

# Comment on “Forecasting COVID-19 impact on hospital bed-days, ICU-days, ventilator-days and deaths by US state in the next 4 months”

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Governments are considering IHME’s projections of the COVID-19 epidemic in U.S. states [1] in order to help with planning hospital resources. However, these projections may severely underestimate the number of deaths, hospitalizations, ICU utilization, and ventilator utilization because they assume that any state that has implemented three out of the following four interventions will see an epidemic trajectory similar to that reported in Wuhan, China. The interventions they consider are

- school closures
- non-essential business closures
- travel restrictions including public transportation closures
- stay-at-home recommendations

It is unlikely that implementing even all four of these measures will yield results like those reported by China, given the multiple steps taken in China’s lockdown (some of which are listed below), many of which have not yet been implemented in the U.S.:

- banning of gatherings
- school closures
- mandatory masks in public places
- (Jan 23) stay-at-home lockdown order
- travel restrictions between areas of China
- building of field hospitals
- designation of certain hospitals exclusively for COVID-19
- economic aid package
- medical teams from all over China sent to Hubei
- door to door screening in certain areas to identify cases for isolation
- military dispatched to help
- (Feb 2) quarantine of all suspected cases collectively in Hubei
- (Feb 3) creation of makeshift hospitals to take in mild cases

- (Feb 10) “close management” of all apartment complexes in Hubei
- online ordering and bulk delivery of food to neighborhoods, distributed by volunteers

Contrary to the IHME assumptions, the effectiveness of interventions such as lockdowns is far from homogenous and depends on how well people comply, the presence of enforcement, how well testing/contact tracing/quarantine efforts that are run alongside the lockdown are performed, etc. The use of masks in public [2], testing/contact tracing/quarantine efforts, and travel restrictions [3]—all of which were implemented in China—may work synergistically with lockdowns to reduce household-to-household transmission and to prevent new communities from becoming infected or re-infected.

A report released on March 30 quantifying the impact of nonpharmaceutical interventions on COVID-19 in Europe predicts that even with the complete lockdowns implemented by 10 out of the 11 countries studied, the number of new infections may still increase [4]. Given that the response in even the U.S. states implementing all four of the interventions considered by IHME [1] may be less effective than the European lockdowns, there is a distinct possibility that without action beyond that assumed by the IHME study, the rate of new deaths and hospitalizations may not only not peak and decrease as quickly as IHME predicts but may also continue to exponentially increase (albeit at a slower rate).

The strength of response necessary to contain the virus is currently uncertain, and the efficacy of interventions depends on their implementation. Thus, the question is not “what will happen?” but rather “what will we do?” The answer to the former depends on our answer to the latter.

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[1] IHME COVID-19 health service utilization forecasting team, Christopher JL Murray. Forecasting COVID-19 impact on hospital bed-days, ICU-days, ventilator-days and deaths by US state in the next 4 months. *medRxiv 2020.03.27.20043752* .

[2] Feng, S. *et al.* Rational use of face masks in the covid-19 pandemic. *The Lancet Respiratory Medicine* (2020).

[3] Siegenfeld, A. F. & Bar-Yam, Y. Eliminating COVID-19: A

community-based analysis. *arXiv:2003.10086* .

[4] Flaxman, S., Mishra, S., Gandy, A. *et al.* Estimating the number of infections and the impact of nonpharmaceutical interventions on COVID-19 in 11 European countries. *Imperial College COVID-19 Response Team* (2020).