

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

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

Monthly deaths registered in Punjab's civil registration system, from January 2015 to June 2021 are [available on github](#). The data was reported in [The Hindu](#). It is currently unclear whether the data is recorded according to date of death or date of registration.

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

According to the [2019 CRS report](#), 99% of registrations occurred within 21 days. Registration was thus prompt in pre-pandemic times.

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

According to the 2019 CRS report, Punjab saw complete death registration during 2012 to 2019. Total registrations for 2015 to 2019 in the available data range from 99% to 100% of the registrations recorded in the 2019 CRS report. Registrations increased by 1% between 2016 and 2019, and there is no significant trend in registrations during 2019.

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

The close match between yearly totals in the available data and in the CRS report, along with lack of significant trends in registered deaths over the pre-pandemic period, provides some confidence in the integrity of the data. There are, however some drops in registration around the time of national lockdown.

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

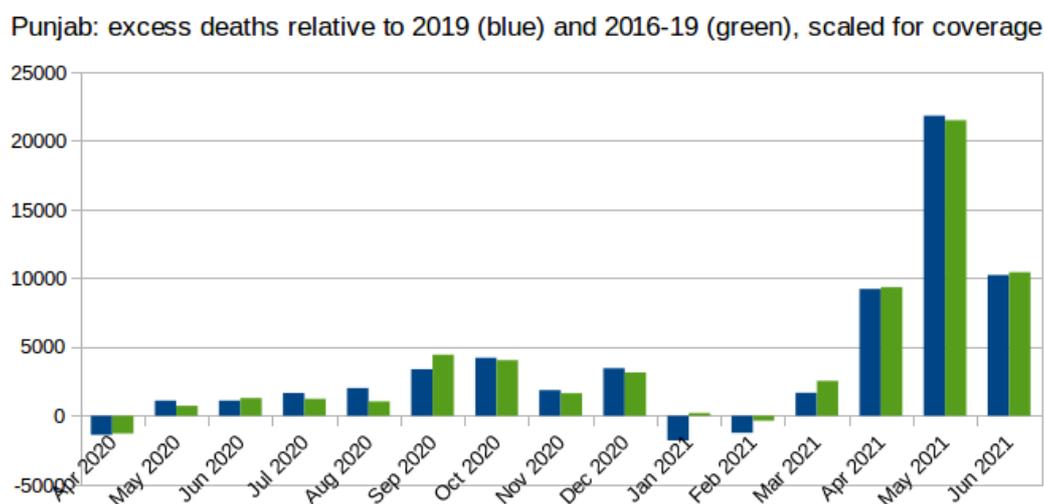
February to April, 2020 saw an 8% drop in registrations relative to the same period in 2019. No six month period of 2020 saw a significant drop in registrations relative to the same period in 2019.

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

2019 values, possibly adjusted for a drop in coverage, or an average over previous years can give baseline expectations for registered deaths during the pandemic. Registered deaths in the system during January-April 2020 are almost exactly equal to the average over this period during 2016-2019, so the average over 2016-2019 is one possible choice for baseline.

### *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 2016-19 baseline.



<sup>1</sup> Prepared on 22<sup>nd</sup> 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](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	2016-19 baseline	2019 baseline	2016-19 baseline	2019 baseline	2016-19 baseline	2019 baseline	2016-19 baseline
<b>Apr 2020-Feb 2021</b>	14	16	0.5	0.5	7%	8%	2.5	2.8
<b>March-June 2021</b>	43	44	1.4	1.5	65%	67%	4.2	4.3
<b>Apr 2020-June 2021</b>	57	60	1.9	2.0	22%	23%	3.6	3.7

According to these calculations, 73-75% of the total excess deaths upto June, 2021 occurred during March-June 2021. Thus, according to the mortality data, Punjab was hit considerably harder during the second wave of the pandemic. The extent of this asymmetry may be exaggerated if there was, in fact, a significant drop in registration during the early days of the pandemic (more discussion later).

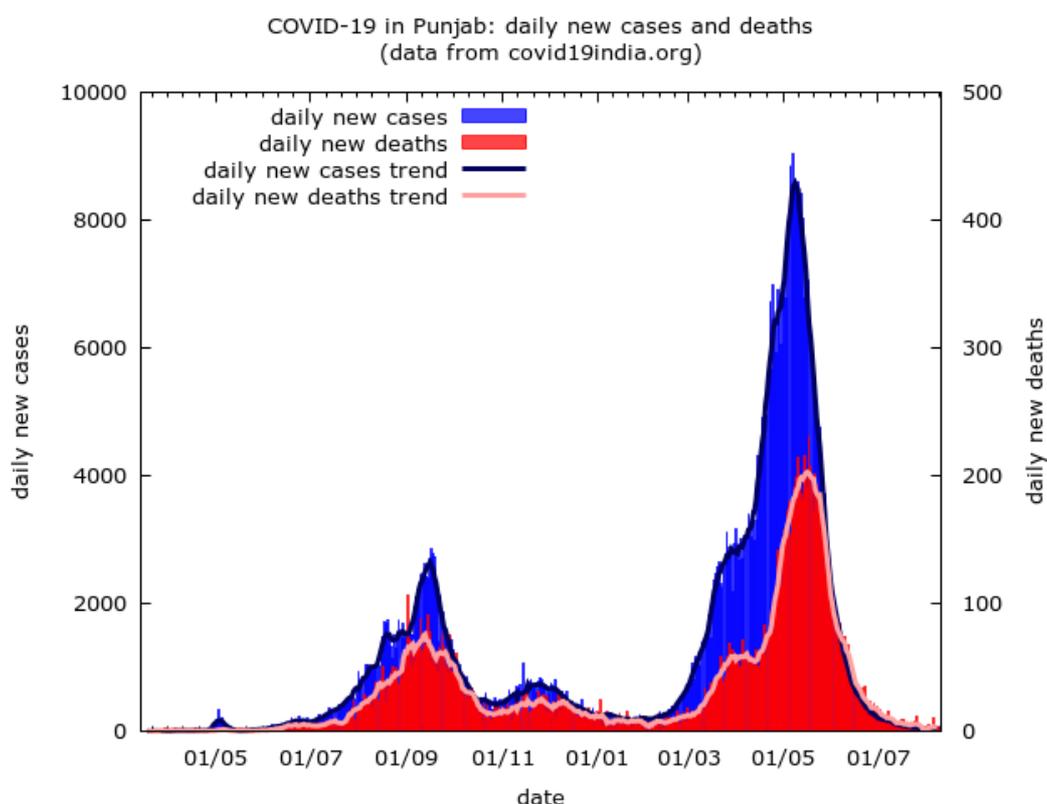
*Are there other notable features in the death registration data?*

What appears as a slight increase in excess deaths during December 2020 is consistent with a slight uptick in daily cases in November and December 2020.

Another notable feature in the data is that we see signs of an increase in mortality in March 2021, consistent with Punjab being hit early during the second wave of the pandemic.

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

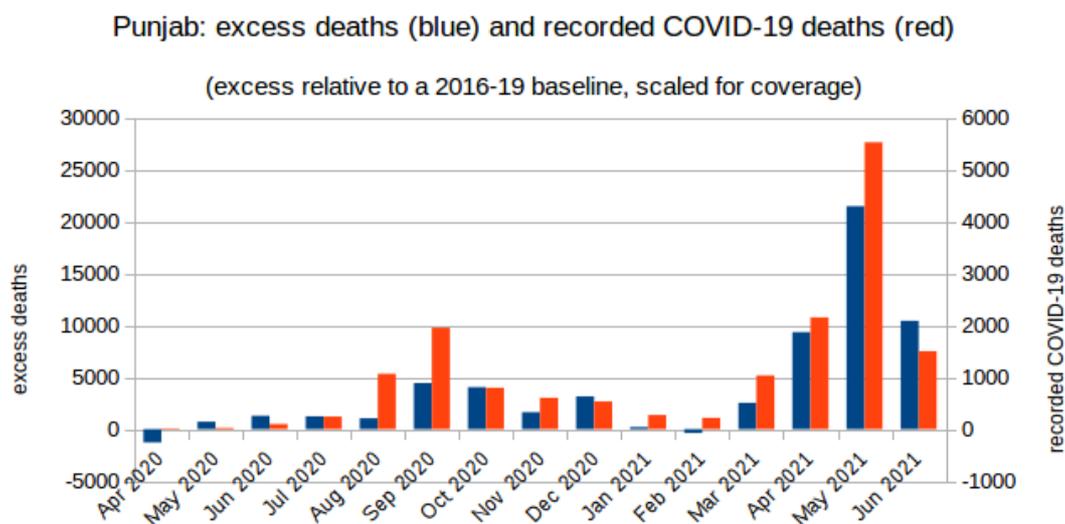
The trajectory of recorded COVID-19 cases and deaths, using data from [covid19india.org](https://covid19india.org), is shown below.



The state saw a first wave peak, at around 2600 daily cases, around September 16, 2020; and a second wave peak, at around 8600 daily cases, around May 9, 2021. The second wave surge was clearly visible by March 2021.

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

Excess deaths relative to a 2016-2019 baseline, alongside recorded COVID-19 deaths from [covid19india.org](https://covid19india.org), are plotted below.



With a 2016-19 average baseline, there is a reasonable correlation (correlation coefficient: 0.73) during April 2020-February 2021 between monthly COVID-19 deaths and monthly excess deaths. This rises to 0.95 if we consider the whole period April 2020-June 2021. If we choose, instead, to use 2019 values as a baseline, these correlation coefficients drop to 0.61 and 0.93 respectively.

*Other notes*

There is some indication in the data that registration coverage may have dropped during the pandemic. If, say, we assume a 5% drop in coverage relative to a 2016-19 baseline throughout the pandemic period, this increases excess deaths over April 2020-June 2021 to 77K. In this scenario, we find excess mortality more closely tracking official COVID-19 deaths during December 2020 to March 2021. Moreover the ratio of excess deaths to COVID-19 deaths now remains almost unchanged during wave 1 and wave 2.