

Some U.S. coronavirus curves are starting to flatten

April 6 2020, by Dana Goldman, Stephanie Hedt



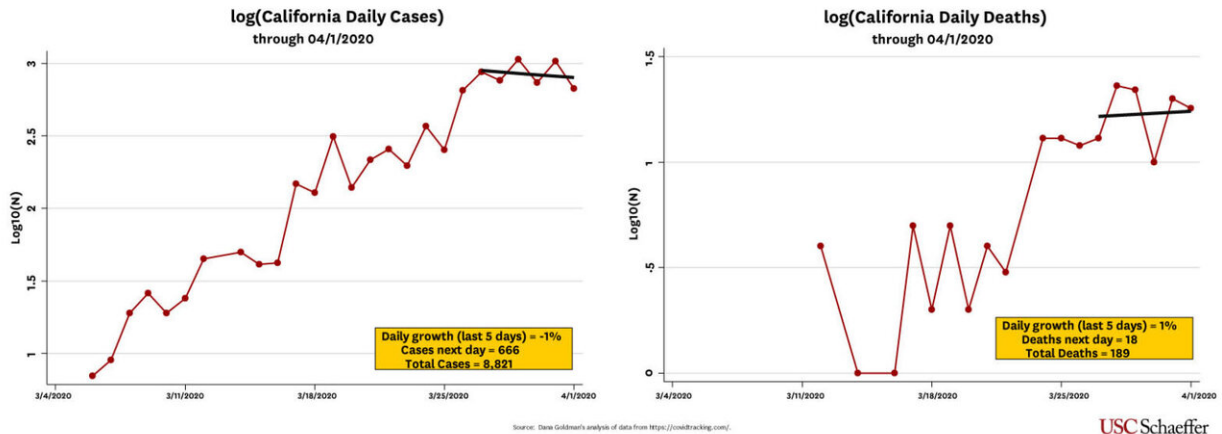
Credit: University of Southern California

To slow the exponential growth of coronavirus, and lessen the burden on hospitals and healthcare workers, local and state officials have issued sweeping mandates closing non-essential businesses and schools and ordering residents to stay at home. But have these blunt measures started to "flatten the curve" of the virus' spread?

Data from recent days, as seen in the charts below, point to encouraging results. We review daily deaths reported in California, New York, and the U.S. as a whole. While case numbers are regularly reported and updated, the number of cases is fraught with bias due to testing constraints and local policies. For example, a state may have fewer cases simply because they have been more restrictive in who gets a test. Deaths are a more reliable indicator of the spread and intensity of the pandemic.

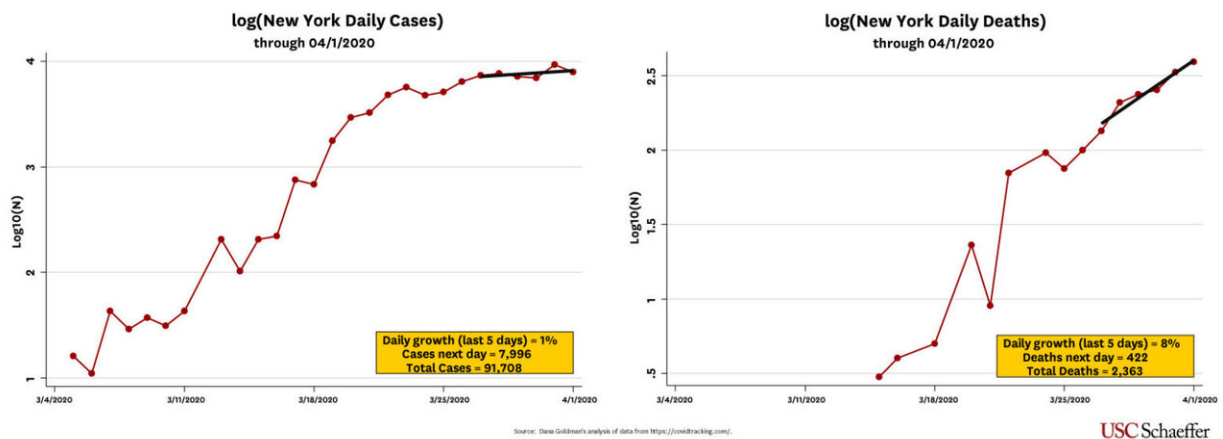
The charts below are plotted on a [logarithmic scale](#). Each step on the [vertical axis](#) represents a ten-fold increase in either cases or deaths (depending on the chart). When there is [exponential growth](#) (as in the case of virus spread), a logarithmic scale shows more clearly the deviations from exponential growth.

California



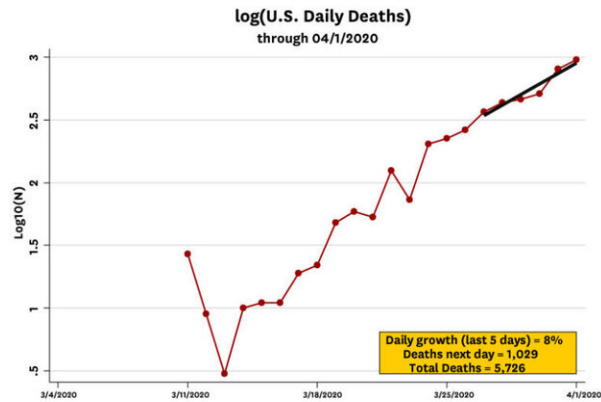
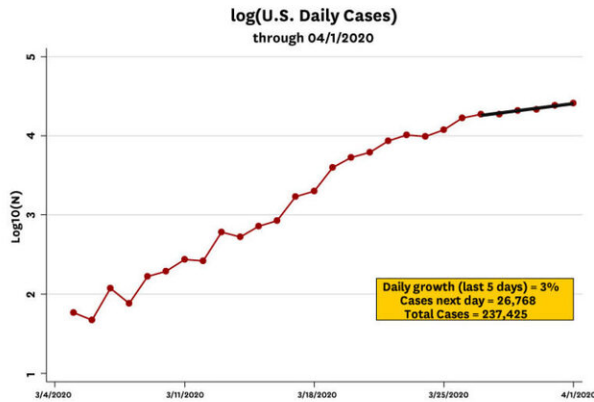
California was the first state to issue a state-wide stay at home order (on March 19th) and the data are starting to show the state has benefited: cases and deaths both look to be flattening. Within the last week, the daily growth rate has come down to essentially zero, which should make the hospital caseload more manageable.

New York



In contrast, New York did not issue a state-wide mandate until March 22, even though the state had been named an epicenter long before then. The caseload chart gives New York hope that it will soon see a flattening, but deaths are still rising much more steeply than in California.

United States

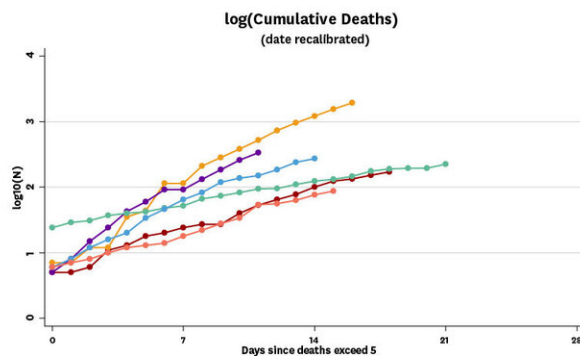
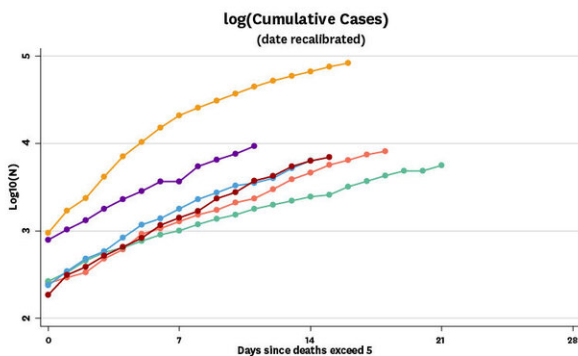


Source: Dana Goldstein's analysis of data from <https://covidtracking.com/>.

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For the U.S. as a whole, we still are seeing growth in the epidemic. Again, it is most important to watch the number of deaths, but cases give a sense of the current magnitude.

Below we break out trends in six states. The graphs map days since deaths in each state exceed five, which allows us to compare trends by states.

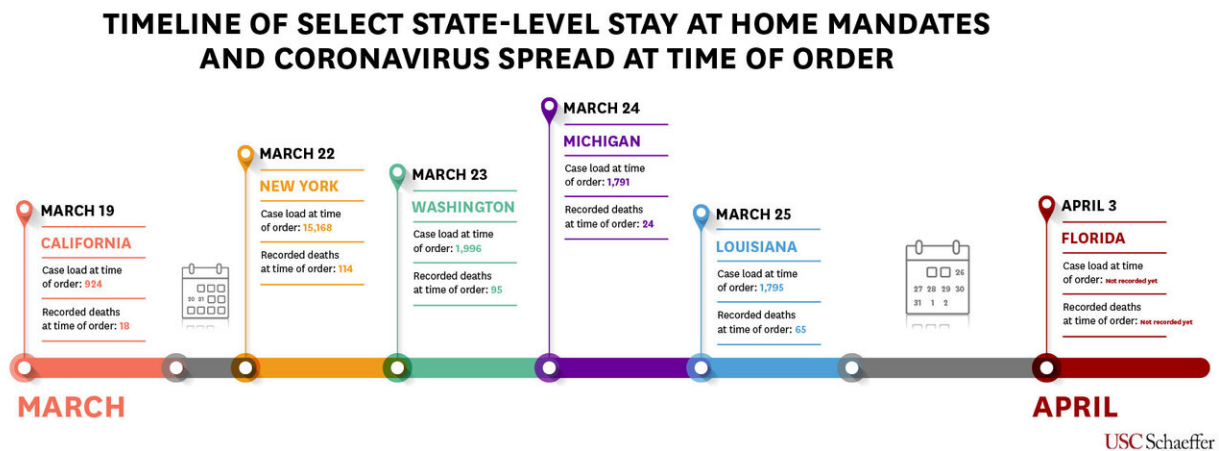


Legend: CA (red), NY (orange), HI (purple), WA (green), LA (blue), FL (dark red)

Source: Dana Goldstein's analysis of data from <https://covidtracking.com/>.

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You can see states like Florida (which was the most recent state to implement a state-wide stay at home order), are having a bit more trouble in caseloads compared to California. While New York is well above other states in terms of magnitude, states that implemented stay-at-home mandates early are beginning to see a deviation from the growth rate (the curve of the graph) compared to those states that did not.



Ultimately, the public health goal is to keep the number of hospitalizations manageable. To that end, we want to flatten not only the case curve but more importantly the hospitalization curve because the most severe cases require hospitalization and intensive healthcare resources. Deaths are closely tied to hospitalizations and thus reflect

resource use and potential capacity constraints. We'd expect more deaths to occur where there is unconstrained spread of the virus because the capacity of the local healthcare systems will not be able to keep up.

However, it is important to remember that deaths are a lagging indicator (by about two or three weeks) of oncoming demand on hospital resources because of the average time from exposure to the onset of severe symptoms. We are starting to see evidence that these stay-at-home measures are working, and the next couple weeks will be telling.

Provided by University of Southern California

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