Coronavirus Disease 2019 (COVID-19)

Forecasts of Total Deaths

Updated June 24, 2020

Interpretation of Cumulative Death Forecasts

- This week CDC received 20 individual national forecasts.
- This week's national ensemble forecast suggests that there will likely be between 130,000 and 150,000 total reported COVID-19 deaths by July 18th.
- The state-level ensemble forecasts suggest that the number of new deaths over the next four weeks in Arizona, Arkansas, California, Florida, Hawaii, Missouri, Nevada, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Utah will likely exceed the number reported over the last four weeks. For other states, the number of new deaths is expected to be similar to the number seen in the previous four weeks or to decrease slightly.

National Forecast

National Forecast
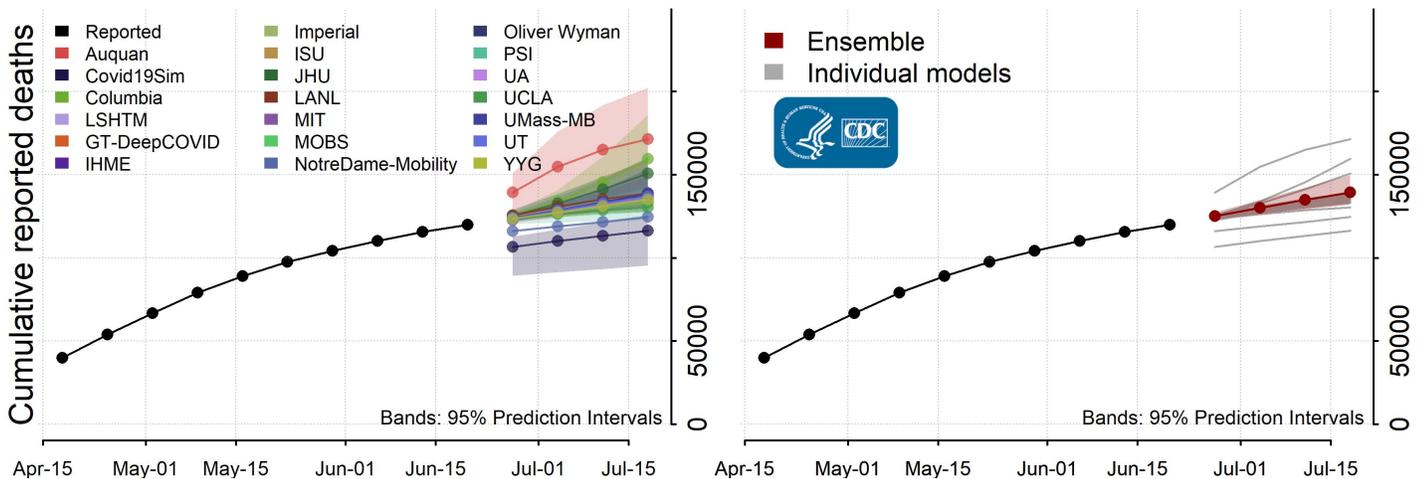
- The figure shows cumulative reported COVID-19 deaths and forecasted deaths for the next four weeks in the United States.
- Models make various assumptions about the levels of social distancing and other interventions, which may not reflect recent changes in behavior. See model descriptions below for details.

State Forecasts

State-level forecasts figures show observed and forecasted state-level cumulative COVID-19 deaths in the US. Each state forecast uses a different scale, due to differences in the numbers of COVID-19 deaths occurring in each state.

Forecasts fall into one of two categories

- The Auquan, CAN, Geneva, GT-DeepCOVID, Imperial, ISU, LANL, LSHTM, MIT, MOBS, Oliver Wyman, NotreDame-Mobility, UA, UCLA, UMass-MB, and UT forecasts assume that existing control measures will remain in place during the prediction period.
- The Columbia, Covid19Sim, GT_CHHS, JHU, NotreDame-FRED, PSI, and YYG forecasts make different assumptions about how levels of social distancing will change in the future.

Download state forecasts 📄 [12 pages]

Download forecast data 📊 [1 sheet]

Modeling Groups

Forecasts were provided by these modeling groups:

Auquan Data Science ↗

Model names: Auquan

Intervention assumptions: These projections do not make specific assumptions about which interventions have been implemented or will remain in place.

Methods: SEIR model

Columbia University ↗

Model name: Columbia

Intervention assumptions: This model assumes that contact rates will increase 5% per week over the next two weeks. The reproductive number is then set to 1 for the remainder of the projection period.

Methods: Metapopulation SEIR model.

COVID Act Now (state-level forecasts only) ↗

Model name: CAN

Intervention assumptions: This model assumes that the effects of current interventions are reflected in the observed data and that those effects will continue going forward.

Methods: SEIR model.

COVID-19 Simulator Consortium ⬈

Model name: Covid19Sim

Intervention assumptions: This model is based on assumptions about how levels of social distancing will change in the future. It assumes a 20% increase in mobility as each state reopens.

Methods: SEIR model.

Georgia Institute of Technology, Center for Health and Humanitarian Systems (Georgia forecasts only) ⬈

Model name: GT_CHHS

Intervention assumptions: This model assumes that once stay-at-home orders are lifted, contact rates will gradually increase. It also assumes that households containing symptomatic cases will self-quarantine.

Methods: Agent-based model.

Georgia Institute of Technology, College of Computing ⬈

Model name: GT-DeepCOVID (formerly GA_Tech)

Intervention Assumptions: This model assumes that the effects of interventions are reflected in the observed data and will continue going forward.

Methods: Deep learning.

Imperial College, London (national-level forecasts only) ⬈

Model name: Imperial

Intervention Assumptions: These projections do not make specific assumptions about which interventions have been implemented or will remain in place.

Methods: Ensembles of mechanistic transmission models, fit to different parameter assumptions.

Institute of Health Metrics and Evaluation ⬈

Model name: IHME

Intervention assumptions: Projections are adjusted to reflect differences in aggregate population mobility and community mitigation policies.

Methods: Combination of a mechanistic disease transmission model and a curve-fitting approach.

Iowa State University ↗

Model name: ISU

Intervention Assumptions: These projections do not make specific assumptions about which interventions have been implemented or will remain in place.

Methods: Nonparametric spatiotemporal model.

Johns Hopkins University, Infectious Disease Dynamics Lab ↗

Model name: JHU

Intervention Assumptions: This model assumes that the effectiveness of interventions is reduced after shelter-in-place orders are lifted.

Methods: Stochastic metapopulation SEIR model.

London School of Hygiene and Tropical Medicine ↗

Model name: LSHTM

Intervention assumptions: These projections assume that current interventions will not change during the forecasted period.

Methods: Renewal equation, using estimates of the time-varying reproductive number.

Los Alamos National Laboratory ↗

Model name: LANL

Intervention assumptions: This model assumes that currently implemented interventions and corresponding reductions in transmission will continue, resulting in an overall decrease in the growth rate of COVID-19 deaths.

Methods: Statistical dynamical growth model accounting for population susceptibility.

Massachusetts Institute of Technology ↗

Model name: MIT

Intervention Assumptions: The projections assume that current interventions will remain in place indefinitely.

Methods: SEIR model.

Northeastern University ⧉

Model name: MOBS (Laboratory for the Modeling of Biological and 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.

Notre Dame University ⧉

Model name: NotreDame-Mobility, NotreDame-FRED

Intervention assumptions: These forecasts assume that population-level mobility is a reliable proxy for adherence to social distancing, and that recent trends in mobility will continue over the coming weeks.

Methods:

- NotreDame-Mobility: SEIR model fit to data on deaths, test positivity, and population mobility.
- NotreDame-FRED: Agent-based model.

Oliver Wyman ⧉

Model name: Oliver Wyman

Intervention assumptions: These projections assume that current interventions, will remain unchanged during the forecasted period.

Methods: Time-dependent SIR model for detected and undetected cases.

Predictive Science Inc. ⧉

Model name: PSI

Intervention assumptions: These projections assume that current interventions will not change during the forecasted period.

Methods: Stochastic SEIRX model.

Snyder Wilson Consulting ⧉

Model name: SWC

Intervention assumptions: These projections do not make specific assumptions about which interventions have been implemented or will remain in place.

Methods: Bayesian SEIR model.

University of Arizona ⧉

Model name: UA

Intervention assumptions: This model assumes that current interventions will remain in effect for at least four weeks after the forecasts are made.

Methods: SIR mechanistic model with data assimilation.

University of California, Los Angeles ⧉

Model name: UCLA

Intervention assumptions: These projections assume that current interventions will not change during the forecasted period.

Methods: Modified SEIR model.

University of Geneva / Swiss Data Science Center (national one-week ahead forecasts only) ⧉

Model name: 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.

University of Massachusetts, Amherst ⧉

Model names: UMass-MB, Ensemble

Intervention assumptions:

- UMass-MB: These projections do not make specific assumptions about which interventions have been implemented or will remain in place.
- Ensemble: The national and state-level ensemble forecasts include models that assume certain social distancing measures will continue and models that assume those measures will not continue.

Methods:

- UMass-MB: Bayesian SEIRD model.
- Ensemble: Equal-weighted combination of 2 to 11 models, depending on the availability of national and state-level forecasts. To ensure consistency, the ensemble includes only models with 4 week-ahead forecasts and models that do not assign a significant probability to there being fewer cumulative deaths than have already been reported by the day of submission. Only one model was available for the forecasts for Guam and the Northern Mariana Islands.

University of Texas, Austin ⧉

Model name: UT

Intervention assumptions: This model estimates the extent of social distancing using geolocation data from mobile phones and assumes that the extent of social distancing will 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: Nonlinear Bayesian hierarchical regression with a negative-binomial model for daily variation in death rates.

Youyang Gu (COVID-Projections) ⧉

Model name: YYG

Intervention assumptions: The model accounts for individual state-by-state re-openings and their impact on infections and deaths.

Methods: SEIS mechanistic model.

Additional Resources:

Previous COVID-19 Forecasts

FAQ: COVID-19 Data and Surveillance

CDC COVID Data Tracker

COVID-19 Mathematical Modeling