

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

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

Monthly registered deaths from the civil registration system in Andhra Pradesh, from January 2018 to May 2021, is [available on github](#). This data was reported in [Scroll.in](#). Summary data from Andhra Pradesh's CRS portal is [publicly accessible](#), and an updated monthly series, including June 2021, is also [available on github](#). The death registration data is recorded according to the date of registration, and not according to the date of death.

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

According to the [2019 CRS report](#), 91% of registrations occurred within 21 days, and 93% within 30 days. Registration delays in 2018 were similar.

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

According to the 2019 CRS report, during 2015, 2016, 2017, 2018 and 2019 Andhra Pradesh saw death registration of 85.6%, 89.5%, 95.4%, 100% and 100%. [According to NFHS-5](#), however, registration levels were only 80.2% during the three years prior to the NFHS (which was conducted between July 2019 and November 2019 in the state). This is considerably lower than the presumed 96% based on SRS-CRS estimates for 2016 to 2019. This suggests that the SRS-CRS estimates may considerably overestimate death registration in the state.

In 2018, the online system captured 88.7% of all registered deaths, and in 2019, the online system captured 90.6% of all registered deaths. We thus rescale our baseline and pandemic mortality estimates to adjust for coverage in the online CRS system.

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

The data in the online system appears to be relatively complete and up-to-date, without any major unexplained fluctuations. There is no significant trend in registrations in this system during 2019. There are, however risks associated with fluctuations in registration during 2020, and with possible overestimation of registration coverage in the state.

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

Registrations during February-April 2020 were 12% below the values in 2019. Registrations during January-June 2020 were 8% below the values in 2019. There were thus very significant fluctuations in registration during the early part of 2020.

Birth registration was also affected in this period – the whole of 2020 saw 6.5% fewer births compared to the year 2019. Birth and death registration were disrupted during the same months. Given that we do not expect immediate effects of the lockdown or the pandemic on fertility, these birth registration drops suggest that birth registration was disrupted.

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

2019 values or the 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 again to account for registration coverage in the online system.

An alternative choice is to adjust 2020 registered deaths (but not 2021 registered deaths) according to the 2020 drop in birth registration. I.e., we assume a 6.5% drop in registration coverage during 2020 relative to 2019, but recovery to 2019 levels in 2021. This calculation assumes that the drop in

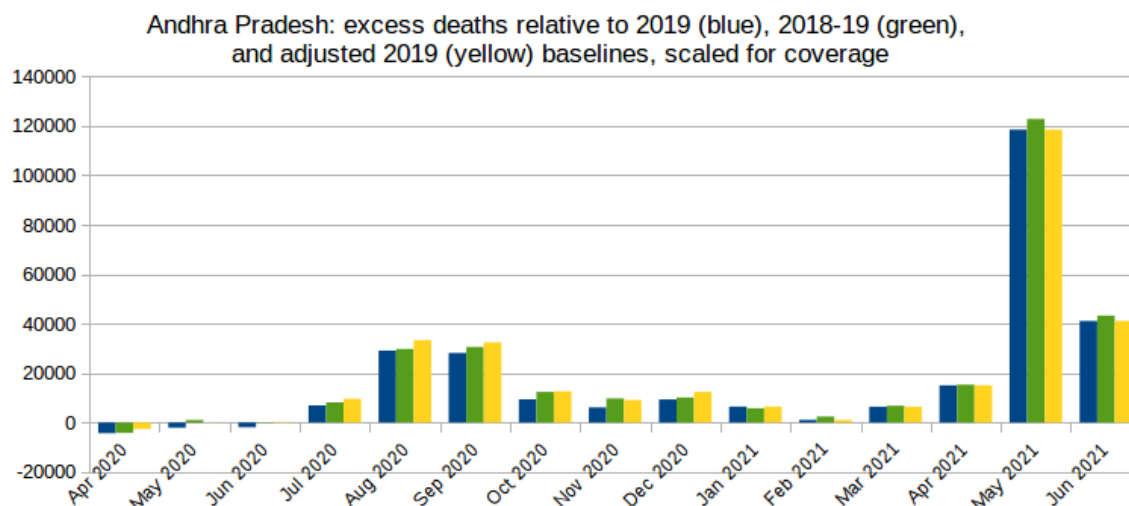
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<sup>1</sup> Prepared on 23<sup>rd</sup> August 2021, by Murad Banaji and Aashish Gupta. Updated October 6<sup>th</sup> 2021.

birth registrations reflects disruption to registration, which applies also to death registration. This baseline is referred to as an "adjusted 2019 baseline" below.

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

Below is a plot of excess deaths relative to a 2019 baseline, a 2018-19 baseline and an adjusted 2019 baseline. In each case, the values are scaled for coverage in the online system.



*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	2018-19 baseline	2019 baseline	2018-19 baseline	2019 baseline	2018-19 baseline	2019 baseline	2018-19 baseline
<b>Apr 2020-Feb 2021</b>	88	106	1.7	2.0	24%	30%	12.3	14.7
<b>March-June 2021</b>	181	188	3.4	3.6	143%	154%	32.7	34.0
<b>Apr 2020-June 2021</b>	269	294	5.1	5.6	54%	61%	21.2	23.1

The figures for the adjusted 2019 baseline are very similar to those for the 2018-19 baseline. The calculations suggest that 30-40% of recorded COVID-19 deaths in the state occurred during April 2020-February 2021. All calculations suggests that recording of COVID-19 deaths got considerably worse during the second wave.

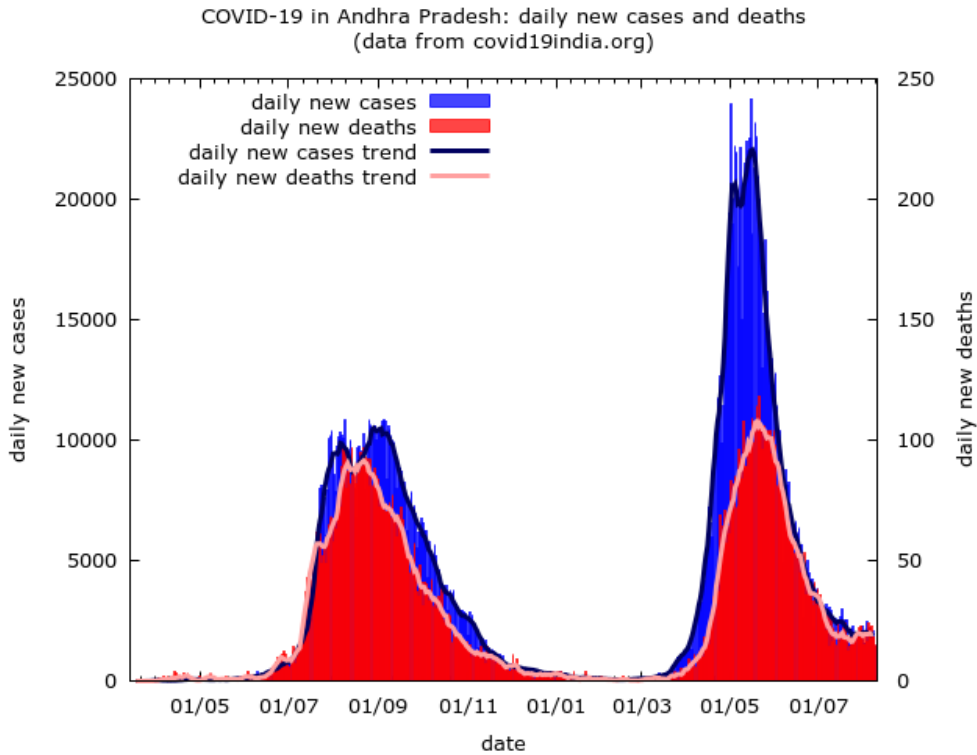
*Are there other notable features in the death registration data?*

The greatest 2020 excess mortality was in November, 2020. This coincides with a second surge in the state which followed a surge in COVID-19 cases in Delhi late in 2020.

The mortality surge in Andhra Pradesh is very high. Around 295K deaths between April 2020 and June 2021 imply that an additional 0.55% of Andhra Pradesh's population died in this period. This level of mortality is 1.73 times usual mortality in the state.

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

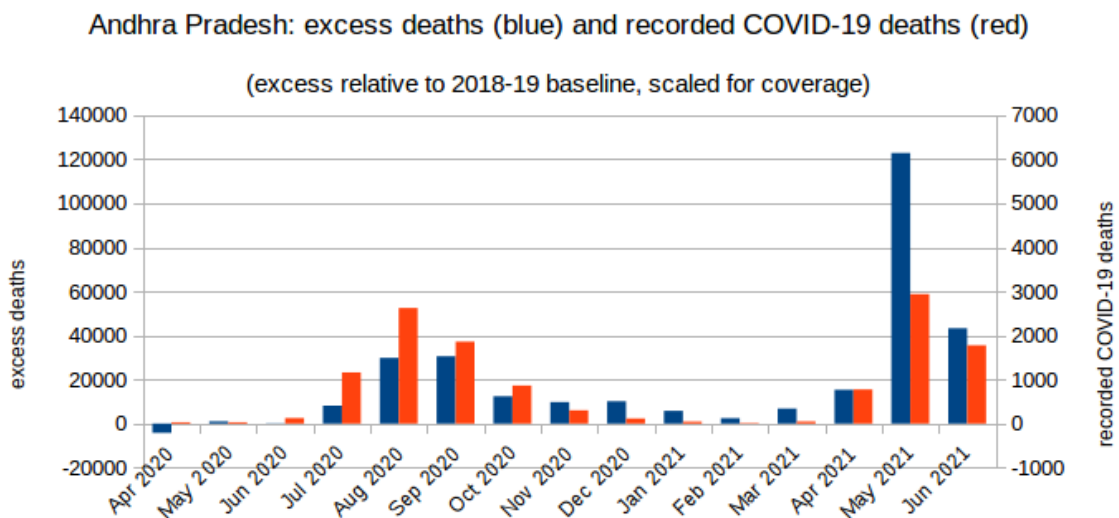
The trajectory of recorded COVID-19 cases and deaths, using data from [covid19india.org](https://covid19india.org), is shown below.



The first wave peak, at around 10.5K daily cases, occurred around July 15, 2020. The second wave peak, at around 22K daily cases, occurred around May 17, 2021.

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

Excess deaths relative to 2018-19 values, alongside recorded COVID-19 deaths from [covid19india.org](https://covid19india.org), are plotted below.



There is a fairly high correlation between monthly recorded COVID-19 deaths and monthly excess deaths. Using either the 2019 or the 2018-19 baseline, during April 2020-February 2021, the correlation coefficient is 0.90, dropping to 0.82 over the period April 2020-June 2021. Using the adjusted 2019 baseline the correlation coefficients rise to 0.91 and 0.84 respectively.

*Other notes*

Given that the second surge was still winding down in June 2021, it is likely that July 2021 would also see some excess mortality. July 2021 is also likely to record excess deaths because of delayed registration of deaths that occurred in June 2021. If, as the NFHS-5 report suggests, the completion of death registration in Andhra Pradesh was lower than suggested by the CRS report, this would raise estimates of excess mortality in the state even further.