Informe de resultados de COVID-19: la Región de las Américas

4 de diciembre de 2020

Este documento contiene información resumida sobre las últimas proyecciones del modelo IHME sobre COVID-19 en la Región de las Américas. El modelo se ejecutó el 03 de diciembre de 2020.

Situación actual

- Las muertes diarias en la última semana aumentaron a 3,370 por día en promedio en comparación con 3,120 la semana anterior (Figura 2). Esto convierte a COVID-19 en la causa número 1 de muerte en la Región de las Américas esta semana (Tabla 1).
- La R efectiva, calculada usando casos, hospitalizaciones y muertes, es mayor que 1 en 8 países de la región (Figura 3). La R efectiva en la Región de las Américas el 19 de noviembre fue 0.88.
- Estimamos que el 20% de las personas en la Región de las Américas han sido infectadas al 30 de noviembre (Figura 4).
- La tasa de mortalidad diaria es superior a 4 por millón en Belice, México y Estados Unidos de América (Figura 6).

Tendencias de los impulsores de la transmisión

- En la última semana no se han impuesto nuevos mandatos. No se han levantado mandatos esta semana (Cuadro 2).
- La movilidad la semana pasada fue un 23% más baja que la línea de base anterior a COVID-19 (Figura 8). La movilidad estuvo cerca de la línea de base (dentro del 10%) en El Salvador y Nicaragua. La movilidad fue inferior al 30% de la línea de base en Argentina, Bahamas, Belice, Canadá, Chile, Costa Rica, Honduras, Panamá y Perú.
- Al 30 de noviembre, estimamos que el 74% de las personas siempre usaban una máscara al salir de casa (Figura 9) en comparación con el 74% de la semana pasada. El uso de mascarillas fue inferior al 50% en Haití y Santa Lucía.
- Hubo 164 pruebas de diagnóstico por cada 100.000 personas el 30 de noviembre (Figura 10).

Proyecciones

- En nuestro escenario de referencia, que representa lo que creemos que es más probable que suceda, nuestro modelo proyecta 1,182,000 muertes acumuladas el 1 de abril de 2021. Esto representa 437,000 muertes adicionales del 30 de noviembre al 1 de abril (Figura 14). Las muertes diarias alcanzarán un máximo de 4.660 el 3 de enero de 2021, el 3 de enero de 2021, el 3 de enero de 2021, el 3 de enero de 2021 (Figura 15).

- El escenario de referencia asume que 65 países de la región volverán a imponer mandatos para el 1 de abril de 2021.
- Si se alcanzara la cobertura universal de mascarillas (95%) en la próxima semana, nuestro modelo proyecta 104.000 muertes acumulativas menos en comparación con el escenario de referencia del 1 de abril de 2021.
- Bajo nuestro escenario de flexibilización de mandatos, nuestro modelo proyecta 1,447,000 muertes acumuladas el 1 de abril de 2021.
- Para el 1 de abril de 2021, proyectamos que el lanzamiento proyectado de la vacuna salvará 14,400 vidas. Si se logra un rápido despliegue de la vacuna, se salvarán 27.500 vidas. La implementación rápida dirigida a personas de alto riesgo solo podría salvar, en comparación con el escenario "sin vacuna," 34.800 vidas.
- La Figura 21 compara nuestros pronósticos de escenarios de referencia con otros modelos archivados públicamente. Los pronósticos son muy divergentes.
- 11 países de la región tendrán una presión alta o extrema en las camas de hospital en algún momento de diciembre a febrero (Figura 22). 22 estados tendrán una presión alta o extrema en camas de las UCI de diciembre a febrero (Figura 23).

Actualizaciones de modelos

La actualización del modelo de esta semana incluye el impacto esperado por la distribución de la vacunación y escenarios alternativos de vacunación. Para permitir que el modelo de transmisión incorpore vacunas, agregamos dos características a la formulación del modelo de transmisión SEIIR. Primero, debido a que no está claro si alguna vacuna potencial evitará la transmisión o solo reducirá la probabilidad de enfermedad, permitimos la opción de que algunas personas vacunadas aún estén infectadas (y se vuelvan infecciosas para otras). Estos individuos son rastreados a través de su infección, y el impacto de la vacuna solo se calcula cuando se estima la probabilidad de que su infección haya resultado en la muerte. Como la vacunación puede resultar en la prevención de la infección, agregamos una segunda vía en la que los individuos susceptibles pueden ser eliminados del proceso de transmisión. Es importante señalar que, en ausencia de información más detallada sobre la detección previa para la distribución de la vacuna, asumimos que las personas que han sido previamente infectadas con COVID-19 tienen la misma probabilidad de recibir la vacuna que las personas susceptibles. El marco de modelación nos permite especificar el número de vacunas, su eficacia para prevenir la muerte y su eficacia para prevenir infecciones. La parametrización de estos números se describe a continuación.

La segunda característica que agregamos al modelo fue separar a los individuos de alto riesgo (por ejemplo, individuos con una tasa más alta de mortalidad por infección, como los mayores de 65 años o con comorbilidades) y rastrearlos explícitamente a través del proceso SEIIR con su propio conjunto de posibilidades. Al hacer esto, podemos acomodar fácilmente campañas de vacunación específicas que se centran preferentemente en la distribución temprana de vacunas en este grupo. No hay una mezcla diferencial o alteración de la infecciosidad dentro de este grupo frente al resto de la población de una ubicación determinada, sino que la creación de estos nuevos grupos alimenta el cálculo de las muertes a futuro mediante el uso de una tasa de mortalidad por infección específica del grupo de edad. Esta adición duplica el número de compartimentos en el modelo SEIIR, ya que ahora hacemos un seguimiento simultáneo de las personas que no están vacunadas, vacunados y desprotegidos de enfermedades, vacunados y protegidos de enfermedades, y vacunados y protegidos de infecciones, tanto en alto riesgo como bajo riesgo. grupos.

Este marco se utilizó para agregar la vacunación esperada al escenario de flexibilización de mandatos, escenario de referencia y escenario de uso universal del cubrebocas. A continuación, se describe el ritmo de ampliación de la vacuna y cómo se calculó para cada país. Además, desarrollamos un escenario donde la capacidad máxima de la vacuna se duplicó y la velocidad de ampliación de la vacuna fue dos veces más rápida. También, desarrollamos un escenario en el que la entrega rápida de vacunas estaba dirigida exclusivamente a personas de alto riesgo. Finalmente, para ayudar a cuantificar el impacto marginal de la vacunación, incluimos un escenario alternativo sin vacuna que tiene los mismos supuestos que el escenario de referencia, como la reimposición de mandatos con la tasa de mortalidad diaria superior a 8 por millón.

La ampliación de la vacuna COVID-19 por ubicación se estimó utilizando datos específicos de cada vacuna candidata sobre: (i) Capacidad del fabricante por trimestre hasta fines de 2021 (Linksbridge, https://pharmanews.linksbridge.com/Covid-19); (ii) Dosis aseguradas por país o grupo de compra, por ejemplo, COVAX; (iii) Estado actual de desarrollo de candidatos a vacunas (descubrimiento, Fase I-III, uso limitado; Linksbridge); (iv) Probabilidad de éxito según el estado de desarrollo de la vacuna candidata (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6139376/); y (v) Tasas autoinformadas de vacilación por las vacunas de encuestas realizadas por Facebook (https://covidsurvey.mit.edu/). Asumimos una eficacia del 95% para las vacunas de ARNm de Pfizer / BioNTech y Moderna (https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-conclude-phase-3- estudio-covid-19-vacuna; https://investors.modernatx.com/news-releases/news-release-details/moderna-announces-primary-efficacy-analysis-phase-3-cove-study); 70% para la vacuna AstraZeneca / Oxford (https://www.astrazeneca.com/media-centre/press-releases/2020/azd1222hlr.html); 90% para otras vacunas de ARNm; y 75% para todas las demás vacunas (supuesto). Entre los individuos que están efectivamente vacunados, en ausencia de datos de los ensayos sobre la eficacia del bloqueo de la transmisión, asumimos que el 50% de ellos están protegidos contra la infección y el 50% restante está protegido contra la muerte debido a una enfermedad grave si se infecta. Asumimos que la vacuna Pfizer / BioNTech estaría disponible para su uso el 15 de diciembre de 2020; la vacuna Moderna el 22 de diciembre de 2020; y la vacuna AstraZeneca / Oxford el 7 de enero de 2021. Las fechas de disponibilidad de otras vacunas se basaron en el estado de desarrollo (Discovery, 12 meses; Fase I, 9 meses; Fase II, 6 meses; y Fase III, disponible el 1 de febrero de 2021) . Estos datos se combinaron para estimar el número de dosis efectivas disponibles por ubicación y tiempo.

Para nuestro escenario de referencia, asumimos, con base en el número de vacunas anuales contra la influenza estacional en los EE. UU. De 180 millones, con la mayoría de las dosis administradas durante tres meses, que el número máximo de vacunas administradas por día es de 3 millones, y asumimos una escala: período hasta esta tasa máxima de 90 días utilizando una función de crecimiento exponencial. Para el escenario de ampliación rápida, se supuso que el número máximo de vacunas, la entrega era de 6 millones por día con un período de ampliación de 45 días. Estimamos la tasa de entrega máxima por día para otras ubicaciones al escalar linealmente la tasa de entrega para los Estados Unidos, utilizando el índice de calidad y acceso a la atención médica (HAQ) (http://ghdx.healthdata.org/record/ihme-data/gbd -Índice-de-acceso-y-calidad-a-la-asistencia-sanitaria-2016-1990-2016). Asumimos que el desperdicio de vacunas fue del 10% y la tasa de abandono entre la primera y la segunda dosis fue del 10%. Las dosis de vacuna se distribuyeron entre las dos poblaciones prioritarias de trabajadores esenciales y adultos de 65 años y más, proporcionalmente al tamaño. Las dosis se administraron primero a estas dos poblaciones, antes de que se administraran a la población adulta general de 18 a 64 años. Definimos la población trabajadora esencial como la proporción de personas que dejaron sus hogares para trabajar en el período de tiempo con menor movilidad durante la pandemia, utilizando datos de encuestas de Facebook.

COVID-19 Results Briefing: the Region of the Americas

December 4, 2020

This document contains summary information on the latest projections from the IHME model on COVID-19 in the Region of the Americas. The model was run on December 03, 2020.

Current situation

- Daily deaths in the last week increased to 3,370 per day on average compared to 3,120 the week before (Figure 2). This makes COVID-19 the number 1 cause of death in the Region of the Americas this week (Table 1).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 8 regions (Figure 3). The Effective R in the Region of the Americas on November 19 was 0.88.
- We estimated that 20% of people in the Region of the Americas have been infected as of November 30 (Figure 4).
- The daily death rate is greater than 4 per million in Belize, Mexico, and United States of America (Figure 6).

Trends in drivers of transmission

- In the last week, no new mandates have been imposed. No mandates have been lifted this week (Table 2).
- Mobility last week was 23% lower than the pre-COVID-19 baseline (Figure 8). Mobility was near baseline (within 10%) in El Salvador, and Nicaragua. Mobility was lower than 30% of baseline in Argentina, Bahamas, Belize, Canada, Chile, Costa Rica, Honduras, Panama, and Peru.
- As of November 30, we estimated that 74% of people always wore a mask when leaving their home (Figure 9) compared to 74% last week. Mask use was lower than 50% in Haiti, and Saint Lucia.
- There were 164 diagnostic tests per 100,000 people on November 30 (Figure 10).

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 1,182,000 cumulative deaths on April 1, 2021. This represents 437,000 additional deaths from November 30 to April 1 (Figure 14). Daily deaths will peak at 4,660 on January 3, 2021, January 3, 2021, January 3, 2021, January 3, 2021 (Figure 15).
- The reference scenario assumes that 65 countries in the region will re-impose mandates by April 1, 2021.

- If **universal mask coverage (95%)** were attained in the next week, our model projects 104,000 fewer cumulative deaths compared to the reference scenario on April 1, 2021.
- Under our **mandates easing scenario**, our model projects 1,447,000 cumulative deaths on April 1, 2021.
- By April 1 2021, we project that 14,400 lives will be saved by the projected vaccine rollout. If rapid rollout of vaccine is achieved, 27,500 lives will be saved. Rapid rollout targeting high-risk individuals only could save, compared to the "no vaccine" scenario, 34,800 lives.
- Figure 21 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.
- 11 countries in the region will have high or extreme stress on hospital beds at some point in December through February (Figure 22). 22 states will have high or extreme stress on ICU capacity in December through February (Figure 23).

Model updates

This week's model update includes the expected impact of vaccination scale-up and alternative vaccination scenarios. To allow the transmission model to incorporate vaccinations, we added two features to the SEIIR transmission model formulation. First, because it is unclear if any potential vaccine will prevent transmission or only reduce the probability of disease, we allowed the option for some vaccinated individuals to still be infected (and become infectious to others). These individuals are tracked through their infection, and the impact of the vaccine is only calculated when estimating the probability that their infection resulted in death. As the vaccine may result in the prevention of infection, we added a second pathway where susceptible individuals may become removed from the transmission process. It is important to note that in the absence of more detailed information on pre-screening for vaccine distribution, we assume individuals who have been previously infected with COVID-19 are as likely to receive the vaccine as susceptible individuals. The modeling framework allows us to specify the number of vaccinations, their effectiveness at preventing death, and their effectiveness at preventing infections. The parameterization of these numbers is described below.

The second feature we added to the model was to split out high-risk individuals (e.g., individuals with a higher infection-fatality rate such as those over the age of 65 or with comorbidities) and track them explicitly through the SEIIR process with their own set of pathways. By doing this, we can easily accommodate targeted vaccination campaigns that preferentially focus early vaccine distribution on this group. There is no differential mixing or alteration of infectiousness within this group versus the rest of a location's population, but rather the creation of these new groups feeds into the calculation of future deaths by using a group-specific infection-fatality rate. This addition doubles the number of compartments in the SEIIR model as we now simultaneously track individuals who are unvaccinated, vaccinated, and unprotected from disease, vaccinated and protected from disease, and vaccinated and protected from infection, in both the high-risk and low-risk groups.

This framework was used to add expected vaccination to the mandates easing scenario, reference scenario, and universal mask scenario. The pace of vaccine scale-up and how it was calculated for each country is described below. In addition, we developed a scenario where vaccine maximum capacity was doubled and the speed of vaccine scale-up was twice as fast. In addition, we developed a scenario where fast vaccine delivery was targeted exclusively to high-risk individuals. Finally, to help quantify the marginal impact of vaccination, we included an alternative no vaccine scenario that has the same assumptions as the reference scenario such as the reimposition of mandates with the daily death rate exceeds 8 per million.

The scale-up of COVID-19 vaccine by location was estimated using data specific to each candidate vaccine on: (i) Manufacturer capacity by quarter through the end of 2021 (Linksbridge, https://pharmanews.linksbridge.com/Covid-19); (ii) Secured doses by country or purchasing group, e.g., COVAX; (iii) Current vaccine candidate development status (discovery, Phase I-III, limited use; Linksbridge); (iv) Probability of success by vaccine candidate development status (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6139376/); and (v) Self-reported rates of vaccine hesitancy from surveys conducted by Facebook (https://covidsurvey.mit.edu/). We assumed efficacy of 95% for the Pfizer/BioNTech and Moderna mRNA vaccines (https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-conclude-phase-3-study-covid-19-vaccine; https://investors.modernatx.com/news-releases/news-release-details/moderna-announces-primary-efficacy-analysis-phase-3-cove-study); 70% for the AstraZeneca/Oxford vaccine (https://www.astrazeneca.com/media-centre/press-releases/2020/azd1222hlr.html); 90% for other mRNA vaccines; and 75% for all other vaccines (assumed). Among individuals who are effectively vaccinated, in the absence of any data from the trials on efficacy blocking transmission, we assumed 50% of them are protected from infection and the remaining 50% are protected from death due to severe disease if infected. We assumed the Pfizer/BioNTech vaccine would be available for use on December 15, 2020; the Moderna vaccine on December 22, 2020; and the AstraZeneca/Oxford vaccine on January 7, 2021. Availability dates for other vaccines were based on development status (Discovery, 12 months; Phase I, 9 months; Phase II, 6 months; and Phase III, available February 1, 2021). These data were combined to estimate the number of effective doses available by location and time.

For our reference scenario, we assumed, based on the number of annual seasonal flu vaccinations in the USA of 180 million, with most doses delivered over three months, that the maximum number of vaccines delivered per day is 3 million, and assumed a scale-up period to this maximum rate of 90 days using an exponential growth function. For the fast scale-up scenario, the maximum number of vaccines, delivery was assumed to be 6 million per day with a scale-up period of 45 days. We estimated the maximum delivery rate per day for other locations by linearly scaling the delivery rate for the United States, using the Healthcare Access and Quality (HAQ) Index (http://ghdx.healthdata.org/record/ihme-data/gbd-2016-healthcare-access-and-quality-index-1990-2016). We assumed vaccine wastage was 10% and the dropout rate between the first and second doses was 10%. Vaccine doses were distributed between the two priority populations of essential workers and adults aged 65 years and over, proportional to size. Doses were delivered to these two populations first, before doses were administered to the general adult population aged 18 to 64 years. We defined the essential worker population as the proportion of people who left their homes for work at the period of time with the lowest mobility during the pandemic, using data from surveys from Facebook.

Current situation

Figure 1. Reported daily COVID-19 cases

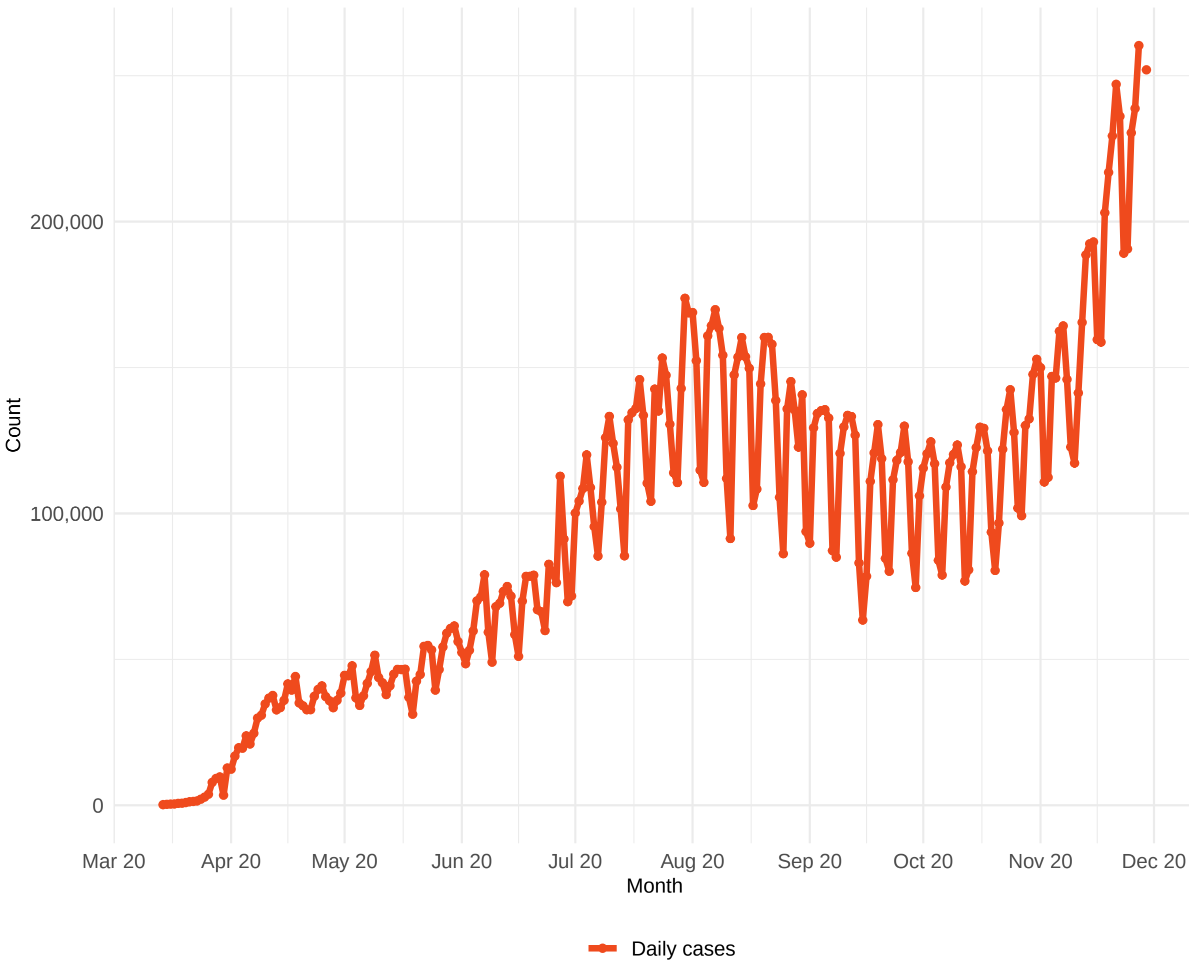


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	23,578	1
Ischemic heart disease	22,182	2
Stroke	10,124	3
Chronic obstructive pulmonary disease	7,401	4
Tracheal, bronchus, and lung cancer	6,369	5
Lower respiratory infections	6,211	6
Chronic kidney disease	6,184	7
Alzheimer's disease and other dementias	5,890	8
Diabetes mellitus	5,822	9
Cirrhosis and other chronic liver diseases	4,153	10

Figure 2a. Reported daily COVID-19 deaths

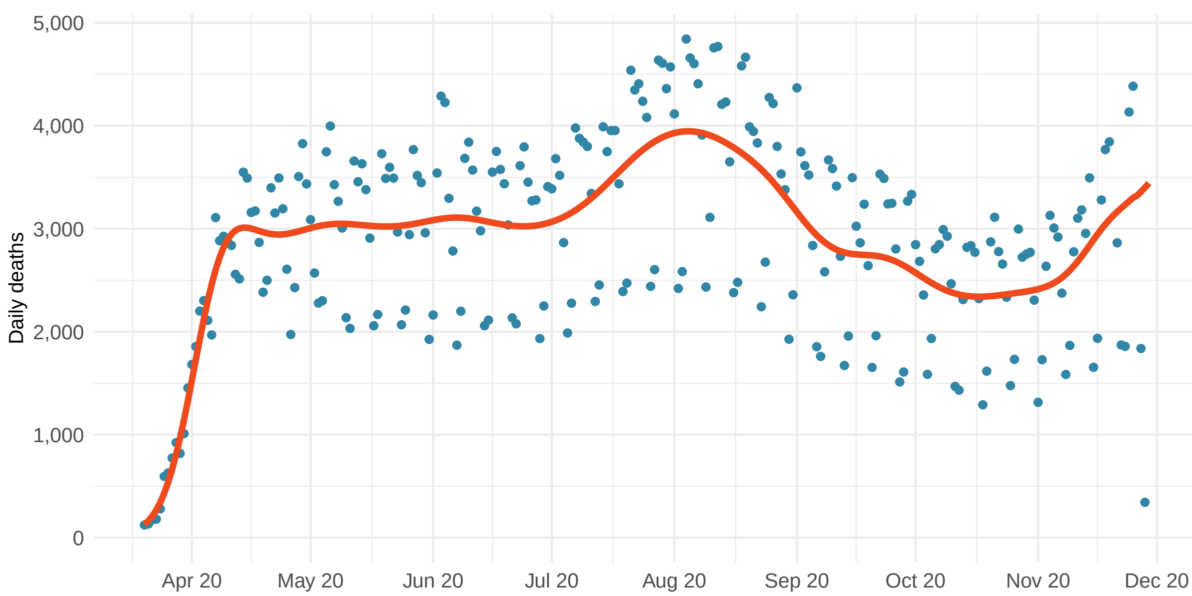


Figure 2b. Estimated cumulative deaths by age group

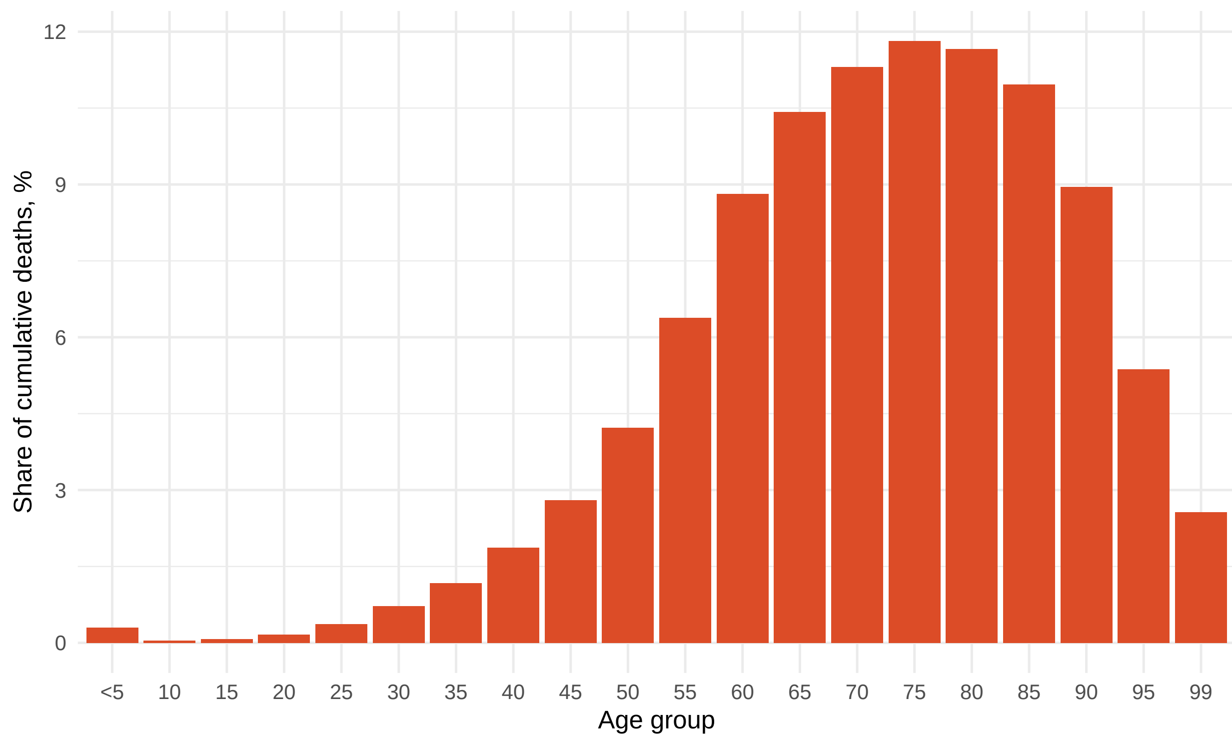


Figure 3. Mean effective R on November 19, 2020. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline, all other things being held the same.

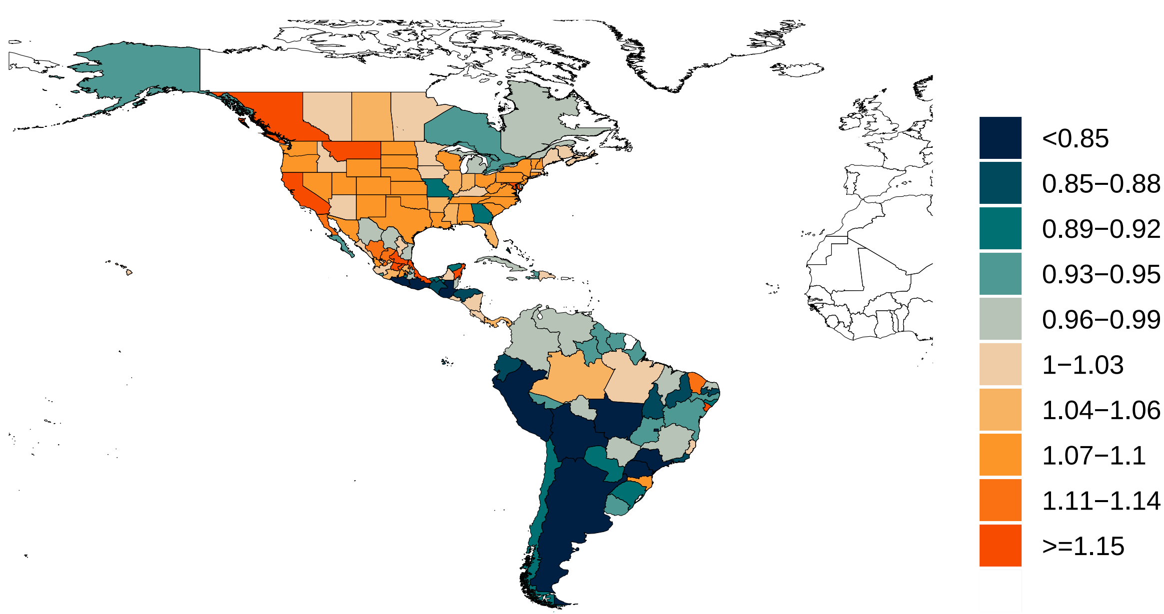


Figure 4. Estimated percent of the population infected with COVID-19 on November 30, 2020

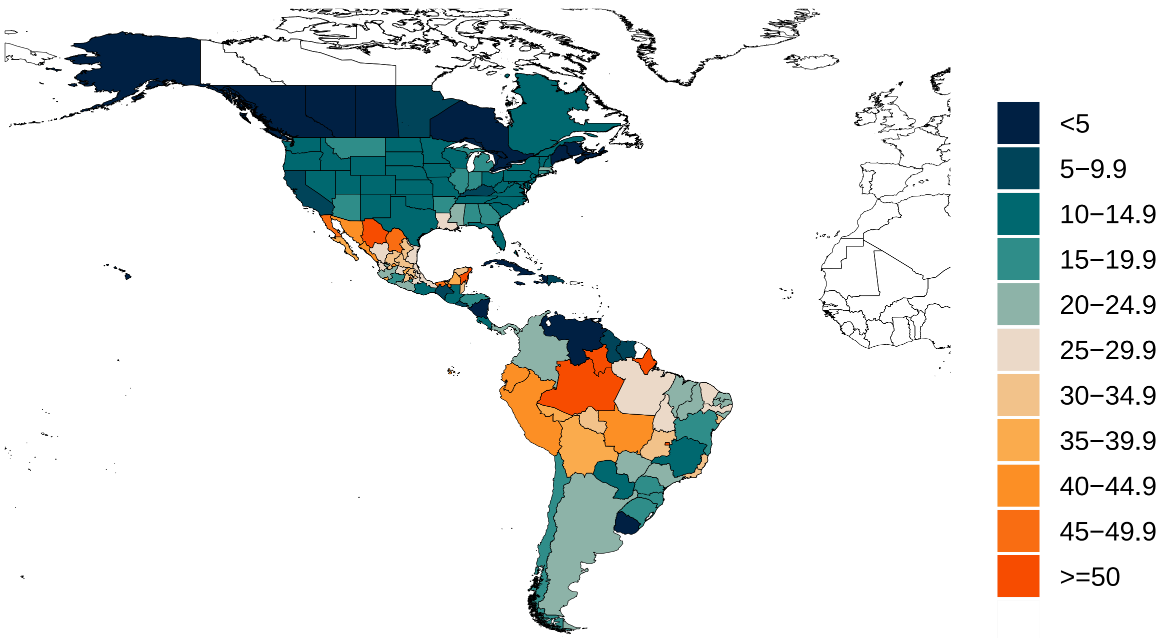


Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.

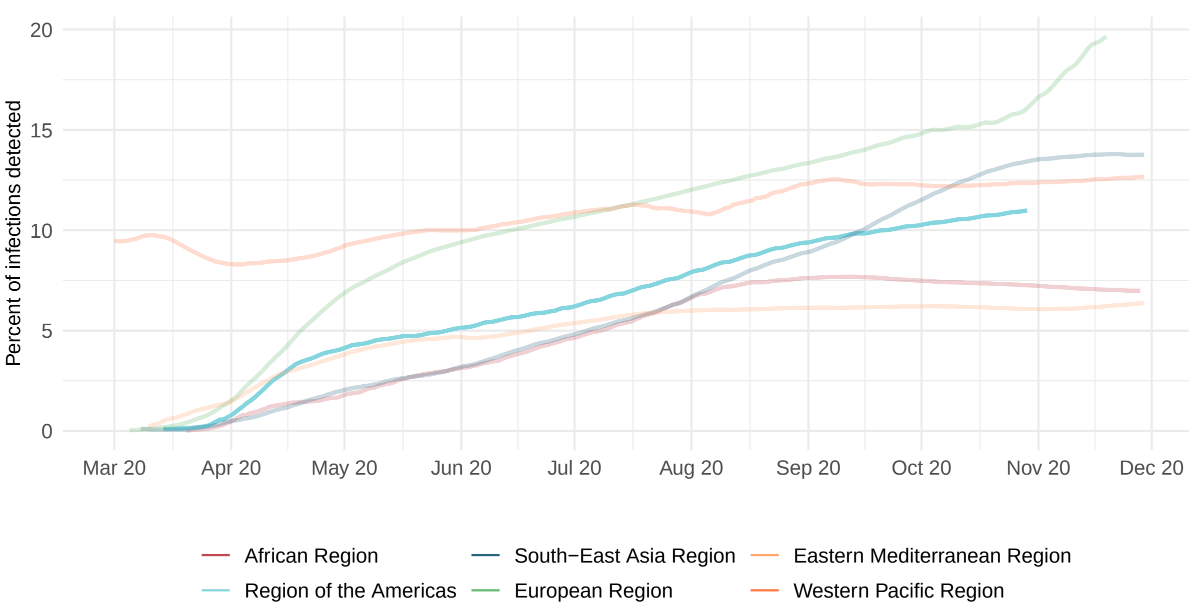
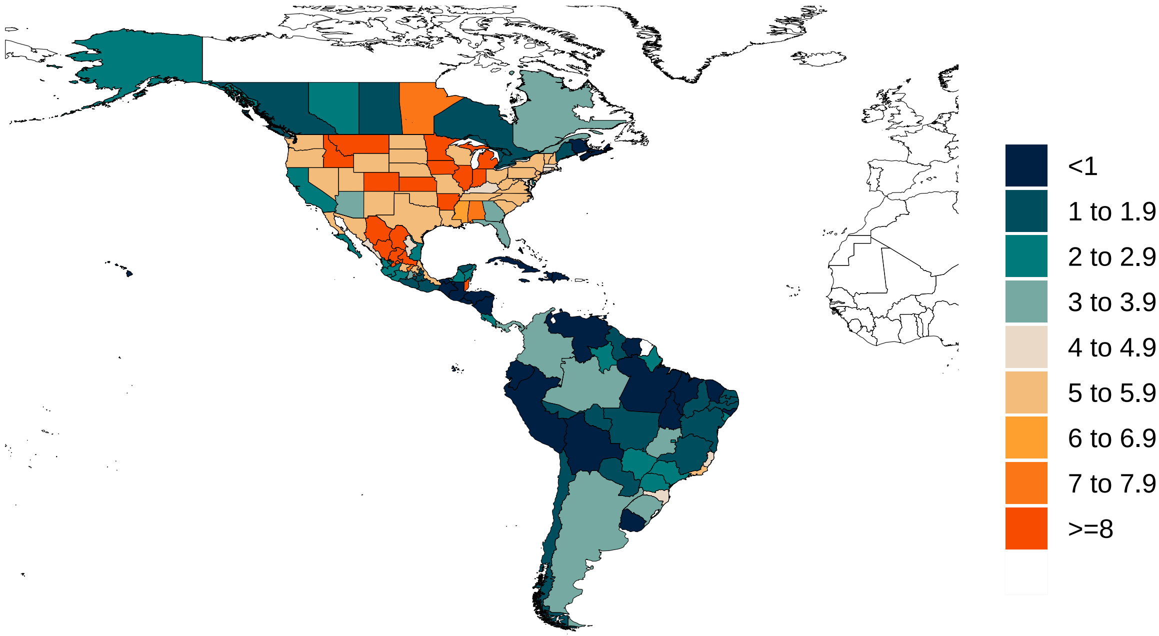


Figure 6. Daily COVID-19 death rate per 1 million on November 30, 2020



Critical drivers

Table 2. Current mandate implementation

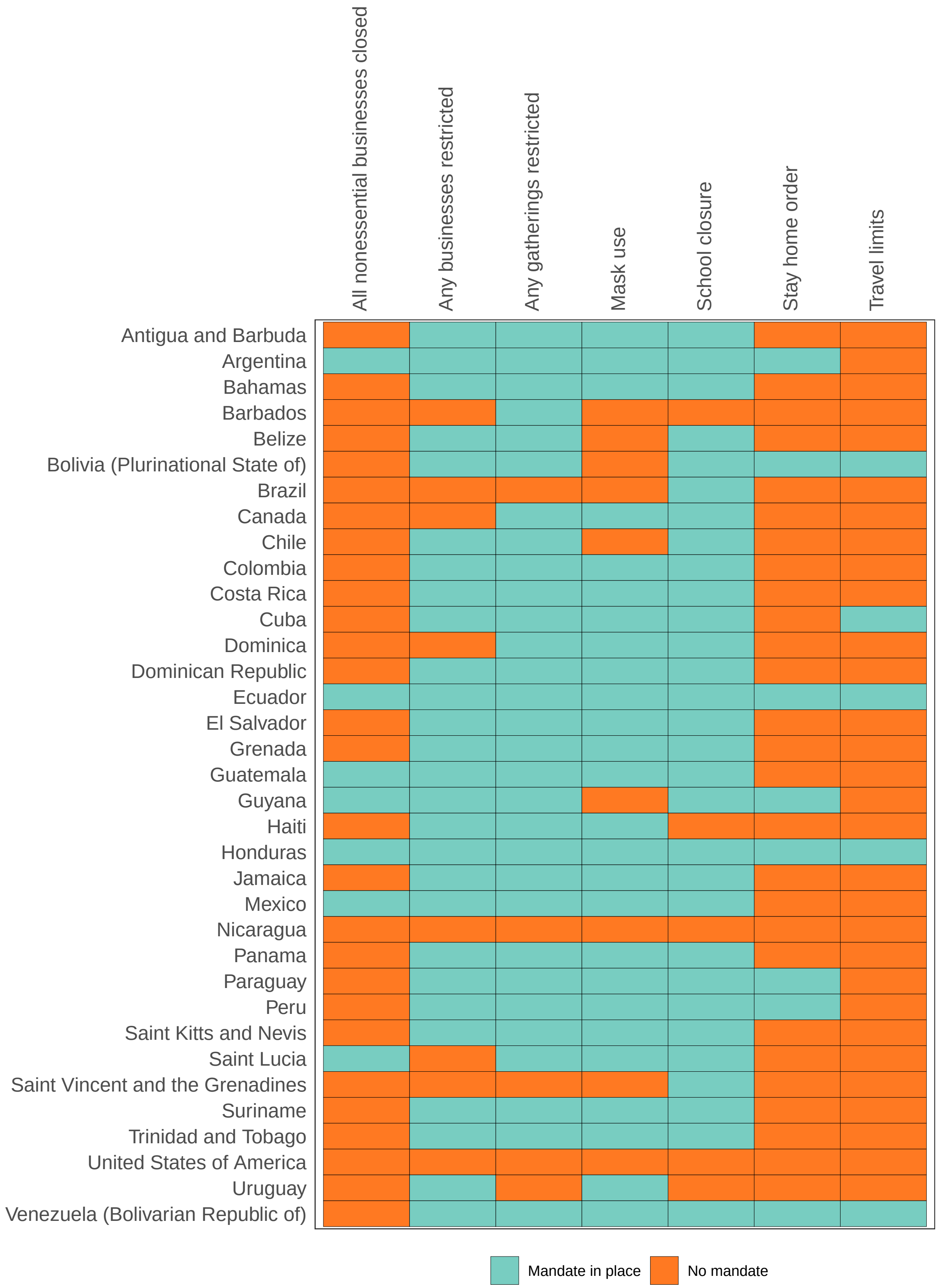


Figure 7. Total number of social distancing mandates (including mask use)

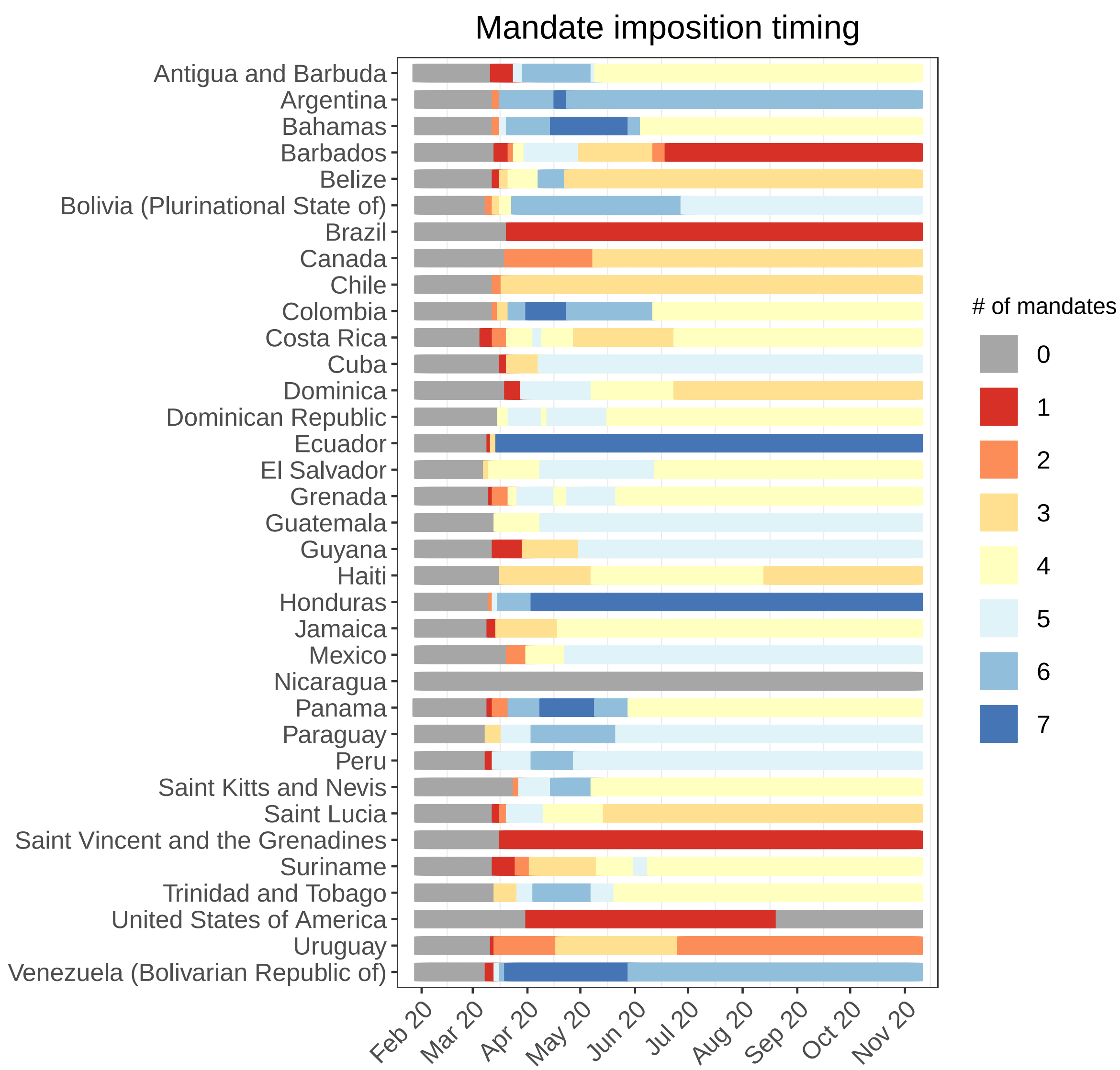


Figure 8a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

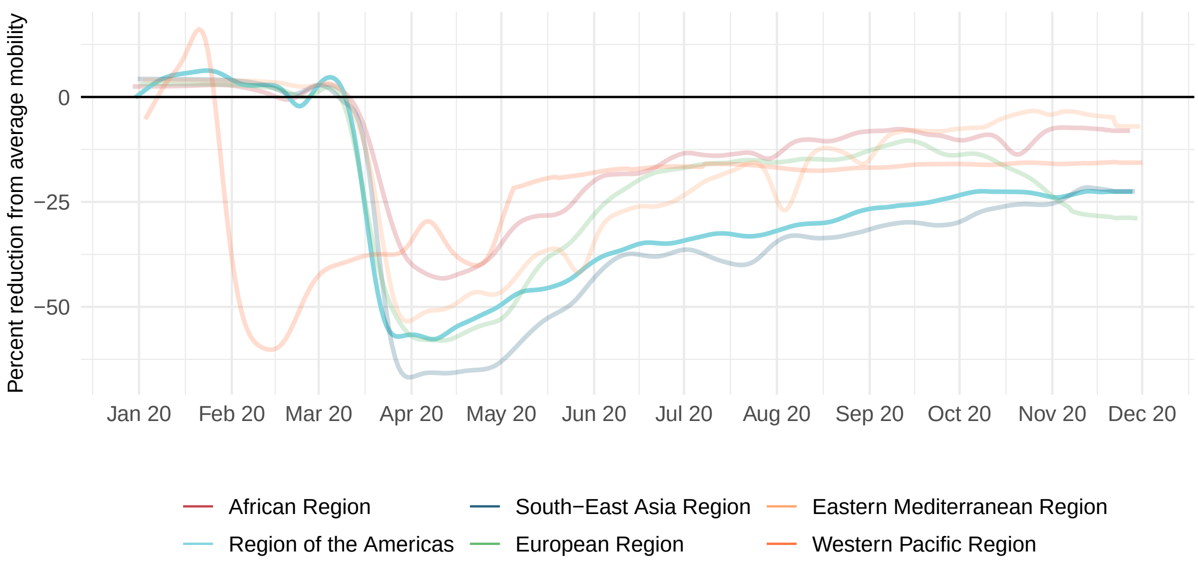


Figure 8b. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on November 30, 2020

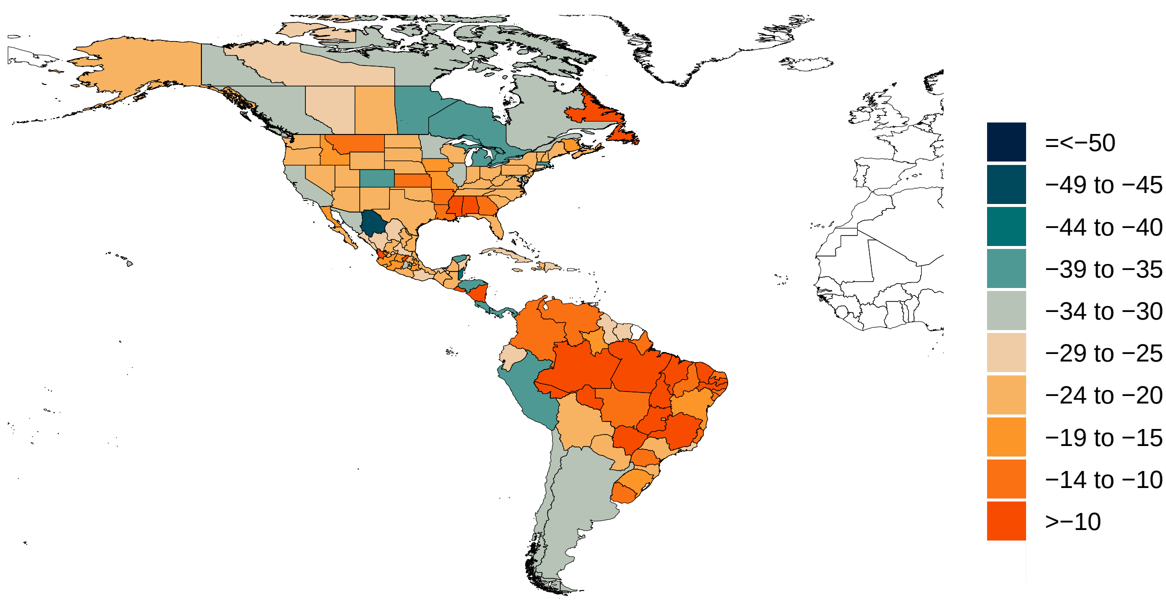


Figure 9a. Trend in the proportion of the population reporting always wearing a mask when leaving home

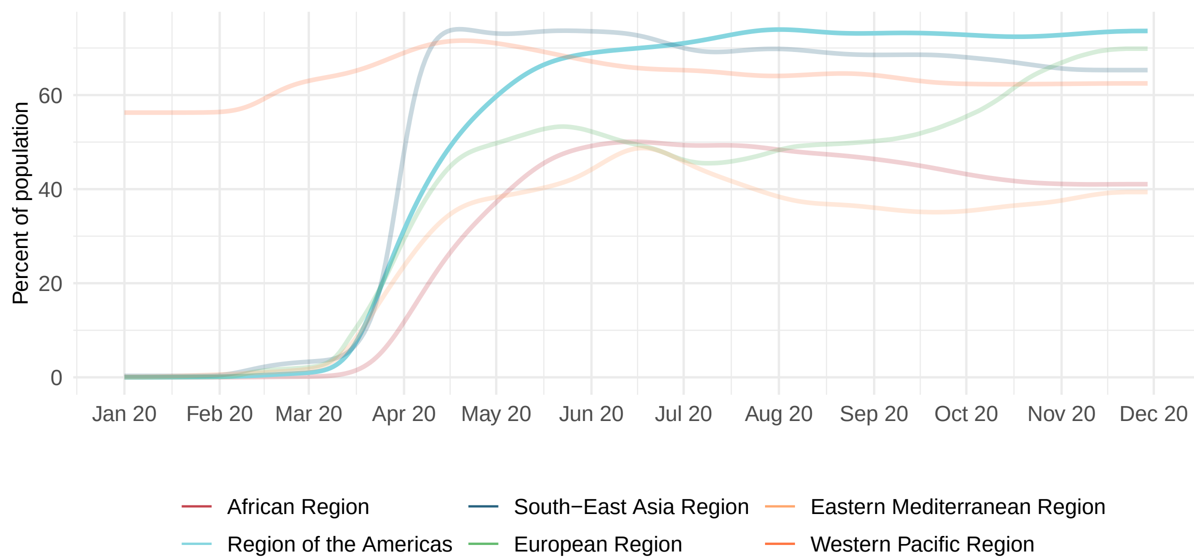


Figure 9b. Proportion of the population reporting always wearing a mask when leaving home on November 30, 2020

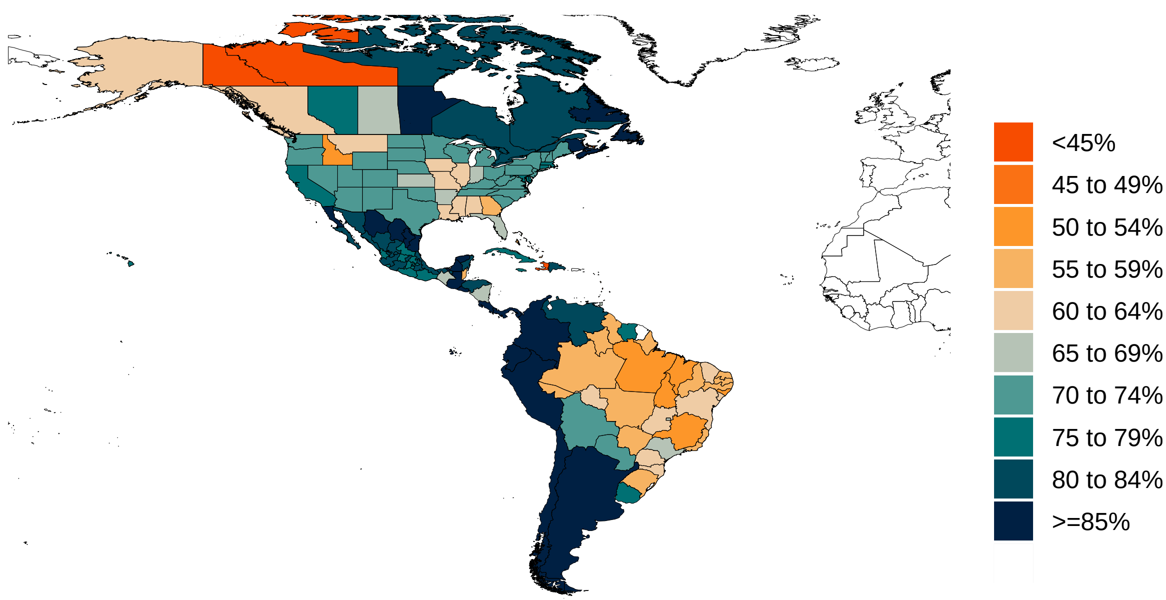


Figure 10a. Trend in COVID-19 diagnostic tests per 100,000 people

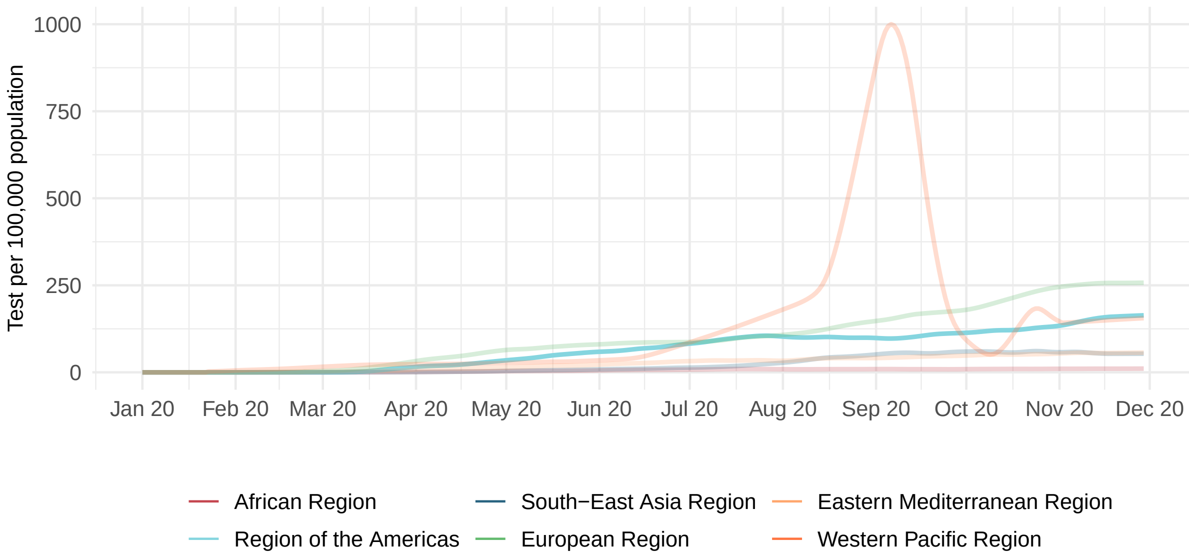


Figure 10b. COVID-19 diagnostic tests per 100,000 people on November 25, 2020

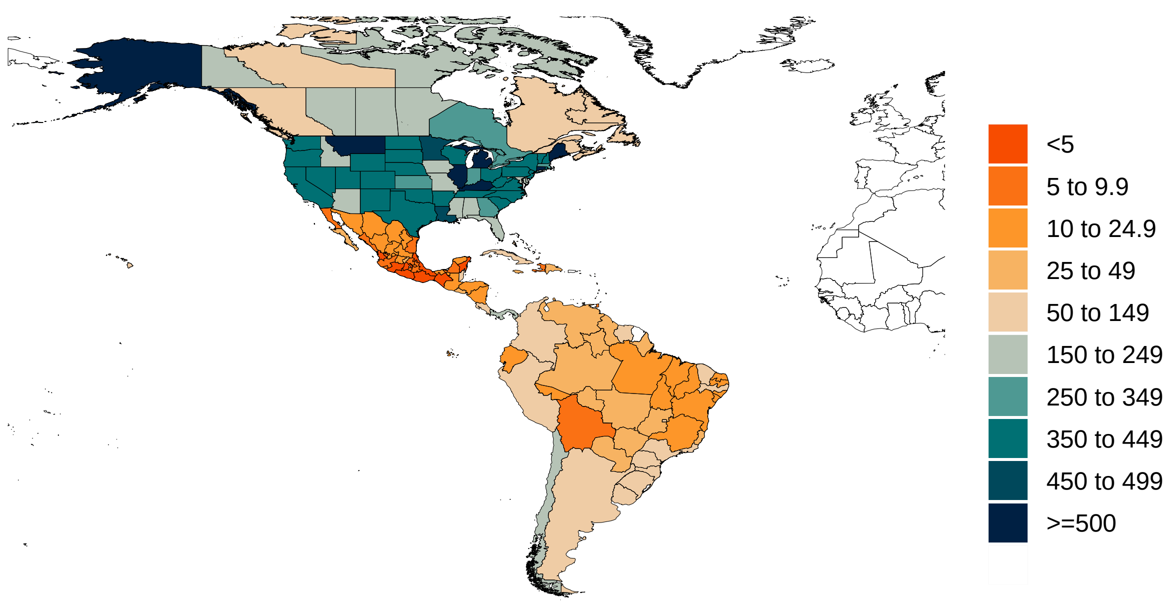


Figure 11. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

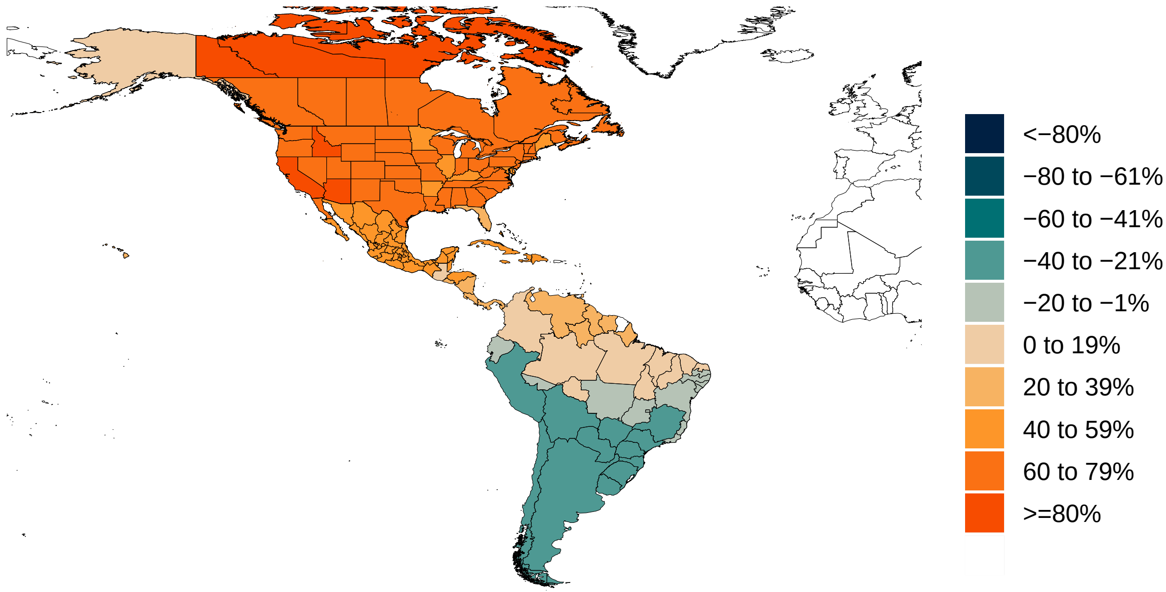


Figure 12. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses

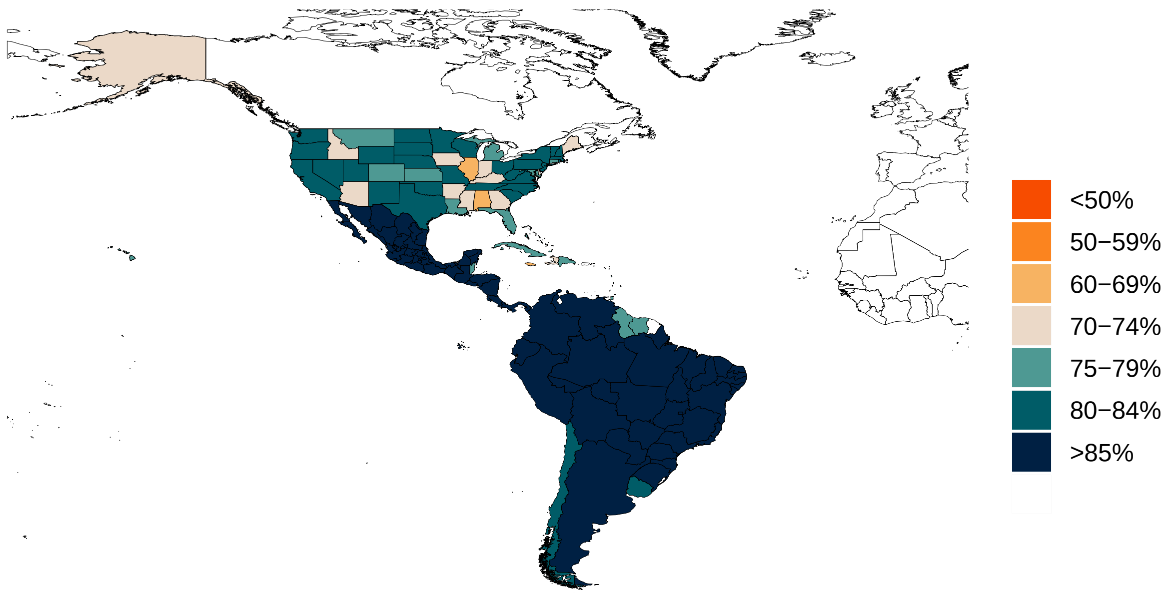
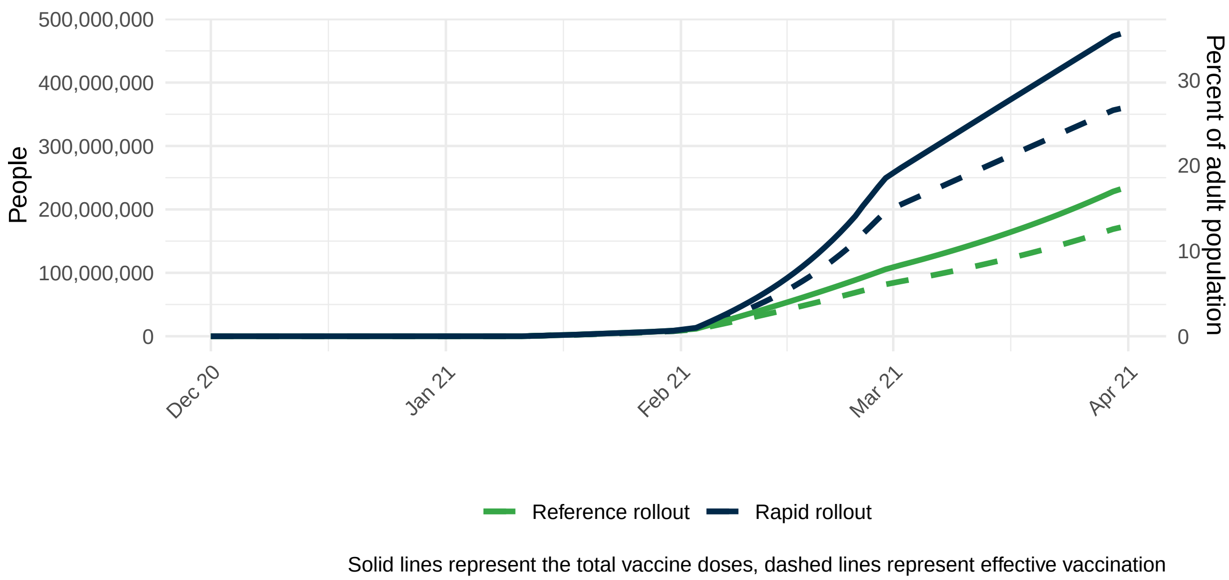


Figure 13. The number of people who receive any vaccine and those that are immune accounting for efficacy, loss to follow up for 2 dose vaccines, and a 28 day delay between first dose and immunity for 2 dose vaccines.



Projections and scenarios

We produce six scenarios when projecting COVID-19. The reference scenario is our forecast of what we think is most likely to happen. We assume that if the daily mortality rate from COVID-19 reaches 8 per million, social distancing (SD) mandates will be re-imposed. The mandate easing scenario is what would happen if governments continue to ease social distancing mandates with no re-imposition. The universal mask mandate scenario is what would happen if mask use increased immediately to 95% and social distancing mandates were re-imposed at 8 deaths per million. These three scenarios assume our reference vaccine delivery scale up where vaccine delivery will scale to full capacity over 90 days.

The rapid vaccine rollout scenario assumes that vaccine distribution will scale up to full delivery capacity in half the time as the reference delivery scenario and that the maximum doses that can be delivered per day is twice as much as the reference delivery scenario. The rapid vaccine rollout to high-risk populations scenario is the same but high-risk populations are vaccinated before essential workers or other adults. The no vaccine scenario is the same as our reference scenario but with no vaccine use.

Figure 14. Cumulative COVID-19 deaths until April 01, 2021 for six scenarios

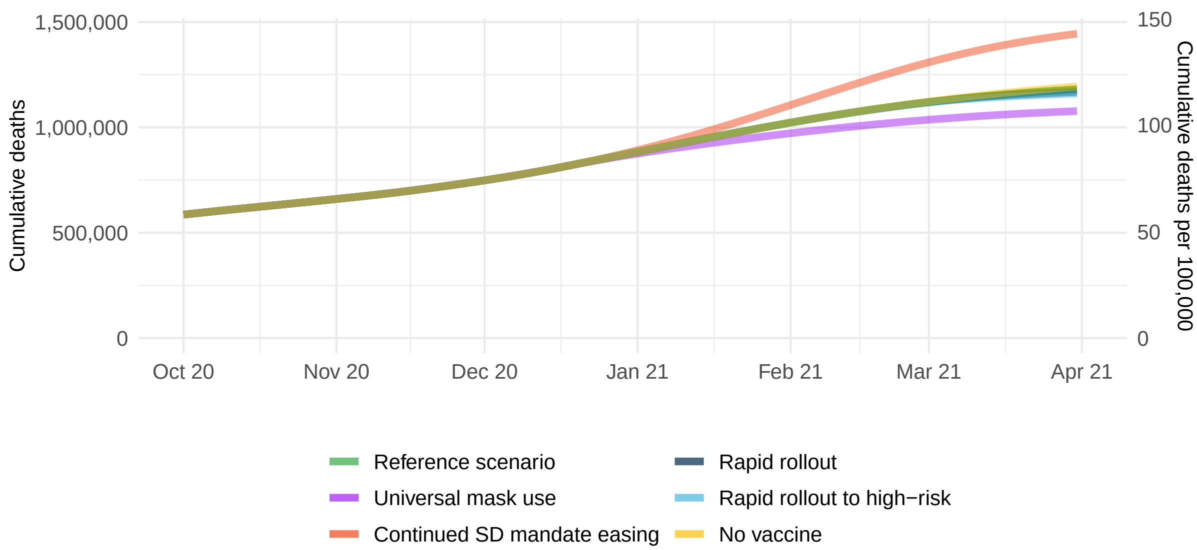


Figure 15. Daily COVID-19 deaths until April 01, 2021 for six scenarios

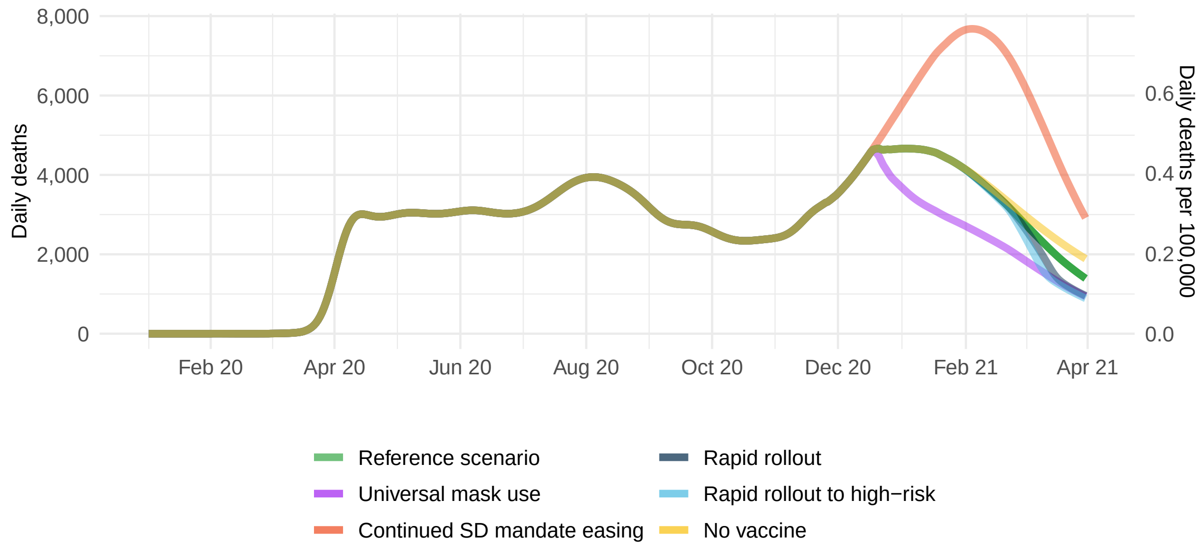


Figure 16. Daily COVID-19 infections until April 01, 2021 for six scenarios

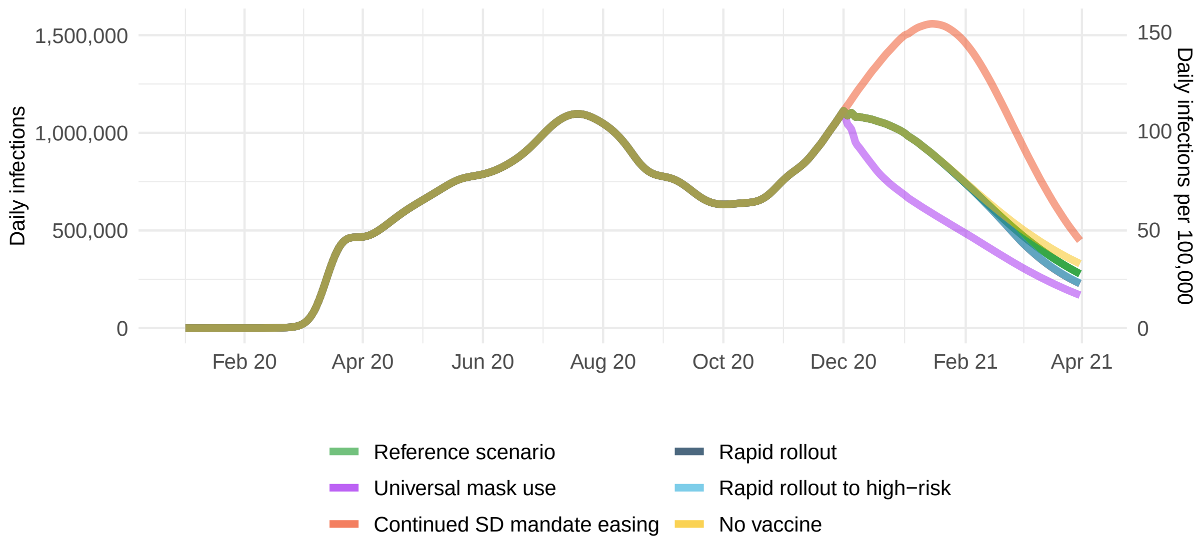


Figure 17. Susceptible population, accounting for infections and people immune through vaccination

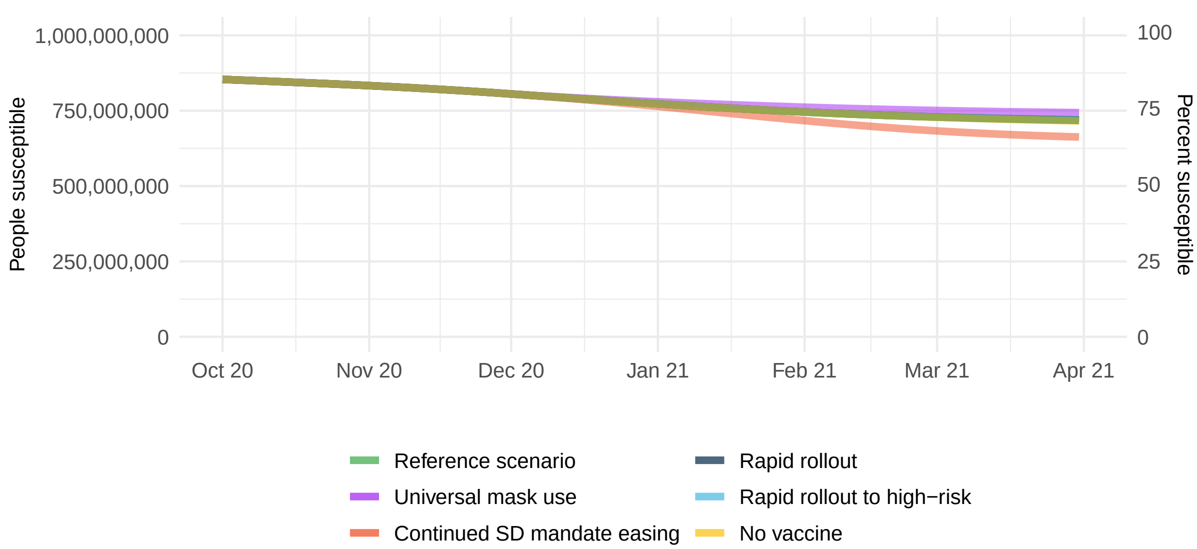


Figure 18. Month of assumed mandate re-implementation. (Month when daily death rate passes 8 per million, when reference scenario model assumes mandates will be re-imposed.)

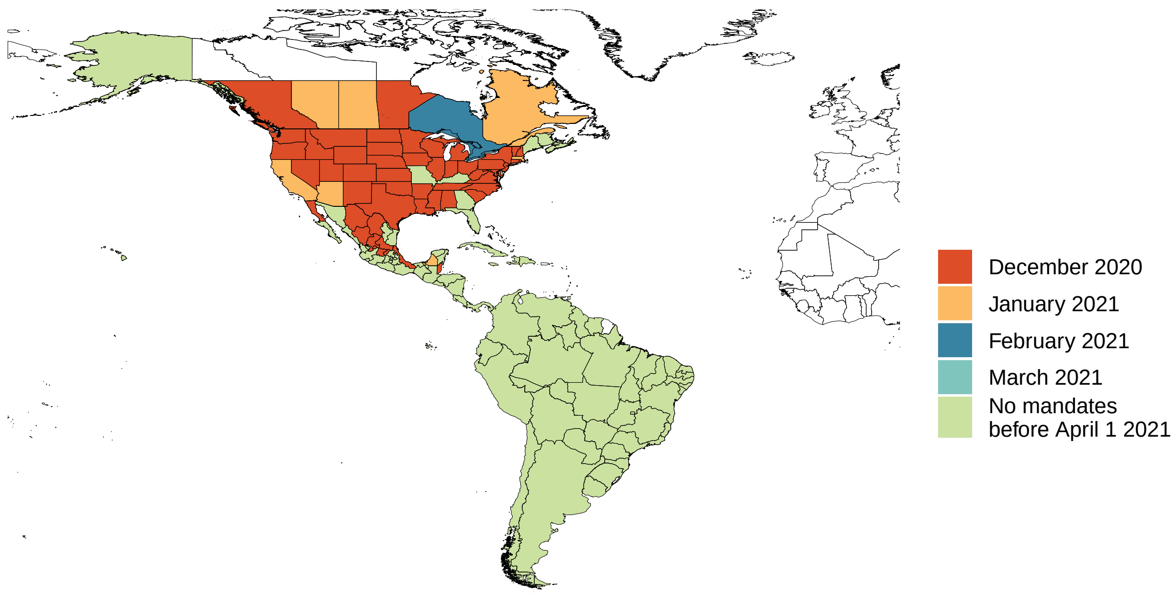


Figure 19. Forecasted percent infected with COVID-19 on April 01, 2021

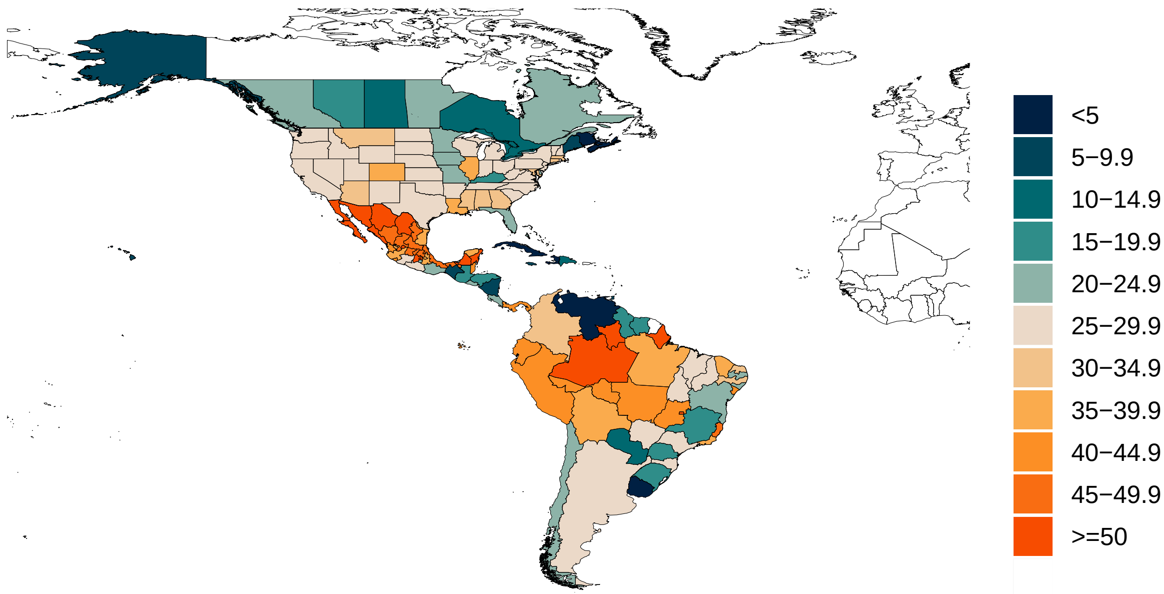


Figure 20. Daily COVID-19 deaths per million forecasted on April 01, 2021 in the reference scenario

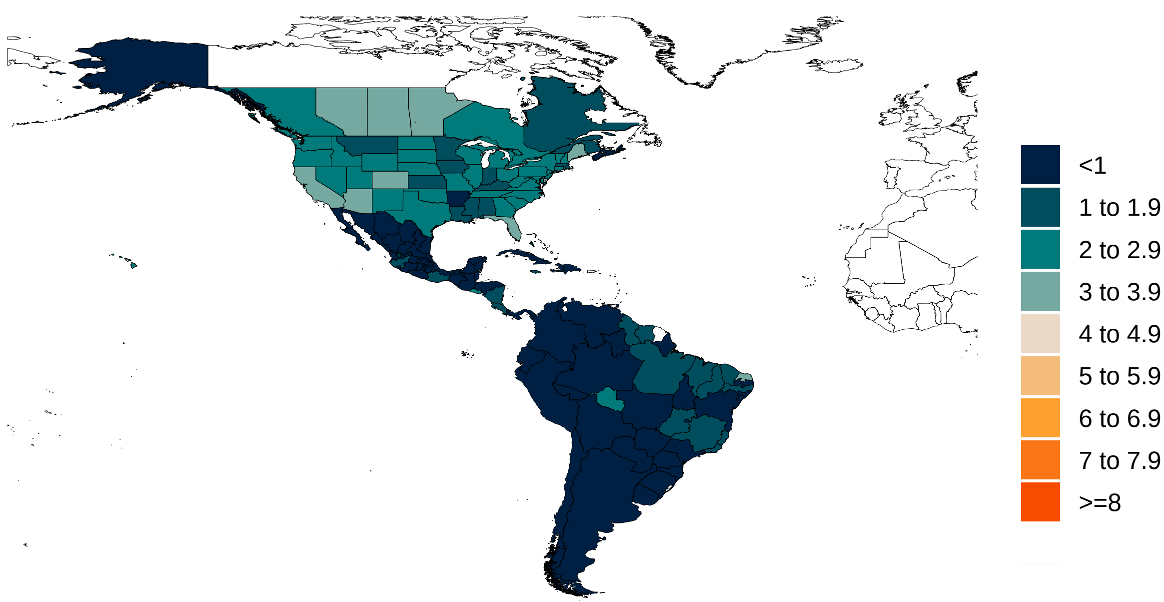


Figure 21. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), 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.

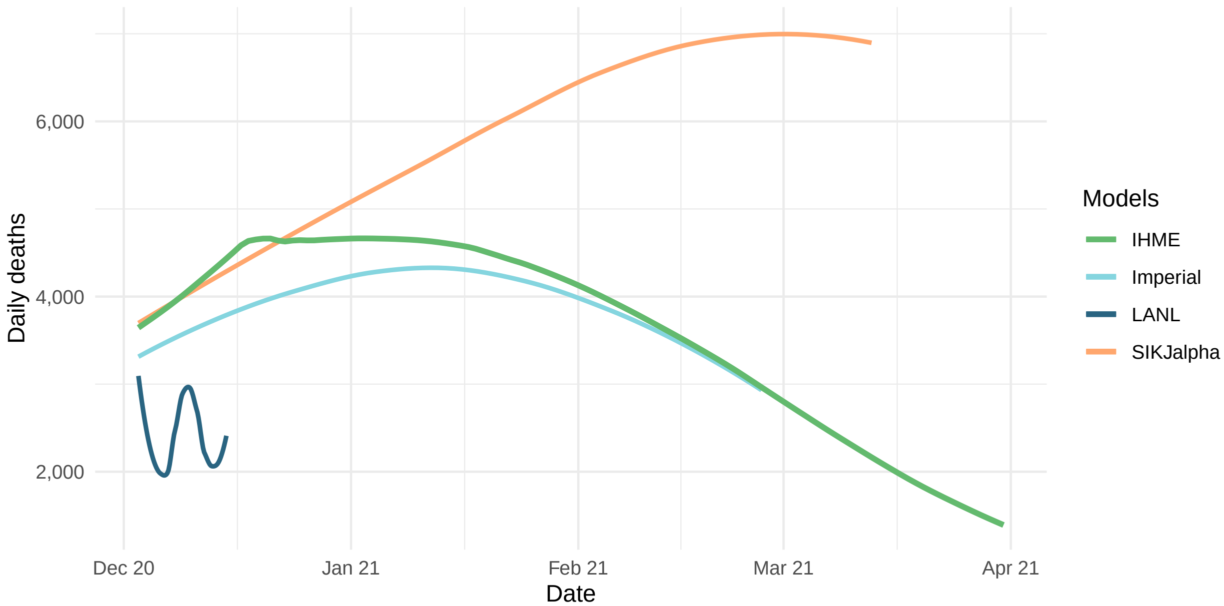


Figure 22. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and greater than 20% is considered *extreme stress*.

Figure 23. 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*.

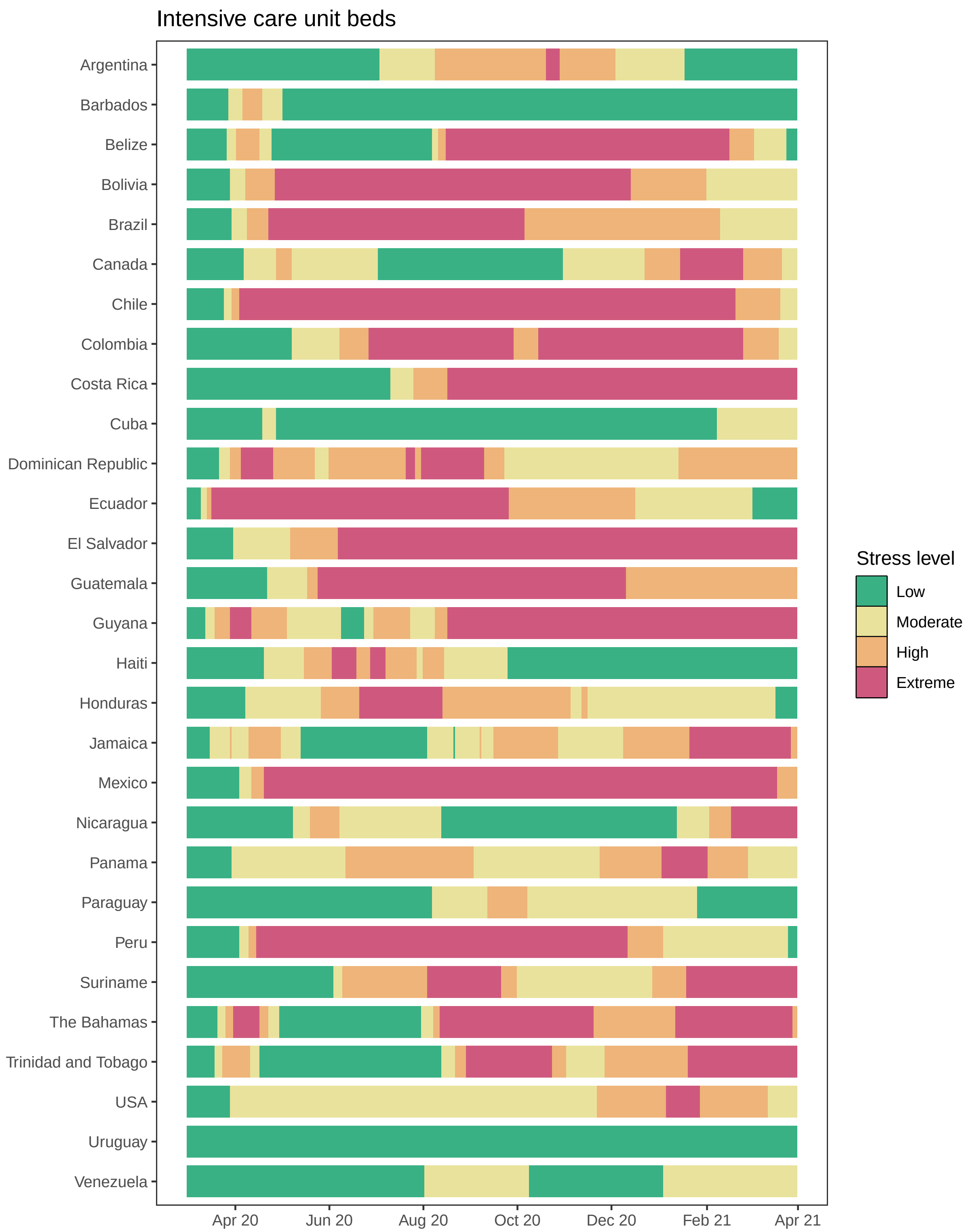


Table 3. Ranking of COVID-19 among the leading causes of mortality in the full year 2020. Deaths from COVID-19 are projections of cumulative deaths on Jan 1, 2021 from the reference scenario. Deaths from other causes are from the Global Burden of Disease study 2019 (rounded to the nearest 100).

Cause name	Annual deaths	Ranking
Ischemic heart disease	1,153,500	1
COVID-19	883,402	2
Stroke	526,400	3
Chronic obstructive pulmonary disease	384,900	4
Tracheal, bronchus, and lung cancer	331,200	5
Lower respiratory infections	323,000	6
Chronic kidney disease	321,600	7
Alzheimer's disease and other dementias	306,300	8
Diabetes mellitus	302,700	9
Cirrhosis and other chronic liver diseases	215,900	10

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.