Informe de resultados de COVID-19

México

06 de marzo de 2021

Este documento contiene información resumida sobre las últimas proyecciones del modelo IHME sobre COVID-19 en México. El modelo se ejecutó el 6 de marzo de 2021 con datos hasta el 1 de marzo de 2021.

Situación actual

• Los casos notificados diariamente en la última semana disminuyeron a 5,200 por día en promedio en comparación con los 6,600 de la semana anterior (Figura 1).

• Las muertes diarias en la última semana disminuyeron a 750 por día en promedio en comparación con las 840 de la semana anterior (Figura 2). Esto mantiene al COVID-19 en la causa número 1 de muerte en México esta semana (Tabla 1).

• La R efectiva, calculada usando casos, hospitalizaciones y muertes, no es mayor que 1 en ninguno de los estados (Figura 23).

• Estimamos que 39% de las personas en México han sido infectadas al 1 de marzo (Figura 4).

• La tasa de mortalidad diaria es superior a 4 por millón en 18 estados (Figura 3).

Tendencias en los impulsores de la transmisión

• La movilidad la semana pasada fue 31% menor que la línea de basal anterior a COVID-19 (Figura 8). La movilidad no estuvo cerca de la línea basal (dentro de 10%) en ningún estado. La movilidad fue inferior a 30% de la línea basal en 15 estados.

• Al 1 de marzo, estimamos que 86% de las personas siempre usaban cubrebocas al salir de casa (Figura 10) lo cual no muestra cambios de lo observado la semana pasada. Ningún estado presenta un uso de mascarillas inferior a 50%.

• Hubo 18 pruebas de diagnóstico por cada 100,000 personas el 1 de marzo (Figura 12).

• En México, 88.8% de las personas dicen que aceptarían o probablemente aceptarían una vacuna para COVID-19. La fracción de la población que está dispuesta a recibir la vacuna COVID-19 oscila entre 83% en Colima y 92% en Zacatecas (Figura 15).

• En nuestro escenario de referencia actual, esperamos que 76.5 millones estén vacunados para el 1 de julio (Figura 16).

Proyecciones

• En nuestro escenario de referencia, que representa lo que creemos que es más probable que suceda, nuestro modelo proyecta 208,000 muertes acumuladas el 1 de julio de 2021. Esto representa 22,000 muertes adicionales del 1 de marzo al 1 de julio (Figura 17). Se

espera que las muertes diarias disminuyan de manera constante hasta el 1 de julio (Figura 18).

• Para el 1 de julio de 2021, proyectamos que el programa proyectado de vacuna salvará 1,800 vidas.

• Si se alcanzara la cobertura universal de mascarillas (95%) en la próxima semana, nuestro modelo proyecta 1,100 muertes acumuladas menos en comparación con el escenario de referencia el 1 de julio de 2021 (Figura 17).

• En nuestro peor escenario, nuestro modelo proyecta 209,000 muertes acumuladas el 1 de julio de 2021 (Figura 17).

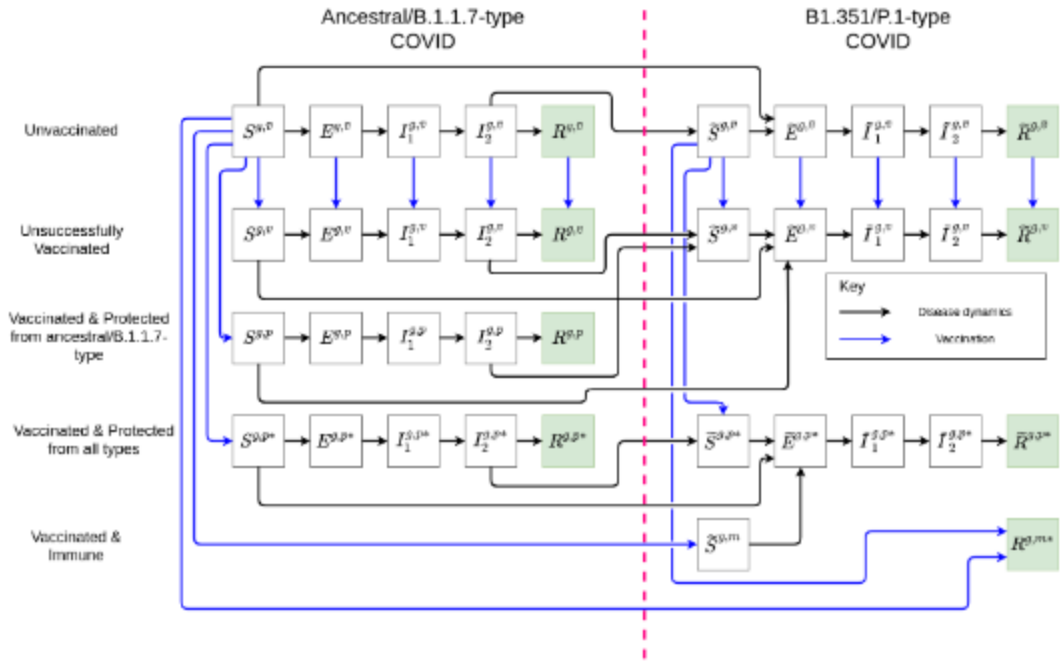
• La Figura 20 compara nuestros pronósticos de escenarios de referencia con otros modelos archivados públicamente. Los pronósticos son muy divergentes. Mientras que el modelo de los Alamos predice 400 muertes diarias al 1 de junio, el del Colegio Imperial 200 y el de IHME prácticamente sin muertes.

• Después del mes de abril de 2021 No se espera que ingun estado presente presiones por camas hospitalarias o en las UCI (Figuras 21 y 22).

Actualizaciones de modelos

Esta semana hemos modificado nuestro modelo SEIR para analizar la reducción de la inmunidad por variantes cruzadas. El grupo de placebo del ensayo de Sudáfrica de Novavax sugiere que la infección con variantes anteriores no proporcionó protección contra B.1.351. Durante los últimos tres meses, la epidemia en Amazonas, Brasil, donde más de 70% de la población estaba previamente infectada, también sugiere que la variante P.1 probablemente esté infectando en altas tasas a las personas que anteriormente estaban infectadas con variantes ancestrales. Con base en estas observaciones, hemos modificado el marco SEIR para permitir una protección parcial o nula de la infección con variantes ancestrales o B.1.1.7 contra B.1.351 o P.1. En este modelo más elaborado, dos supuestos críticos determinan sustancialmente el impacto de la nueva variante de ampliación: 1) protección contra B.1.351 o P.1 de infección ancestral o B.1.1.7, y 2) el aumento en la transmisibilidad de B .1.351 o P.1 en comparación con el incremento visto en B.1.1.7.

El modelo SEIR elaborado tiene los compartimentos que se muestran a continuación. El número real de compartimentos es mayor, ya que rastreamos a las personas de alto riesgo y de bajo riesgo por separado.



En nuestro escenario de referencia, o lo que creemos que es más probable que ocurra, tomamos muestras de una distribución uniforme que va desde el 25% al 50% de inmunidad de variante cruzada. En el peor de los casos, tomamos muestras de una distribución uniforme que oscila entre el 0% y el 50% de inmunidad de variante cruzada. En el escenario de referencia, también asumimos que la probabilidad de transmisión de B.1.351 y P.1 es del 25% al 75% que la del aumento de B.1.1.7 sobre las variantes ancestrales. Este rango se ha seleccionado para aproximarse a la ampliación observada de la variante B.1.351 en Sudáfrica en condiciones de inmunidad reducida contra las variantes cruzadas. En el peor de los casos, se supone que la probabilidad de transmisión de B.1.351 y P.1 es del 0 al 50% del aumento de B.1.17 sobre las variantes ancestrales. La introducción de una inmunidad de variante cruzada reducida tiene impactos importantes en los próximos cuatro meses en entornos (como Brasil) con alta infección acumulativa de variantes ancestrales y la presencia de B.1.351 o P.1. En otros entornos, con una menor infección acumulada de variantes ancestrales y una baja prevalencia de estas variantes de escape, el impacto en nuestros pronósticos durante los próximos cuatro meses es menos pronunciado.

COVID-19 Results Briefing

Mexico

March 06, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in Mexico. The model was run on March 06, 2021 with data through March 1, 2021.

Current situation

- Daily reported cases in the last week decreased to 5,200 per day on average compared to 6,600 the week before (Figure 1).
- Daily deaths in the last week decreased to 750 per day on average compared to 840 the week before (Figure 2). This makes COVID-19 the number 1 cause of death in Mexico this week (Table 1).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 0 states (Figure 23).
- We estimated that 39% of people in Mexico have been infected as of March 1 (Figure 4).
- The daily death rate is greater than 4 per million in 18 states (Figure 3).

Trends in drivers of transmission

- Mobility last week was 31% lower than the pre-COVID-19 baseline (Figure 8). Mobility was near baseline (within 10%) in no states. Mobility was lower than 30% of baseline in in 15 states.
- As of March 1 we estimated that 86% of people always wore a mask when leaving their home (Figure 10) compared to 86% last week. Mask use was lower than 50% in no states.
- There were 18 diagnostic tests per 100,000 people on March 1 (Figure 12).
- In Mexico 88.8% of people say they would accept or would probably accept a vaccine for COVID-19. The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 83% in Colima to 92% in Zacatecas (Figure 15).
- In our current reference scenario, we expect that 76.45 million will be vaccinated by July 1 (Figure 16).

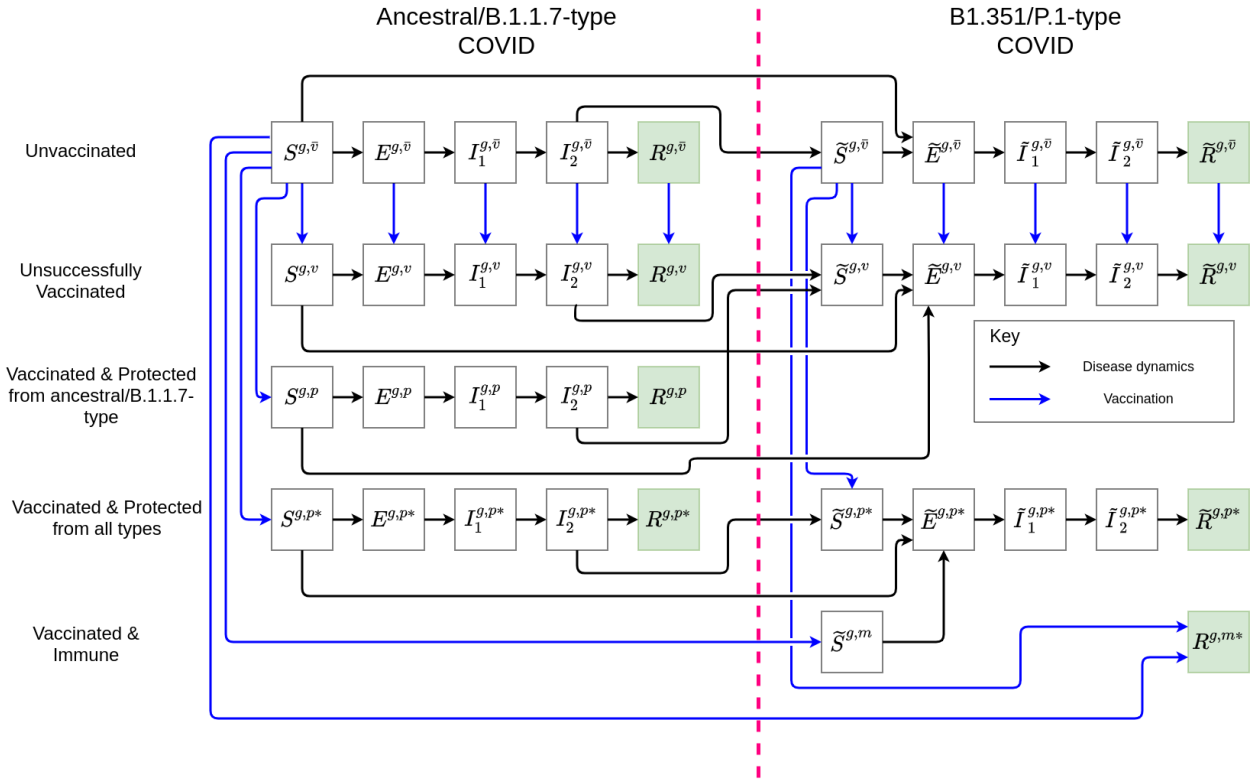
Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 208,000 cumulative deaths on July 1, 2021. This represents 22,000 additional deaths from March 1 to July 1 (Figure 17). Daily deaths are expected to decline steadily until July 1 (Figure 18).

- By July 1, 2021, we project that 1,800 lives will be saved by the projected vaccine rollout.
- If **universal mask coverage (95%)** were attained in the next week, our model projects 1,100 fewer cumulative deaths compared to the reference scenario on July 1, 2021 (Figure 17).
- Under our **worse scenario**, our model projects 209,000 cumulative deaths on July 1, 2021 (Figure 17).
- Figure 20 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.
- At some point from March through July 1, 0 states will have high or extreme stress on hospital beds (Figure 24). At some point from March through July 1, 1 states will have high or extreme stress on ICU capacity (Figure 22).

Model updates

This week we have modified our SEIR model to allow for reduced cross-variant immunity. The placebo arm of the Novavax South African trial suggests that infection with ancestral variants provided no protection against B.1.351. Over the last three months, the epidemic in Amazonas, Brazil – where more than 70% of the population were previously infected – also suggests that the P.1 variant is likely infecting at high rates those individuals who were previously infected with ancestralvariants. Based on these observations, we have modified the SEIR framework to allow for no or partial protection from infection with ancestral variants or B.1.1.7 against B.1.351 or P.1. In this more elaborated model, two critical assumptions substantially determine the impact of new variant scale-up: 1) protection against B.1.351 or P.1 from ancestral or B.1.1.7 infection, and 2) the increase in transmissibility of B.1.351 or P.1 compared to the increment seen in B.1.1.7. The elaborated SEIR model has the compartments shown below. The actual number of compartments is larger, since we track high-risk and low-risk individuals separately.



In our reference scenario, or what we think is most likely to occur, we sample from auniform distribution ranging from 25% to 50% cross-variant immunity. In the worse scenario, we sample from a uniform distribution ranging from 0% to 50% cross-variant immunity. In the reference scenario, we also assume that the probability of transmission for B.1.351 and P.1 is 25%–75% that of the increase of B.1.1.7 over ancestral variants. This range has been selected to approximate the observed scale-up of the B.1.351 variant in South Africa under conditions of reduced cross-variant immunity. In the worse scenario, the probability of transmission for B.1.351 and P.1 is assumed to be 0–50% of the increase of B.1.17 over ancestral variants. The introduction of reduced cross-variant immunity has important impacts in the next four months in settings (such as Brazil) with high ancestral variant cumulative infection and the presence of B.1.351 or P.1. In other settings, with lower cumulative infection from ancestral variants and low prevalence of these escape variants, the impact in our forecasts over the next four months is less pronounced.

Figure 1. Reported daily COVID-19 cases

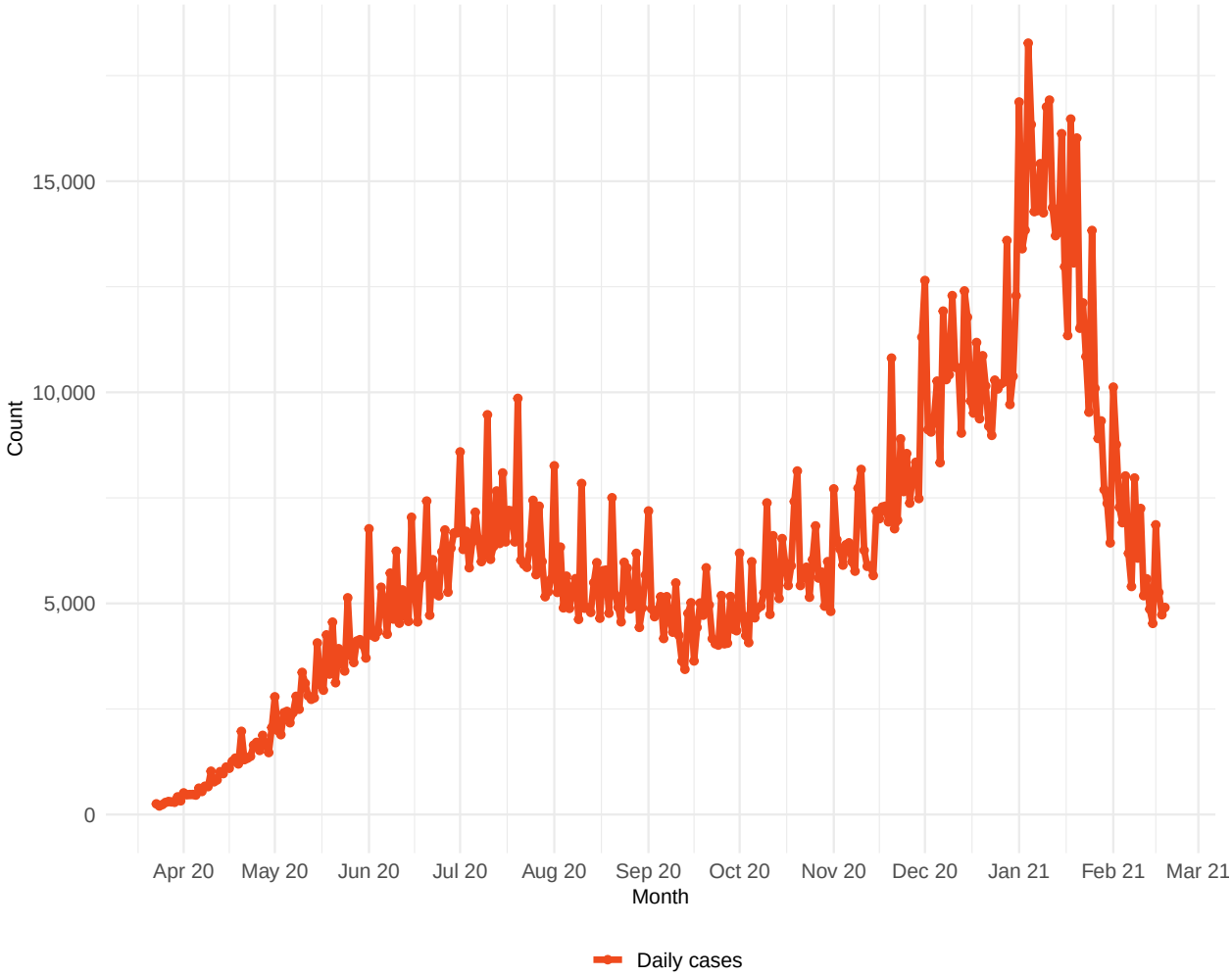


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	5,243	1
Ischemic heart disease	2,044	2
Diabetes mellitus	1,420	3
Chronic kidney disease	1,395	4
Cirrhosis and other chronic liver diseases	891	5
Stroke	729	6
Chronic obstructive pulmonary disease	630	7
Interpersonal violence	590	8
Alzheimer's disease and other dementias	455	9
Lower respiratory infections	434	10

Figure 2. Reported daily COVID-19 deaths

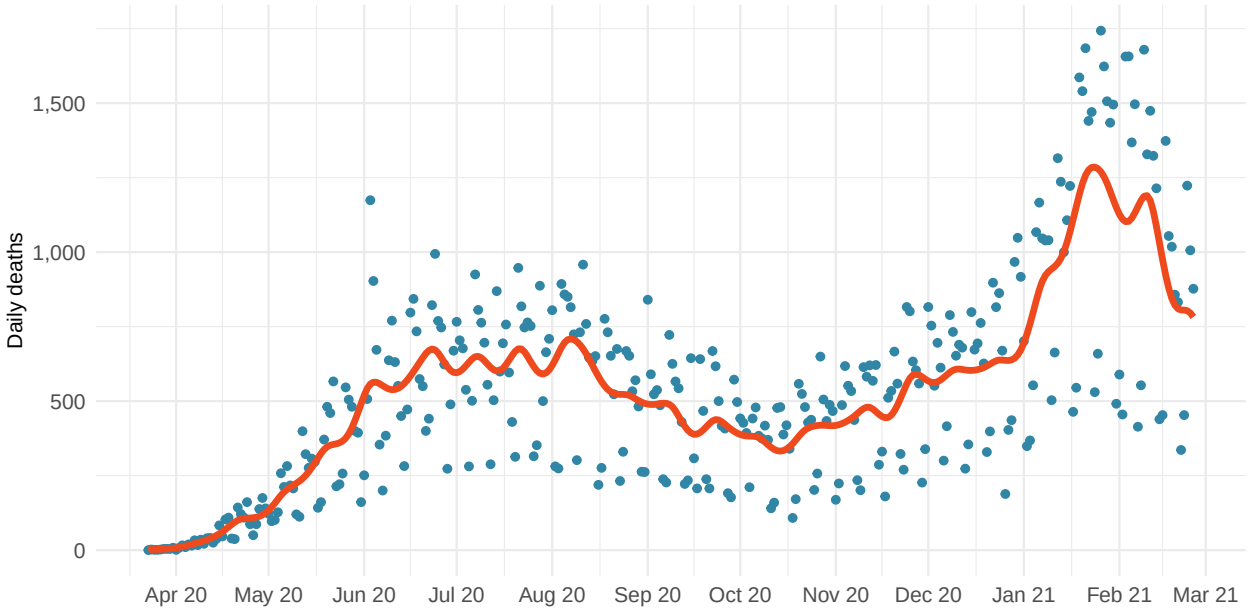


Figure 3. Daily COVID-19 death rate per 1 million on March 01, 2021

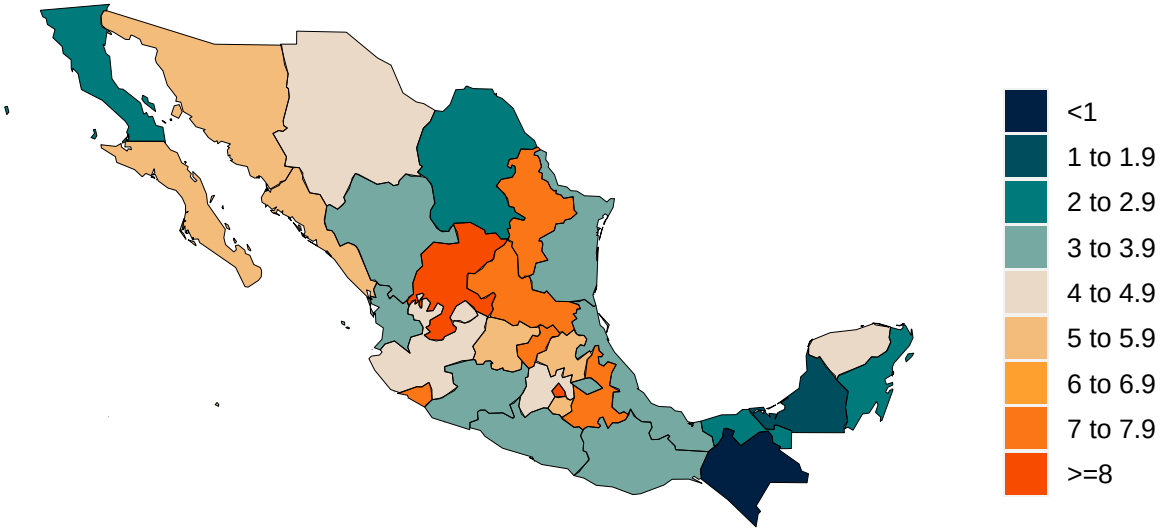


Figure 4. Estimated percent of the population infected with COVID-19 on March 01, 2021

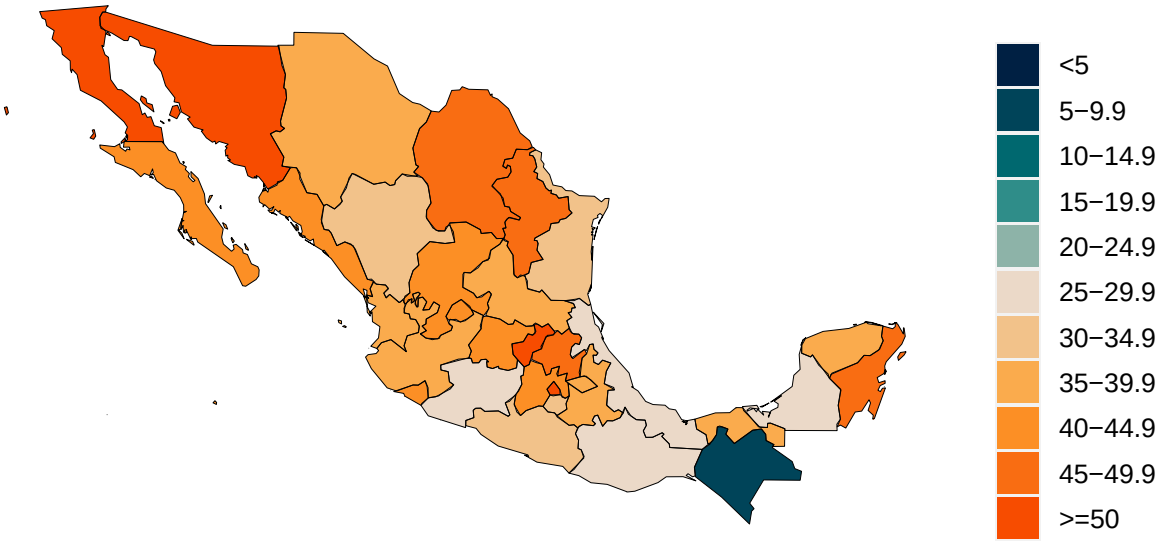
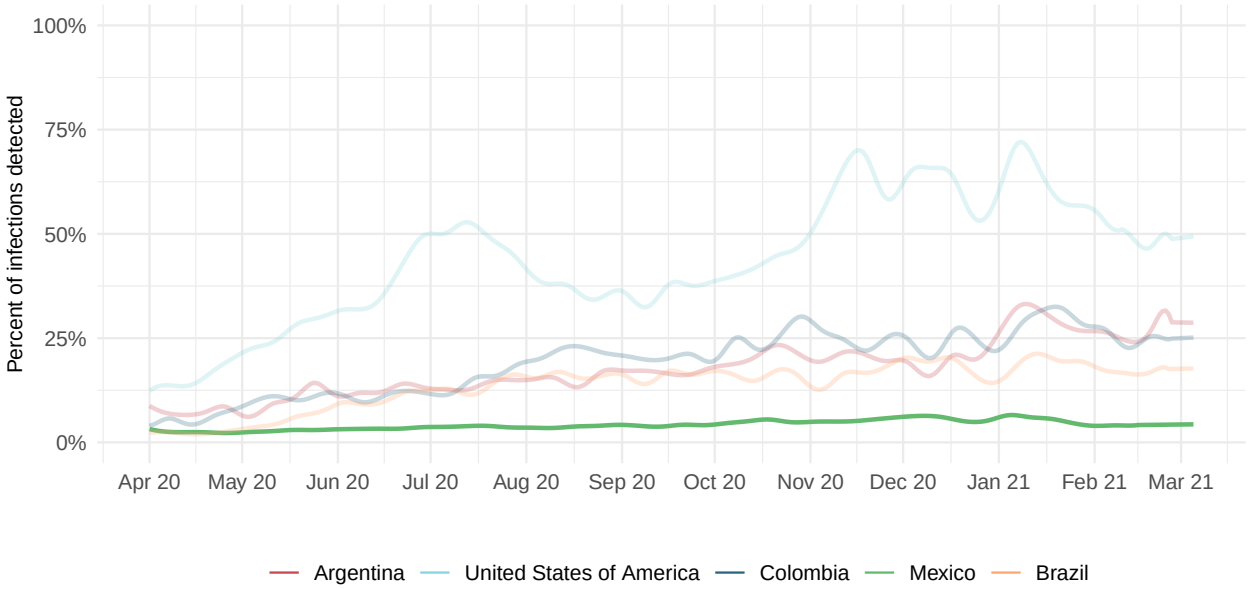


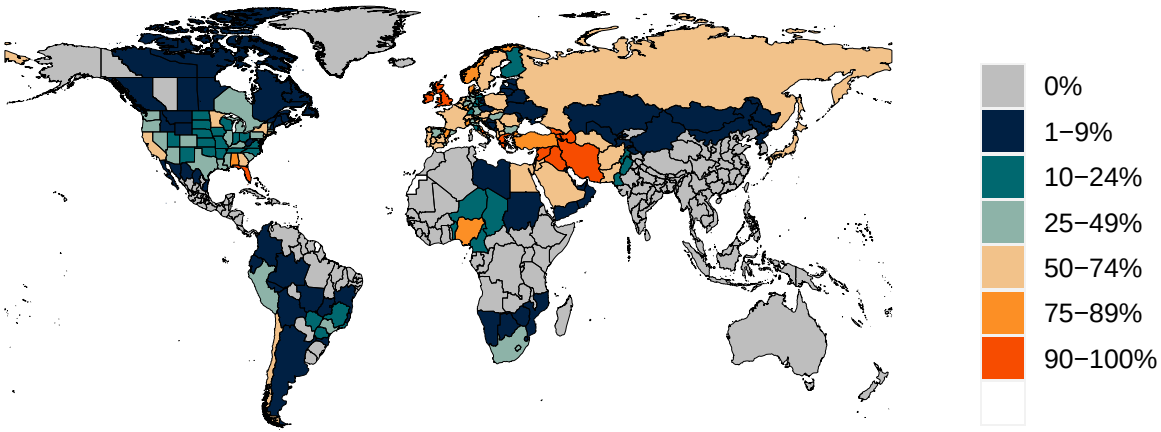
Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.



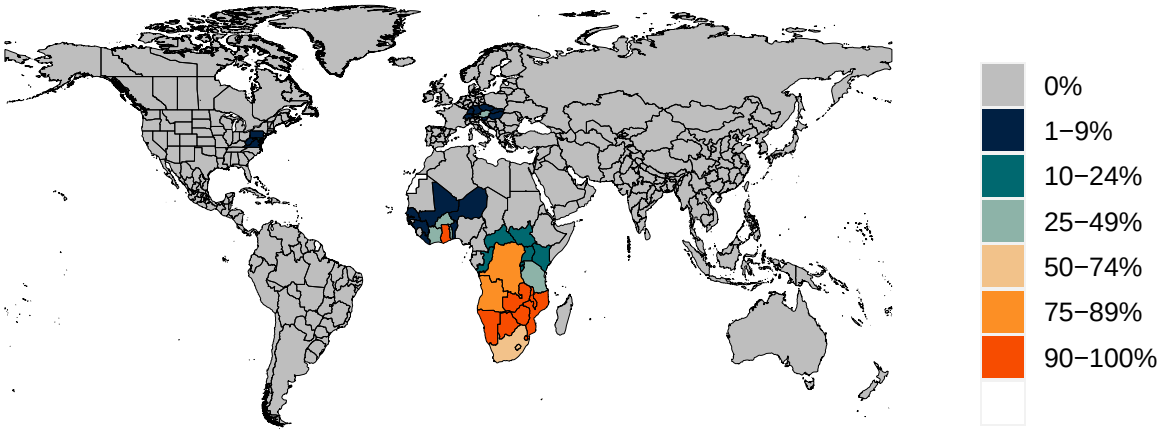
*Due to measurement errors in cases and testing rates, the infection to detection rate (IDR) can exceed 100% at particular points in time.

Figure 6. Percent of circulating SARS-CoV-2 for 3 primary variants on March 1, 2021.

A. Percent B.1.1.7 variant



B. Percent B.1.351 variant



C. Percent P1 variant

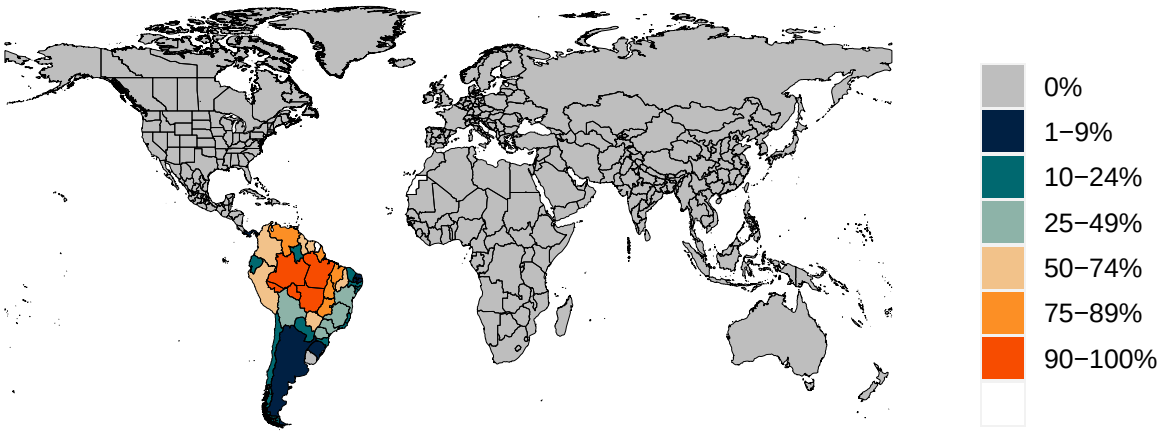


Figure 7. Infection fatality ratio on March 01, 2021. This is estimated as the ratio of COVID-19 deaths to infections based on the SEIR disease transmission model.

Critical drivers

Table 2. Current mandate implementation

Figure 8. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

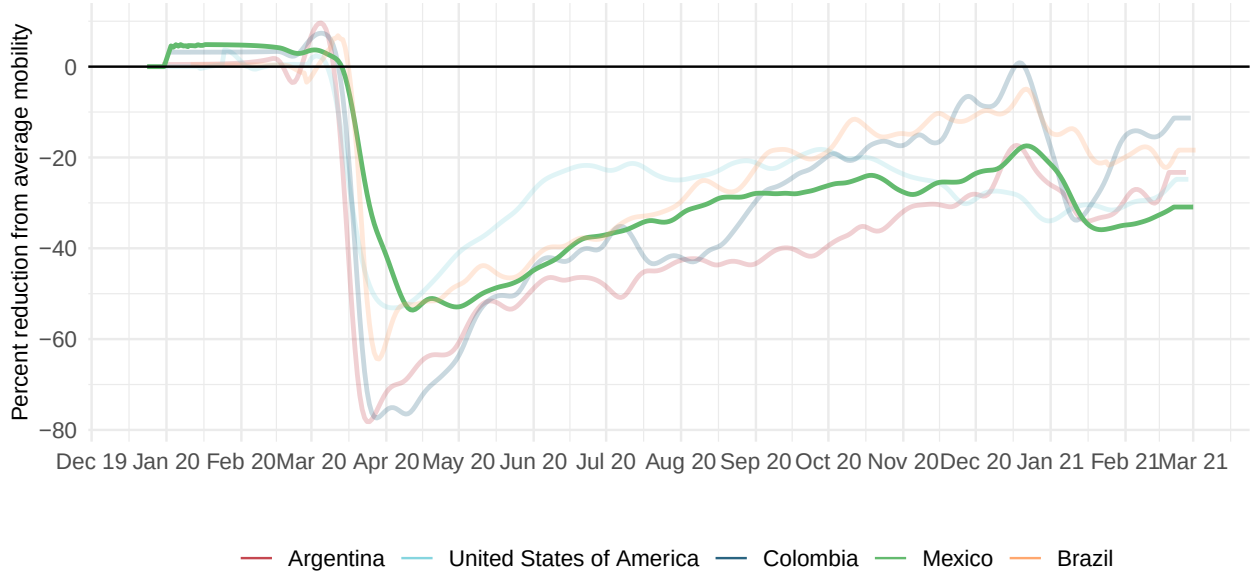


Figure 9. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on March 01, 2021

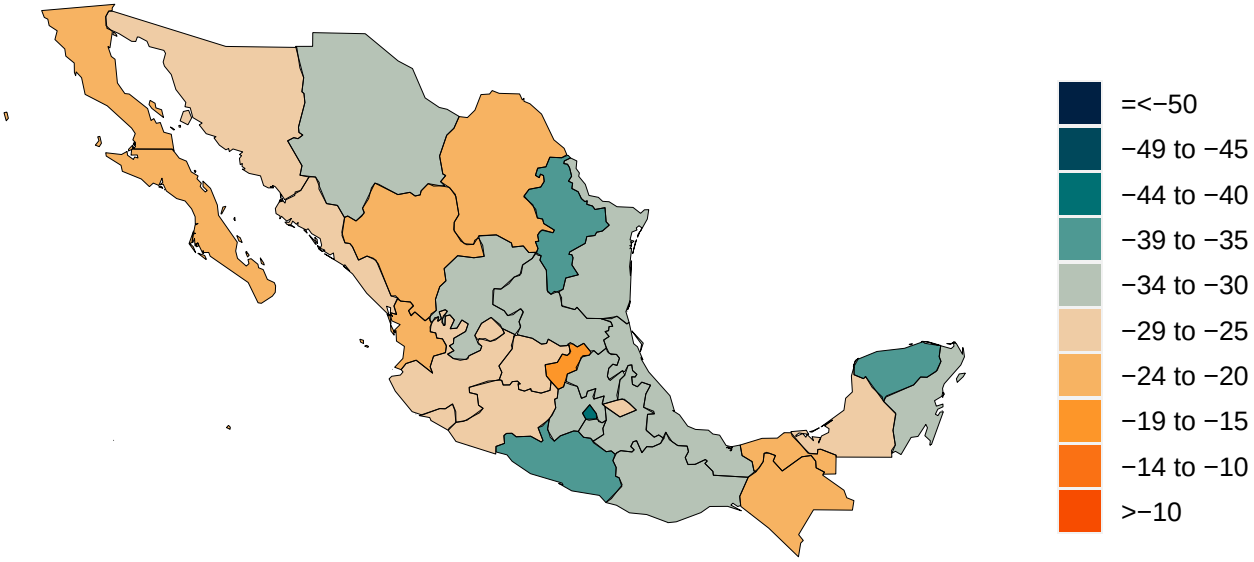


Figure 10. Trend in the proportion of the population reporting always wearing a mask when leaving home

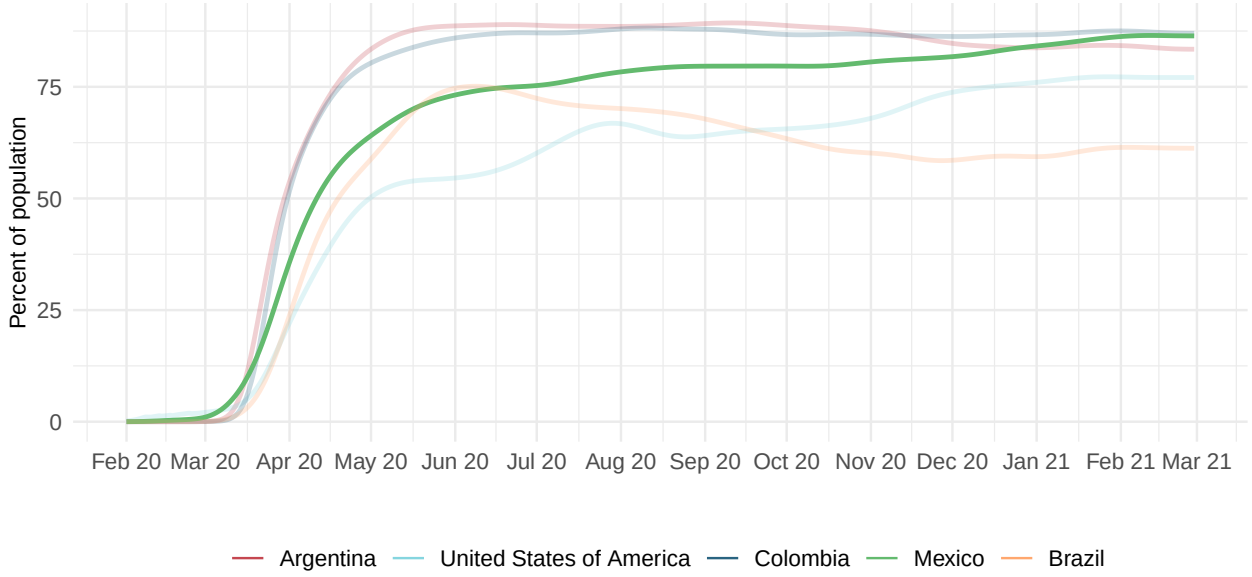


Figure 11. Proportion of the population reporting always wearing a mask when leaving home on March 01, 2021

Figure 12. Trend in COVID-19 diagnostic tests per 100,000 people

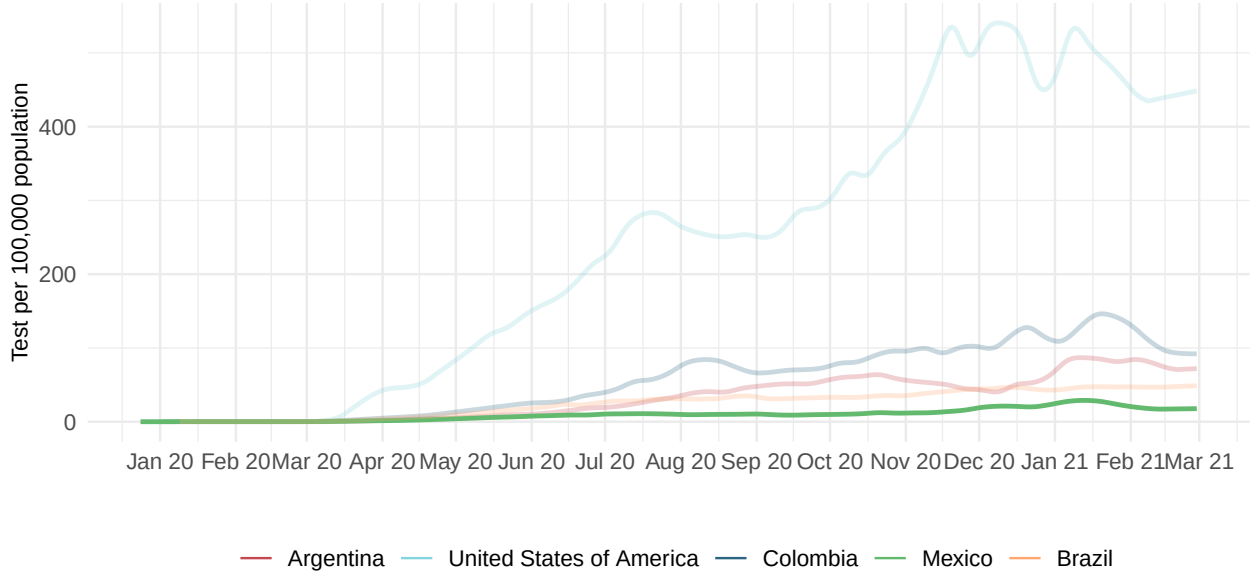


Figure 13. COVID-19 diagnostic tests per 100,000 people on February 13, 2021

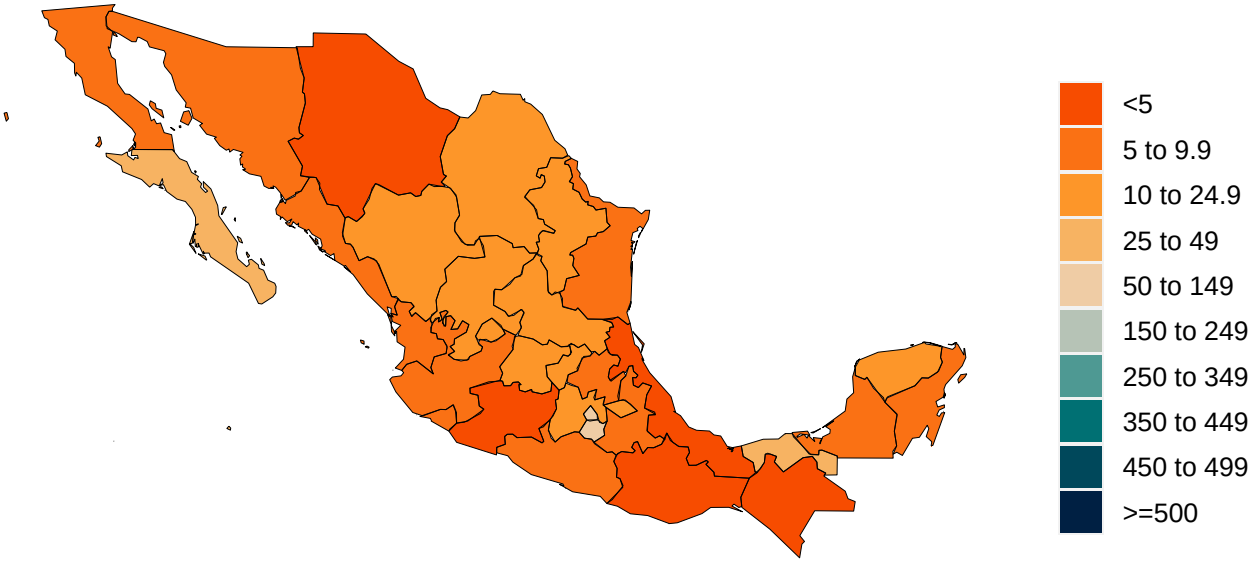
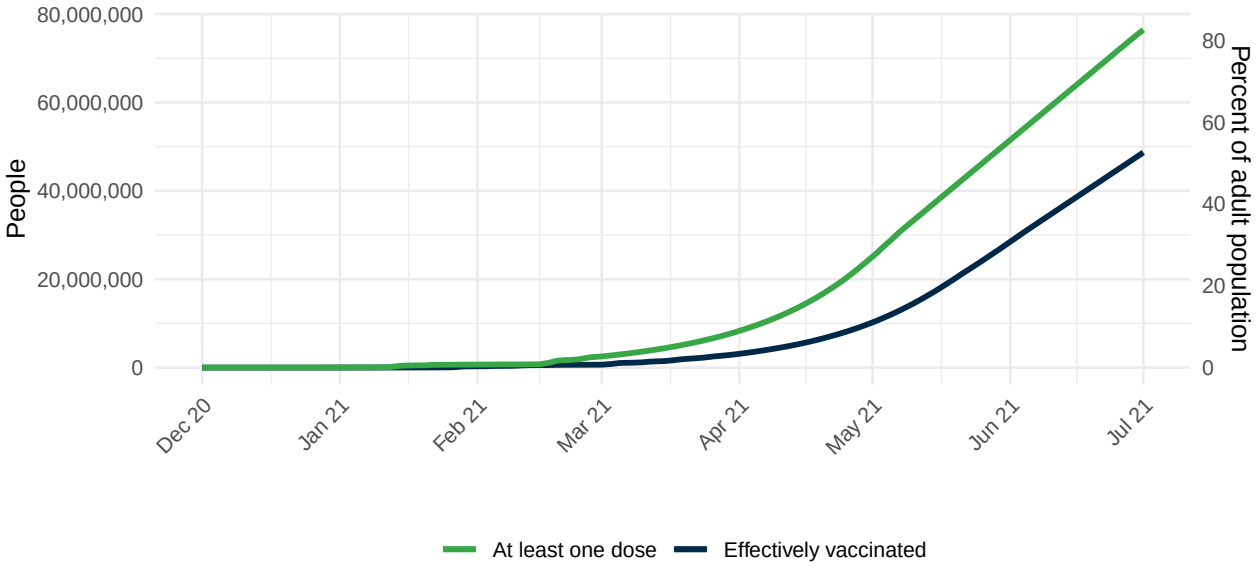


Figure 14. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

Figure 15. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and yes, probably).

Figure 16. The number of people who receive any vaccine and those who are effectively vaccinated and protected against disease, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses.



Projections and scenarios

We produce three scenarios when projecting COVID-19. The **reference scenario** is our forecast of what we think is most likely to happen:

- Vaccines are distributed at the expected pace.
- Governments adapt their response by re-imposing social distancing mandates for 6 weeks whenever daily deaths reach 8 per million, unless a location has already spent at least 7 of the last 14 days with daily deaths above this rate and not yet re-imposed social distancing mandates. In this case, the scenario assumes that mandates are re-imposed when daily deaths reach 15 per million.
- Variants B.1.1.7 (first identified in the UK), B.1.351 (first identified in South Africa), and P1 (first identified in Brazil) continue to spread from locations with (a) more than 5 sequenced variants, and (b) reports of community transmission, to adjacent locations following the speed of variant scale-up observed in the regions of the UK.
- In one-quarter of those vaccinated, mobility increases toward pre-COVID-19 levels.

The **worse scenario** modifies the reference scenario assumptions in three ways:

- First, it assumes that variants B.1.351 or P1 begin to spread within 3 weeks in adjacent locations that do not already have B.1.351 or P1 community transmission.
- Second, it assumes that all those vaccinated increase their mobility toward pre-COVID-19 levels.
- Third, it assumes that among those vaccinated, mask use starts to decline exponentially one month after completed vaccination.

The **universal masks scenario** makes all the same assumptions as the reference scenario but also assumes 95% of the population wear masks in public in every location.

Figure 17. Cumulative COVID-19 deaths until July 01, 2021 for three scenarios

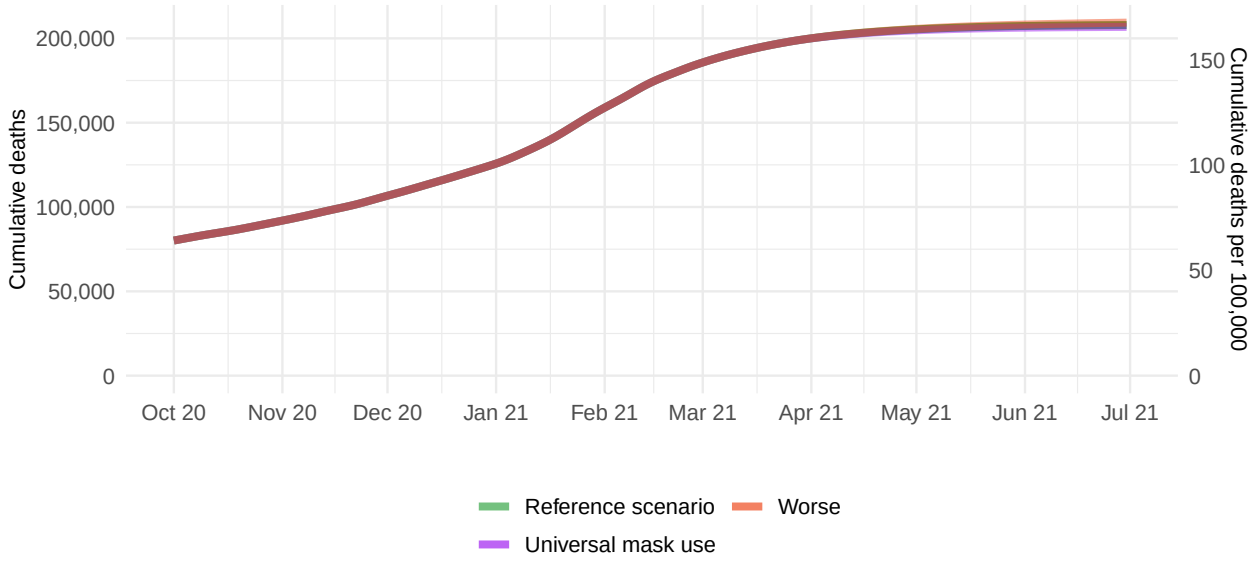


Figure 18. Daily COVID-19 deaths until July 01, 2021 for three scenarios

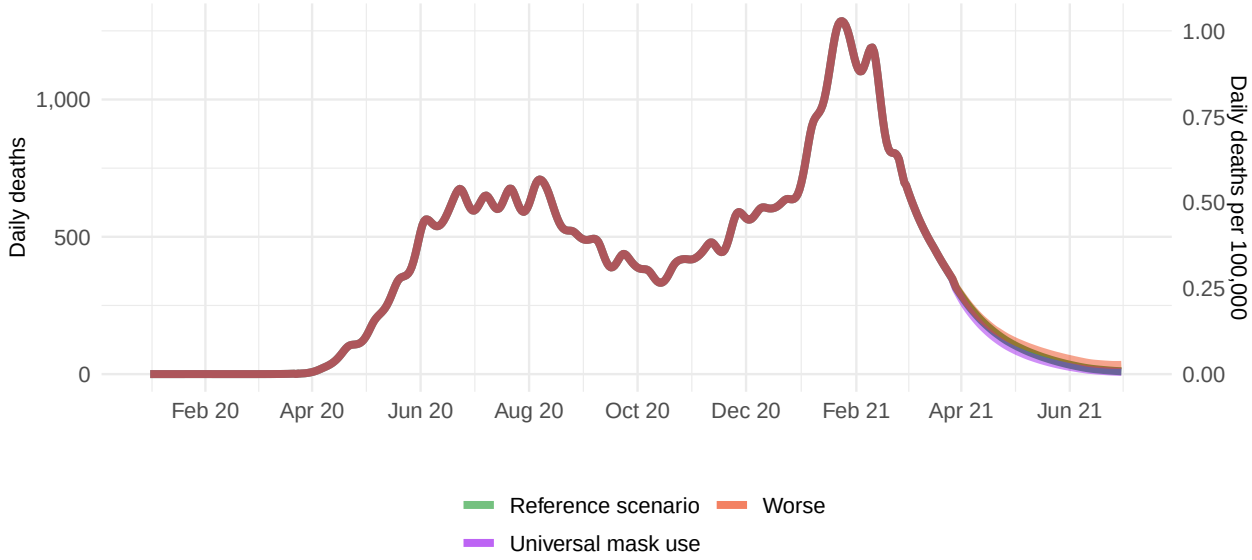


Figure 19. Daily COVID-19 infections until July 01, 2021 for three scenarios

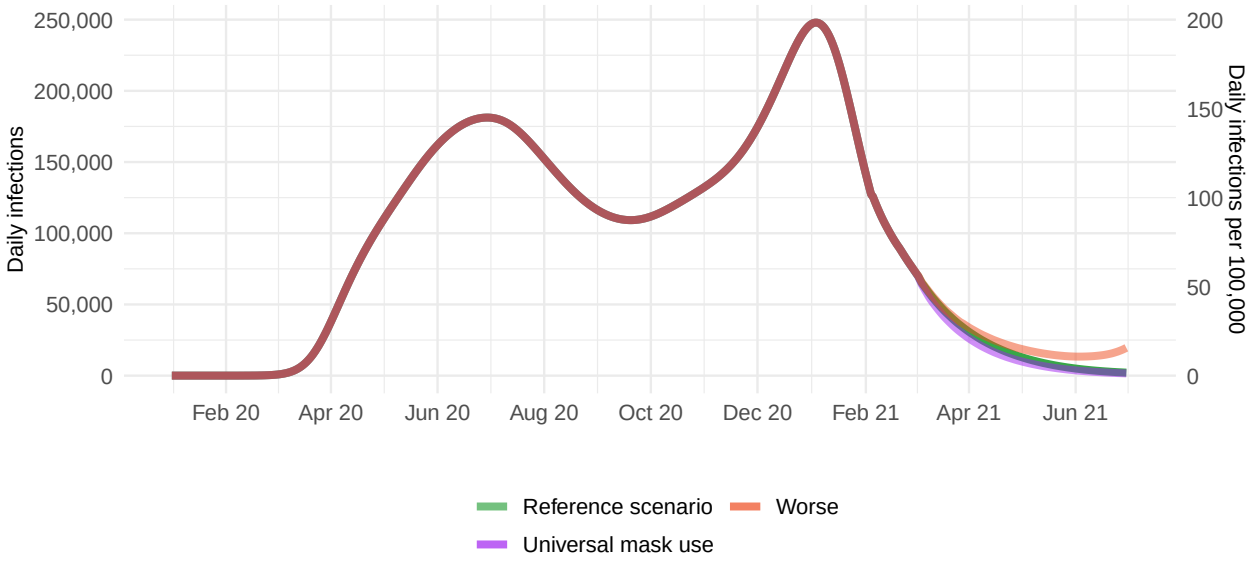


Figure 20. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), Imperial College London (Imperial; https://www.covidsim.org), The Los Alamos National Laboratory (LANL; https://covid-19.bsvgateway.org/), and the SI-KJalpha model from the University of Southern California (SIKJalpha; https://github.com/scc-usc/ReCOVER-COVID-19). Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from availble locations in that region.

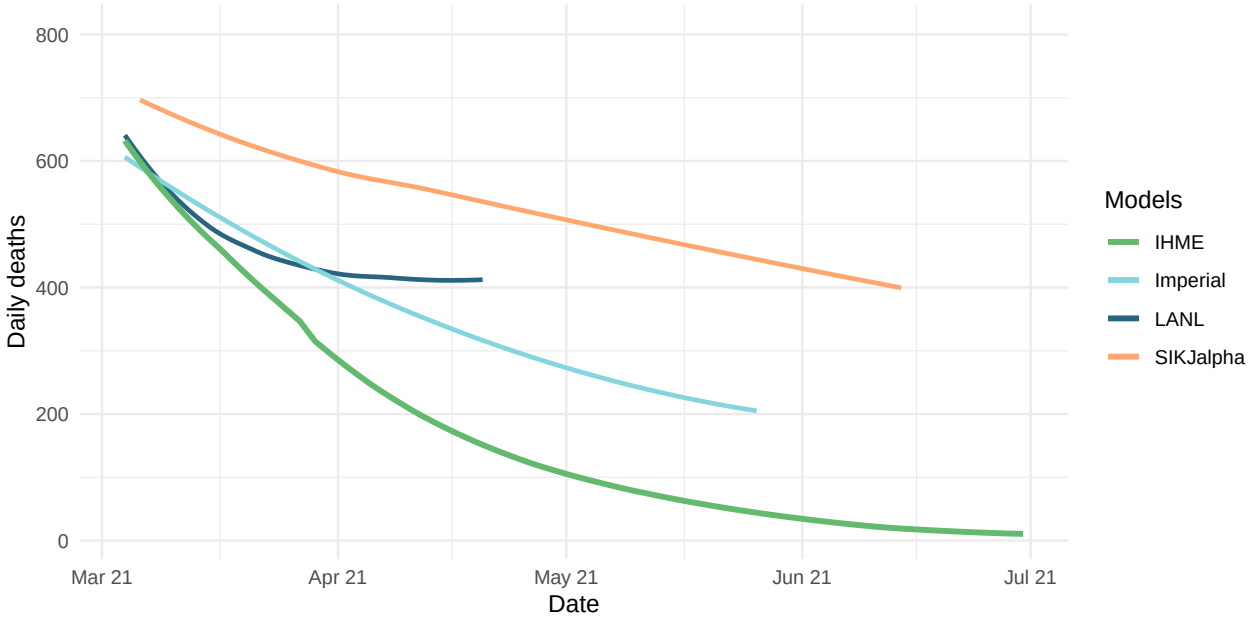


Figure 21. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and greater than 20% is considered *extreme stress*.

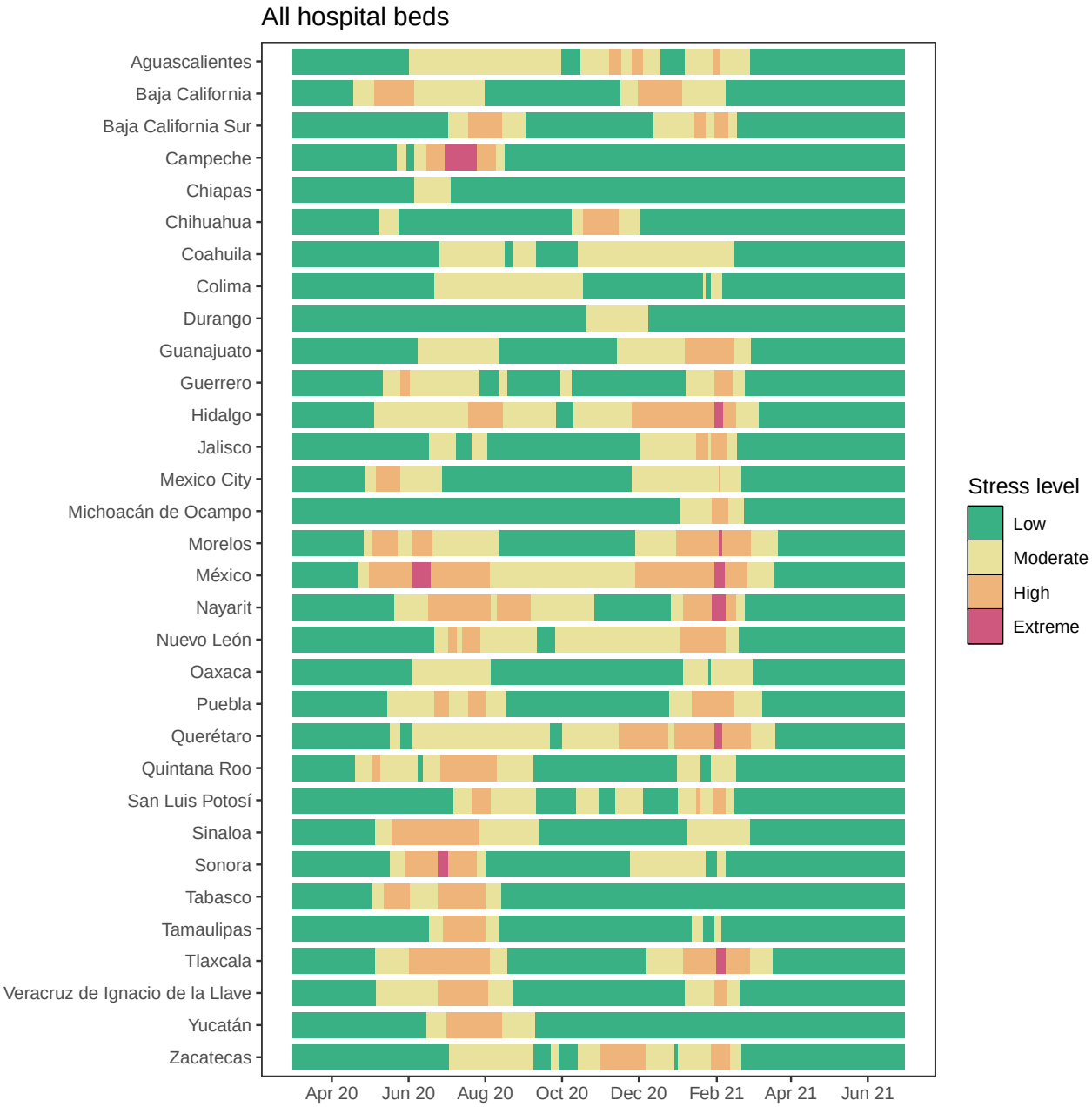
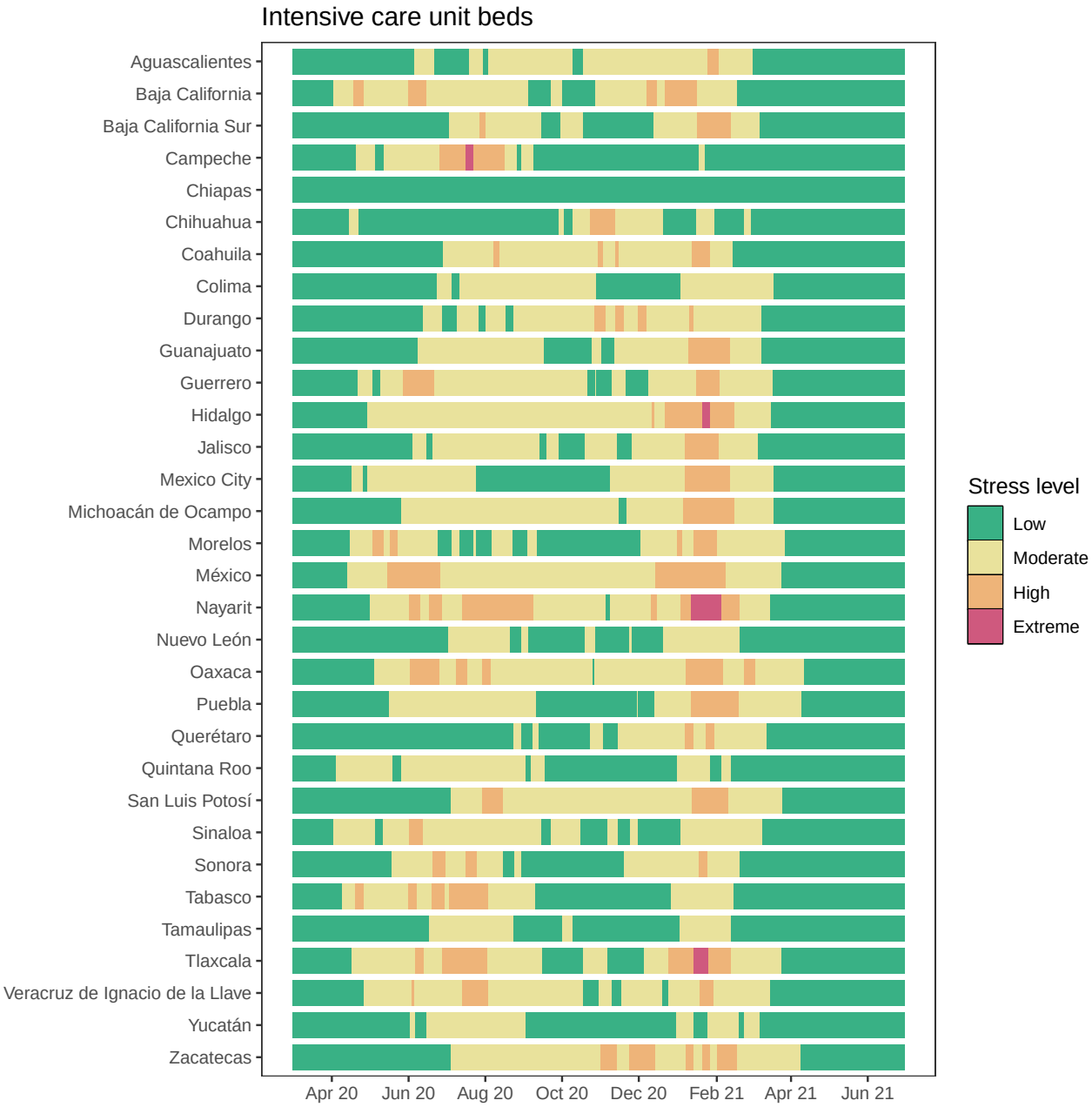


Figure 22. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *moderate stress*, 30-59% is considered *high stress*, and greater than 60% is considered *extreme stress*.



More information

Data sources:

Mask use data sources include PREMISE; Facebook Global symptom survey (This research is based on survey results from University of Maryland Social Data Science Center) and the Facebook United States symptom survey (in collaboration with Carnegie Mellon University); Kaiser Family Foundation; YouGov COVID-19 Behaviour Tracker survey.

Vaccine hesitancy data are from the COVID-19 Beliefs, Behaviors, and Norms Study, a survey conducted on Facebook by the Massachusetts Institute of Technology (https://covidsurvey.mit.edu/).

Data on vaccine candidates, stages of development, manufacturing capacity, and pre-purchasing agreements are primarily from Linksbridge and supplemented by Duke University.

A note of thanks:

We wish to warmly acknowledge the support of these and others who have made our COVID-19 estimation efforts possible.

More information:

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

Questions? Requests? Feedback? Please contact us at https://www.healthdata.org/covid/contact-us.