COVID-19 Forecasts

Last updated April 24, 2020

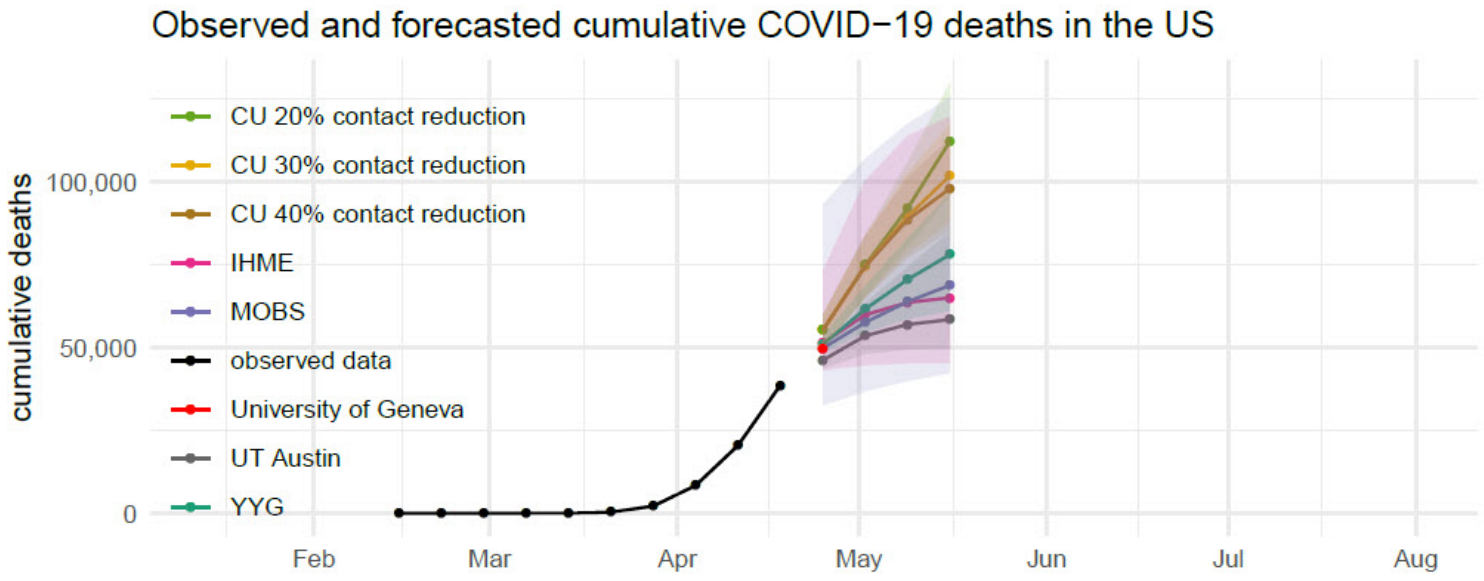
Why Forecasting COVID-19 Deaths in the US is Critical

CDC is responding to a pandemic of coronavirus disease 2019 (COVID-19) caused by a novel coronavirus, SARS-CoV-2, that is spreading from person to person. The federal government is working closely with state, tribal, local, and territorial health departments, and other public health partners, to respond to this situation. Forecasts of deaths will help inform public health decision-making by projecting the likely impact in coming weeks.

What the Forecasts Aim to Predict

Forecasts based on the use of statistical or mathematical models (subsequently referred to as "models") aim to predict changes in national- and state-level cumulative reported COVID-19 deaths for the next four weeks. Forecasting teams predict numbers of deaths using different types of data (e.g., COVID-19 data, demographic data, mobility data), methods (see below), and estimates for the impacts of interventions (e.g. social distancing, use of face coverings).

National Forecast



The CU models make various assumptions about the effectiveness of current interventions. All other models are conditional on existing social distancing measures continuing through the projected time−period shown. The University of Geneva model (red) only produces point forecasts 1 week into the future. Intervals shown are at the 95% uncertainty level.

- These forecasts show cumulative reported COVID-19 deaths since February and forecasted deaths for the next four weeks in the United States.
- The CU models make various assumptions about the effectiveness of current interventions. All other models assume that existing social distancing measures will continue through the time-period shown.

Interpretation of Forecasts

- National-level forecasts indicate that deaths are likely to continue to rise in the coming weeks. How quickly they will increase remains very uncertain.
- Models that incorporate strong contact reduction (e.g. IHME, MOBS) suggest that new deaths will continue to occur, but slow substantially over the next four weeks. Conversely, models that do not incorporate as strong contact reductions (e.g. CU 20%, CU 30%) suggest that total deaths may continue to rise quickly.
- State-level forecasts vary widely, reflecting differences in early epidemic phases, timing of interventions, and model-specific assumptions (e.g. about the effectiveness of implemented interventions).

State Forecasts

State level forecasts show observed and forecasted state level cumulative COVID-19 deaths in the US.

Forecasts fall into one of three categories

- The LANL model does not explicitly model the effects of individual social distancing measures but assumes that implemented interventions will continue to be upheld in the future resulting in decreased growth.
- The IHME, UT Austin, University of Geneva, YYG, and MOBS_NEU models are conditional on existing social distancing measures continuing through the projected period.
- The CU models make different assumptions about the effectiveness of current social distancing interventions.

Download state forecasts

Download model data

Working to Bring Together Forecasts for COVID-19 Deaths in the US

CDC works with partners to bring together weekly forecasts for COVID-19 deaths in one place. These forecasts have been developed independently and shared publicly. It is important to bring these forecasts together to help understand how they compare with each other and how much uncertainty there is about what may happen in the upcoming four weeks.

Columbia University

Model names: CU 20% contact reduction, CU 30% contact reduction, CU 40% contact reduction

Intervention assumptions
These models are based on assumptions of reducing the number of contacts per case. Three different adaptive scenarios of contact reduction are projected: 20%, 30%, and 40% contact reduction in US counties with at least 10 cases. Additional reductions are implemented with additional new cases, and all social distancing interventions remain in place until the end of the projection.

Methods
Metapopulation SEIR model

Institute for Health Metrics and Evaluation

Model name: IHME

Intervention assumptions
This model assumes social distancing stays in place until the pandemic, in its current phase, reaches the point when COVID-19 deaths are less than 0.3 per million people. Based on these latest projections, IHME expects social distancing measures to be in place through the end of May.

Methods
Non-linear mixed effects curve-fitting

Los Alamos National Laboratory (state-level forecasts only)

Model name: LANL

Intervention assumptions
Currently implemented interventions and the corresponding reductions in transmission will continue to be upheld in the future, resulting in an overall decrease in the growth rate of COVID-19. Over the course of the forecast, the model assumes that the growth will decrease over time.

Methods
Statistical dynamical growth model accounting for population susceptibility

Northeastern

Model name: MOBS (Laboratory for the Modeling of Biological + Socio-technical Systems)

Intervention assumptions
The projections assume that social distancing policies in place at the date of calibration are extended for the future weeks.

Methods
Metapopulation, age-structured SLIR model

University of Texas, Austin

Model name: UT Austin

Intervention assumptions
Estimates the extent of social distancing using geolocation data from mobile phones and assumes that the extent of social distancing does not change during the period of forecasting. The model is designed to predict confirmed COVID-19 deaths resulting from only a single wave of transmission.

Methods
Statistical mixed-effects model.

University of Geneva (one-week ahead forecasts only)

Model name: University of Geneva

Intervention assumptions
The projections assume that social distancing policies in place at the date of calibration are extended for the future weeks.

Methods
Exponential and linear statistical models fit to the recent growth rate of cumulative deaths.

Youyang Gu (COVID-Projections)

Model name: YYG

Intervention assumptions
The projections assume that strong social distancing policies will remain in place through the projected period.

Methods
SEIS mechanistic model.

Archive of COVID19 Forecasts

An archive of previous COVID-19 forecasts may be accessed here

Additional Resources:

Previous COVID-19 Forecasts

COVID Cases, Data, and Surveillance

FAQ: COVID-19 Data and Surveillance

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