

COVID-19: What's New for May 12, 2020

Main updates on IHME COVID-19 predictions since May 10, 2020

First set of COVID-19 projections for 17 more countries

Over the last few months, the novel coronavirus has rapidly spread worldwide, leaving countries facing highly variable trajectories of COVID-19 infections and deaths. In turn, we have sought to produce COVID-19 predictions for increasingly more locations in addition to the US. We first added European Economic Area (EEA) countries [on April 7](#), and then Puerto Rico and Canada (nationally and by province) [on April 22](#).

Today we publish a first set of COVID-19 projections for 17 additional countries. These include COVID-19 estimates for nine countries in Latin America: at the national level for Argentina, Chile, Colombia, the Dominican Republic, Ecuador, Panama, and Peru, and for a subset of states in Brazil and Mexico. For Brazil, these states include Amazonas, Bahia, Ceará, Maranhão, Paraná, Pernambuco, Rio de Janeiro, and São Paulo. For Mexico, included states are Baja California, Mexico City, Puebla, Quintana Roo, Sinaloa, the state of México, and Tabasco. Any reported estimates for Brazil or Mexico more broadly reflect the aggregation of these states and not the national level; subsequently, national-level estimates are likely to be higher than these aggregates.

An additional eight countries with more than 50 COVID-19 deaths to date also have been included: Egypt, Israel, Malaysia, Moldova, the Philippines, South Korea, Turkey, and Ukraine.

All currently included locations now have been incorporated into the multi-stage hybrid modeling framework. This means that the transmission dynamics component of our model, which also accounts for changes in key drivers (e.g., testing, mobility, easing of social distancing policies) and their relationships with viral transmission, has been applied to all locations and thus all corresponding estimates reflect this methodological advance.

We summarize key results below, with a special focus on newly added locations; these estimates can be explored further online: <https://covid19.healthdata.org/projections>.

At IHME, our guiding principle is to produce the best possible predictions given what we know today – and to continually improve these estimates to support further gains against COVID-19 tomorrow. We will be continuing to update our projections in the coming days and weeks to incorporate the world's evolving evidence base on COVID-19.

Key findings from today's release (May 12, 2020)

A focus on Latin America

COVID-19 death predictions

For the nine Latin American countries included today, Brazil is likely to experience the highest projected toll by August, with predictions of cumulative COVID-19 deaths for currently included states reaching 88,305 (estimate range of 30,302 to 193,786). Mexico, Peru, and Ecuador could

have the next highest cumulative deaths from COVID-19 by August, as summarized in the table below.

Location	Predictions for cumulative COVID-19 deaths through August from our May 12 release (today)
Argentina	680 (414 to 1,420)
Brazil*	88,305 (30,302 to 193,786)
Chile	687 (421 to 1,417)
Colombia	2,157 (793 to 5,890)
Dominican Republic	881 (595 to 1,435)
Ecuador	5,215 (4,844 to 6,052)
Mexico*	6,859 (3,578 to 16,795)
Panama	661 (362 to 1,345)
Peru	6,428 (2,731 to 21,724)
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* Estimates for Brazil and Mexico reflect the aggregation of currently included states; their national-level predictions are likely higher than what is captured to date.

Hospital resource demand projections

- With today’s release, we also publish a first set of estimates for hospital resource demand – total hospital beds, ICU beds, and invasive ventilators – for these locations. Based on the latest available data, demand for ICU beds could exceed current capacities in many countries. While potential shortages may also occur in the future, our estimates suggest that substantial shortages could already be happening in several locations.

For instance, at the national level, Peru may be experiencing some of the most acute shortages, with predicted need of 1,040 ICU beds (estimate range of 793 to 1,677), with an estimated 88 available. Brazil’s estimates of ICU demand could surpass present capacities, with an estimated need of 6,836 (4,966 to 10,936), and 4,060 ICU beds available among states currently included. Predictions indicate that demand for ICU beds could exceed current capacities among Mexico’s included states; these patterns could change if COVID-19 epidemic trajectories shift.

Subnational locations in Brazil

- In Brazil, São Paulo and Rio de Janeiro are projected to have the highest cumulative COVID-19 deaths by August, potentially rising to 36,811 (11,097 to 81,774) and 21,073 (5,966 to 51,901) deaths, respectively. COVID-19 is currently projected to cause at least 5,000 cumulative deaths in Pernambuco, Ceará, and Amazonas by August.

Location	Predictions for cumulative COVID-19 deaths through August from our May 12 release (today)

Brazil (aggregated across states)	88,305 (30,302 to 193,786)
Amazonas	5,039 (1,859 to 9,383)
Bahia	2,443 (529 to 8,429)
Ceará	8,679 (2,894 to 18,593)
Maranhão	4,613 (868 to 12,661)
Paraná	245 (170 to 397)
Pernambuco	9,401 (2,468 to 23,027)
Rio de Janeiro	21,073 (5,966 to 51,901)
São Paulo	36,811 (11,097 to 81,774)
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- Based on the latest available data, most states may experience their epidemic peaks anytime between now (May 12-14) and June or beyond. As more data become available and more information on Brazil's response is incorporated, these projections are likely to change.
- High hospital resource demand to support COVID-19 patients could exceed several Brazilian states' present capacities – and could worsen as many locations are seeing rising COVID-19 trajectories. Currently, Amazonas has an estimated need of 4,744 total hospital beds (estimate range of 2,933 to 9,776) while an estimated 1,026 beds are available. In terms of ICU beds, our estimates indicate Amazonas has a current need of 1,031 (704 to 1,945), with a capacity of 40 ICU beds.
- Estimated infections appear to far exceed testing throughout Brazil, indicating a critical need for scaling up COVID-19 testing. This is particularly important given the country's mounting death toll and widening gaps in hospital resources.

Subnational locations in Mexico

- Based on the latest available data, currently included Mexican states could have 6,859 cumulative COVID-19 deaths (3,578 to 16,795) by August. Projections indicate that Mexico City, followed by Baja California, may have the highest cumulative COVID-19 deaths within the country (see table below).

Location	Predictions for cumulative COVID-19 deaths through August from our May 12 release (today)
Mexico (aggregated across states)	6,859 (3,578 to 16,795)
Baja California	1,171 (675 to 2,566)
Mexico City	3,414 (1,396 to 9,671)
Puebla	312 (190 to 831)
Quintana Roo	465 (269 to 1,056)
Sinaloa	292 (257 to 362)
State of México	544 (445 to 800)

Tabasco	660 (323 to 1,730)
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- Many Mexican states may be currently experiencing acute hospital resource shortages, trends that are less striking at the national level. Based on the latest available data, Baja California and Quintana Roo could be seeing overall hospital bed demand exceeding current capacities, while all states are either at or far surpassing available ICU beds relative to need for supporting COVID-19 patients at present. Mexico City and Baja California appear to be experiencing the largest gaps in potential need and capacity in terms of ICU beds.
- While our estimates indicate gradual progress in some states for scaling up testing (state of México), testing for COVID-19 falls far below estimated infections in most Mexican states. In the absence of concerted action to increase testing, particularly among states with larger epidemics, COVID-19 trajectories could worsen for Mexico.

A focus on other newly added locations

- Among the newly added locations with more than 50 COVID-19 deaths to date in other regions, Turkey could have the highest cumulative COVID-19 death toll through August, at 5,263 deaths (estimate range of 4,563 to 6,508). As summarized in the table below, the Philippines and Ukraine may also see projected cumulative deaths exceeding 1,000 by August.

Country	Predictions for cumulative COVID-19 deaths through August from our May 12 release (today)
Egypt	2,047 (805 to 6,059)
Israel	272 (266 to 279)
Malaysia	112 (110 to 117)
Moldova	399 (240 to 829)
Philippines	1,735 (1,094 to 3,972)
South Korea	346 (262 to 755)
Turkey	5,263 (4,563 to 6,508)
Ukraine	1,269 (603 to 3,396)
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- For these nine newly included locations, predicted epidemic peaks and daily deaths at peak are highly variable; these patterns reflect the divergent epidemic trajectories that many of these locations have experienced to date. Current predictions indicate that South Korea and Malaysia

likely saw predicted peaks in late March to early April, whereas others (e.g., Ukraine, Moldova, and Egypt) may be experiencing predicted peaks now or in the future.

- At the national level, predictions of hospital resource demand generally did not exceed estimated capacities. Further, most of these countries showed positive trends in scaling up testing relative to estimated infections. South Korea’s success in COVID-19 testing is particularly evident, but other locations, such as Israel and Malaysia, have also been able to achieve and maintain high levels of testing. At the same time, some countries (e.g., the Philippines) have only recently been closing gaps in estimated infections and testing levels – and confirmed cases remain low. Of note, Israel’s mobility trends have markedly increased by nearly 30 percentage points since its mobility nadir around mid-April. This pattern corresponds with easing of previously implemented social distancing policies, though akin to many other countries, initial rises in mobility began prior to when formal easing actions occurred.

A focus on Europe

- Based on the latest data and updated methods, a projected 43,479 cumulative COVID-19 deaths (estimate range of 40,110 to 50,128) could occur in the United Kingdom (UK) by August. Both Italy’s and France’s cumulative COVID-19 death tolls are now estimated to exceed 30,000. These updated predictions reflect the incorporation of these locations into our new multi-stage hybrid model, which was [launched on May 4](#) but had been only fully applied to the US; we subsequently compare estimates for the five EEA countries with the highest projected cumulative deaths for today’s release relative to their May 4 predictions.
- Compared with the May 4 estimates, these five locations – the UK, Italy, France, Spain, and Belgium – all have higher projected cumulative deaths; however, uncertainty intervals substantially overlap. [Our death model updates](#) for May 4 were applied to all included locations at that time, so these changes represent the combination of updated data inputs and the effects of accounting for transmission dynamics and the effects of potential drivers of viral transmission.

Location	Predictions for cumulative COVID-19 deaths through August from our May 12 release (today)	Predictions from our May 4 release	Change of average values since the May 4 release*
United Kingdom	43,479 (40,110 to 50,128)	40,555 (29,657 to 74,539)	↑ 2,924 deaths
Italy	35,137 (34,565 to 35,829)	31,458 (29,605 to 34,969)	↑ 3,679 deaths
France	31,155 (30,257 to 32,410)	28,859 (25,280 to 38,798)	↑ 2,296 deaths
Spain	29,581 (28,956 to 30,447)	27,727 (25,720 to 32,130)	↑ 1,854 deaths
Belgium	10,594 (10,221 to 11,293)	9,464 (8,056 to 13,936)	↑ 1,130 deaths
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*Change estimates do not include uncertainty; they are only based on the average value. If prediction values' uncertainty intervals (the numbers reported in parentheses) overlap a lot across different releases, changes in these estimates are not considered substantively different.

- While most other EEA countries saw small to moderate increases in projected cumulative COVID-19 deaths since the May 4 release, Sweden was the main exception: today's projections point to 5,760 cumulative COVID-19 deaths (estimate range of 4,426 to 9,089) by August, while the May 4 release had Sweden's predictions at 10,196 (estimate range of 3,474 to 37,830). Although the uncertainty intervals overlap for both sets of predictions, the updated estimates are, on average, 4,436 deaths lower.
- At the national level, most EEA countries appeared to have rapidly scaled up testing during or prior to rising estimated infections. Yet some countries have only recently closed gaps between estimated infections and testing (e.g., the Netherlands, Sweden, the UK), indicating a potential need to accelerate testing progress, especially as more countries move to ease previously implemented social distancing policies. Akin to patterns seen in the US, a number of locations saw rising mobility before distancing policies were being considered for easement; we will explore these results more in future releases.

A focus on the US

- By August, the US's cumulative COVID-19 death toll could be 147,040 (113,182 to 226,971). These estimates are higher than those published on May 10 (see table below), though their uncertainty intervals overlap considerably. National-level estimates and the US states with highest projected cumulative COVID-19 deaths are summarized below.

Location	Predictions for cumulative COVID-19 deaths through August from our May 12 release (today)	Predictions from our May 10 release	Change of average values since the May 10 release*
US (national)	147,040 (113,182 to 226,971)	137,184 (102,783 to 223,489)	↑ 9,856 deaths
New York	34,068 (32,779 to 35,983)	31,620 (30,105 to 33,954)	↑ 2,448 deaths
New Jersey	14,692 (12,843 to 18,365)	14,752 (12,255 to 19,594)	↓ 60 deaths
Pennsylvania	12,420 (6,218 to 33,620)	10,742 (6,115 to 25,063)	↑ 1,677 deaths
Massachusetts	9,629 (7,502 to 13,492)	7,545 (6,199 to 10,420)	↑ 2,084 deaths
Illinois	7,830 (5,232 to 14,675)	7,395 (4,898 to 13,814)	↑ 435 deaths
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- In addition to some of the states listed above, several saw sizeable changes since our May 10 release (see table below); however, most of these estimates have overlapping uncertainty intervals across releases. Exact reasons vary by state, but these changes are likely due to a combination of updated data inputs on COVID-19 epidemiologic indicators and key drivers of viral transmission like changes in testing and mobility, as well as easing of distancing policies. It is worth noting that the full potential effects of recent actions to ease social distancing policies, especially if robust containment measures have yet to be fully scaled up, may not be fully known for a few weeks due to the time periods between viral exposure, possible infection, and full disease progression.

Location	Predictions for cumulative COVID-19 deaths through August from our May 12 release (today)	Predictions from our May 10 release	Change of average values since the May 10 release
North Carolina	4,413 (1,416 to 11,321)	1,190 (764 to 2,143)	↑ 3,222 deaths
Maryland	3,799 (2,444 to 7,038)	2,606 (1,890 to 4,645)	↑ 1,192 deaths
Connecticut	5,262 (4,497 to 6,868)	4,575 (3,745 to 6,056)	↑ 688 deaths
Alabama	795 (609 to 1,270)	1,554 (561 to 5,490)	↓ 758 deaths
Georgia	2,062 (1,760 to 2,692)	3,596 (2,139 to 7,079)	↓ 1,534 deaths
Indiana	2,429 (1,810 to 3,731)	4,091 (2,144 to 10,620)	↓ 1,662 deaths
			Results as of 05/12/2020 © 2020 IHME See terms and conditions of use, https://bit.ly/3aK1FSO

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Data and methods updates since our last release on May 10, 2020

Data updates

- For all previously included locations, we have added reported data points on COVID-19 deaths, cases, mobility, and testing rates, as well as available information on social distancing policies for two days (May 9 and May 10 at about 10:00 p.m. Pacific). For all new locations, we include these data inputs from the first date of reporting through May 10.

Methods updates

- As mentioned above, we have now incorporated previously included locations into our updated multi-stage hybrid modeling platform. We apply these same methods to all but one of the newly added locations: the exception is Ecuador. For Ecuador, we approximate the number of deaths differently than for other locations in our analysis. The reason we are using a different approach in Ecuador is that the number of reported deaths due to COVID-19 appears to be improbably low. We consider all-cause mortality, which gets [reported on a weekly basis for Ecuador](#).

Based on trends in all-cause mortality over the past few years, we estimate the number of additional deaths that occurred in Ecuador since March 2020. This corresponds to total excess mortality during the global pandemic. Not all of the excess mortality is due to COVID-19, though. To estimate what proportion of excess deaths we should attribute to COVID-19, we conducted an analysis in 14 other countries (13 European countries and the US) where we had data on both weekly reports of all-cause mortality and reliable data on COVID-19 deaths. In these locations, we took the ratio of all excess mortality to COVID-19 deaths. On average, we found that 55.3% of excess deaths during the pandemic were due to COVID-19 in countries with good registration systems. We subsequently applied this proportion to the number of excess all-cause deaths by week in Ecuador to get an estimate of the weekly deaths due to COVID-19. We plan to update this analysis on a regular basis.

What's in the development pipeline for IHME COVID-19 predictions

Before we introduce new model components or improvements to our current analytical platform for predictions, IHME's COVID-19 development team members test these additions or changes.

Based on currently available data and model testing progress, our immediate- and medium-term priorities are as follows:

- **Initial COVID-19 projections for additional countries.** Data collation and processing for a wider set of locations and countries worldwide are in progress. We are currently working on adapting our prediction model to countries which have experienced more than 50 total COVID-19 deaths to date. With the increasing recognition of under-counting of COVID-19 deaths in many locations outside of EEA and North America, we are now exploring methods that can approximate excess mortality and incorporate such estimates into our COVID-19 models.
- **Additional key epidemic drivers.** Pending data availability across currently included locations, we are exploring how to incorporate additional model covariates such mask or facial covering use by the broader public and human contact rates.

A note of thanks

We would like to extend a special thanks to the Pan-American Health Organization (PAHO) for key data sources; our partners and collaborators in Argentina, Brazil, Chile, Colombia, the Dominican Republic, Ecuador, Egypt, Israel, Malaysia, Mexico, Moldova, Panama, Peru, the Philippines, South Korea, Turkey and Ukraine for their support and expert advice; and to the tireless data collection and collation efforts of individuals and institutions throughout the world.

In addition, we wish to express our gratitude for efforts to collect social distancing policy information in Latin America to University of Miami Institute for Advanced Study of the Americas (Felicia Knaul, Michael Touchton); Fundación Mexicana para la Salud with support from the GDS Services International: Tómatelo a Pecho A.C.; and Centro de Investigaciones en Ciencias de la Salud, Universidad Anáhuac

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Further, IHME is grateful to the Microsoft AI for Health program for their support in hosting our COVID-19 data visualizations on the Azure Cloud.

For all COVID-19 resources at IHME, visit <http://www.healthdata.org/covid>.

Questions? Requests? Feedback? Please contact us [here](#).