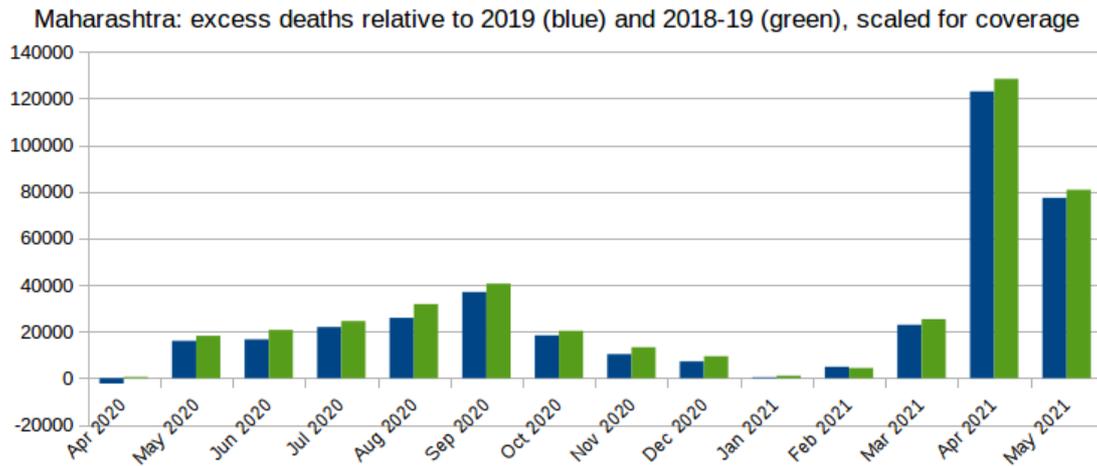
What are possible choices for baseline deaths and hence excess deaths?

2019 values or a 2018-19 average can give baseline expectations for registered deaths during the pandemic. Excess registered deaths calculated against such a baseline can then be rescaled to account for coverage in the online system.

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 2018-19 baseline.

¹ Prepared on 22nd August 2021, by Murad Banaji and Aashish Gupta.



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):

	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	2018-19 baseline	2019 baseline	2018-19 baseline	2019 baseline	2018-19 baseline	2019 baseline	2018-19 baseline
Apr 2020-Feb 2021	156	185	1.3	1.5	24%	30%	3.0	3.5
March-May 2021	223	234	1.8	1.9	134%	144%	5.2	5.4
Apr 2020-May 2021	379	419	3.1	3.4	47%	53%	4.0	4.4

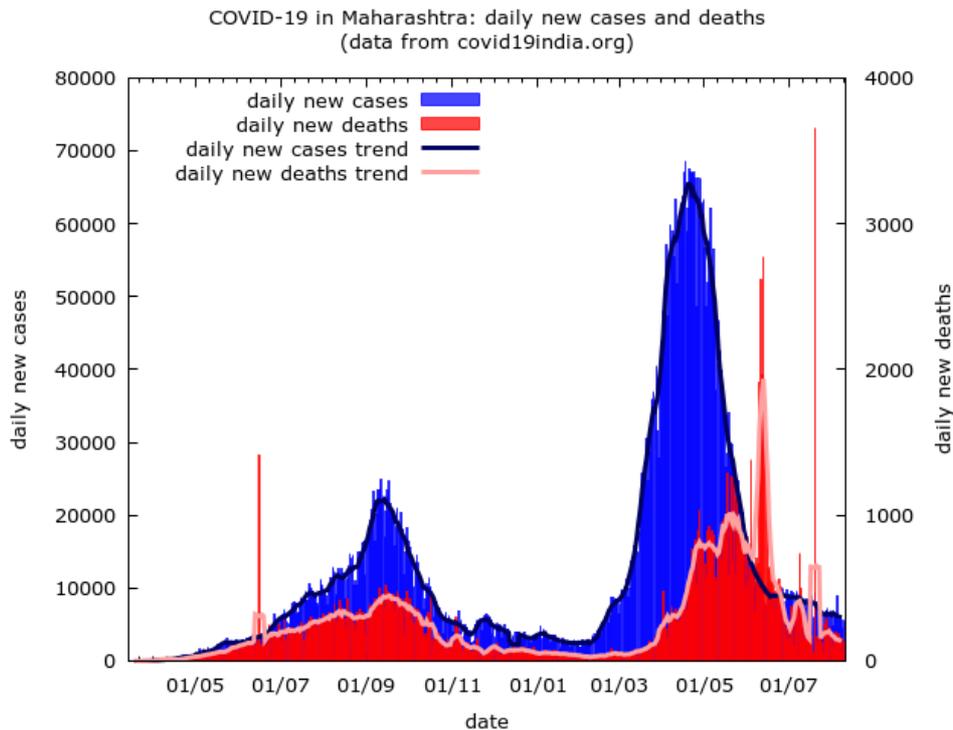
The first wave thus accounted for around 41-44% of excess deaths as recorded upto May, 2021. There is a possible increase in the ratio of excess deaths to recorded COVID-19 deaths during the second wave; this is, however, possibly a consequence of delayed recording of COVID-19 deaths, discussed below.

Are there other notable features in the death registration data?

First wave excess deaths are distributed throughout May-December, 2020, although there is a clear peak in September. The fact that excess deaths return close to zero during January-February 2021 provides some reassurance that using either baseline is reasonable. The second wave is visible in excess mortality data quite early with significant excess deaths already in March 2021, and a peak (in data so far) during April, 2021.

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, is shown below.

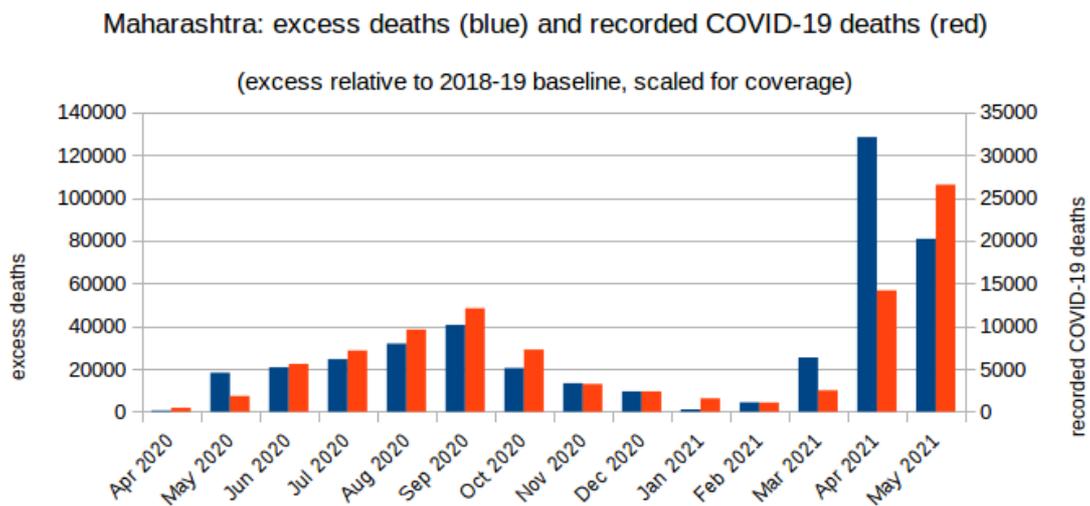


The state saw a first wave peak in daily cases at around 22K daily cases around September 14, 2020. The second wave peak in daily cases, at around, 65K daily cases occurred around Apr 21, 2021.

During the first two weeks of June, Maharashtra [added almost 13,000 "backlog" COVID-19 deaths](#), to its official count. A further [3998 backlog deaths were added in July](#). It is likely that many of these deaths actually occurred in May or earlier.

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

Excess deaths relative to 2019 values, scaled for coverage in the online system, alongside recorded COVID-19 deaths (from [covid19india.org](#)) are plotted below.



Using either a 2019 baseline or a 2018-19 baseline, there is a very strong correlation (correlation coefficient: 0.94) during April 2020 to February 2021 between monthly recorded COVID-19 deaths and monthly excess mortality. This drops to 0.78 if we consider the whole period between April 2020 and May 2021.

The drop in correlation when we consider the second wave period is likely, at least in part, a consequence of the delays in the recording of COVID-19 deaths during the second wave (see above). This could be the reason why excess deaths and recorded COVID-19 deaths went "out of sync" during April and May, 2021.