ESPAÑOL

Las actualizaciones del modelo para la segunda semana de septiembre incluyen datos adicionales sobre muertes, casos y covariables hasta el 4 de septiembre.

Situación actual

- La transmisión de COVID-19 según lo capturado por los casos notificados se mantiene estable en las últimas semanas (Gráfica 1), mientras que las muertes muestran un descenso de mediados de agosto a septiembre y a partir de esa fecha se muestra estable la tendencia (Gráfica 2).
- La tasa de infección por cada caso infectado ó R efectiva basada en el análisis combinado de datos sobre casos, hospitalizaciones y muertes sugiere que la transmisión está aumentando en 6 estados. La R efectiva es superior a 1.11 en Durango y Guanajuato, y por arriba de 1 pero debajo de 1.10 Nuevo León, Sinaloa y Michoacán, manteniéndose por segunda semana consecutiva en esa cifra en Zacatecas (Gráfica 3).
- En ocho estados se estima que más de 25% de la población ha sido infectada de COVID19. Entre ellos Sonora, Sinaloa, Campeche, Baja California y Tlaxcala. En Tabasco, Quintana Roo y Ciudad de México se estima que al menos una de cada tres personas está infectada (Gráfica 4).
- Debido al bajo número de pruebas diagnósticas, México solo logra que 2.5 % de las infecciones acumuladas sean detectadas como casos confirmados. Baja California es la entidad que más capta y le siguen Coahuila, Yucatán, San Luis Potosi y Ciudad de México (Gráfica 5).
- La tasa de mortalidad diaria sigue arriba de 4.0 por un millón de habitantes en 20 estados del país y la tasa es por arriba de 5.0 por 1 millón de habitantes en 11 estados. Destacan por presentar la mortalidad más alta (> 7 por un millón) en San Luis Potosí y Guanajuato; en Tabasco, Hidalgo, Colima, Zacatecas, Nuevo León, Sinaloa y Baja California Sur, la mortalidad esta entre 5.0 y 6.9 por un millón de habitantes (Gráfica 6).
- De acuerdo con las estimaciones de IHME, en México, en la primera semana de septiembre COVID-19 es la primera causa de muerte, le sigue la cardiopatía isquémica y la diabetes (Tabla 1).

Factores impulsores de las tendencias de transmisión (movilidad, uso de cubrebocas, pruebas y estacionalidad)

- La movilidad medida por el uso de aplicaciones en teléfonos inteligentes ha aumentado a nivel nacional en las últimas 4 semanas de -30.2 a -25.2 (5% más movilidad). Los estados que mantienen baja movilidad son Yucatán y Quintana Roo. En contraste, otros estados han aumentado su movilidad como Durango, Zacatecas, Jalisco, Nayarit, Tlaxcala, Guanajuato, Querétaro, Coahuila, Morelos, Mexico, Hidalgo, Chiapas y Baja California (Gráficas 8a y 8b).
- Es evidente que el desempeño en la realización pruebas diagnósticas a nivel nacional es muy pobre en México comparado con otros países de la región. Las tasas de pruebas nacionales están muy por debajo de lo que reportan Colombia y Perú (Gráfica 10a). Al comparar por estados se observa el 27 de agosto ningún estado en el país realiza más de 50 pruebas por 100 mil habitantes, registrando que Chiapas, Morelos, Mexico, Veracruz, Oaxaca y Baja California no realizaron ni 5 pruebas por 100 mil habitantes ese día (Gráfica 10b).
- La proporción de población que usa cubrebocas al salir de casa es en promedio alto, pero aún hay espacio para mejorar. A la fecha hay varios estados por encima de 80% como Tabasco, Nuevo León, Tamaulipas, Quintana Roo y Yucatán (Gráfica 9b).

Proyecciones

- Las proyecciones en un escenario intermedio establecen que en el país se acumularán 138,416 muertes por COVID19 para el primero de enero de 2021. Se observa un incremento de noviembre a diciembre y en la

segunda quincena de este mes un ligero descenso a 600 muertes al día. Sin embargo, de mantener la relajación de los mandatos, el peor escenario proyecta 158 mil muertes, con un incremento a más de 1300 muertes diarias para enero. Incorporando el uso de cubrebocas a 95% de la población se podrían salvar en el país 29 mil vidas para el 1 de enero si comparamos el peor y el mejor escenario (Gráficas 12 y 13).

- Los estados que de acuerdo a las proyecciones necesitan re-imponer mandatos inmediatamente son Guanajuato, Zacatecas y Durango. Para octubre Querétaro, Nuevo León y Michoacán. En noviembre serían 8 estados y 10 en el mes de diciembre. Quedando fuera de estas reimposiciones en lo que resta del año Chiapas, Tabasco, Oaxaca, Campeche, Tlaxcala, Aguascalientes, Sonora y Tamaulipas (grafica 15).
- Con excepción de Chiapas, el resto del país presentará más 20% de la población infectada, destacando en el sentido opuesto que 13 estados rebasaran 40% de la población infectada para el 1 de enero de 2021 (Gráfica 16).
- La tasa de mortalidad diaria para el 1 de enero de 2021 en el país es muy heterogénea. Por abajo de 2 por 1 millón de habitantes se ubican Chiapas, Ciudad de México, Querétaro, Zacatecas, Nuevo León y Sinaloa. En contraste por arriba de 8 por un millón de habitantes estarán Oaxaca, Puebla, Quintana Roo, Veracruz, Estado de México, Coahuila y Baja california Sur (Gráfica 16).
- Al terminar 2020, de acuerdo con las estimaciones de IHME, la primera causa de muere será COVID19 en México (tabla 2).

Notas metodológicas

El gran aumento de muertes diarias que se espera para fines de noviembre y diciembre se debe a los continuos aumentos de la movilidad, la disminución del uso de máscaras y, lo que es más importante, la estacionalidad. Estimamos el impacto probable de la estacionalidad al examinar las tendencias en el hemisferio norte y sur. Por ejemplo, países del hemisferio sur como Argentina, Chile, el sur de Brasil y Sudáfrica tuvieron epidemias mucho mayores de lo esperado debido a la movilidad, las pruebas y el uso de mascarillas. La asociación estadística entre las tasas de transmisión de COVID-19 y los patrones de estacionalidad de la neumonía es fuerte y es la base para nuestra estimación de la magnitud del aumento estacional que se espera.

La experiencia clínica sugiere que el manejo de casos de COVID-19 ha mejorado a través de métodos de oxigenación / ventilación, uso de dexametasona y remdesivir. Este mejor manejo se manifestaría como una reducción en la tasa de mortalidad por infección en cada grupo de edad. Hemos buscado evidencia estadística de este cambio de dos formas. Primero, hemos examinado la tasa de letalidad por ingreso de COVID-19: el número de muertes dividido por los ingresos hospitalarios. Hasta la fecha, la tasa de mortalidad por ingreso se ha mantenido constante desde abril. Esto podría explicarse por dos posibles factores. Primero, es posible que no haya cambios en la tasa de mortalidad por infección. En segundo lugar, es posible que la tasa de mortalidad por infección haya disminuido porque los hospitales están admitiendo solo a pacientes más graves con el tiempo, haciendo mejor triage. Sin embargo, hemos analizado la tasa de mortalidad por infección medida directamente mediante estudios de seroprevalencia y hasta la fecha no hemos detectado ninguna disminución estadísticamente significativa en la tasa de mortalidad por infección. Continuaremos realizando pruebas de manera regular para detectar evidencia estadística de que la tasa de mortalidad por infección está disminuyendo, pero aún no la vemos en base a nuestros análisis seropositivos.

ENGLISH

Model updates for the second week of September include additional data on deaths, cases, and covariates through September 4.

Current situation

- The transmission of COVID-19 as captured by reported cases has remained stable in recent weeks (Figure 1). Deaths show a decline from mid-August to September, but have stabilized since then (Figure 2).
- The infection rate per infected case or effective R based on combined analysis of case, hospitalization, and death data suggests that transmission is increasing in six states. The effective R is above 1.11 in Durango and Guanajuato, and above 1 but below 1.10 in Nuevo Leon, Sinaloa, and Michoacan remaining at that level for the second consecutive week in Zacatecas (Figure 3).
- In eight states it is estimated that more than 25% of the population has been infected with COVID-19. Among them are Sonora, Sinaloa, Campeche, Baja California, and Tlaxcala. In Tabasco, Quintana Roo, and Mexico City, it is estimated that at least one in three people are infected (Figure 4).
- Due to the low number of diagnostic tests, Mexico only manages to have 2.5% of the accumulated infections detected as confirmed cases Baja California Sur captures the most followed by Coahuila, Yucutan, San Luis Potosi, and Mexico City (Figure 5).
- The daily mortality rate continues to be above 4.0 per million inhabitants in 20 states of the country and is above 5.0 per million inhabitants in 11 states. The highest mortality rates (>7 per million) are found in San Luis Potosi and Guanajuato; in Tabasco, Hidalgo, Colima, Zacatecas, Nuevo Leon, Sinaloa, and Baja California Sur, mortality rates are between 5.0 and 6.9 per million inhabitants (Figure 6).
- According to IHME estimates, in Mexico, in the first week of September COVID-19 was the leading cause of death, followed by ischemic heart disease and diabetes (Table 1).

Trends in key drivers of transmission (mobility, mask use, testing, and seasonality)

- Mobility as measured by the use of smartphone applications has increased nationally in the last four weeks from -30.2 to -25.2 (5% more mobility). The states that maintain low mobility are Yucatan and Quintana Roo. In contrast, other states have increased mobility such as Durango, Zacatecas, Jalisco, Nayarit, Tlaxcala, Guanajuato, Querétaro, Coahuila, Morelos, Mexico, Hidalgo, Chiapas, and Baja California (Figures 8a and 8b).
- It is evident that the performance of diagnostic tests at the national level is very poor in Mexico compared to other countries in the region. National testing rates are far below those reported by Colombia and Peru (Figure 10a). A comparison by state shows that on August 27, no state in the country had performed more than 50 tests per 100,000 inhabitants, and by that date, Chiapas, Morelos, Mexico, Veracruz, Oaxaca, and Baja California recorded fewer than five tests per 100,000 inhabitants (Figure 10b).
- The proportion of the population that uses masks when leaving home is on average high, but there is still room for improvement. To date there are several states above 80%, such as Tabasco, Nuevo Leon, Tamaulipas, Quintana Roo, and Yucatan (Figure 9b).

Projections

- Projections in an intermediate scenario establish that 138,416 deaths from COVID-19 will accumulate in the country by January 1, 2021. An increase is observed from November to December and in the second half of this month a slight decrease to 600 deaths per day. However, if relaxation of the mandates is maintained, the worst-case scenario projects 158,000 deaths, with an increase to more than 1,300 deaths per day by January. By

incorporating the use of masks for 95% of the population, 29,000 lives could be saved in the country by January 1 if we compare the worst- and best-case scenarios (Figures 12 and 13).

- The states that according to projections need to re-impose mandates immediately are Guanajuato, Zacatecas, and Durango. For October, Querétaro, Nuevo León, and Michoacán. In November there will be eight states that need to re-impose mandates and 10 will need to do so in the month of December. Outside of these, re-impositions for the rest of the year are Chiapas, Tabasco, Oaxaca, Campeche, Tlaxcala, Aguascalientes, Sonora, and Tamaulipas (Figure 15).
- With the exception of Chiapas, the rest of the country will have more than 20% of the population infected, with 13 states exceeding 40% of the population by January 1, 2021 (Figure 16).
- The daily mortality rate for January 1, 2021, in the country is very heterogeneous. Below 2 per 1 million inhabitants is observed in Chiapas, Mexico City, Queretaro, Zacatecas, Nuevo Leon, and Sinaloa. In contrast, Oaxaca, Puebla, Quintana Roo, Veracruz, the State of Mexico, Coahuila, and Baja California Sur all show above 8 per million inhabitants (Figure 16).
- At the end of 2020, according to IHME estimates, the leading cause of death in Mexico will be COVID-19 (Table 2).

Methodology notes

The large increase in daily deaths expected in late November and December is due to continued increases in mobility, decreased use of masks and, most importantly, seasonality. We estimate the likely impact of seasonality by examining trends in the northern and southern hemispheres. For example, southern hemisphere countries such as Argentina, Chile, southern Brazil, and South Africa had much larger than expected epidemics due to mobility, testing, and mask use. The statistical association between the transmission rates of COVID-19 and the seasonality patterns of pneumonia is strong and is the basis for our estimate of the magnitude of the expected seasonal increase.

Clinical experience suggests that COVID-19 case management has been improved through oxygenation/ventilation methods, and use of dexamethasone and remdesivir. This improved management would manifest itself as a reduction in the mortality rate from infection in each age group. We have sought statistical evidence of this change in two ways. First, we have examined the mortality rate per admission of COVID-19: the number of deaths divided by hospital admissions. To date, the admission mortality rate has remained constant since April. This could be explained by two possible factors. First, there may be no change in the infection death rate. Second, the infection death rate may have decreased because hospitals are admitting only more serious patients over time and doing better triage. However, we have analyzed the infection mortality rate as measured directly by seroprevalence studies, and to date we have not detected any statistically significant decrease in the infection mortality rate. We will continue to test regularly for statistical evidence that the infection mortality rate is decreasing, but we do not yet see it based on our seropositive tests.

COVID-19 Results Briefing: Mexico

Institute for Health Metrics and Evaluation (IHME)

September 11, 2020

This briefing contains summary information on the latest projections from the IHME model on COVID-19 in Mexico. The model was run on September 11, 2020.

Model updates

Updates to the model this week include additional data on deaths, cases, and updates on covariates.

Current situation

Figure 1. Reported daily COVID-19 cases

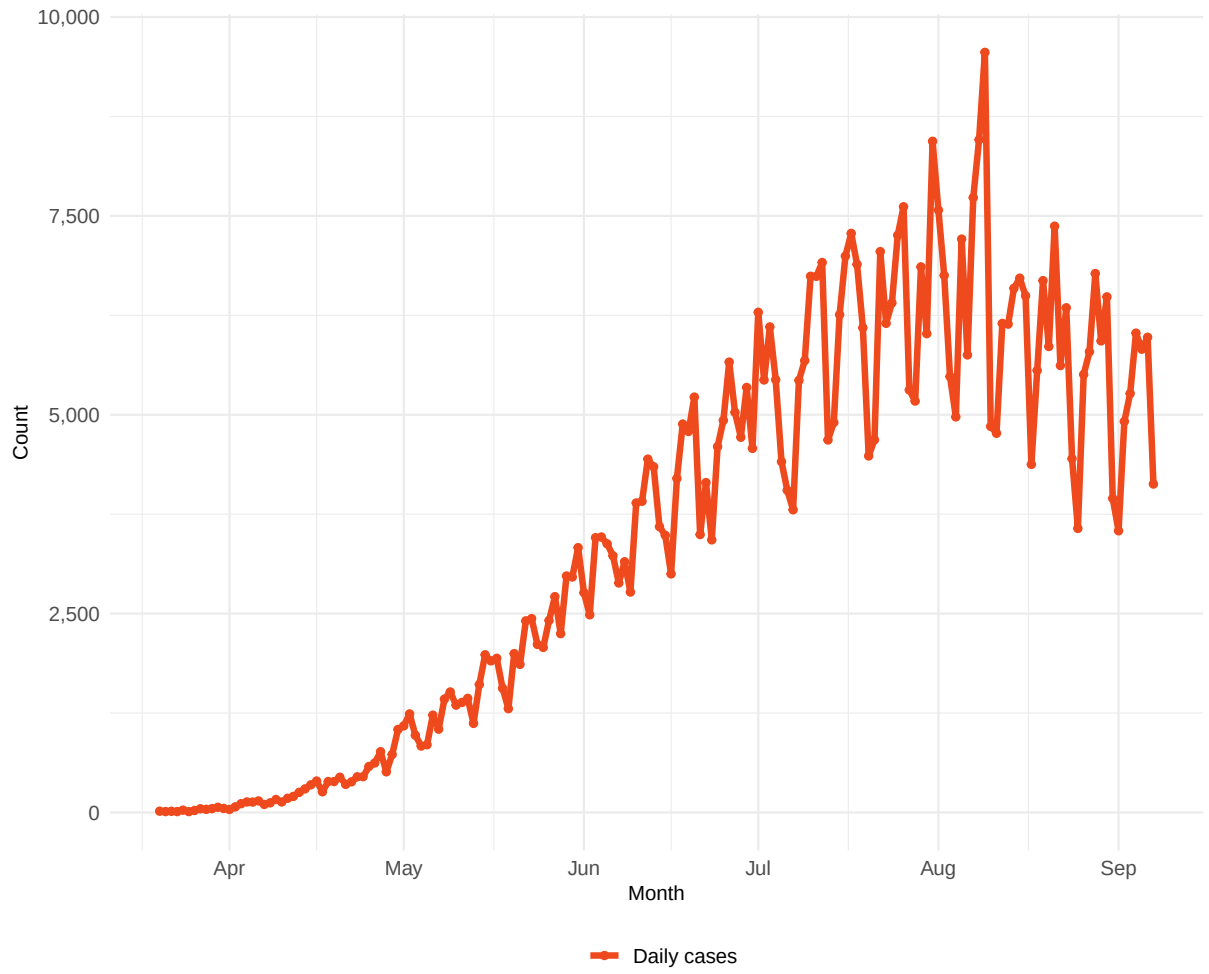


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	3,483	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 2a. Reported daily COVID-19 deaths and smoothed trend estimate

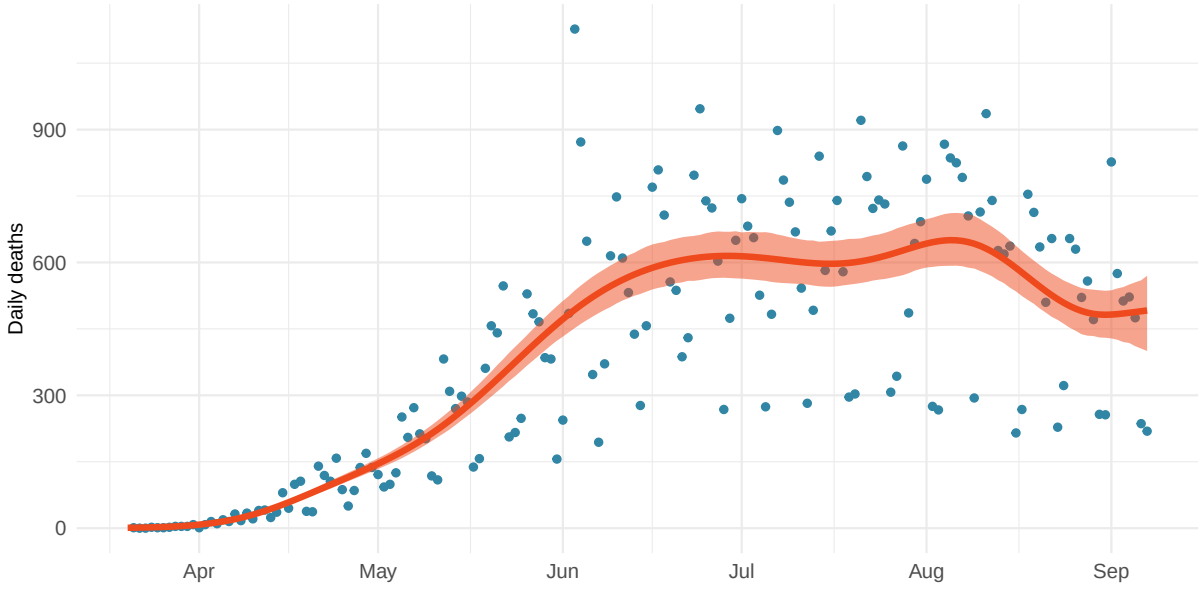


Figure 2b. Estimated cumulative deaths by age group

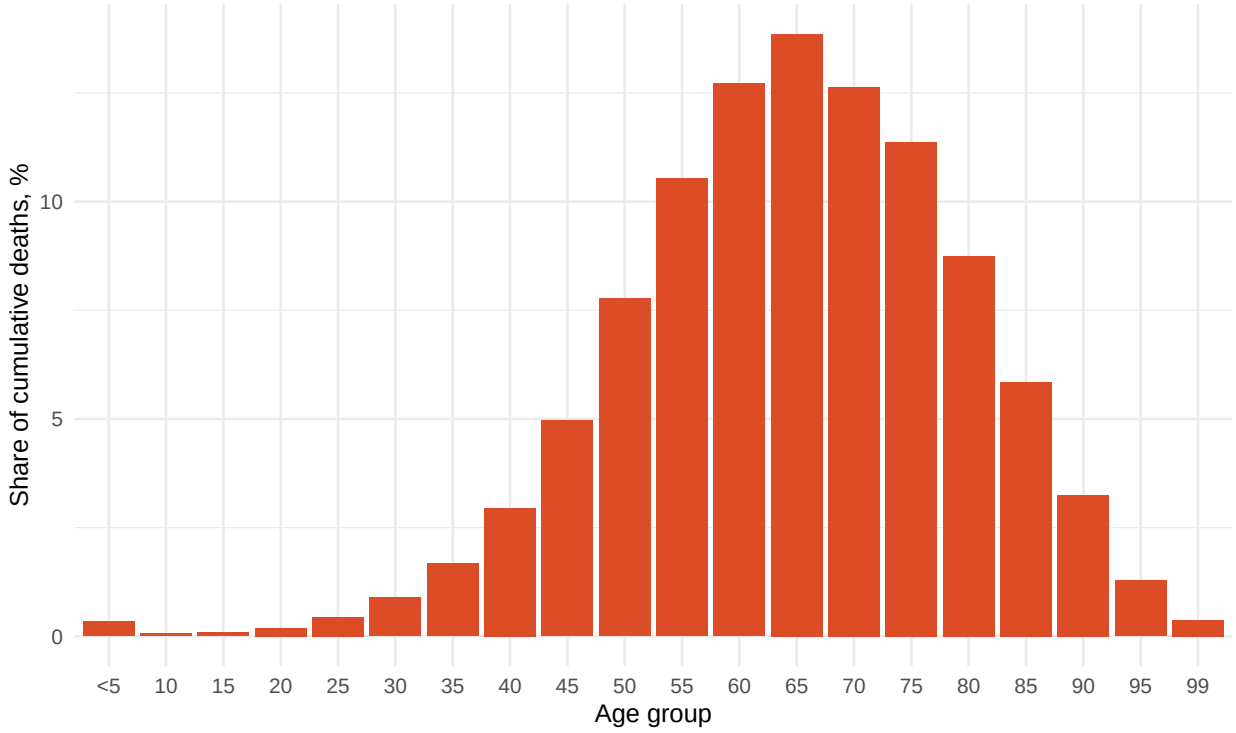


Figure 3. Mean effective R on August 28, 2020. The estimate of effective R is based on the combined analysis of deaths, case reporting and hospitalizations where available. Current reported cases reflect infections 11-13 days prior so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline all other things being held the same.

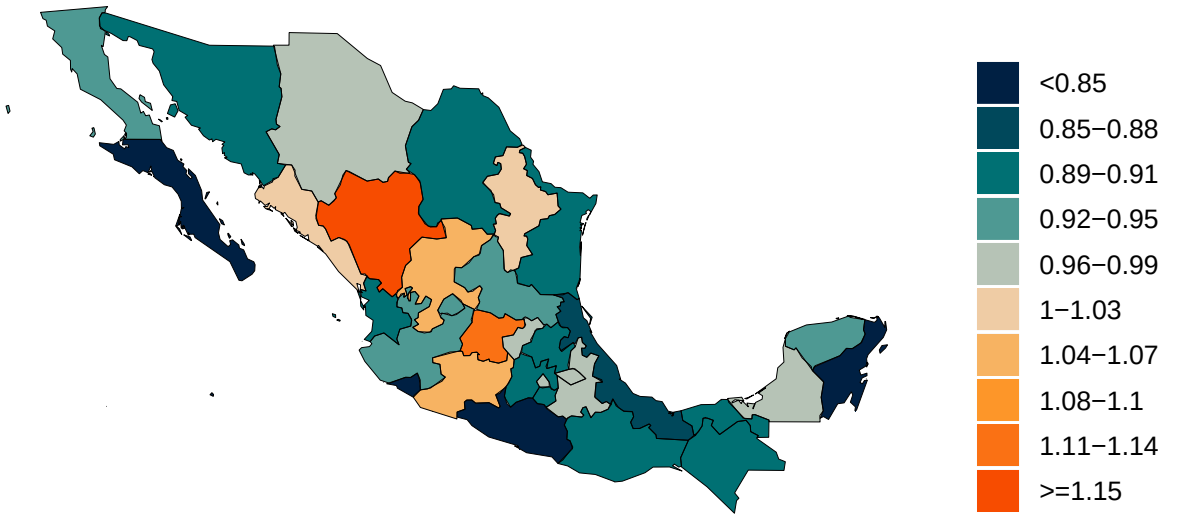


Figure 4. Estimated percent infected with COVID-19 on September 08, 2020

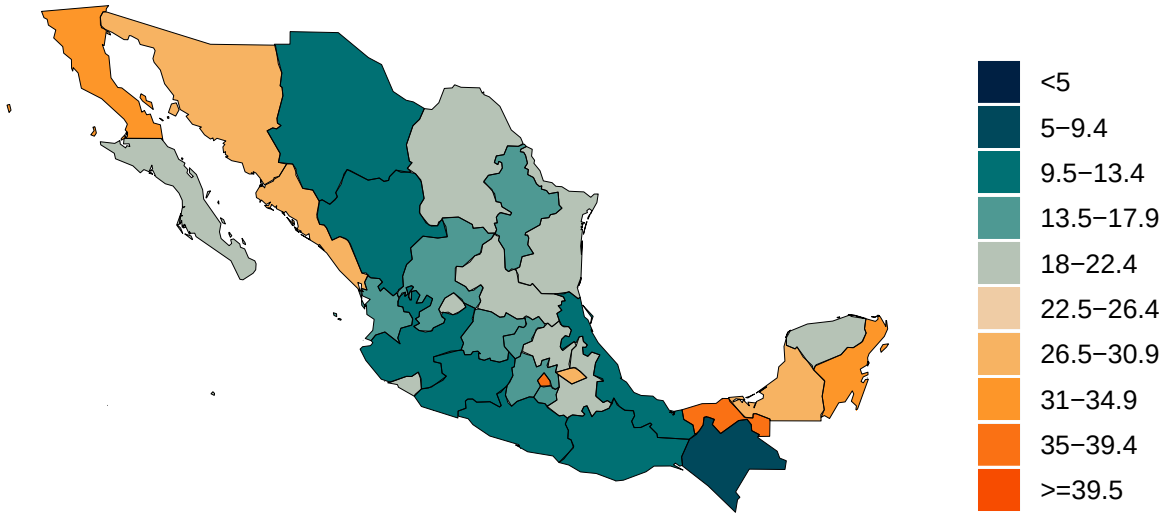


Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported COVID-19 cases to estimated COVID-19 infections based on the SEIR model.

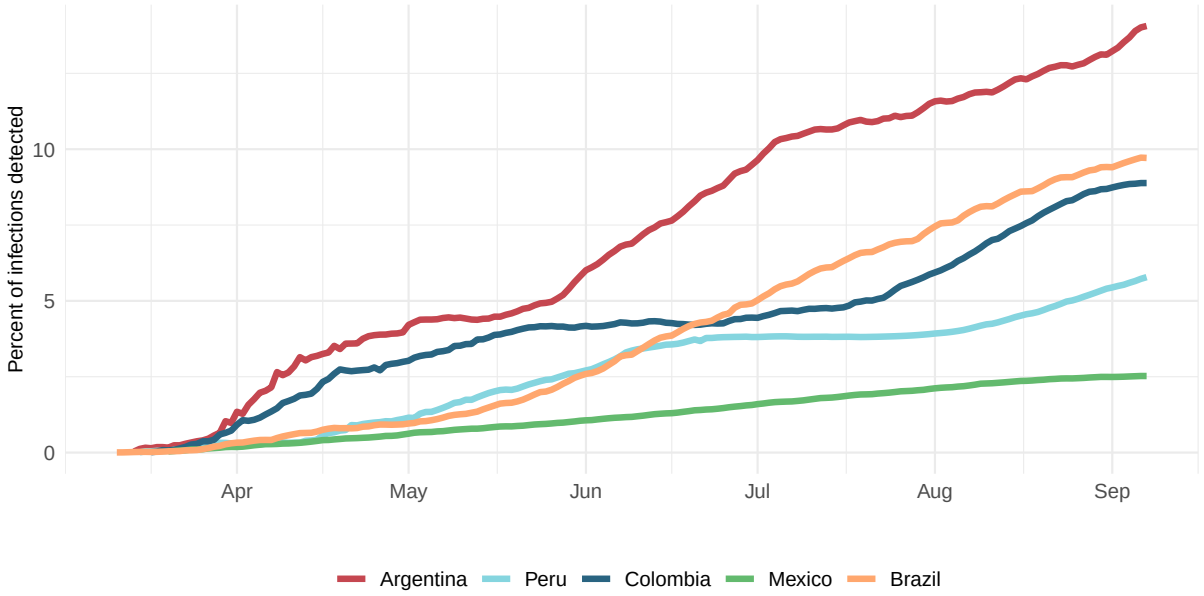
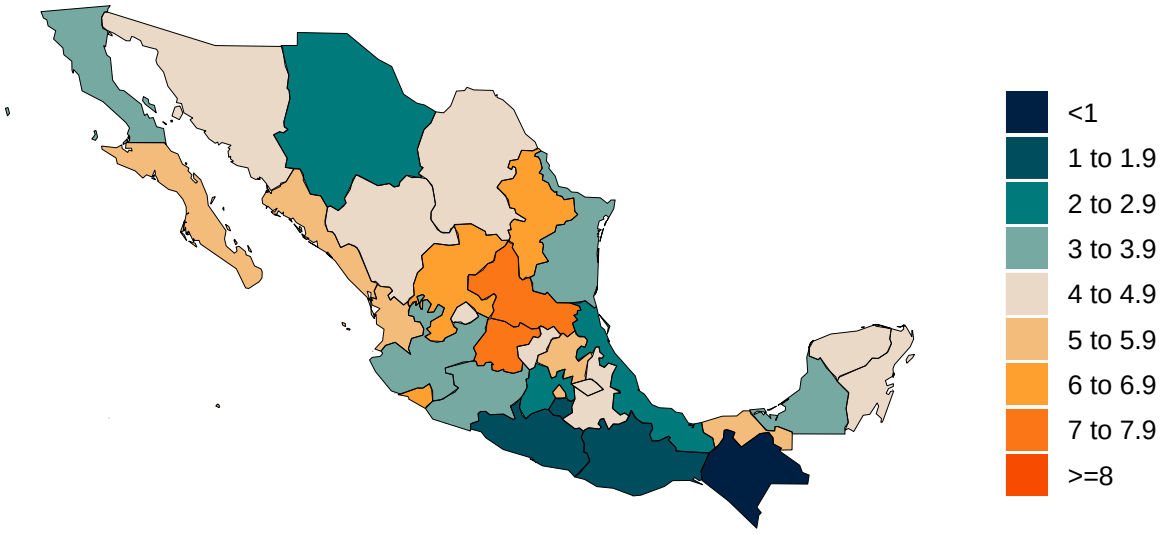


Figure 6. Daily COVID-19 death rate per 1 million on September 08, 2020



Critical drivers

Table 2. Current mandate implementation

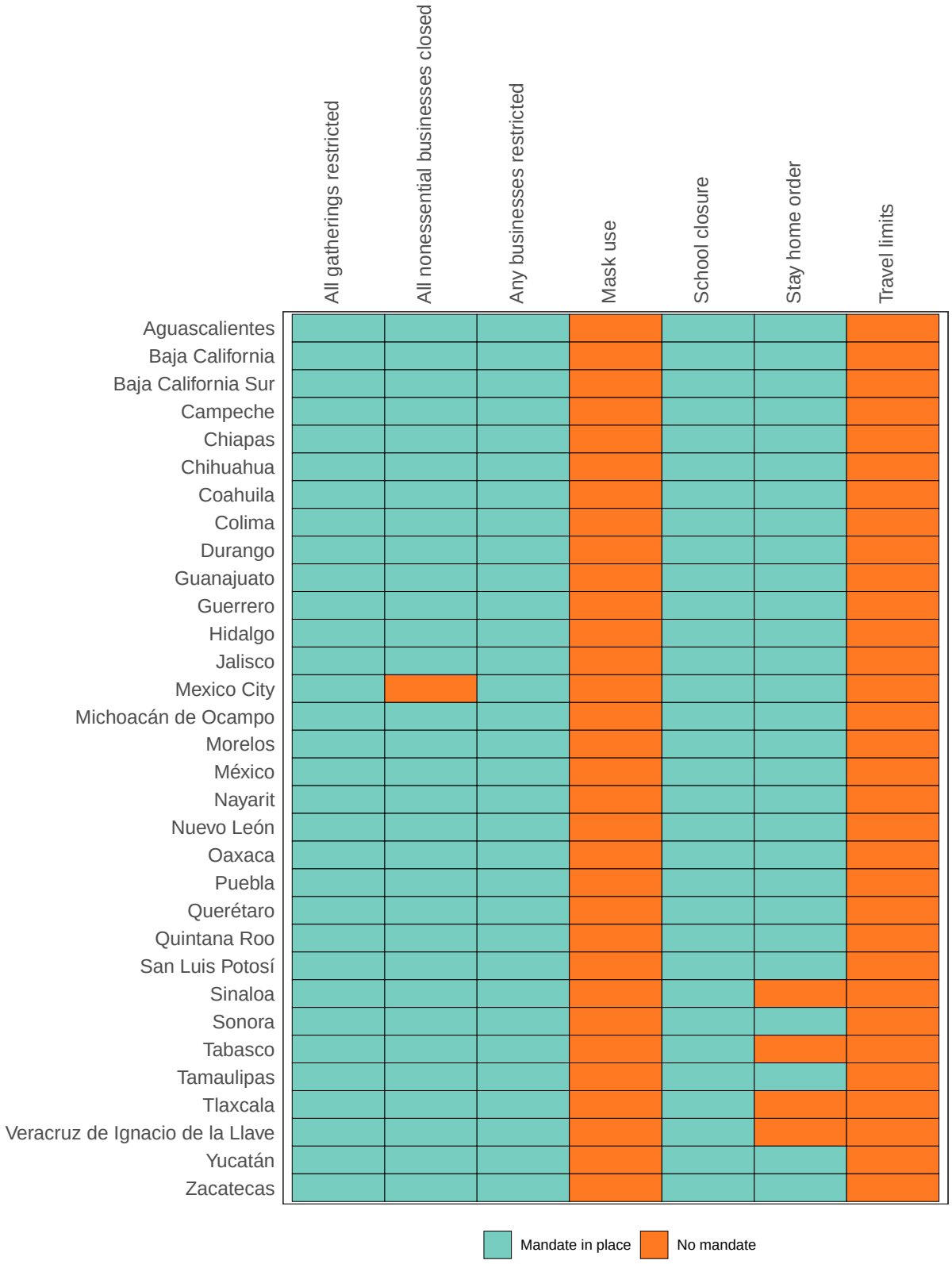


Figure 7. Total number of mandates

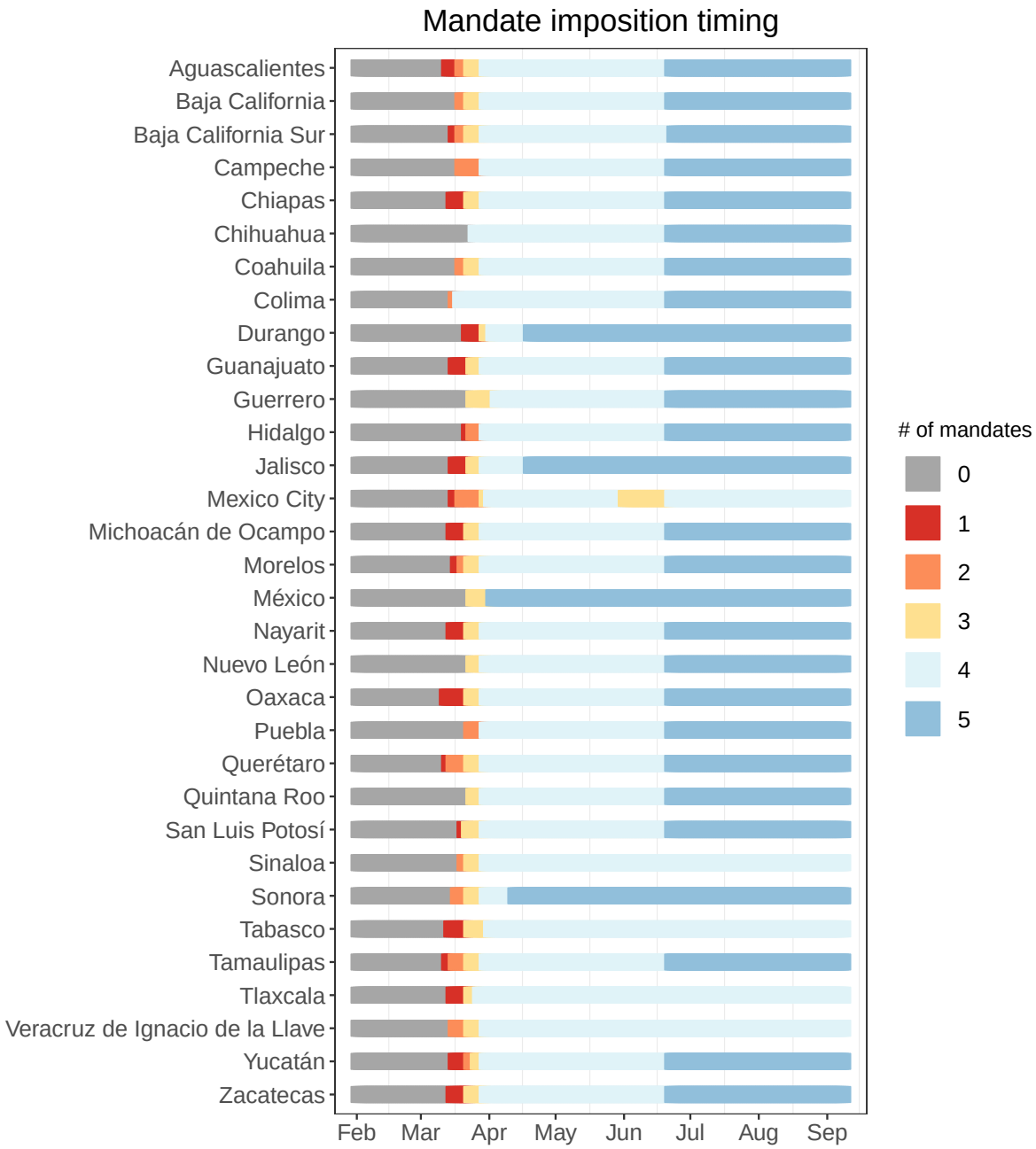


Figure 8a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

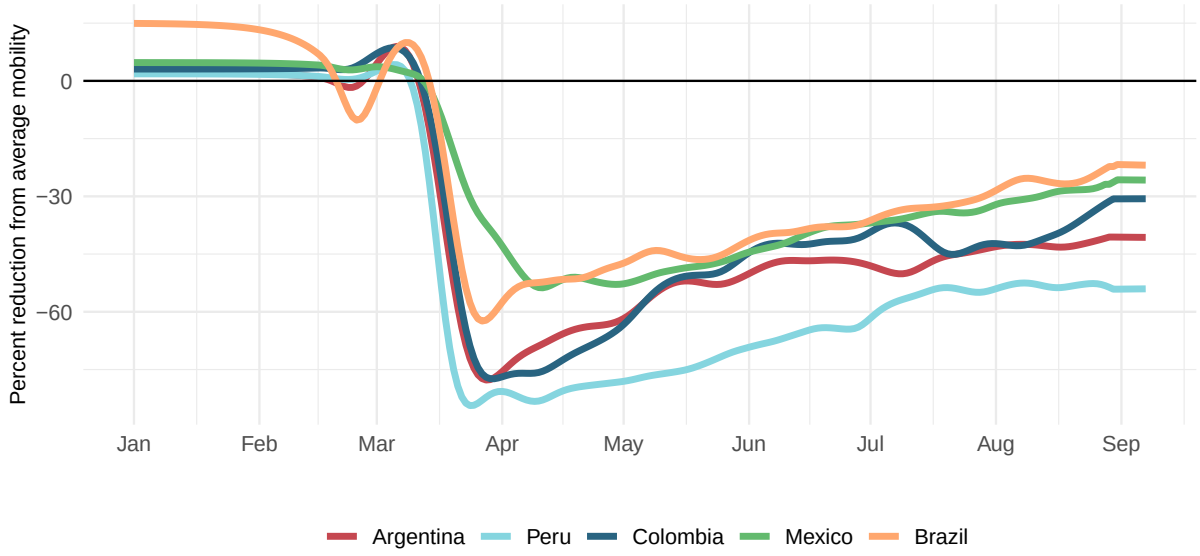


Figure 8b. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent)

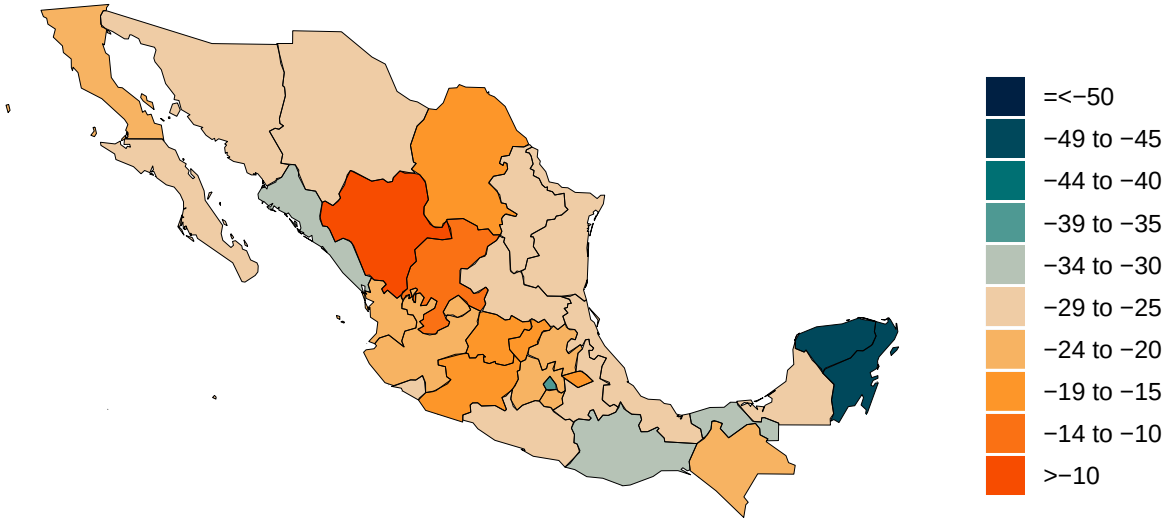


Figure 9a. Trend in the proportion of the population reporting always wearing a mask when leaving home

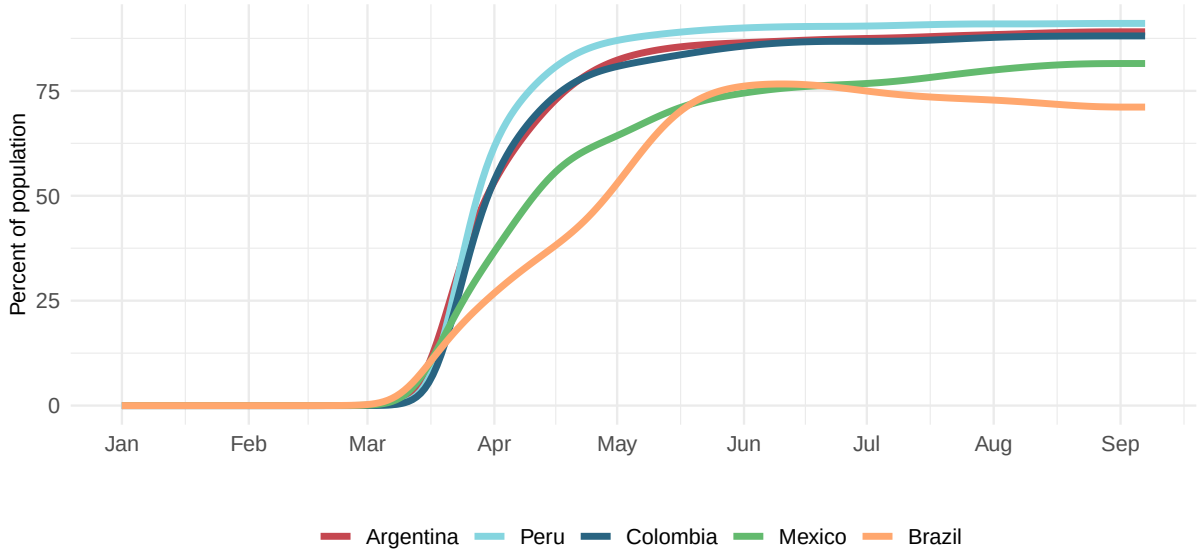


Figure 9b. Proportion of the population reporting always wearing a mask when leaving home on September 08, 2020

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

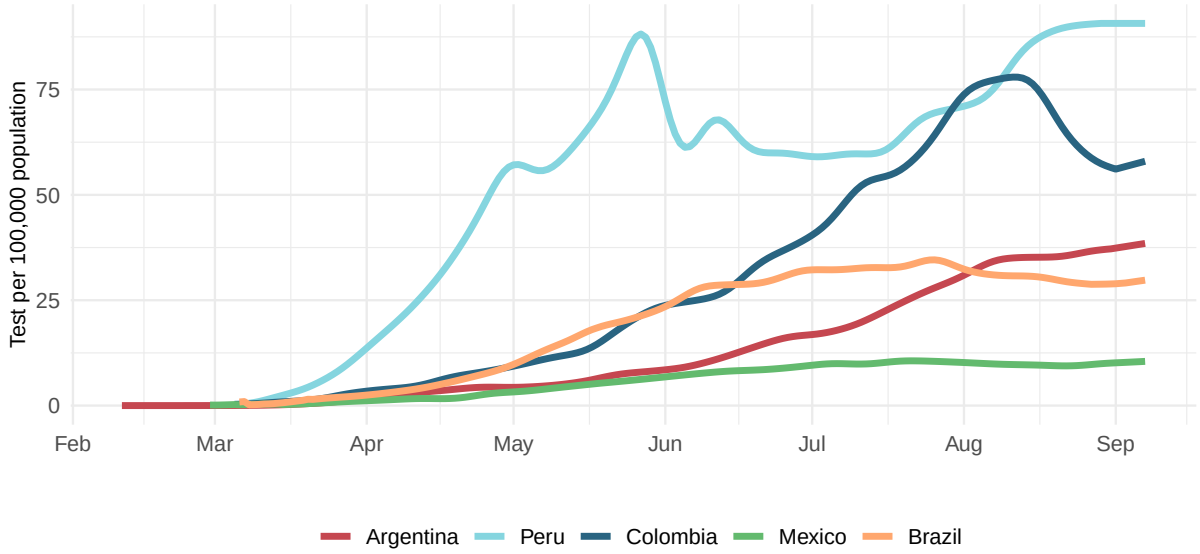


Figure 10b. COVID-19 diagnostic tests per 100,000 people on September 02, 2020

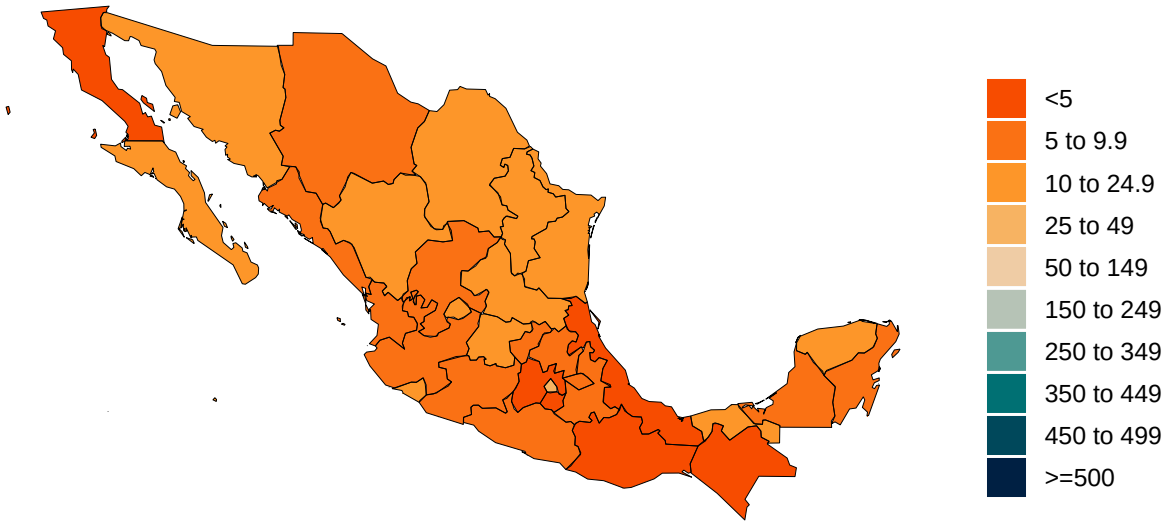


Figure 11. Increase in the risk of death due to pneumonia on February 1 compared to August 1

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. 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.

Figure 12. Cumulative COVID-19 deaths until January 01, 2021 for three scenarios.

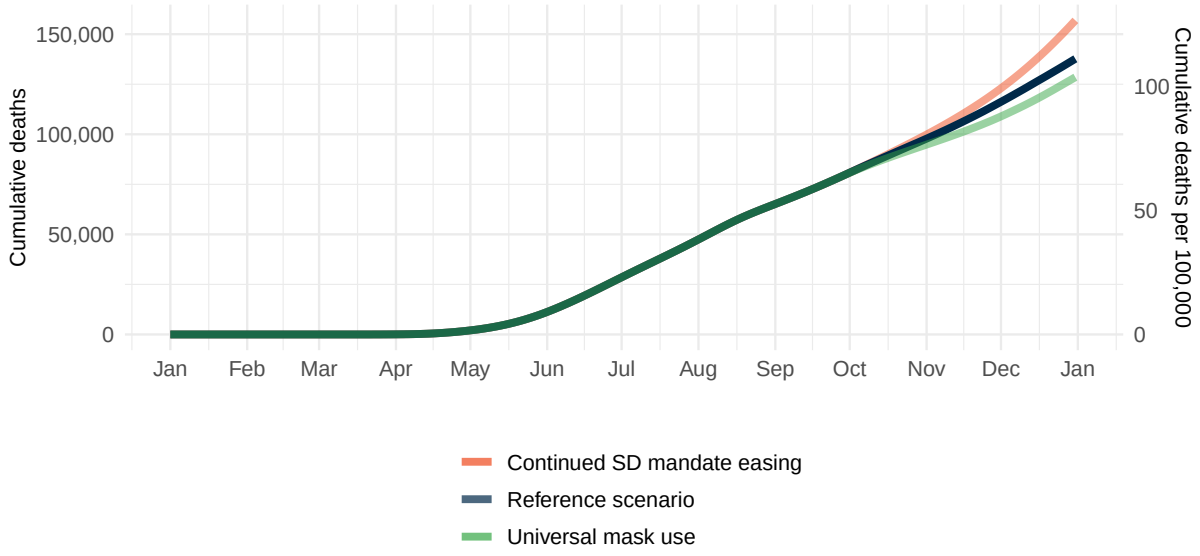


Fig 13. Daily COVID-19 deaths until January 01, 2021 for three scenarios.

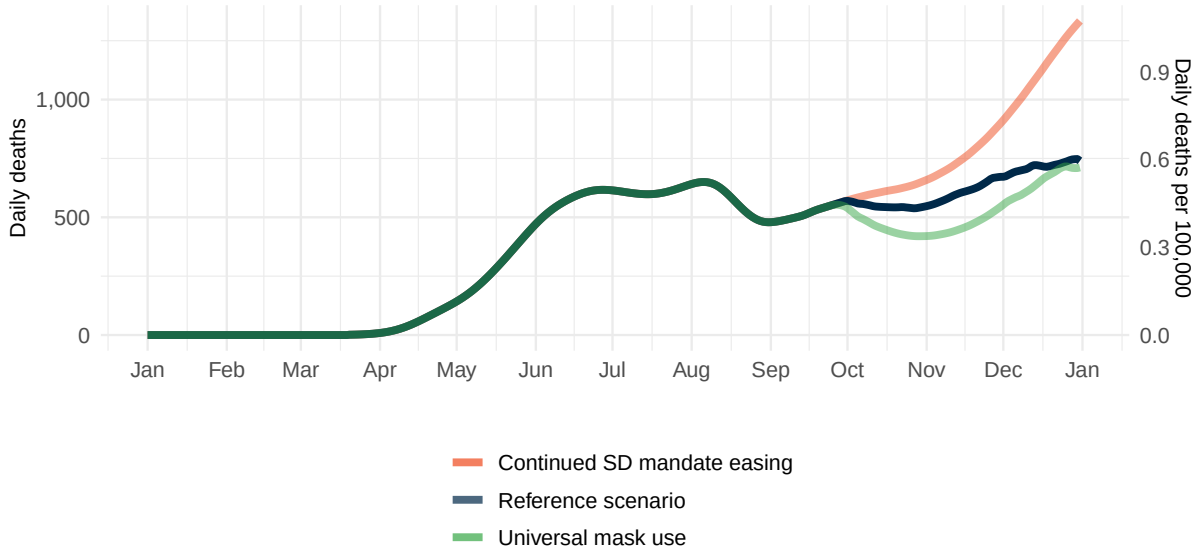


Fig 14. Daily COVID-19 infections until January 01, 2021 for three scenarios.

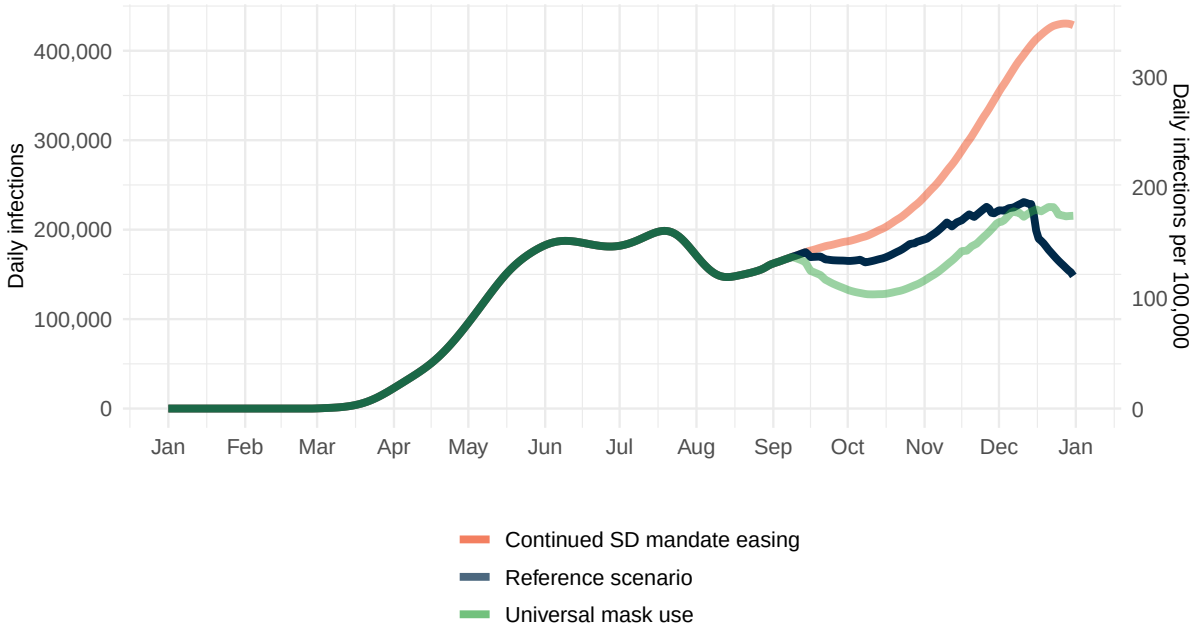


Fig 15. Month of assumed mandate re-implementation. (Month when daily death rate passes 8 per million, when reference scenario model assumes mandates will be re-imposed.)

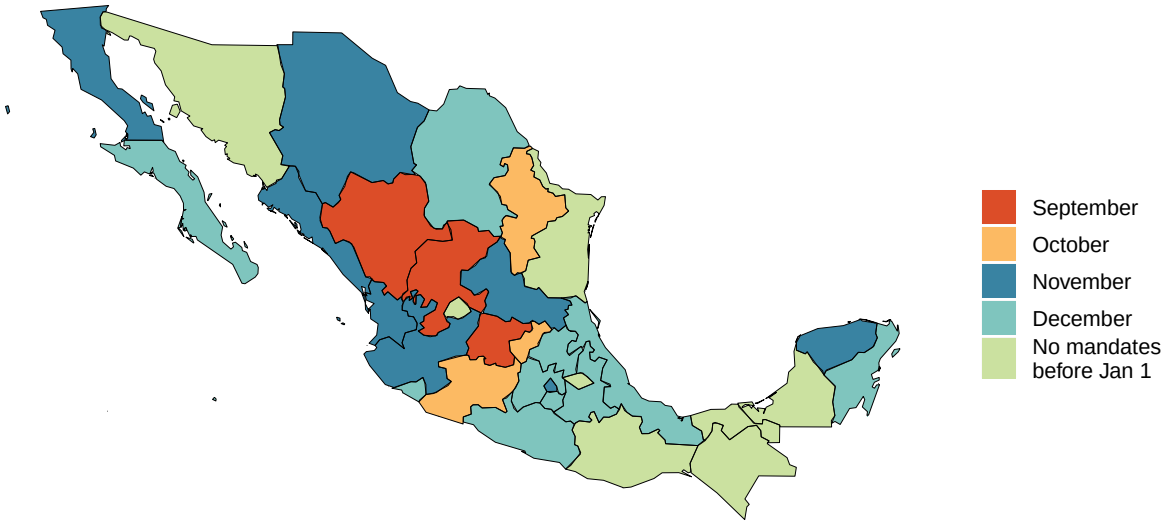


Figure 16. Forecasted percent infected with COVID-19 on January 01, 2021

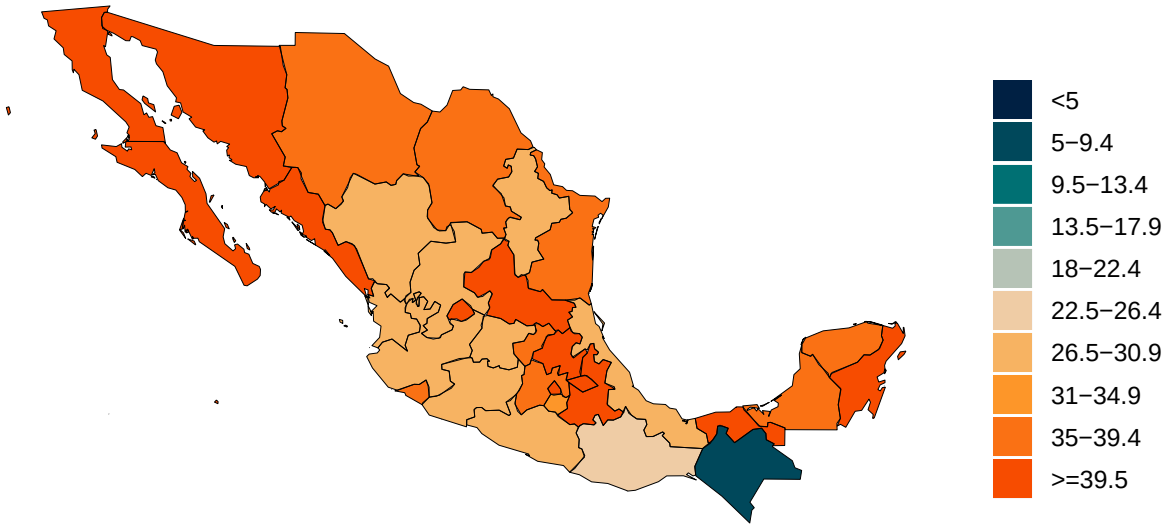


Figure 17. Daily COVID-19 deaths per million forecasted on January 01, 2021 in the reference scenario

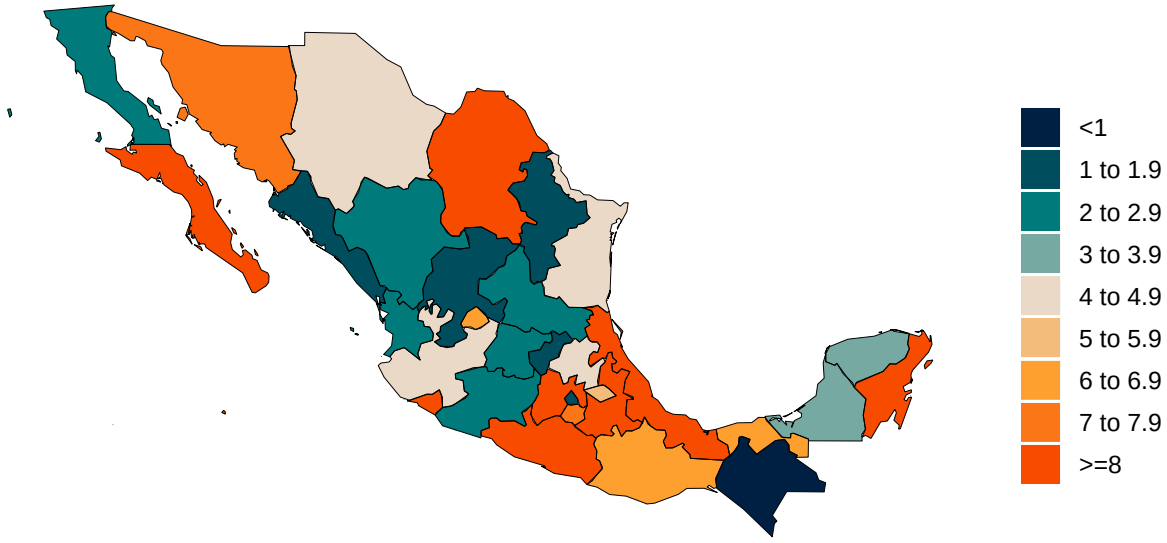


Table 3. Ranking of COVID-19 among the leading causes of mortality in the full year 2020. Deaths from COVID-19 are projections of cumulative deaths on Jan 1, 2021 from the reference scenario. Deaths from other causes are from the Global Burden of Disease study 2019 (rounded to the nearest 100).

Cause name	Annual deaths	Ranking
COVID-19	138,416	1
Ischemic heart disease	106,300	2
Diabetes mellitus	73,800	3
Chronic kidney disease	72,500	4
Cirrhosis and other chronic liver diseases	46,300	5
Stroke	37,900	6
Chronic obstructive pulmonary disease	32,800	7
Interpersonal violence	30,700	8
Alzheimer's disease and other dementias	23,700	9
Lower respiratory infections	22,600	10

Mask data source: Premise; Facebook Global symptom survey (This research is based on survey results from University of Maryland Social Data Science Center); Kaiser Family Foundation; YouGov COVID-19 Behaviour Tracker survey

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, Bolivia, Chile, Colombia, Cuba, the Dominican Republic, Ecuador, Egypt, Honduras, Israel, Japan, Malaysia, Mexico, Moldova, Panama, Peru, the Philippines, Russia, Serbia, 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), with data published here: http://observcovid.miami.edu/; Fundación Mexicana para la Salud (Héctor Arreola-Ornelas) with support from the GDS Services International: Tómatelo a Pecho A.C.; and Centro de Investigaciones en Ciencias de la Salud, Universidad Anáhuac (Héctor Arreola-Ornelas); Lab on Research, Ethics, Aging and Community-Health at Tufts University (REACH Lab) and the University of Miami Institute for Advanced Study of the Americas (Thalia Porteny).

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. We would like to also extend a warm thank you to the many others who have made our COVID-19 estimation efforts possible.