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Supplementary Materials for

Spatiotemporal pattern of COVID-19 spread in Brazil

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Other Supplementary Material for this manuscript includes the following:
(available at science.sciencemag.org/cgi/content/full/science.abh1558/DC1)

Movies S1 and S2 (GIF)
MDAR Reproducibility Checklist (PDF)

Materials and Methods

Epidemiological data

We downloaded data on reported COVID-19 cases and deaths from Brasil.io (https://brasil.io/home/), a repository of publicly available information. Brasil.io assembles datasets using an Application Program Interface (API) that retrieves daily information on confirmed COVID-19 cases and deaths from State Health Offices. Data are treated by A.Justen and about 40 volunteer collaborators/Brasil.io (https://github.com/turicas/covid19-br/blob/master/api.md). Each record has the date (DD/MM/YYYY) and the municipality (N=5,570) and the state (26 states and one federal district) of reporting. There is no information on demographics (sex, age, race/ethnicity), or clinical and laboratory records.

Data were extracted on November 13, and we used information from epidemiological week 9 (February 23-29) until epidemiological week 41 (October 4-10). **Figure S1** shows epidemiological curves of cases and deaths in Brazil, with their respective 7-day moving averages. A summary of the dates of the first case and death, the moment when 50 cases and deaths were recorded, and the epidemiological week when the percentage of cases (deaths) in capital cities became smaller than the percentages in the remaining municipalities of each state are in **Table S1**.

A limitation of the data is that the temporal reference is the date of reporting, not the date of first symptoms. Therefore, patterns of disease spread highlighted in our findings are likely to be lagged by at least a week, probably more. There is no comprehensive dataset that records all cases by date of first symptoms. The alternative is the Influenza Epidemiological Surveillance Information System (SIVEP-Gripe), an information system of the Ministry of Health that captures all notifications of severe acute respiratory illness (SARI) hospitalizations. In this case, no mild cases would be included in the analysis, and therefore patterns would reflect only severe COVID-19, not the overall pandemic spread. Despite the data limitation, it is better to compromise the timing of the pattern instead of failing to describe the intensity and pattern of the epidemic spread.

Spatiotemporal clusters

To analyze spatiotemporal clusters (the duration as well as the location of clusters) of daily cases and deaths of COVID-19 across Brazilian municipalities (**Figs. 1C and 1D**), we utilized a retrospective space-time scan statistic, which uses a cylindrical window to scan across the study area. The cylinder has a geographic base that represents the area of a potential cluster. The height corresponds to time that indicates the duration of the cluster (*16*). Of all the possible centroids positioned throughout municipalities, the geographic base is centered around one of the municipal centroids, and its radius varies from zero to a maximum set value. Here, we set the maximum size of the spatial cluster to 5% of the population at risk (anything larger than that would result in large geographical clusters that would provide no meaningful interpretation). The height of the cylinder represents the time interval that varies from less than or equal to half of the study period to the entire study period. We chose day as the time interval and we set the maximum size of the temporal cluster to 6% of the entire period (14 days out of 229 days). Also, the minimum number of deaths in a cluster of high rates was set to 120.

Using the number of confirmed COVID-19 cases and deaths obtained from Brasil.io and the population size in each municipality, a likelihood ratio of the observed COVID-19 cases (deaths) to the expected for a cylindrical window is calculated assuming a discrete Poisson model:

$$\left(\frac{c}{E[c]}\right)^{c}\left(\frac{C-c}{C-E[c]}\right)^{C-c}$$

where *C* is the total number of COVID-19 cases (deaths), *c* is the number of COVID-19 cases (deaths) observed within the window, and *E[c]* is the expected number of COVID-19 cases (deaths) within the window (*16*). Under the Poisson model, the expected number of COVID-19 cases (deaths) in each municipality is proportional to its total population. In addition, the probability of a COVID-19 case (death) being in a municipality *m* assuming that it was reported on day *d* is the same for all days *d* (*16*).

For each cylindrical window, the estimated relative risk (**Tables S2 and S3**) represents the ratio of the risk within the window to the risk outside the window. A p-value adjusted for multiple and dependent testing estimates the statistical significance of each cluster using Monte Carlo simulation with 999 random replications of the data. Spatiotemporal analyses were done in SaTScan™ v.9.6 (http://www.satscan.org/), and maps were prepared in ArcMap v.10.6.1 (ESRI; Redlands, CA).

Geographic center

Using the distribution of COVID-19 cases and deaths by epidemiological week we calculated the geographic center (or the center of concentration) of those distributions using the R package "stplanr" (*33*). The geographic center was calculated by taking the geographic centroid of each municipality (N=5,570) as a set of input points that in combination were used to find the national geographic centroid. Then the municipal centroid locations were weighted with the COVID-19 cases (deaths) in each municipality (obtained from Brasil.io), producing a geographic centroid based on the COVID-19 cases (deaths). We calculated the geographic center for Brazil and each state, for both cases and deaths.

An R script was developed to investigate the movement of the COVID-19 case- and death-weighted centroids in Brazil from the introduction of SARS-CoV-2 in epidemiological week 9 (February 23-29) until epidemiological week 41 (October 4-10). We mapped the path of the COVID-19 case- (**Fig. 2A**) and death-weighted (**Fig. 2B**) geographic centers to show the movement of the epidemic centroid in Brazil over time. We also created choropleth maps for the cumulative number of cases and deaths up to week 41 using an exponential classification (for the legend) due to the wide range of case counts in the different municipalities. We used the choropleth map as a background for the path of the geographic center. **Figure S2** shows maps for the movement of the centroid for COVID-19 cases and deaths in each state.

Our R script also produced a table containing the length of each line connecting the centroids, the length between each centroid and the capital city, and the direction of the line's movement. In the case of states, we also calculated the distance between the capital city and the furthest municipality in the state. That distance was the denominator of a ratio that considered the length of the line connecting centroids each week as the numerator (the largest the ratio, the further cases or deaths moved to the interior) (**Fig. 2D and Tables S4 and S5**).

Locational Hoover Index

The Hoover index is a widely used measure to analyze the concentration of the population relative to areas in a country (*21*, *22*). To assess the progressive spread of COVID-19 cases and deaths we used the locational Hoover index, a measure of the spatial imbalance between any two variables across a geographical area (*34*). The index is calculated as:

$$H_{st} = 50 \sum_i \left| \frac{p_{ist}}{\sum_i p_{ist}} - \frac{a_{ist}}{\sum_i a_{ist}} \right|$$

where H_{st} is the index in state s at the end of the period t, p_{ist} is the population of municipality i in state s at the end of the period t, and a_{ist} is the number of COVID-19 cases (or deaths) in municipality i in state s at the end of the period t. Therefore, the locational Hoover index represents any given municipality's proportion of the overall population of the state to its relative proportion of COVID-19 cases or deaths within a specified period (*34*). The index ranges from 0 (zero) to 100 (%), such that higher values indicate more imbalanced distributions (or concentration of events in a few municipalities), while lower values indicate more balanced distributions (or spread of events).

We calculated the locational Hoover index for COVID-19 cases and deaths for Brazil (using all 5,570 municipalities) and each of the states by epidemiological week (**Tables S6 and S7**). The temporal trend of the index (**Fig. 3A**) facilitates (i) an assessment of the speed of COVID-19 spread in Brazil, (ii) a comparison of the pattern of spread in each state, (iii) contrasting of the pattern of spread of cases and deaths, and (iv) identification of shifts in the trend (concentration after a period of spread and vice-versa).

We created bivariate choropleth maps of the index for COVID-19 cases and deaths for two periods: early, using the first week states had information for cases and deaths (**Fig. 3C**) and later (**Fig. 3D**) in the epidemic (epidemiological week 41, the last week included in our study period). The color grid in the maps shows a 3x3 table with tertiles of locational Hoover Indices for cases and deaths. The maps facilitate the identification of differences across states, but also the states where deaths moved further to the interior faster than cases.

The calculation of the locational Hoover index and plots were done in R (R core team, 2020). Bivariate choropleths were created using ArcMap v.10.6.1 and ArcGIS Pro v.2.7 (ESRI; Redlands, CA).

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<u>Policy response indicators</u>

We used two policy response indicators: the Social Distancing Policy Stringency (SDPS) Index, and the Containment Index. Both were extracted from the COVID-19 Government Response Tracker for the Brazilian Federation (CGRT-BRFED), which uses publicly available information to code the stringency measures adopted by the federal and 26 state governments, and Brasilia's federal district (*35*). The coding follows the Oxford COVID-19 Government Response Tracker, and data are available on Github (https://github.com/cgrtbrfed/covid19brpolicyresponses).

Policies, as prescribed in government decrees, laws, and other official rulings published in government official gazettes, are the primary sources to code policy stringency for a broad range of non-pharmaceutical interventions. Each policy was coded with a score of 0 (zero) if no policy mandates were in place, a score of 1 if policies were only issued as recommendations (non-binding), a score of 2 if the policy was mandatory but only specific to certain sectors or levels (e.g., school closures are only mandated for primary-level education), and a score of 3 if the closure was mandatory for all levels and sectors (e.g., mandatory school closure for primary, secondary and tertiary levels). Also, each policy was coded with respect to its geographical coverage. If the policies were directed at the entire state, they received a geographical target score of 1; if they applied only to the state capital, they received a geographical score of 0.5, and if the policy was geographically targeted for specific hotspots excluding the capital, a score of 0 (zero) was assigned. Considering these two dimensions, a final score was then calculated for each policy where the stringency level ranges from 0 (no policy intervention) to 100 (maximum level of intervention). There were no missing data for these indicators in the CGRT-BRFED dataset.

Specifically, the SDPS measures the stringency level of school closures, work closures in the commerce and service sectors, work closures in industry, public and private gatherings, stay at home orders, and mask use for sub-national governments as mandated by the executive and legislative branches of government. For the federal government, it also included the stringency of international entry policies for nationals and other travelers. The Containment Index includes all policies that compose the SDPS except for the use of masks.

Social Distancing Index

We obtained a measure of social isolation (Social Distancing Index - SD) from In Loco (https://mapabrasileirodacovid.inloco.com.br/pt/), based on anonymized locational data from over 60 million mobile devices. The index is calculated daily, as the percentage of individuals staying at home, i.e., within a radius of 450 meters of the location estimated to be their home. The home location was defined by the frequency of nighttime signals.

Here, we used the daily state-level data to obtain weekly information, (using the epidemiological week as temporal reference) by calculating averages. We also calculated an aggregated index for Brazil by taking a weighted average of state-level indices, weighted by the 2020 population estimates obtained from the Brazilian Institute of Geography and Statistics (https://www.ibge.gov.br/estatisticas/sociais/populacao/9103-estimativas-de-populacao.html?=&t=o-que-eb).

We compared In Loco's SD with other publicly-available mobility data. Specifically, Google COVID-19 Community Mobility Reports (https://www.google.com/covid19/mobility/) has six mobility sub-indices: retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residential. We used Ordinary Least Squares (OLS) to model the weekly In Loco's SD across states using Google's six sub-indices between epidemiological weeks 9 and 41, and obtained an adjusted $R^2 = 78.41\%$. At the national level, the same exercise by OLS returned an adjusted $R^2 = 95.63\%$.

Correlations

We used the Pearson correlation coefficient to assess the strength of associations between nine variables obtained for Brazil and each state, detailed by epidemiological week. Assumptions for the expected correlations and the summary of findings for the states are in **Table S8**, and detailed correlations for the states are in **Fig. S3**. The variables are:

1. Social Distancing Policy Stringency (SDPS) Index (named as Stringency Index (STR) in **Fig. 4C**, for simplicity) – **Table S9**
2. Containment Index (CTN) – **Table S10**
3. Social Distancing Index (SD) – **Table S11**
4. Locational Hoover Index for cases (HIc) – **Table S6**
5. Locational Hoover Index for deaths (HId) – **Table S7**
6. Percentage of cases in each epidemiological week (PCTc) – **Table S12**
7. Percentage of deaths in each epidemiological week (PCTd) – **Table S13**

8. Normalized distance by which the national geographical center of cases shifted in each week (DSTc). Distances were normalized to vary between 0 and 100 – original ratios of distances are in **Table S4**
9. Normalized distance by which the national geographical center of deaths shifted in each week (DSTd). Distances were normalized to vary between 0 and 100 – original ratios of distances are in **Table S5**

All calculations and graphics were done in R (R core team, 2020).

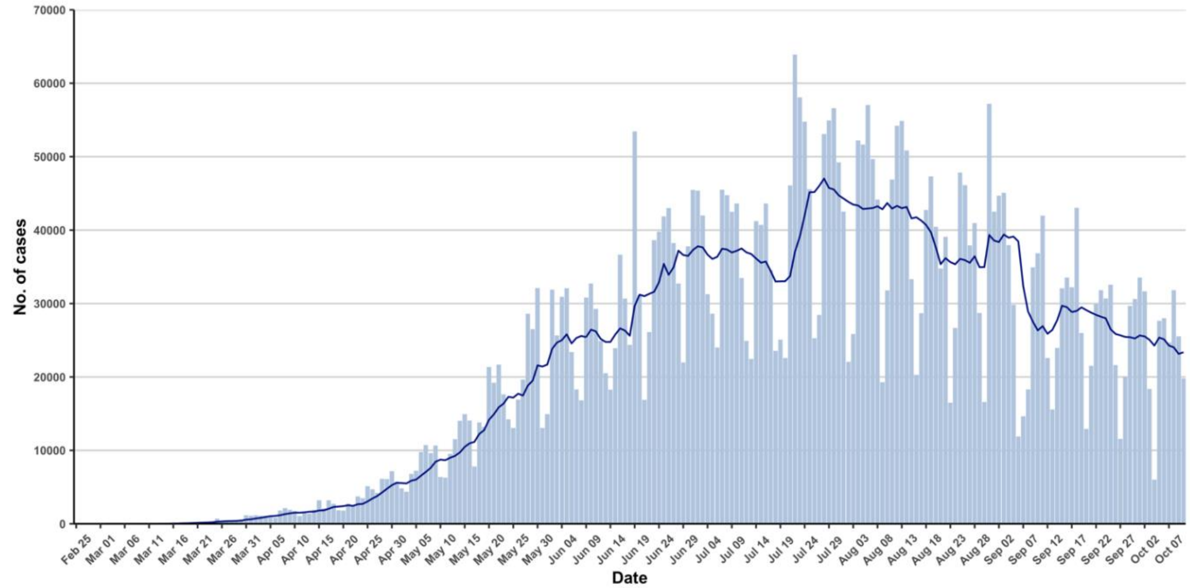
Cluster analysis

We conducted a hierarchical cluster analysis (**Fig. 4D**) by defining a dissimilarity measure between pairs of observations using a Euclidean distance and the average linkage method (*25*). It was based on five metrics for each state: (i) cumulative deaths per 100,000 people, (ii) maximum percentage of deaths in a week, (iii) maximum value of SD in a week, (iv) epidemiological week when HId became lower than 50, and (v) the maximum estimated value of the effective reproduction number (R_t) in a week. The R_t (**Table S14**) was extracted from *Observatório Covid-19 BR* (https://covid19br.github.io/), a multidisciplinary group of researchers that have been working together to produce varied indicators and to disseminate knowledge on the pandemic.

We identified the optimal number of clusters ($k = 6$) using the gap statistic, which compares the variability of the observations within each cluster (within-cluster sum of squares) for different values of k with their expected values under a null reference distribution of data (*36, 37*).

Clustering analysis was done in R (R core team, 2020), and maps were created using ArcMap v.10.6.1 and ArcGIS Pro v.2.7 (ESRI; Redlands, CA).

(A)



(B)

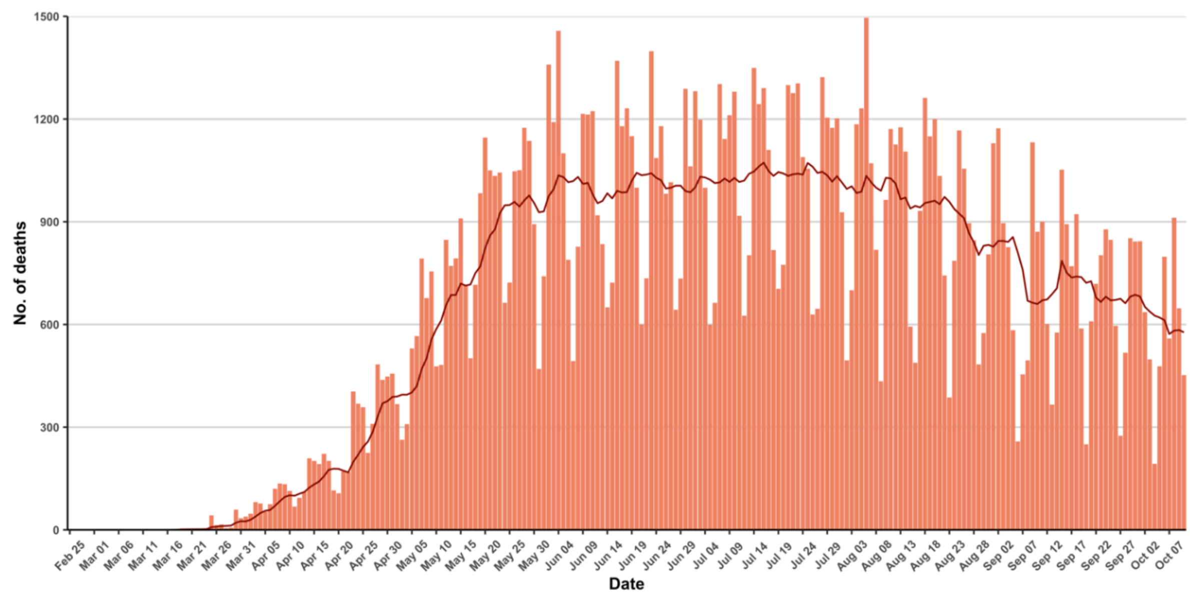
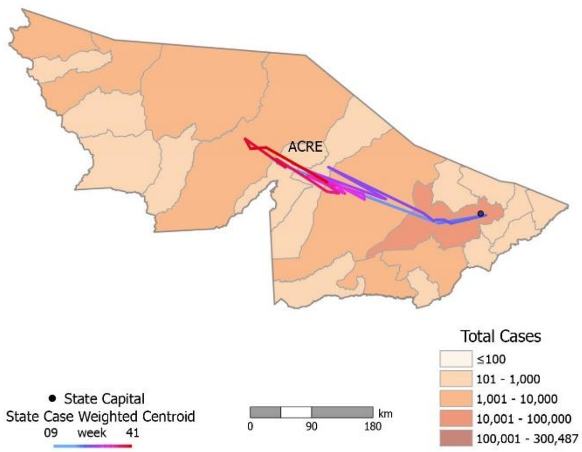


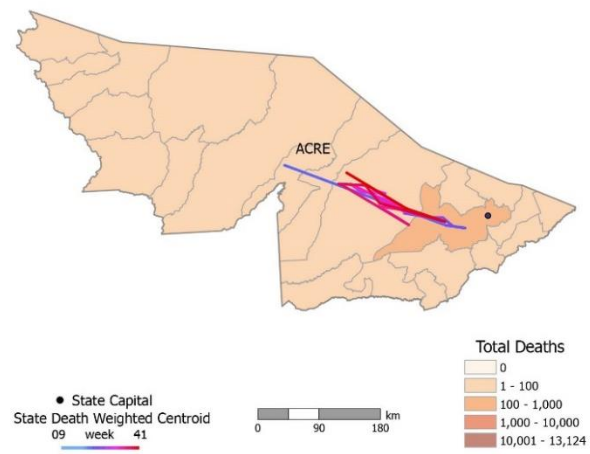
Fig. S1.

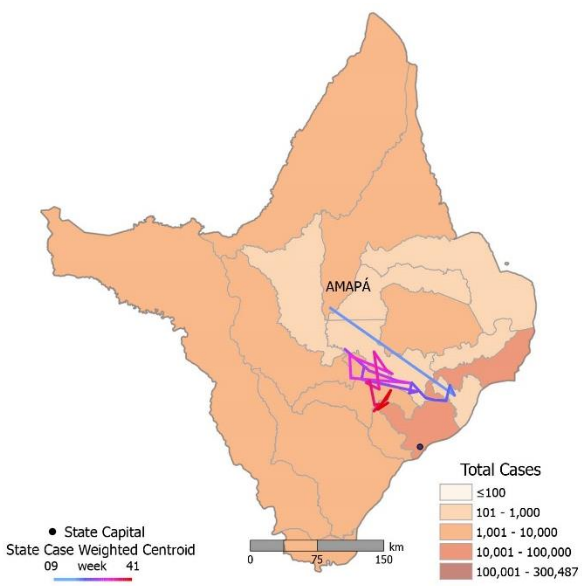
Epidemiological curves of COVID-19. **(A)** Cases and **(B)** deaths. Bars are daily numbers reported to Health Secretariats, and lines represent the 7-day moving average.

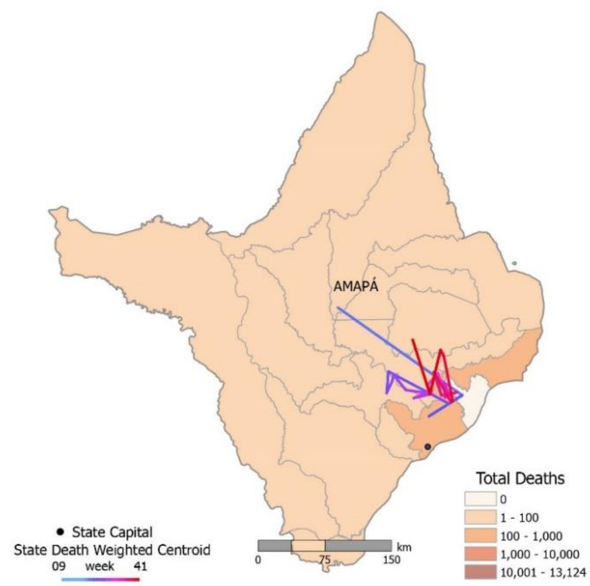
North Region

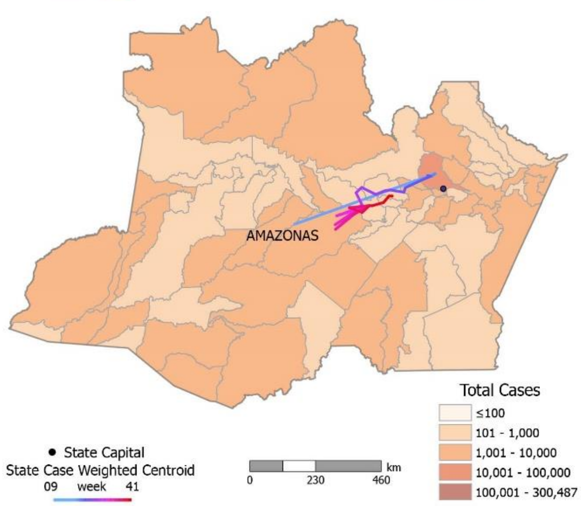
Cases | Deaths

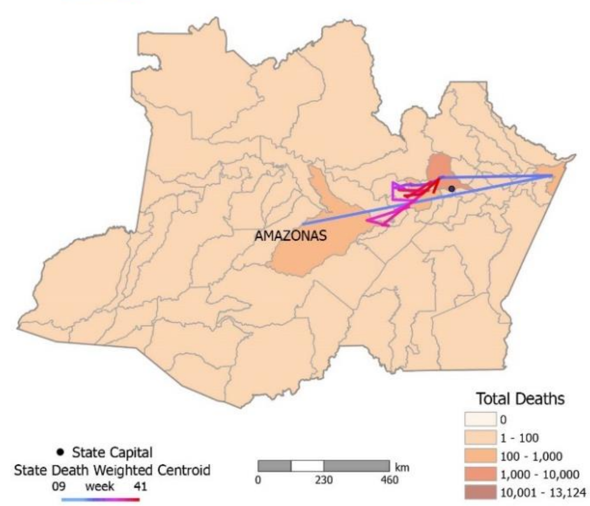


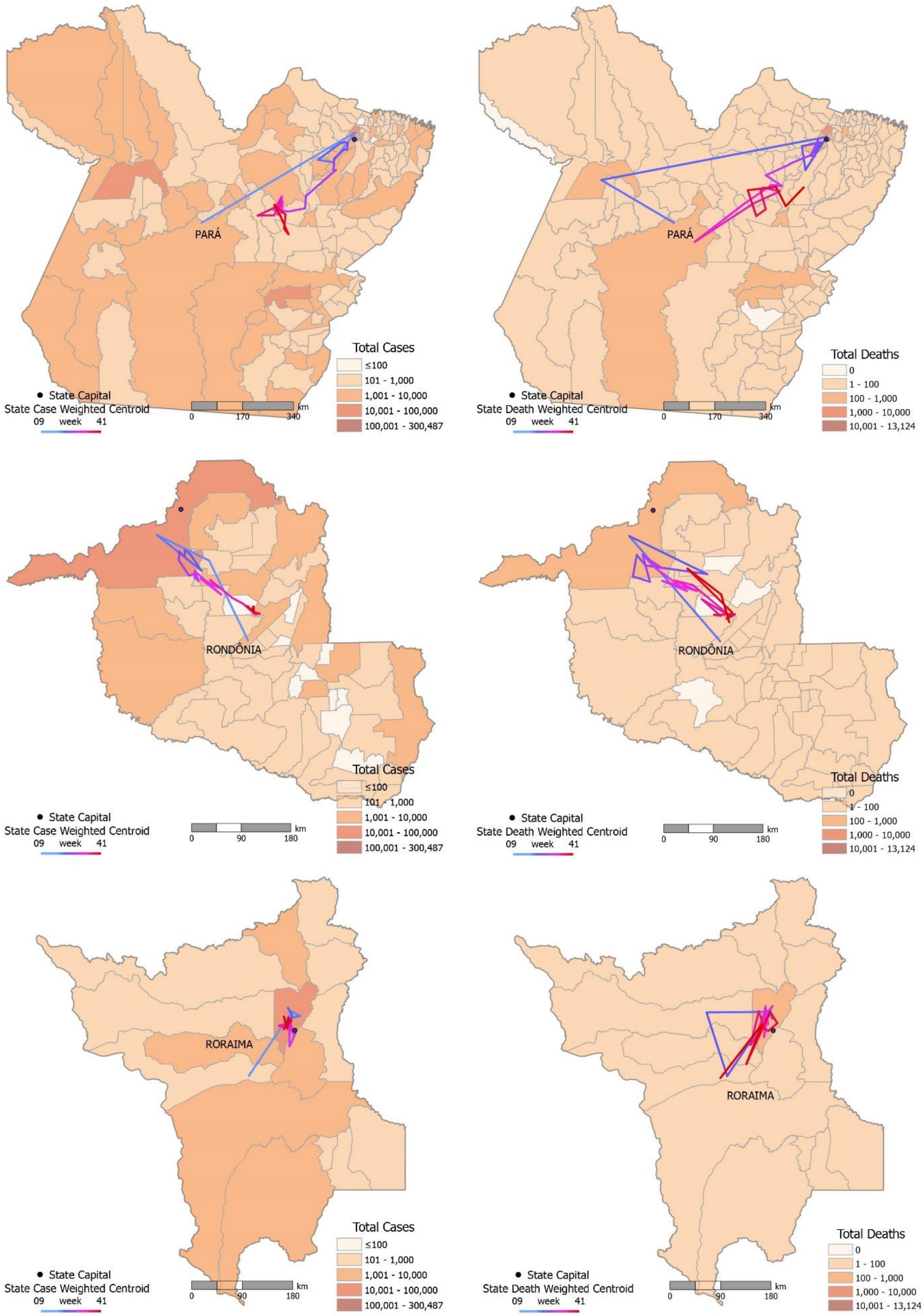











PARÁ
Total Cases
≤100
101 - 1,000
1,001 - 10,000
10,001 - 100,000
100,001 - 300,487
State Capital
State Case Weighted Centroid
09 week 41
0 170 340 km
PARÁ
Total Deaths
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1 - 100
100 - 1,000
1,000 - 10,000
10,001 - 13,124
State Capital
State Death Weighted Centroid
09 week 41
0 170 340 km
RONDÔNIA
Total Cases
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101 - 1,000
1,001 - 10,000
10,001 - 100,000
100,001 - 300,487
State Capital
State Case Weighted Centroid
09 week 41
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RONDÔNIA
Total Deaths
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State Capital
State Death Weighted Centroid
09 week 41
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RORAIMA
Total Cases
≤100
101 - 1,000
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100,001 - 300,487
State Capital
State Case Weighted Centroid
09 week 41
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RORAIMA
Total Deaths
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State Capital
State Death Weighted Centroid
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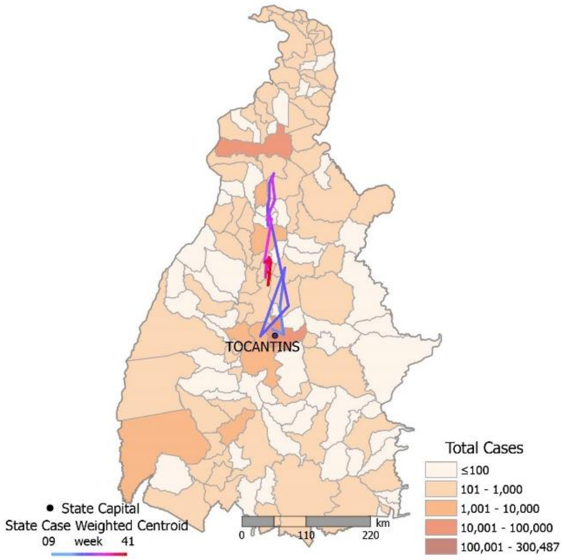
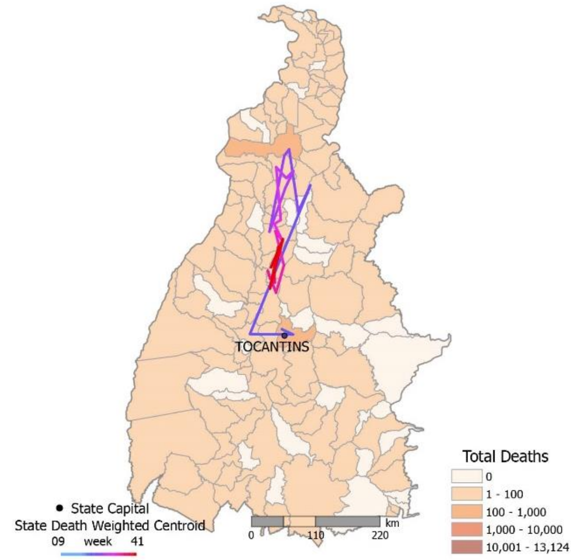
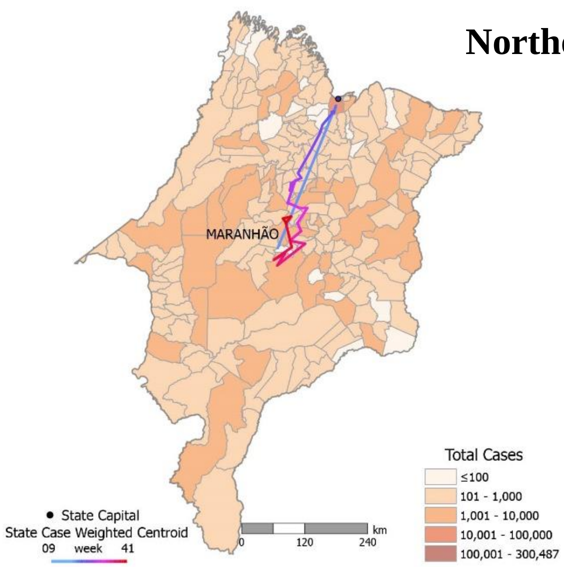
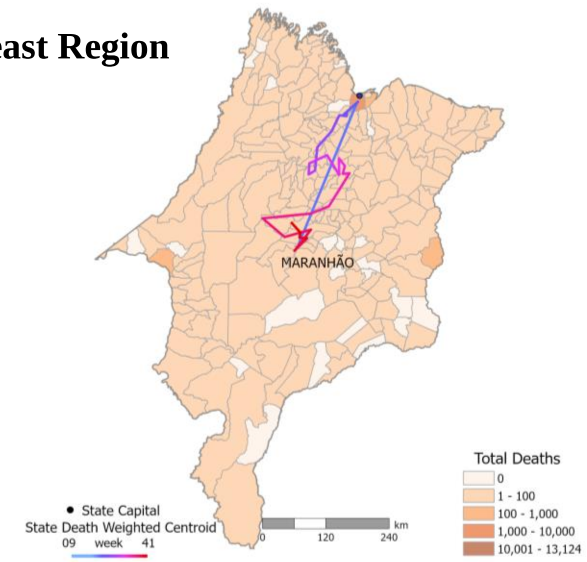
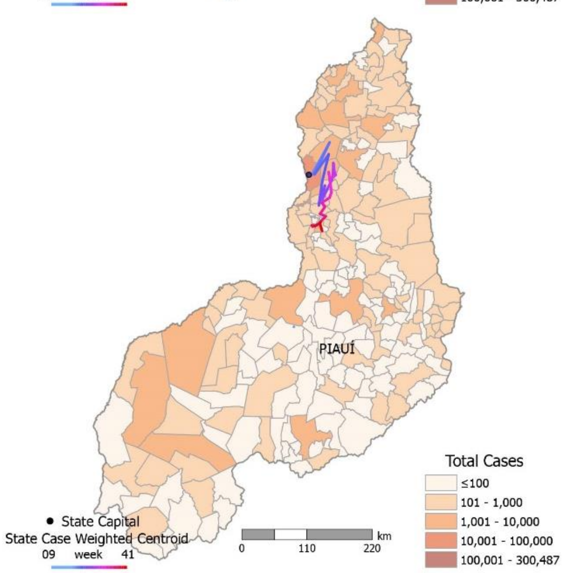


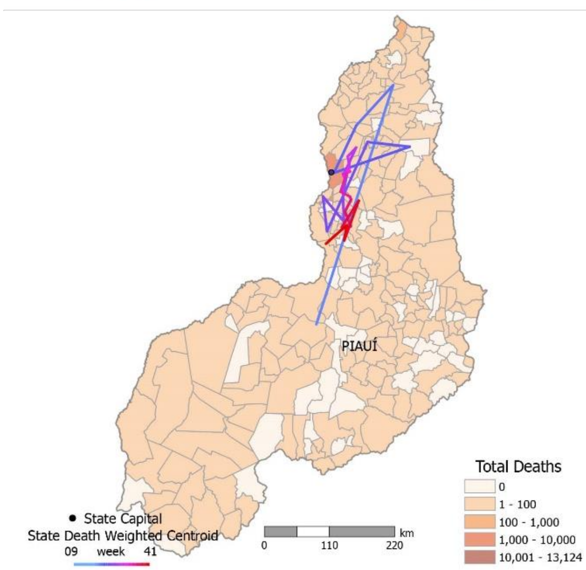


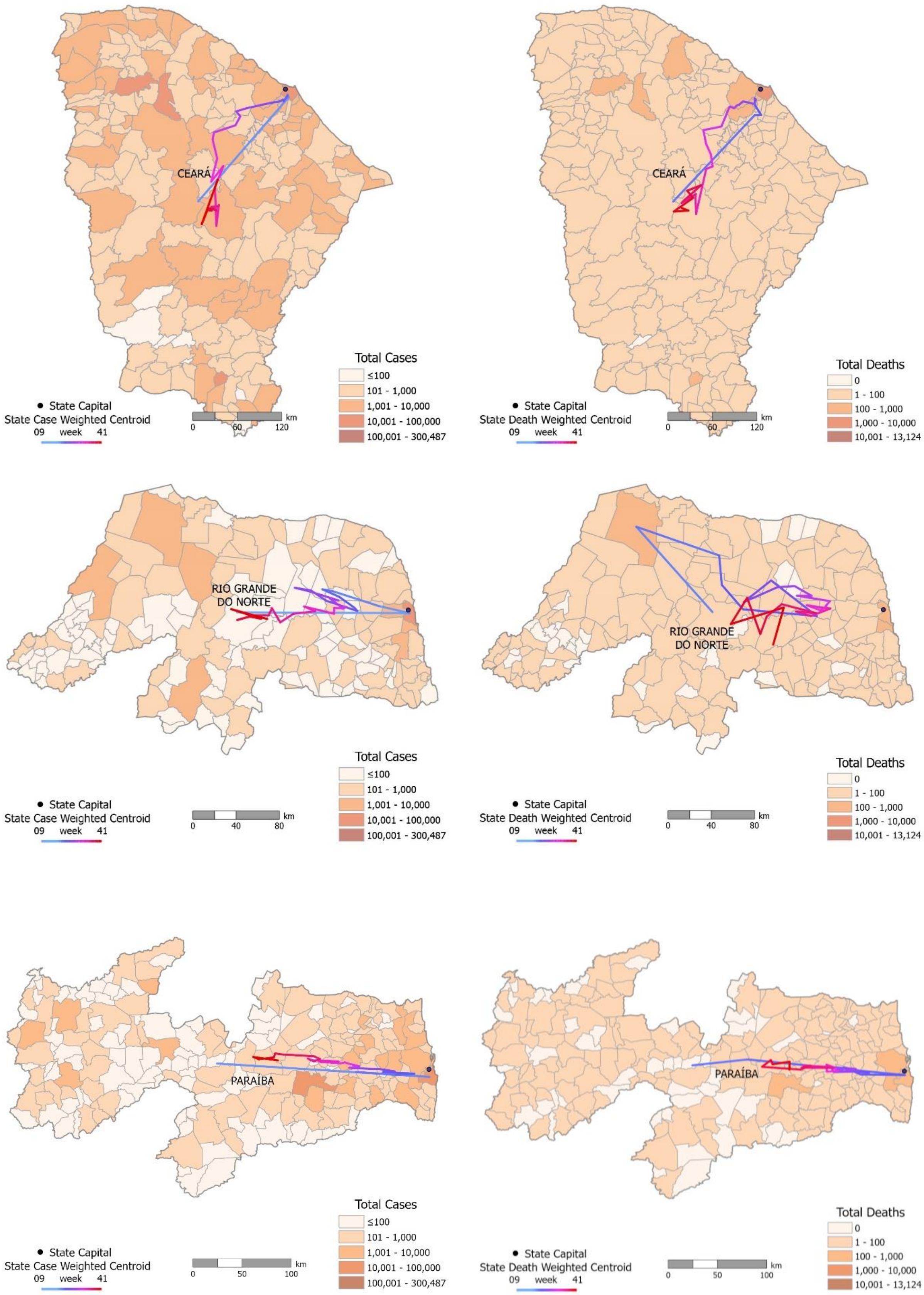
Northeast Region







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State Capital
State Case Weighted Centroid
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Total Cases
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100,001 - 300,487
CEARÁ
State Capital
State Death Weighted Centroid
09 week 41
km
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Total Deaths
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10,001 - 13,124
RIO GRANDE DO NORTE
State Capital
State Case Weighted Centroid
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km
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Total Cases
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RIO GRANDE DO NORTE
State Capital
State Death Weighted Centroid
09 week 41
km
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Total Deaths
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1,000 - 10,000
10,001 - 13,124
PARAÍBA
State Capital
State Case Weighted Centroid
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Total Cases
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100,001 - 300,487
PARAÍBA
State Capital
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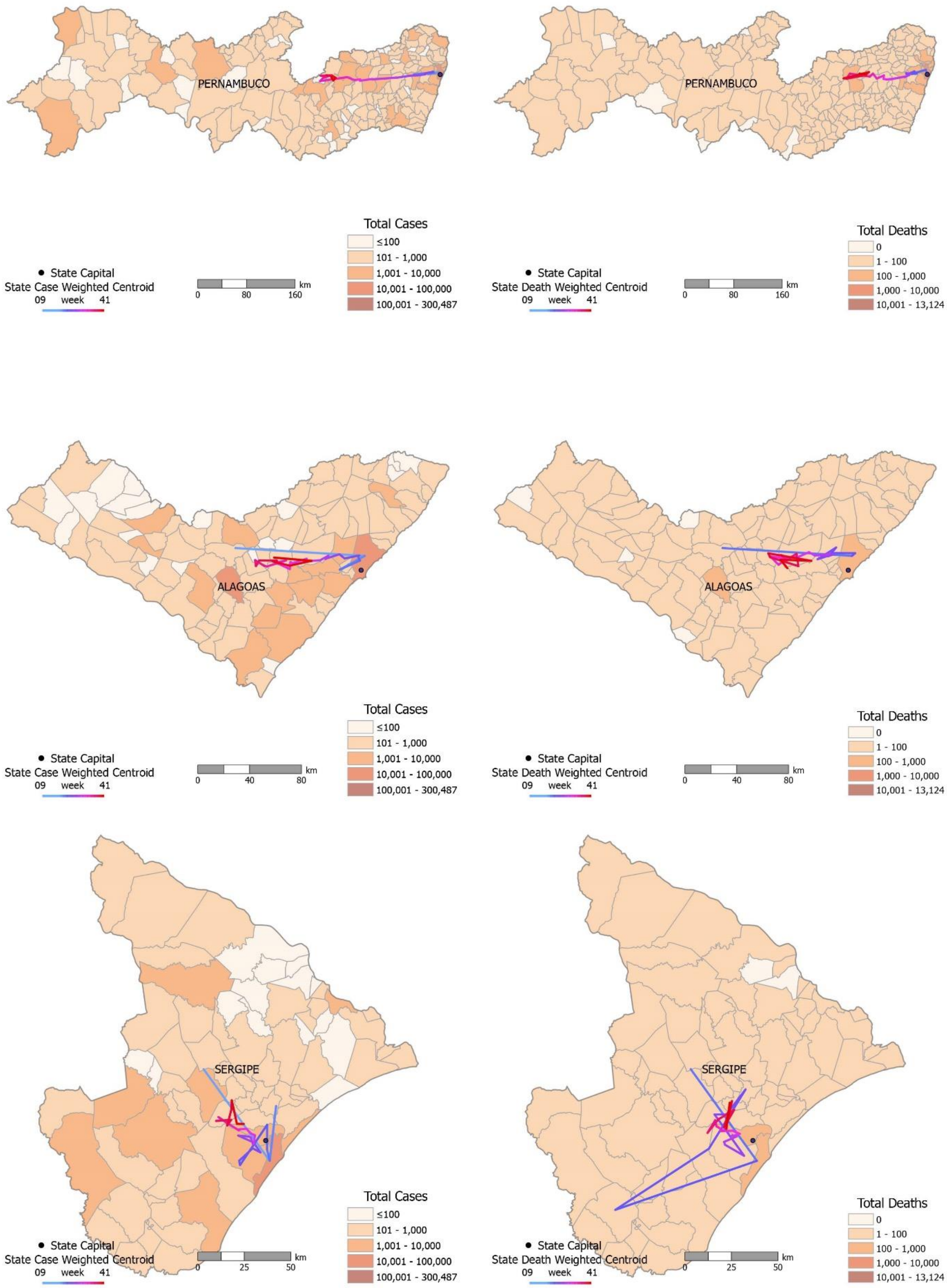
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State Capital
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100,001 - 300,487
PERNAMBUCO
State Capital
State Death Weighted Centroid
09 week 41
0 80 160 km
Total Deaths
0
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1,000 - 10,000
10,001 - 13,124
ALAGOAS
State Capital
State Case Weighted Centroid
09 week 41
0 40 80 km
Total Cases
≤100
101 - 1,000
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100,001 - 300,487
ALAGOAS
State Capital
State Death Weighted Centroid
09 week 41
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Total Deaths
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1,000 - 10,000
10,001 - 13,124
SERGIPE
State Capital
State Case Weighted Centroid
09 week 41
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Total Cases
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100,001 - 300,487
SERGIPE
State Capital
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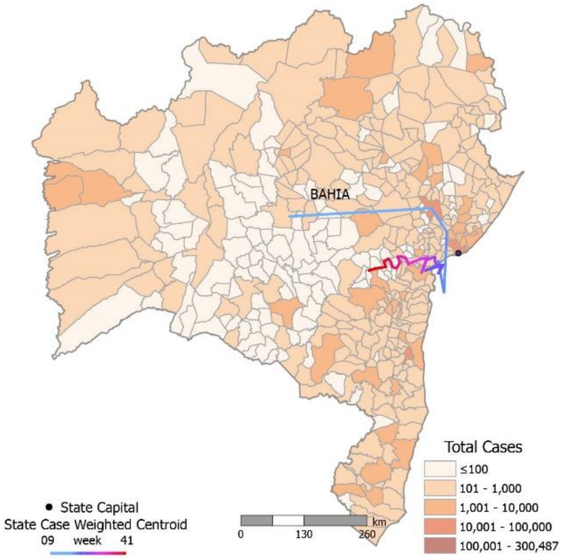
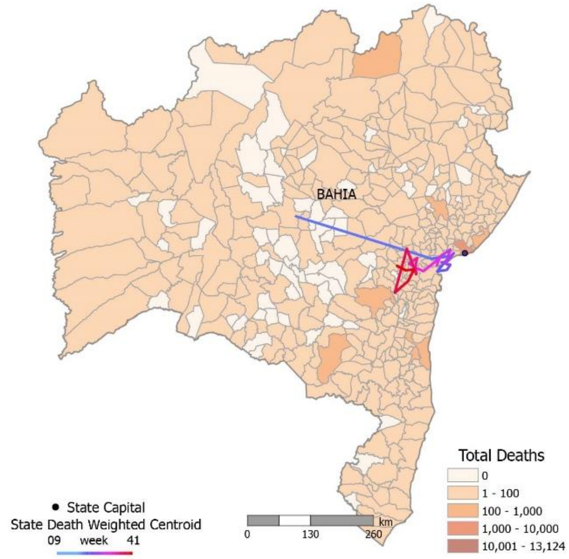
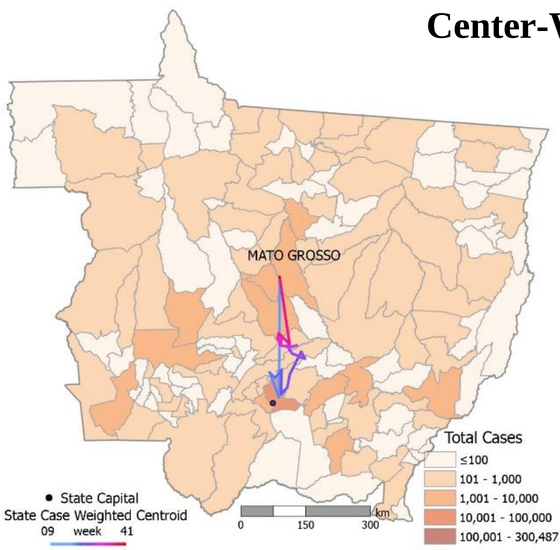
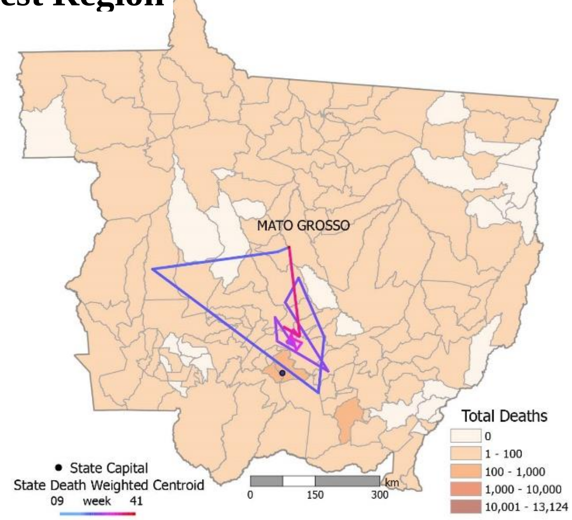
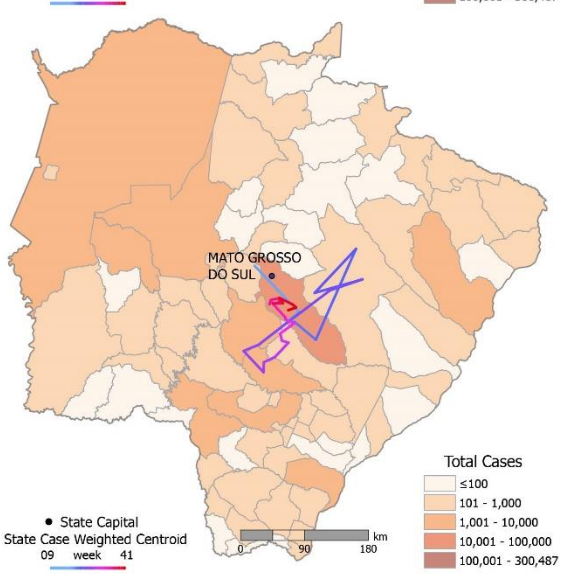


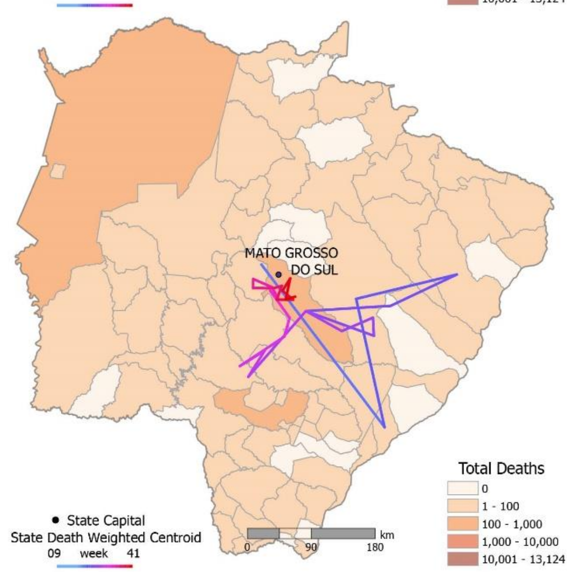


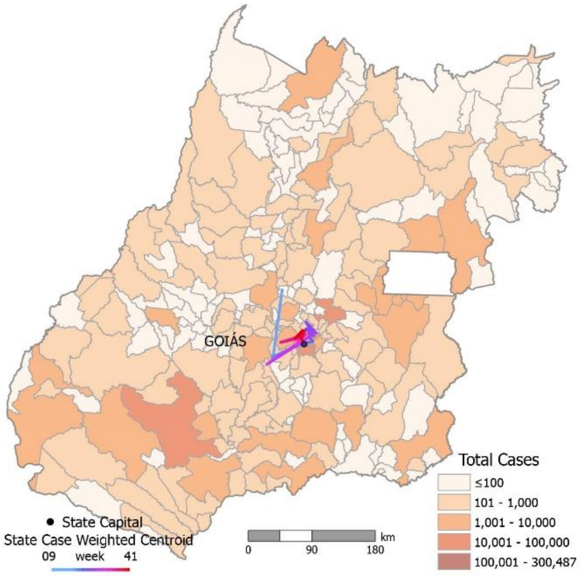
Center-West Region

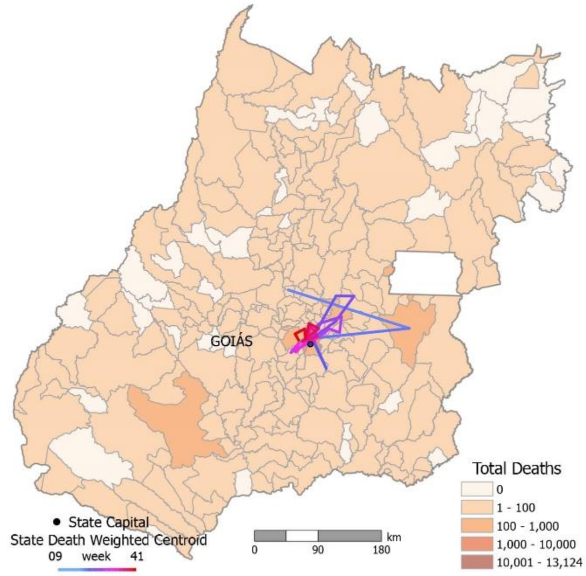




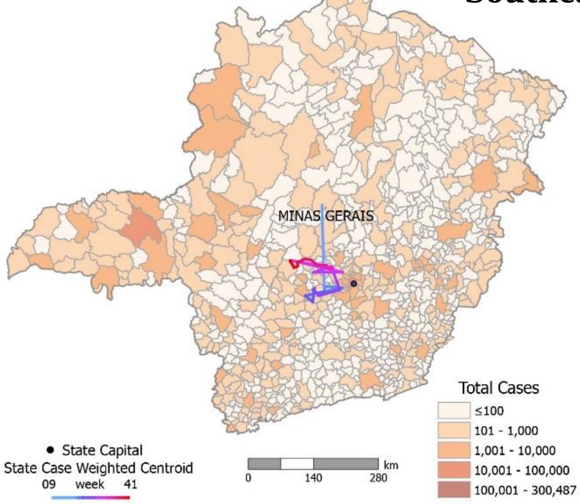


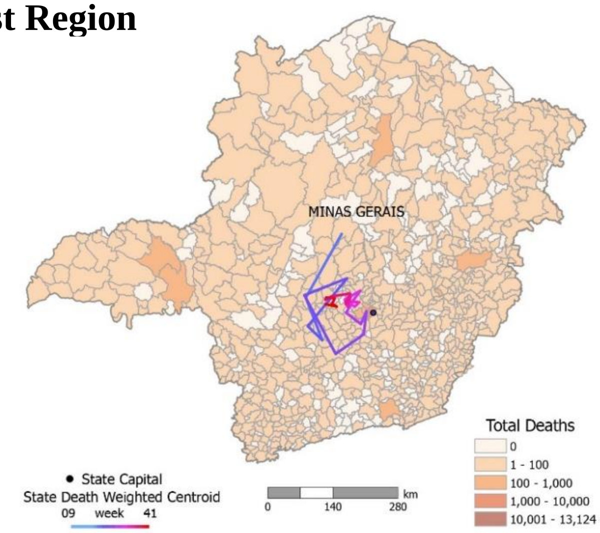


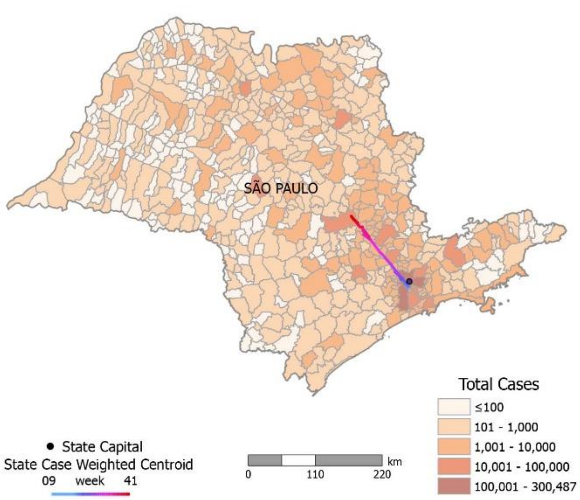


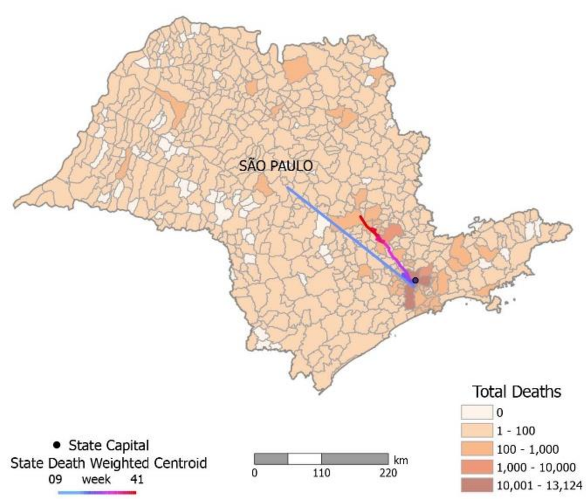


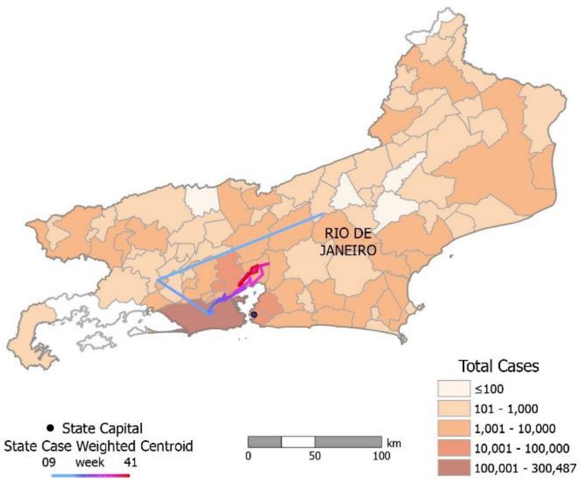
Southeast Region

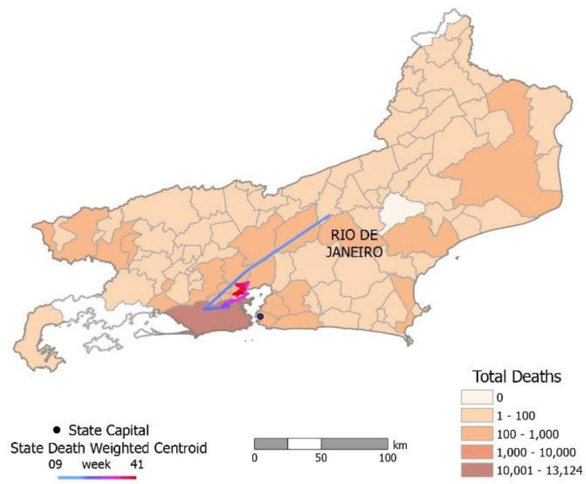


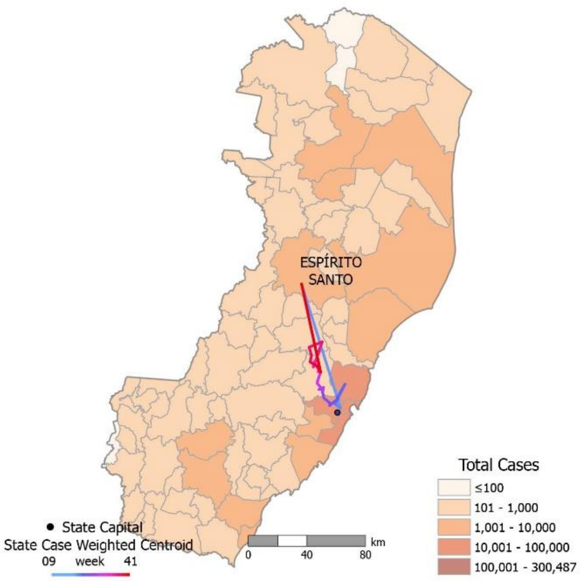


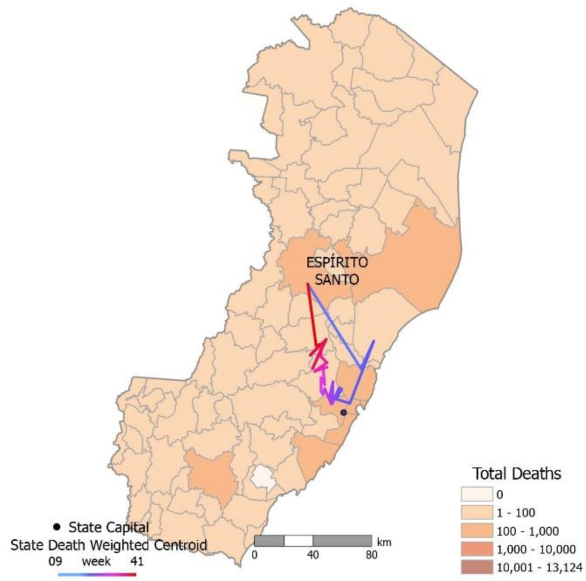




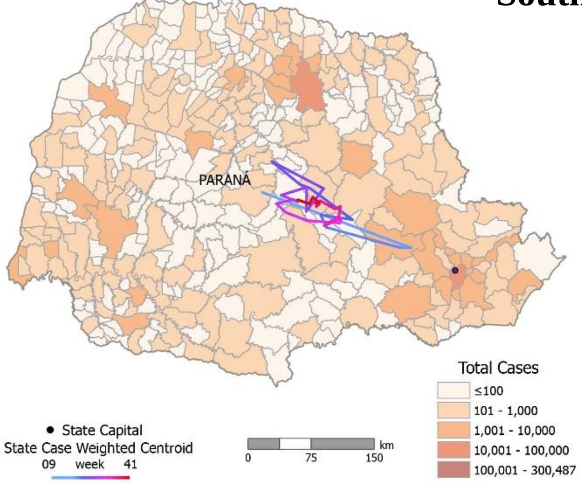


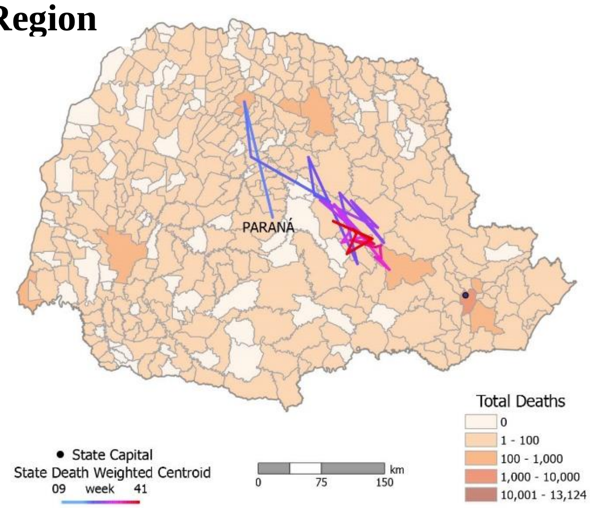






South Region





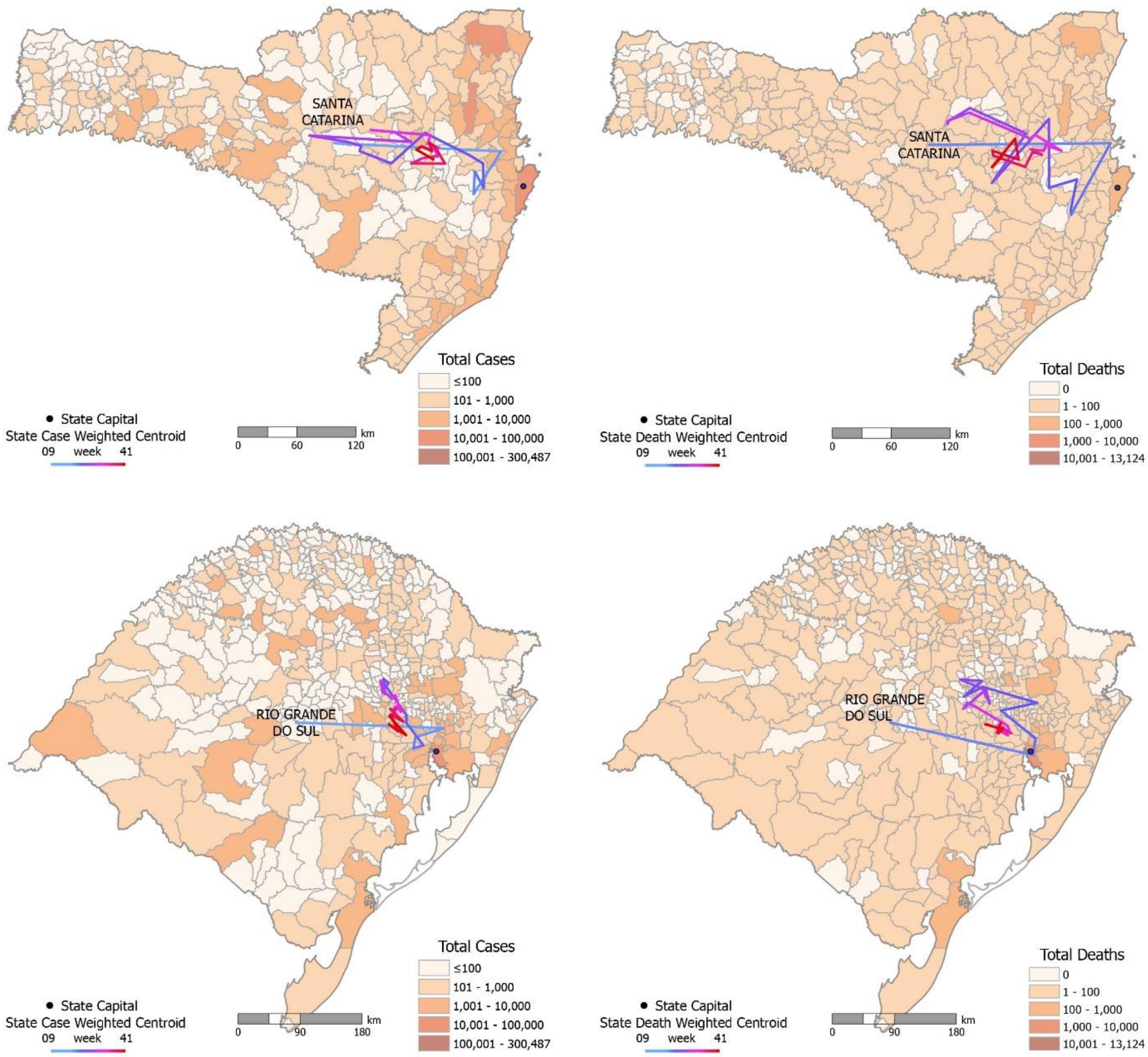
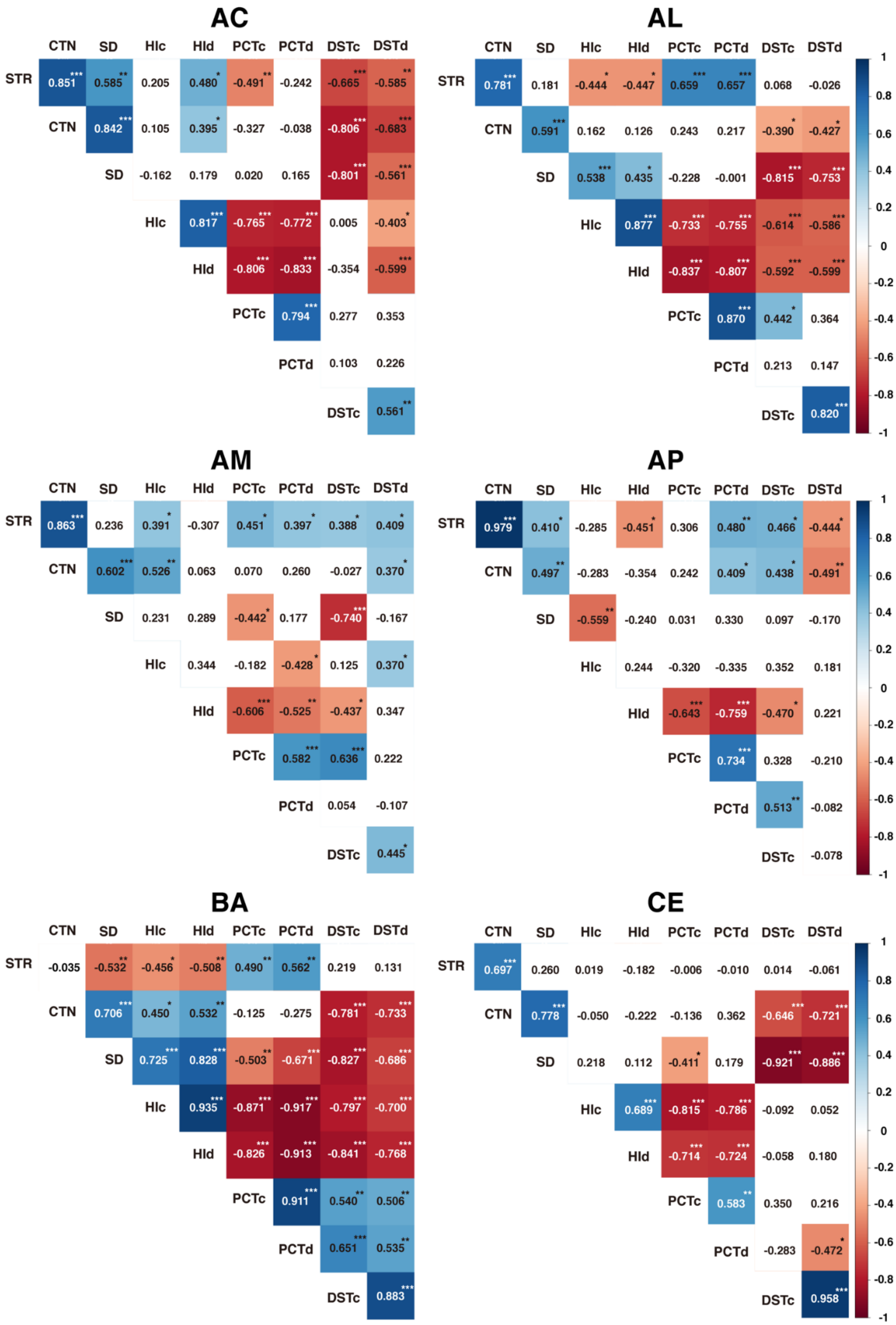


Fig. S2.

COVID-19 case- and death-weighted geographic centers by epidemiological week and state. The first case in each state was recorded in the capital city, except for Rio de Janeiro, Rondônia, Bahia, Minas Gerais, and Rio Grande do Sul, and thus the trajectory of the center starts in the interior. This was more common for deaths, with 14 states not reporting the first death in the capital: Rio de Janeiro, Amazonas, Pará, Piauí, Rio Grande do Norte, Paraíba, Espírito Santo, Paraná, Santa Catarina, Mato Grosso do Sul, Mato Grosso, and Goiás.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CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.851*** 0.585** 0.205 0.480* -0.491** -0.242 -0.665*** -0.585**
CTN 0.842*** 0.105 0.395* -0.327 -0.038 -0.806*** -0.683***
SD -0.162 0.179 0.020 0.165 -0.801*** -0.561***
HIc 0.817*** -0.765*** -0.772*** 0.005 -0.403*
HId -0.806*** -0.833*** -0.354 -0.599***
PCTc 0.794*** 0.277 0.353
PCTd 0.103 0.226
DSTc 0.561**
AL
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.781*** 0.181 -0.444* -0.447* 0.659*** 0.657*** 0.068 -0.026
CTN 0.591*** 0.162 0.126 0.243 0.217 -0.390* -0.427*
SD 0.538*** 0.435* -0.228 -0.001 -0.815*** -0.753***
HIc 0.877*** -0.733*** -0.755*** -0.614*** -0.586***
HId -0.837*** -0.807*** -0.592*** -0.599***
PCTc 0.870*** 0.442* 0.364
PCTd 0.213 0.147
DSTc 0.820***
1 0.8 0.6 0.4 0.2 0 -0.2 -0.4 -0.6 -0.8 -1
AM
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.863*** 0.236 0.391* -0.307 0.451* 0.397* 0.388* 0.409*
CTN 0.602*** 0.526** 0.063 0.070 0.260 -0.027 0.370*
SD 0.231 0.289 -0.442* 0.177 -0.740*** -0.167
HIc 0.344 -0.182 -0.428* 0.125 0.370*
HId -0.606*** -0.525** -0.437* 0.347
PCTc 0.582*** 0.636*** 0.222
PCTd 0.054 -0.107
DSTc 0.445*
AP
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.979*** 0.410* -0.285 -0.451* 0.306 0.480** 0.466* -0.444*
CTN 0.497** -0.283 -0.354 0.242 0.409* 0.438* -0.491**
SD -0.559** -0.240 0.031 0.330 0.097 -0.170
HIc 0.244 -0.320 -0.335 0.352 0.181
HId -0.643*** -0.759*** -0.470* 0.221
PCTc 0.734*** 0.328 -0.210
PCTd 0.513** -0.082
DSTc -0.078
1 0.8 0.6 0.4 0.2 0 -0.2 -0.4 -0.6 -0.8 -1
BA
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR -0.035 -0.532** -0.456* -0.508** 0.490** 0.562** 0.219 0.131
CTN 0.706*** 0.450* 0.532** -0.125 -0.275 -0.781*** -0.733***
SD 0.725*** 0.828*** -0.503** -0.671*** -0.827*** -0.686***
HIc 0.935*** -0.871*** -0.917*** -0.797*** -0.700***
HId -0.826*** -0.913*** -0.841*** -0.768***
PCTc 0.911*** 0.540** 0.506**
PCTd 0.651*** 0.535**
DSTc 0.883***
CE
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.697*** 0.260 0.019 -0.182 -0.006 -0.010 0.014 -0.061
CTN 0.778*** -0.050 -0.222 -0.136 0.362 -0.646*** -0.721***
SD 0.218 0.112 -0.411* 0.179 -0.921*** -0.886***
HIc 0.689*** -0.815*** -0.786*** -0.092 0.052
HId -0.714*** -0.724*** -0.058 0.180
PCTc 0.583** 0.350 0.216
PCTd -0.283 -0.472*
DSTc 0.958***
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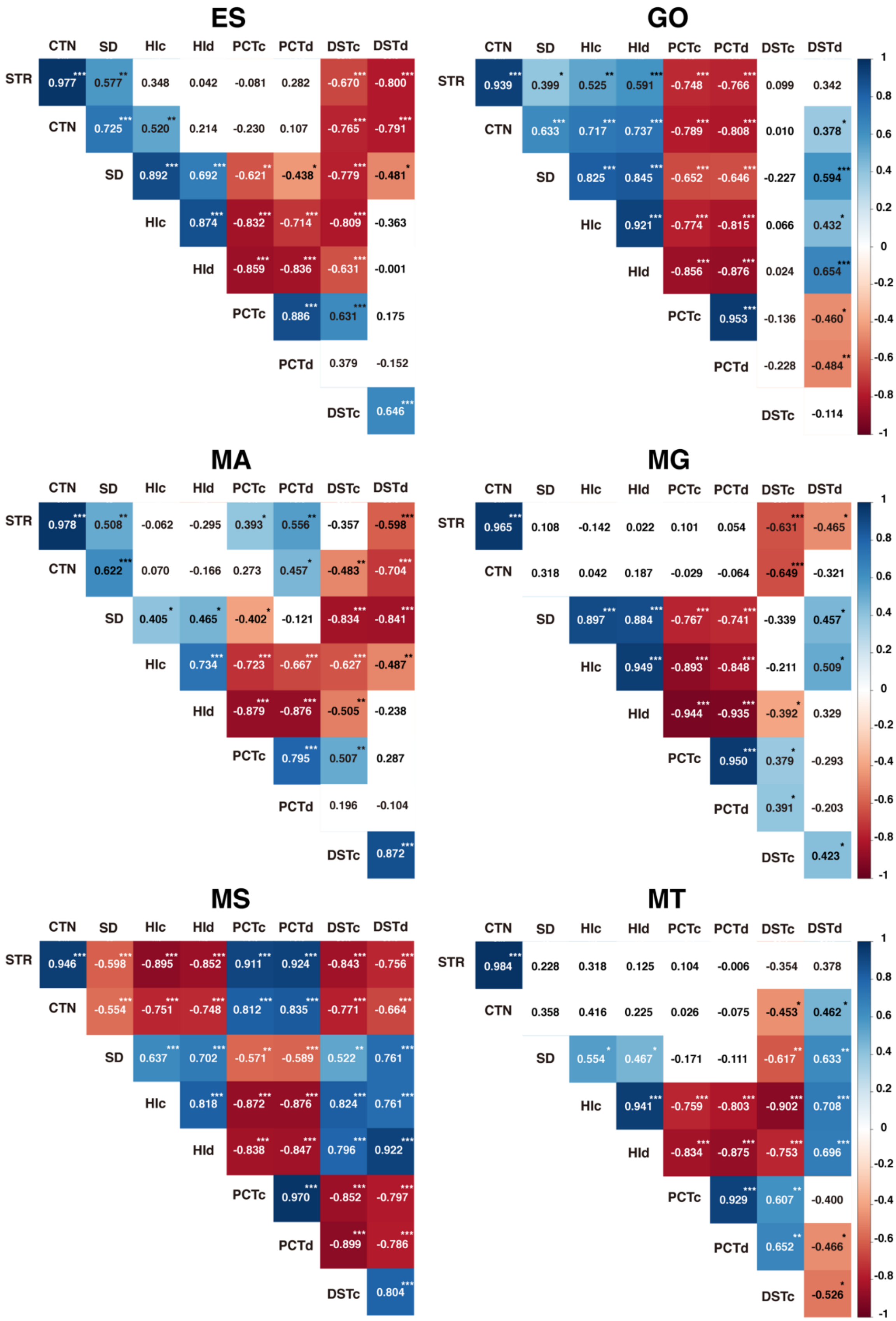
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STR 0.977 0.577 0.348 0.042 -0.081 0.282 -0.670 -0.800
CTN 0.725 0.520 0.214 -0.230 0.107 -0.765 -0.791
SD 0.892 0.692 -0.621 -0.438 -0.779 -0.481
HIc 0.874 -0.832 -0.714 -0.809 -0.363
HId -0.859 -0.836 -0.631 -0.001
PCTc 0.886 0.631 0.175
PCTd 0.379 -0.152
DSTc 0.646
GO
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.939 0.399 0.525 0.591 -0.748 -0.766 0.099 0.342
CTN 0.633 0.717 0.737 -0.789 -0.808 0.010 0.378
SD 0.825 0.845 -0.652 -0.646 -0.227 0.594
HIc 0.921 -0.774 -0.815 0.066 0.432
HId -0.856 -0.876 0.024 0.654
PCTc 0.953 -0.136 -0.460
PCTd -0.228 -0.484
DSTc -0.114
MA
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.978 0.508 -0.062 -0.295 0.393 0.556 -0.357 -0.598
CTN 0.622 0.070 -0.166 0.273 0.457 -0.483 -0.704
SD 0.405 0.465 -0.402 -0.121 -0.834 -0.841
HIc 0.734 -0.723 -0.667 -0.627 -0.487
HId -0.879 -0.876 -0.505 -0.238
PCTc 0.795 0.507 0.287
PCTd 0.196 -0.104
DSTc 0.872
MG
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.965 0.108 -0.142 0.022 0.101 0.054 -0.631 -0.465
CTN 0.318 0.042 0.187 -0.029 -0.064 -0.649 -0.321
SD 0.897 0.884 -0.767 -0.741 -0.339 0.457
HIc 0.949 -0.893 -0.848 -0.211 0.509
HId -0.944 -0.935 -0.392 0.329
PCTc 0.950 0.379 -0.293
PCTd 0.391 -0.203
DSTc 0.423
MS
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.946 -0.598 -0.895 -0.852 0.911 0.924 -0.843 -0.756
CTN -0.554 -0.751 -0.748 0.812 0.835 -0.771 -0.664
SD 0.637 0.702 -0.571 -0.589 0.522 0.761
HIc 0.818 -0.872 -0.876 0.824 0.761
HId -0.838 -0.847 0.796 0.922
PCTc 0.970 -0.852 -0.797
PCTd -0.899 -0.786
DSTc 0.804
MT
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.984 0.228 0.318 0.125 0.104 -0.006 -0.354 0.378
CTN 0.358 0.416 0.225 0.026 -0.075 -0.453 0.462
SD 0.554 0.467 -0.171 -0.111 -0.617 0.633
HIc 0.941 -0.759 -0.803 -0.902 0.708
HId -0.834 -0.875 -0.753 0.696
PCTc 0.929 0.607 -0.400
PCTd 0.652 -0.466
DSTc -0.526
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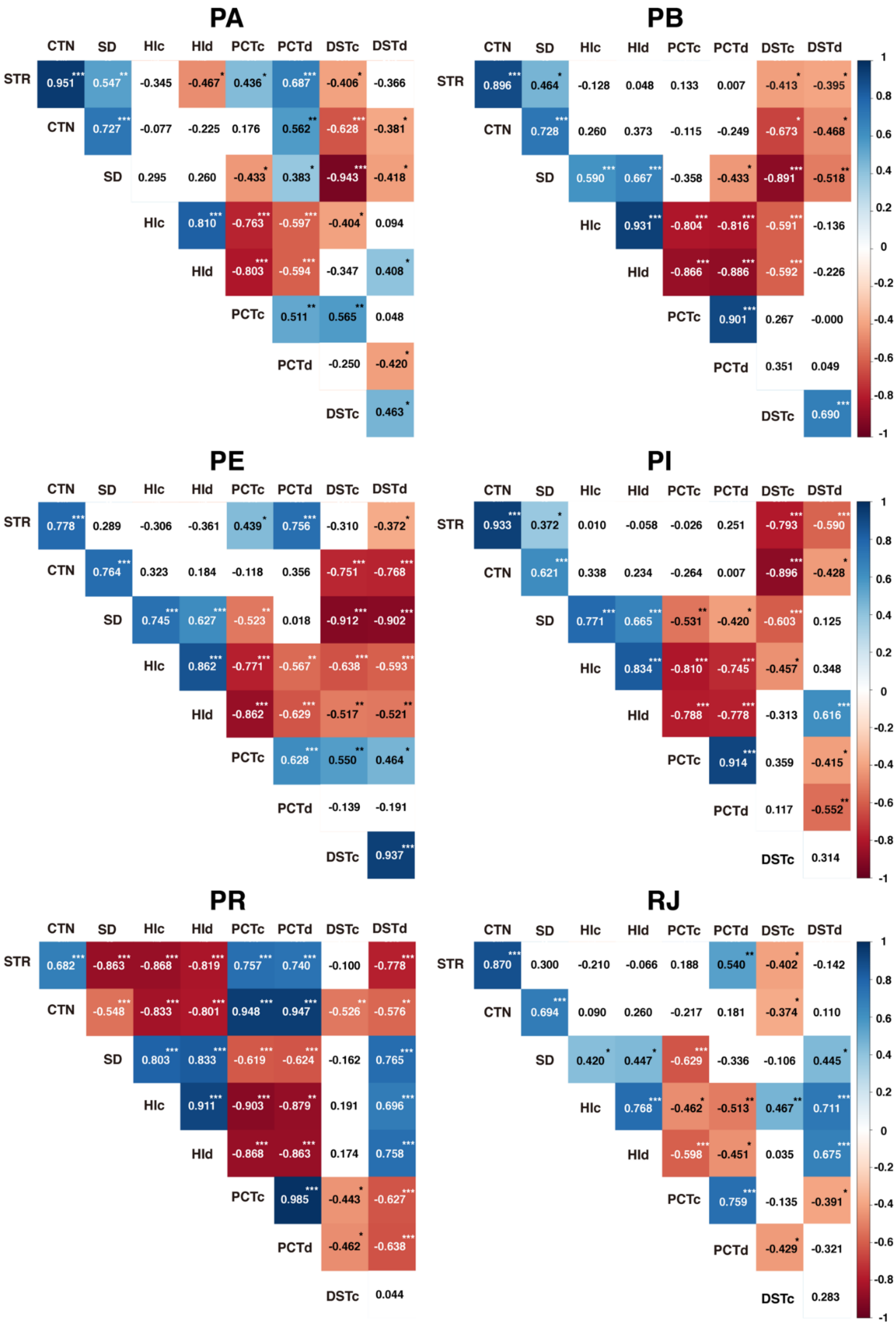
PA
PB
PE
PI
PR
RJ
STR
CTN
SD
HIc
HId
PCTc
PCTd
DSTc
DSTd
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0.4
0.2
0
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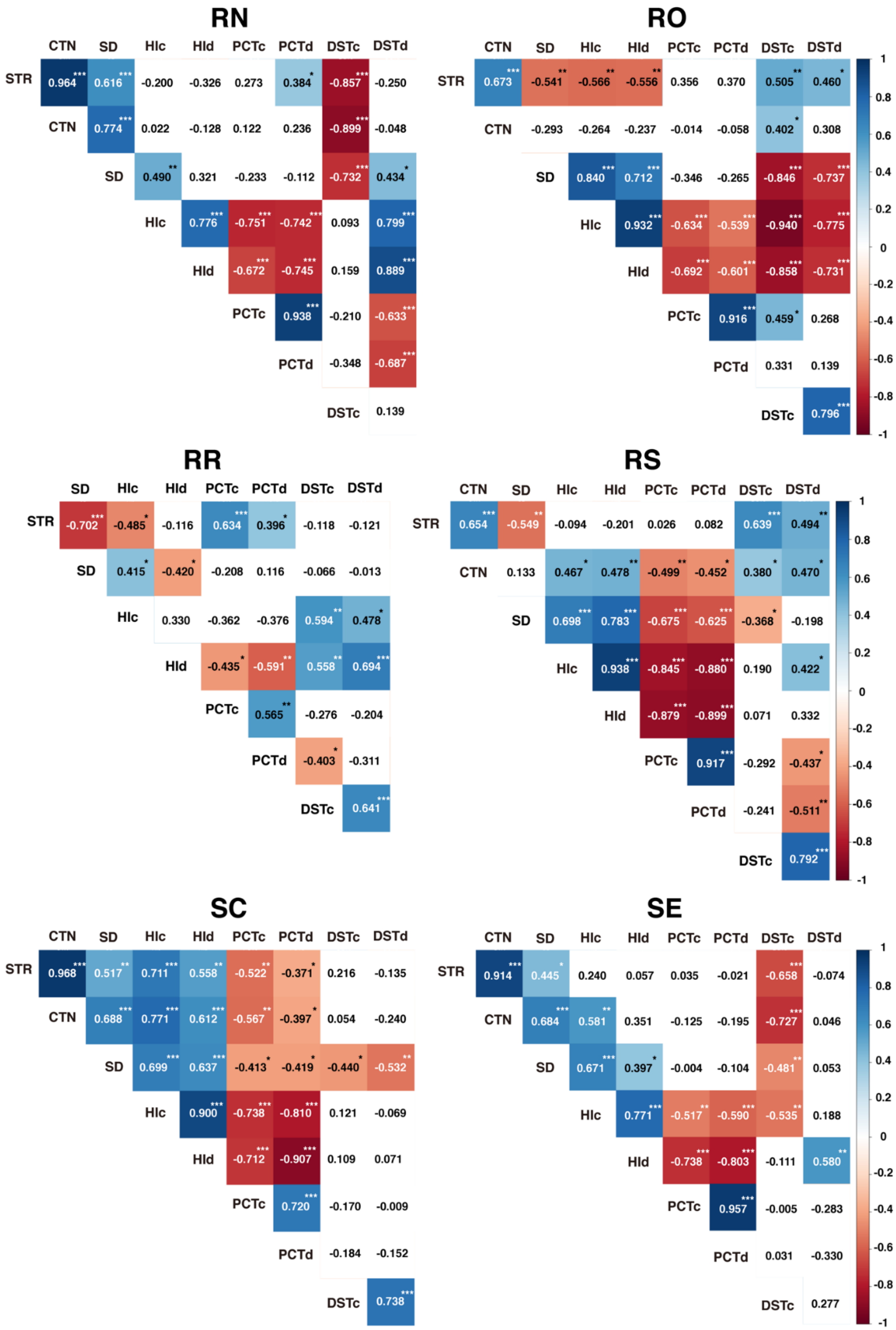
-0.8
-1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CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.964*** 0.616*** -0.200 -0.326 0.273 0.384* -0.857*** -0.250
CTN 0.774*** 0.022 -0.128 0.122 0.236 -0.899*** -0.048
SD 0.490** 0.321 -0.233 -0.112 -0.732*** 0.434*
HIc 0.776*** -0.751*** -0.742*** 0.093 0.799***
HId -0.672*** -0.745*** 0.159 0.889***
PCTc 0.938*** -0.210 -0.633***
PCTd -0.348 -0.687***
DSTc 0.139
RO
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.673*** -0.541** -0.566** -0.556** 0.356 0.370 0.505** 0.460*
CTN -0.293 -0.264 -0.237 -0.014 -0.058 0.402* 0.308
SD 0.840*** 0.712*** -0.346 -0.265 -0.846*** -0.737***
HIc 0.932*** -0.634*** -0.539*** -0.940*** -0.775***
HId -0.692*** -0.601*** -0.858*** -0.731***
PCTc 0.916*** 0.459* 0.268
PCTd 0.331 0.139
DSTc 0.796***
1 0.8 0.6 0.4 0.2 0 -0.2 -0.4 -0.6 -0.8 -1
RR
SD HIc HId PCTc PCTd DSTc DSTd
STR -0.702*** -0.485* -0.116 0.634*** 0.396* -0.118 -0.121
SD 0.415* -0.420* -0.208 0.116 -0.066 -0.013
HIc 0.330 -0.362 -0.376 0.594** 0.478*
HId -0.435* -0.591** 0.558** 0.694***
PCTc 0.565** -0.276 -0.204
PCTd -0.403* -0.311
DSTc 0.641***
RS
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.654*** -0.549** -0.094 -0.201 0.026 0.082 0.639*** 0.494**
CTN 0.133 0.467* 0.478** -0.499** -0.452* 0.380* 0.470*
SD 0.698*** 0.783*** -0.675*** -0.625*** -0.368* -0.198
HIc 0.938*** -0.845*** -0.880*** 0.190 0.422*
HId -0.879*** -0.899*** 0.071 0.332
PCTc 0.917*** -0.292 -0.437*
PCTd -0.241 -0.511**
DSTc 0.792***
1 0.8 0.6 0.4 0.2 0 -0.2 -0.4 -0.6 -0.8 -1
SC
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.968*** 0.517** 0.711*** 0.558** -0.522** -0.371* 0.216 -0.135
CTN 0.688*** 0.771*** 0.612*** -0.567** -0.397* 0.054 -0.240
SD 0.699*** 0.637*** -0.413* -0.419* -0.440* -0.532**
HIc 0.900*** -0.738*** -0.810*** 0.121 -0.069
HId -0.712*** -0.907*** 0.109 0.071
PCTc 0.720*** -0.170 -0.009
PCTd -0.184 -0.152
DSTc 0.738***
SE
CTN SD HIc HId PCTc PCTd DSTc DSTd
STR 0.914*** 0.445* 0.240 0.057 0.035 -0.021 -0.658*** -0.074
CTN 0.684*** 0.581** 0.351 -0.125 -0.195 -0.727*** 0.046
SD 0.671*** 0.397* -0.004 -0.104 -0.481** 0.053
HIc 0.771*** -0.517** -0.590*** -0.535** 0.188
HId -0.738*** -0.803*** -0.111 0.580**
PCTc 0.957*** -0.005 -0.283
PCTd 0.031 -0.330
DSTc 0.277
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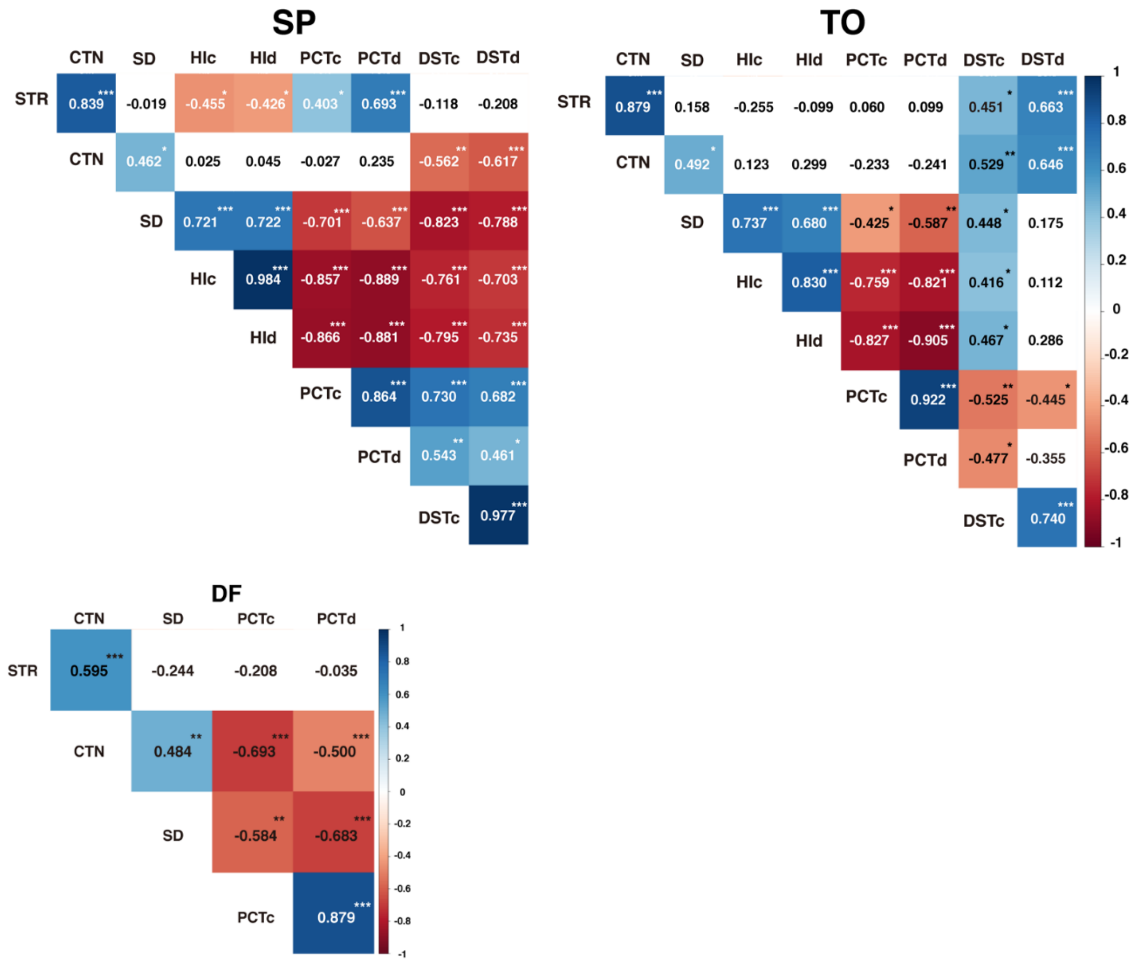

Fig. S3.

Correlation matrices between selected variables for each state. Cells in shades of red or blue are statistically significant: * <0.05, ** <0.01, and *** <0.001. Variables: Stringency Index (STR), Containment Index (CTN), Social Distancing Index (SD), locational Hoover Index for cases (HIc), locational Hoover Index for deaths (HId), percentage of cases in each epidemiological week (PCTc), percentage of deaths in each epidemiological week (PCTd), normalized distance by which the national geographical center of cases shifted in each week (DSTc), and normalized distance (vary between 0 and 100) by which the national geographical center of deaths shifted in each week (DSTd). Some states have fewer variables in the correlation matrix. The Federal District of Brazil (DF) is not divided into municipalities and therefore does not have HIc, HId, DSTc, and DSTd. In the state of Roraima (RR), SD did not change throughout the study period (standard deviation = 0). State acronyms by region, North: AC=Acre, AP=Amapá, AM=Amazonas, PA=Pará, RO=Rondônia, RR=Roraima, and TO=Tocantins; Northeast: AL=Alagoas, BA=Bahia, CE=Ceará, MA=Maranhão, PB=Paraíba, PE=Pernambuco, PI=Piauí, RN=Rio Grande do Norte, and SE=Sergipe; Center-West: DF=Distrito Federal, GO=Goiás, MT=Mato Grosso, and MS=Mato Grosso do Sul; Southeast: ES=Espírito Santo; MG=Minas Gerais; RJ=Rio de Janeiro; and SP=São Paulo; South: PR=Paraná; RS=Rio Grande do Sul; and SC=Santa Catarina.

Table S1.

Selected indicators of onset and progression of COVID-19 cases and deaths by state

State	Date of 1st case	Date of 50th case	Days to 50 cases	Date of 1st death	Date of 50th death	Days to 50 deaths	Days between 1st case and 1st death	Days between 50th cases and 50th deaths	Week % cases cap < int	Week % deaths cap < int
AC	3/17/2020	4/6/2020	20	4/6/2020	5/12/2020	36	20	16	20	28
AL	3/8/2020	4/13/2020	36	3/31/2020	5/1/2020	31	23	-5	21	26
AM	3/13/2020	3/25/2020	12	3/24/2020	4/11/2020	18	11	6	20	28
AP	3/20/2020	4/7/2020	18	4/4/2020	5/5/2020	31	15	13	21	-
BA	3/6/2020	3/22/2020	16	3/29/2020	4/22/2020	24	23	8	24	28
CE	3/16/2020	3/20/2020	4	4/3/2020	4/8/2020	5	18	1	21	24
DF	3/7/2020	3/20/2020	13	3/29/2020	5/14/2020	46	22	33	-	-
ES	3/19/2020	3/27/2020	8	4/2/2020	4/25/2020	23	14	15	12	14
GO	3/12/2020	3/28/2020	16	3/26/2020	5/12/2020	47	14	31	15	17
MA	3/20/2020	3/31/2020	11	3/29/2020	4/19/2020	21	9	10	19	21
MG	3/8/2020	3/21/2020	13	3/30/2020	4/23/2020	24	22	11	14	15
MS	3/14/2020	4/1/2020	18	3/31/2020	6/22/2020	83	17	65	15	14
MT	3/20/2020	4/4/2020	15	4/3/2020	5/28/2020	55	14	40	15	14
PA	3/18/2020	4/3/2020	16	4/1/2020	4/23/2020	22	14	6	18	19
PB	3/18/2020	4/8/2020	21	3/31/2020	4/26/2020	26	13	5	19	18
PE	3/12/2020	3/27/2020	15	3/25/2020	4/9/2020	15	13	0	19	15
PI	3/19/2020	4/12/2020	24	3/27/2020	5/12/2020	46	8	22	21	16
PR	3/12/2020	3/23/2020	11	3/27/2020	4/19/2020	23	15	12	13	13
RJ	3/5/2020	3/18/2020	13	3/19/2020	4/4/2020	16	14	3	20	30
RN	3/12/2020	3/28/2020	16	3/28/2020	4/28/2020	31	16	15	14	13
RO	3/20/2020	4/14/2020	25	3/30/2020	5/12/2020	43	10	18	27	27
RR	3/21/2020	4/8/2020	18	4/3/2020	5/18/2020	45	13	27	-	33
RS	3/10/2020	3/21/2020	11	3/25/2020	4/29/2020	35	15	24	15	15
SC	3/12/2020	3/21/2020	9	3/26/2020	5/1/2020	36	14	27	12	13
SE	3/14/2020	4/16/2020	33	4/2/2020	5/15/2020	43	19	10	28	16
SP	2/25/2020	3/14/2020	18	3/17/2020	3/26/2020	9	21	-9	21	23
TO	3/18/2020	4/24/2020	37	4/15/2020	5/22/2020	37	28	0	14	17

Table S2.

Results of the spatial and temporal scan statistics for COVID-19 cases (**Fig. 1C**)

Cluster #	Period	Population	Observed cases	Expected cases	Relative risk	P-value
1	8/31-8/31	6,497,318	27,960	664	42.33	<0.001
2	8/16-8/20	513,118	2,756	262	10.51	<0.001
3	8/6-8/7	3,178,951	4,120	650	6.34	<0.001
4	10/2-10/2	6,747,815	3,177	690	4.61	<0.001
5	7/19-7/25	1,004,877	3,083	719	4.29	<0.001
6	7/27-8/8	10,556,631	58,476	14,027	4.21	<0.001
7	6/16-6/27	10,091,320	50,366	12,378	4.1	<0.001
8	6/19-7/1	6,421,081	30,161	8,532	3.55	<0.001
9	7/21-8/1	10,501,004	41,830	12,880	3.27	<0.001
10	7/21-8/1	10,583,562	41,635	12,981	3.23	<0.001
11	8/4-8/15	10,407,182	39,548	12,765	3.12	<0.001
12	6/28-7/10	6,431,270	26,095	8,546	3.06	<0.001
13	7/22-8/2	9,965,706	35,064	12,223	2.88	<0.001
14	7/19-7/24	5,881,913	10,051	3,607	2.79	<0.001
15	8/25-9/5	10,574,636	32,641	12,970	2.53	<0.001
16	7/22-8/2	6,161,889	18,132	7,558	2.4	<0.001
17	8/31-9/12	2,200,402	6,921	2,924	2.37	<0.001
18	7/22-8/2	9,612,190	27,622	11,790	2.35	<0.001

Table S3.

Results of the spatial and temporal scan statistics for COVID-19 deaths (**Fig. 1D**)

Cluster #	Period	Population	Observed deaths	Expected deaths	Relative risk	P-value
1	8/6-8/6	9,531,847	272	29	9.35	<0.001
2	6/1-6/12	5,748,640	1,585	211	7.59	<0.001
3	5/20-5/29	10,468,297	1,800	320	5.68	<0.001
4	5/23-6/4	10,295,821	2,106	409	5.21	<0.001
5	5/18-5/30	5,493,243	1,098	218	5.06	<0.001
6	7/14-7/26	2,775,829	500	110	4.55	<0.001
7	6/21-7/3	5,709,504	782	227	3.46	<0.001
8	7/1-7/13	3,297,584	440	131	3.37	<0.001
9	6/12-6/24	3,539,191	466	141	3.32	<0.001
10	8/17-8/28	10,581,643	1,239	388	3.21	<0.001
11	6/10-6/22	1,486,188	185	59	3.14	<0.001
12	6/16-6/27	8,004,692	866	294	2.96	<0.001
13	8/14-8/26	5,355,879	622	213	2.93	<0.001
14	7/27-8/8	4,363,612	497	173	2.87	<0.001
15	8/4-8/14	5,895,294	515	198	2.6	<0.001
16	6/25-7/7	5,488,262	539	218	2.48	<0.001
17	7/21-8/1	10,259,391	927	376	2.47	<0.001
18	8/1-8/13	10,421,740	1,003	414	2.43	<0.001
19	9/8-9/18	2,646,377	161	89	1.81	<0.001

Table S4.

Weekly shift in the geographical center of COVID-19 cases in each state. The shift is shown as the ratio of the distance that the geographical center of cases shifted weekly in each state to the distance between the capital city and the furthest municipality in the state.

Epi week	AC	AL	AM	AP	BA	CE	ES	GO	MA	MG	MS	MT	PA	PB	PE	PI	PR	RJ	RN	RO	RR	RS	SC	SE	SP	TO
10	0.45	0.38	0.36	0.46	0.13	0.43	0.36	0.17	0.38	0.25	0.07	0.34	0.49	0.51	0.50	0.38	0.47	0.29	0.43	0.42	0.37	0.35	0.38	0.32	0.01	0.02
11	0.45	0.04	0.04	0.46	0.06	0.43	0.36	0.10	0.38	0.09	0.16	0.34	0.49	0.51	0.01	0.38	0.11	0.13	0.01	0.42	0.37	0.06	0.08	0.07	0.02	0.02
12	0.09	0.04	0.04	0.17	0.10	0.03	0.01	0.10	0.02	0.08	0.17	0.02	0.02	0.02	0.01	0.01	0.14	0.12	0.08	0.17	0.11	0.06	0.10	0.12	0.01	0.03
13	0.09	0.06	0.04	0.17	0.05	0.02	0.02	0.01	0.02	0.04	0.18	0.08	0.09	0.18	0.06	0.10	0.31	0.13	0.20	0.10	0.09	0.06	0.10	0.07	0.01	0.09
14	0.01	0.03	0.05	0.19	0.05	0.02	0.08	0.03	0.03	0.09	0.28	0.07	0.12	0.08	0.02	0.01	0.33	0.12	0.22	0.12	0.07	0.04	0.08	0.03	0.01	0.21
15	0.07	0.04	0.04	0.15	0.09	0.04	0.04	0.02	0.03	0.15	0.32	0.09	0.04	0.04	0.02	0.07	0.26	0.12	0.18	0.19	0.13	0.10	0.09	0.05	0.02	0.05
16	0.08	0.04	0.05	0.14	0.05	0.03	0.04	0.05	0.03	0.13	0.17	0.03	0.03	0.08	0.02	0.04	0.38	0.11	0.14	0.13	0.10	0.12	0.12	0.12	0.03	0.10
17	0.10	0.04	0.09	0.14	0.07	0.04	0.03	0.04	0.07	0.12	0.33	0.06	0.02	0.11	0.02	0.08	0.40	0.11	0.13	0.12	0.06	0.20	0.22	0.11	0.02	0.40
18	0.10	0.05	0.09	0.18	0.06	0.06	0.03	0.04	0.09	0.12	0.22	0.09	0.04	0.08	0.03	0.05	0.48	0.09	0.21	0.14	0.05	0.20	0.26	0.05	0.02	0.34
19	0.12	0.06	0.12	0.15	0.06	0.07	0.05	0.06	0.14	0.10	0.18	0.16	0.04	0.12	0.04	0.05	0.35	0.10	0.25	0.12	0.04	0.22	0.33	0.04	0.04	0.40
20	0.35	0.08	0.14	0.15	0.06	0.09	0.07	0.05	0.20	0.11	0.25	0.15	0.08	0.19	0.04	0.07	0.36	0.10	0.29	0.13	0.04	0.19	0.33	0.04	0.04	0.42
21	0.21	0.11	0.16	0.25	0.06	0.13	0.08	0.03	0.21	0.05	0.29	0.14	0.11	0.18	0.05	0.06	0.39	0.10	0.25	0.14	0.05	0.21	0.35	0.10	0.04	0.47
22	0.22	0.11	0.19	0.27	0.06	0.16	0.08	0.05	0.23	0.05	0.35	0.16	0.10	0.17	0.07	0.06	0.43	0.08	0.18	0.19	0.04	0.21	0.43	0.06	0.03	0.50
23	0.38	0.11	0.20	0.34	0.08	0.16	0.08	0.04	0.24	0.08	0.31	0.16	0.21	0.17	0.11	0.07	0.39	0.09	0.20	0.19	0.06	0.20	0.31	0.05	0.04	0.48
24	0.42	0.13	0.19	0.26	0.09	0.19	0.07	0.02	0.22	0.13	0.29	0.17	0.24	0.19	0.11	0.07	0.40	0.09	0.17	0.21	0.02	0.22	0.24	0.05	0.06	0.49
25	0.30	0.17	0.21	0.19	0.10	0.25	0.10	0.12	0.27	0.05	0.25	0.16	0.27	0.17	0.16	0.06	0.43	0.08	0.16	0.20	0.10	0.19	0.27	0.04	0.08	0.42
26	0.26	0.17	0.22	0.18	0.08	0.27	0.12	0.05	0.27	0.20	0.24	0.16	0.30	0.19	0.17	0.07	0.41	0.10	0.17	0.18	0.07	0.17	0.32	0.04	0.09	0.36
27	0.25	0.21	0.20	0.27	0.09	0.29	0.12	0.01	0.27	0.08	0.21	0.17	0.26	0.20	0.20	0.05	0.35	0.11	0.17	0.27	0.05	0.17	0.21	0.06	0.11	0.36
28	0.32	0.21	0.26	0.32	0.12	0.36	0.13	0.02	0.27	0.08	0.19	0.16	0.29	0.21	0.20	0.05	0.28	0.09	0.19	0.21	0.05	0.13	0.20	0.08	0.14	0.23
29	0.30	0.21	0.20	0.22	0.13	0.30	0.14	0.03	0.31	0.08	0.16	0.18	0.30	0.26	0.21	0.07	0.28	0.12	0.19	0.25	0.03	0.13	0.18	0.10	0.14	0.24
30	0.38	0.26	0.27	0.24	0.13	0.36	0.15	0.02	0.32	0.11	0.16	0.16	0.27	0.22	0.23	0.08	0.31	0.14	0.26	0.22	0.02	0.15	0.19	0.10	0.17	0.24
31	0.32	0.23	0.20	0.29	0.14	0.46	0.14	0.03	0.35	0.08	0.09	0.18	0.28	0.29	0.29	0.08	0.29	0.15	0.23	0.29	0.03	0.15	0.18	0.14	0.15	0.18
32	0.34	0.28	0.27	0.20	0.15	0.40	0.17	0.02	0.35	0.10	0.10	0.19	0.26	0.29	0.29	0.09	0.30	0.14	0.29	0.32	0.05	0.14	0.21	0.18	0.17	0.23
33	0.31	0.29	0.22	0.23	0.15	0.40	0.17	0.07	0.35	0.12	0.09	0.17	0.31	0.28	0.27	0.10	0.31	0.10	0.32	0.34	0.10	0.15	0.21	0.15	0.15	0.21
34	0.34	0.32	0.18	0.23	0.16	0.42	0.19	0.03	0.42	0.13	0.08	0.34	0.34	0.26	0.29	0.11	0.34	0.12	0.34	0.37	0.05	0.15	0.22	0.15	0.18	0.21
35	0.38	0.32	0.22	0.17	0.17	0.42	0.19	0.03	0.39	0.15	0.10	0.34	0.29	0.28	0.26	0.13	0.35	0.12	0.35	0.38	0.04	0.15	0.16	0.18	0.18	0.24
36	0.46	0.31	0.20	0.17	0.17	0.42	0.17	0.04	0.41	0.16	0.10	0.34	0.29	0.36	0.31	0.13	0.34	0.12	0.39	0.36	0.07	0.11	0.19	0.14	0.19	0.23
37	0.44	0.25	0.18	0.16	0.18	0.42	0.15	0.02	0.37	0.18	0.11	0.34	0.28	0.37	0.28	0.13	0.35	0.14	0.43	0.34	0.06	0.14	0.20	0.14	0.20	0.23
38	0.54	0.27	0.17	0.16	0.19	0.43	0.14	0.01	0.32	0.17	0.08	0.34	0.32	0.37	0.26	0.13	0.35	0.13	0.40	0.34	0.06	0.11	0.19	0.16	0.20	0.23
39	0.52	0.21	0.14	0.18	0.18	0.43	0.12	0.03	0.30	0.18	0.13	0.34	0.32	0.41	0.26	0.12	0.36	0.12	0.37	0.35	0.08	0.13	0.21	0.18	0.21	0.16
40	0.49	0.15	0.13	0.16	0.21	0.48	0.36	0.04	0.31	0.20	0.14	0.34	0.30	0.42	0.26	0.13	0.36	0.09	0.45	0.35	0.05	0.09	0.22	0.11	0.22	0.19
41	0.34	0.26	0.12	0.15	0.23	0.34	0.36	0.03	0.32	0.20	0.14	0.34	0.29	0.36	0.27	0.14	0.39	0.10	0.36	0.36	0.10	0.14	0.18	0.09	0.21	0.20

Table S5.

Weekly shift in the geographical center of COVID-19 deaths in each state. The shift is shown as the ratio of the distance that the geographical center of cases shifted weekly in each state to the distance between the capital city and the furthest municipality in the state

Epi week	AC	AL	AM	AP	BA	CE	ES	GO	MA	MG	MS	MT	PA	PB	PE	PI	PR	RJ	RN	RO	RR	RS	SC	SE	SP	TO
12	0.45	0.38	0.36	0.46	0.43	0.43	0.36	0.17	0.38	0.25	0.07	0.34	0.49	0.51	0.50	0.38	0.47	0.14	0.43	0.42	0.37	0.35	0.38	0.32	0.02	0.02
13	0.45	0.38	0.24	0.46	0.43	0.43	0.36	0.29	0.38	0.25	0.07	0.34	0.49	0.51	0.01	0.27	0.67	0.16	0.66	0.42	0.37	0.01	0.09	0.32	0.01	0.02
14	0.45	0.04	0.04	0.17	0.08	0.08	0.13	0.02	0.02	0.21	0.67	0.33	0.64	0.38	0.01	0.13	0.58	0.10	0.44	0.10	0.11	0.03	0.10	0.07	0.01	0.02
15	0.09	0.04	0.03	0.09	0.04	0.08	0.21	0.08	0.02	0.17	0.67	0.45	0.01	0.01	0.04	0.01	0.37	0.10	0.41	0.10	0.40	0.12	0.10	0.07	0.04	0.02
16	0.06	0.06	0.04	0.17	0.08	0.05	0.03	0.02	0.06	0.20	0.29	0.11	0.10	0.11	0.03	0.21	0.41	0.10	0.35	0.24	0.37	0.12	0.08	0.53	0.02	0.03
17	0.09	0.07	0.04	0.13	0.06	0.03	0.04	0.16	0.05	0.13	0.64	0.15	0.07	0.15	0.03	0.12	0.47	0.09	0.17	0.24	0.11	0.20	0.13	0.15	0.03	0.11
18	0.08	0.08	0.06	0.24	0.05	0.03	0.06	0.18	0.06	0.21	0.42	0.26	0.02	0.09	0.04	0.15	0.25	0.11	0.29	0.16	0.11	0.21	0.19	0.18	0.01	0.47
19	0.10	0.10	0.09	0.19	0.05	0.05	0.07	0.10	0.07	0.17	0.16	0.19	0.06	0.12	0.05	0.06	0.37	0.11	0.35	0.14	0.11	0.21	0.25	0.13	0.02	0.39
20	0.13	0.06	0.10	0.21	0.06	0.06	0.04	0.01	0.11	0.08	0.41	0.12	0.02	0.17	0.05	0.13	0.22	0.11	0.27	0.20	0.07	0.25	0.21	0.16	0.03	0.58
21	0.18	0.07	0.09	0.22	0.05	0.08	0.09	0.06	0.16	0.07	0.37	0.09	0.06	0.18	0.04	0.06	0.34	0.11	0.25	0.21	0.10	0.19	0.33	0.06	0.02	0.56
22	0.18	0.08	0.11	0.17	0.03	0.09	0.06	0.12	0.20	0.02	0.30	0.15	0.06	0.12	0.04	0.05	0.25	0.09	0.23	0.13	0.08	0.15	0.36	0.10	0.02	0.32
23	0.25	0.07	0.13	0.15	0.05	0.10	0.04	0.09	0.21	0.05	0.16	0.08	0.12	0.14	0.06	0.03	0.39	0.10	0.18	0.14	0.14	0.19	0.36	0.10	0.03	0.46
24	0.18	0.07	0.11	0.14	0.04	0.11	0.08	0.07	0.22	0.08	0.38	0.08	0.12	0.18	0.06	0.09	0.26	0.10	0.22	0.17	0.10	0.20	0.35	0.06	0.04	0.51
25	0.25	0.11	0.14	0.16	0.06	0.16	0.07	0.03	0.20	0.07	0.28	0.10	0.20	0.17	0.09	0.06	0.36	0.10	0.14	0.14	0.05	0.20	0.33	0.07	0.05	0.49
26	0.19	0.13	0.14	0.15	0.08	0.21	0.08	0.06	0.16	0.08	0.36	0.08	0.18	0.18	0.08	0.05	0.30	0.09	0.15	0.17	0.15	0.17	0.20	0.07	0.07	0.52
27	0.26	0.16	0.09	0.17	0.06	0.23	0.11	0.03	0.19	0.09	0.22	0.07	0.20	0.17	0.10	0.03	0.31	0.08	0.14	0.25	0.08	0.09	0.19	0.05	0.08	0.36
28	0.23	0.20	0.14	0.21	0.07	0.25	0.09	0.05	0.16	0.06	0.16	0.10	0.21	0.16	0.11	0.04	0.27	0.07	0.16	0.20	0.08	0.07	0.13	0.08	0.10	0.35
29	0.28	0.24	0.11	0.18	0.11	0.27	0.13	0.02	0.17	0.05	0.07	0.10	0.29	0.19	0.11	0.05	0.18	0.08	0.19	0.26	0.06	0.09	0.16	0.11	0.10	0.29
30	0.31	0.21	0.21	0.16	0.13	0.29	0.13	0.03	0.19	0.09	0.09	0.12	0.47	0.19	0.12	0.03	0.22	0.10	0.16	0.21	0.13	0.07	0.16	0.11	0.13	0.32
31	0.18	0.19	0.17	0.18	0.14	0.42	0.13	0.01	0.19	0.08	0.05	0.11	0.27	0.17	0.13	0.04	0.21	0.10	0.13	0.24	0.09	0.08	0.19	0.13	0.14	0.22
32	0.24	0.19	0.18	0.15	0.12	0.37	0.14	0.03	0.27	0.08	0.09	0.12	0.19	0.24	0.14	0.05	0.22	0.10	0.18	0.38	0.06	0.07	0.16	0.14	0.13	0.14
33	0.19	0.21	0.06	0.17	0.13	0.37	0.16	0.05	0.30	0.09	0.10	0.11	0.22	0.17	0.19	0.08	0.22	0.10	0.22	0.29	0.15	0.08	0.17	0.15	0.13	0.21
34	0.17	0.18	0.12	0.15	0.13	0.42	0.18	0.03	0.37	0.09	0.05	0.34	0.23	0.25	0.20	0.08	0.23	0.09	0.17	0.36	0.14	0.09	0.18	0.16	0.15	0.18
35	0.32	0.16	0.06	0.21	0.13	0.41	0.14	0.03	0.38	0.13	0.04	0.34	0.26	0.23	0.17	0.10	0.29	0.09	0.26	0.35	0.05	0.09	0.19	0.14	0.13	0.17
36	0.33	0.15	0.05	0.14	0.15	0.34	0.20	0.05	0.34	0.15	0.09	0.34	0.29	0.25	0.15	0.14	0.24	0.10	0.29	0.38	0.03	0.10	0.25	0.12	0.17	0.20
37	0.27	0.24	0.10	0.14	0.20	0.38	0.18	0.06	0.40	0.15	0.10	0.34	0.26	0.34	0.16	0.14	0.30	0.12	0.32	0.38	0.05	0.10	0.26	0.11	0.16	0.25
38	0.24	0.25	0.11	0.26	0.16	0.38	0.19	0.02	0.36	0.12	0.06	0.34	0.20	0.32	0.20	0.10	0.28	0.09	0.34	0.37	0.11	0.09	0.20	0.15	0.16	0.27
39	0.09	0.11	0.07	0.27	0.13	0.45	0.19	0.05	0.37	0.13	0.04	0.34	0.19	0.32	0.14	0.17	0.28	0.10	0.39	0.19	0.25	0.09	0.22	0.10	0.15	0.15
40	0.18	0.21	0.04	0.15	0.16	0.42	0.36	0.05	0.35	0.11	0.09	0.34	0.22	0.28	0.15	0.14	0.25	0.08	0.25	0.31	0.07	0.13	0.25	0.10	0.18	0.30
41	0.32	0.18	0.04	0.30	0.17	0.43	0.36	0.04	0.34	0.14	0.10	0.34	0.15	0.28	0.17	0.18	0.34	0.10	0.29	0.39	0.41	0.12	0.23	0.15	0.21	0.22

Table S6.

Locational Hoover index for COVID-19 cases by state and epidemiological week.

Epi week	Brazil	AC	AL	AM	AP	BA	CE	ES	GO	MA	MG	MS	MT	PA	PB	PE	PI	PR	RJ	RN	RO	RR	RS	SC	SE	SP	TO
9	94.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73.4	-
10	89.1	-	-	-	-	95.9	-	-	-	-	-	-	-	-	-	-	-	-	60.1	-	-	-	-	-	-	73.1	-
11	80.0	-	69.4	47.3	-	76.5	-	-	75.0	-	94.5	67.8	-	-	-	82.8	-	82.4	58.2	74.8	-	-	81.8	84.7	71.3	72.1	-
12	68.5	53.8	69.4	47.3	40.5	70.5	67.3	66.6	59.8	84.4	77.4	62.3	82.5	82.7	79.8	74.7	73.6	66.4	55.9	58.7	62.7	33.5	69.7	66.1	68.4	65.0	80.7
13	64.9	53.8	68.8	41.9	40.5	65.6	66.5	55.7	57.8	84.4	72.2	58.6	74.1	67.4	67.7	62.5	68.7	60.1	53.2	52.4	70.0	31.5	63.6	55.1	71.3	62.8	69.2
14	59.1	49.9	67.8	40.0	37.2	61.9	64.6	39.9	64.6	75.3	66.2	53.9	58.8	57.6	74.9	63.3	72.1	44.1	39.8	48.2	67.1	30.5	62.8	55.6	65.7	53.3	67.8
15	54.3	50.4	65.7	40.2	27.7	57.5	56.6	47.5	52.6	73.9	60.2	62.7	60.0	64.6	69.0	53.0	72.5	55.0	30.1	49.6	54.5	28.1	52.3	47.0	67.3	43.8	60.2
16	53.5	47.0	61.0	37.1	20.9	64.4	52.5	44.6	60.9	72.9	53.1	46.1	59.1	60.0	58.5	52.8	57.4	48.9	26.1	38.8	54.4	27.0	50.1	48.5	52.2	39.6	79.3
17	54.2	47.2	58.1	21.9	15.2	62.9	48.3	41.9	41.5	66.6	55.6	57.3	57.0	51.7	48.2	51.0	49.4	52.9	25.2	39.5	55.6	23.6	58.6	47.4	48.5	41.2	68.3
18	50.7	44.6	53.8	29.3	15.4	63.0	43.1	38.4	52.2	54.8	52.4	55.6	51.3	40.2	53.0	49.1	48.3	49.2	21.4	38.9	51.0	20.6	65.8	46.0	38.7	38.0	52.4
19	50.3	39.1	45.0	18.1	9.7	64.6	38.1	32.0	45.1	40.3	55.7	60.8	47.1	40.8	47.4	45.9	42.9	50.4	27.4	37.5	51.7	13.8	64.3	45.6	45.9	35.9	45.9
20	47.3	32.3	37.5	21.4	12.7	58.6	33.9	28.9	45.4	34.7	45.9	60.5	39.7	34.7	35.2	40.6	41.1	41.6	19.8	37.3	49.2	11.4	56.0	42.5	40.4	32.5	47.8
21	46.8	20.2	31.5	28.8	27.6	55.3	30.6	28.4	35.0	29.6	43.4	53.9	36.7	35.1	29.3	36.5	37.9	40.1	32.7	31.1	49.6	13.4	62.6	44.3	33.2	32.0	49.2
22	44.9	19.2	31.1	28.2	25.4	49.9	26.1	24.8	36.8	36.2	43.1	61.4	33.1	33.3	30.9	31.8	36.4	42.1	21.5	28.1	46.1	12.1	55.3	53.4	29.6	33.9	47.7
23	41.5	25.5	28.6	31.2	43.7	41.9	24.9	21.5	35.3	36.4	42.7	59.3	30.9	28.3	28.1	25.2	39.0	41.4	26.0	26.8	38.2	14.1	40.8	40.9	30.3	31.9	44.3
24	40.0	28.5	23.3	31.5	27.5	41.3	24.6	23.4	27.2	36.1	41.0	47.9	31.7	33.4	32.4	24.8	38.5	34.6	16.7	25.1	37.4	14.7	45.8	35.3	33.9	30.0	47.6
25	37.2	11.8	20.5	31.4	14.7	40.0	30.2	15.6	35.0	39.4	40.0	41.2	26.6	37.9	30.7	23.4	35.3	33.6	21.1	27.1	38.7	16.0	38.0	33.9	34.9	26.4	37.3
26	35.3	10.7	20.9	33.7	8.0	38.6	31.1	17.6	28.3	41.2	44.0	33.4	24.4	37.2	27.7	25.6	33.6	31.5	15.7	23.9	36.9	17.3	32.0	39.2	30.0	21.4	35.4
27	33.3	12.1	22.5	34.8	43.0	34.9	31.6	16.4	24.7	43.1	38.5	30.1	24.9	31.9	28.4	27.3	33.4	28.8	16.6	21.3	26.5	16.5	35.0	32.4	29.4	20.5	36.4
28	33.5	13.7	22.0	46.5	44.7	30.5	38.8	18.5	27.9	39.6	35.7	28.9	23.7	39.4	26.1	25.6	31.0	29.1	21.8	26.9	37.0	14.5	30.4	26.8	25.8	21.4	32.5
29	32.0	20.6	24.3	38.0	20.2	27.6	31.8	17.5	27.8	39.8	33.4	29.4	24.6	37.9	27.0	22.6	29.7	27.3	24.5	25.8	25.7	14.6	32.9	26.9	25.2	19.7	32.1
30	32.0	27.1	23.2	40.4	20.7	26.4	37.5	19.7	28.2	43.7	31.8	24.4	22.7	36.9	24.4	23.8	26.5	30.5	34.1	27.8	30.5	11.1	26.4	23.8	24.2	23.2	28.0
31	31.9	29.3	25.2	26.7	41.7	28.3	43.3	17.0	28.4	43.3	31.6	28.0	24.0	40.8	23.9	29.1	29.0	26.0	29.0	25.8	22.7	14.3	29.9	22.9	21.8	17.9	26.8
32	31.2	26.2	38.6	37.8	38.9	27.4	35.6	14.5	25.3	44.8	32.1	30.3	23.4	34.6	24.6	30.6	28.0	25.7	32.0	24.7	17.1	16.1	27.4	21.0	24.6	20.8	29.9
33	31.0	40.1	36.9	33.0	39.7	29.2	37.9	16.2	24.6	43.3	32.9	31.0	28.8	44.3	23.9	31.0	29.7	25.8	23.5	32.2	18.3	15.7	30.8	23.9	20.8	16.6	27.2
34	31.1	40.4	34.3	24.6	31.9	30.5	43.0	19.5	23.5	45.6	30.6	29.0	-	43.7	27.2	33.0	29.3	22.5	24.6	30.9	16.6	11.8	26.5	23.5	25.2	19.0	26.5
35	32.5	36.9	32.6	32.8	40.0	27.9	38.5	18.5	17.2	48.2	30.8	27.5	-	39.1	29.8	28.9	30.6	24.9	23.8	29.6	18.7	12.0	26.7	31.3	22.4	18.8	25.1
36	35.9	40.1	33.6	26.1	38.0	27.9	42.0	14.9	20.4	47.1	33.2	23.6	-	38.6	31.7	37.5	31.6	24.6	21.0	31.6	18.5	13.7	29.8	20.7	29.2	22.0	23.3
37	34.1	39.8	24.1	26.4	37.3	28.5	47.9	19.4	25.0	45.1	32.5	30.5	-	39.5	34.1	32.3	32.4	24.4	27.9	43.7	13.5	15.9	22.3	26.7	24.2	22.7	24.8
38	33.6	45.6	25.6	23.9	35.6	29.1	48.0	12.2	27.9	39.0	31.1	22.4	-	42.2	33.6	26.9	31.5	24.4	24.7	34.2	17.6	13.2	27.3	23.1	25.6	22.1	26.2
39	33.2	43.8	25.7	20.6	45.8	27.6	44.8	19.3	22.3	39.0	32.8	23.1	-	45.0	35.3	34.3	30.7	24.0	24.8	31.6	17.1	16.1	26.6	25.9	20.7	24.1	21.5
40	36.0	52.2	31.5	18.4	43.0	34.5	50.0	-	22.5	41.4	34.9	22.3	-	41.8	36.7	32.1	32.0	24.2	23.6	41.0	21.6	13.0	33.2	28.4	30.8	25.6	26.4
41	33.7	34.6	35.3	20.2	42.9	34.9	31.3	-	23.0	43.4	33.0	21.3	-	37.9	32.8	35.9	33.6	29.0	14.9	27.2	23.7	20.3	26.0	30.8	28.6	25.7	25.0

Empty cells indicate no cases reported that week. At the time when the data were downloaded, ES and MT had delays in reporting the most recent weeks.

Table S7.

Locational Hoover index for COVID-19 deaths by state and epidemiological week.

Epi week	Brazil	AC	AL	AM	AP	BA	CE	ES	GO	MA	MG	MS	MT	PA	PB	PE	PI	PR	RJ	RN	RO	RR	RS	SC	SE	SP	TO
12	93.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	95.1	-	-	-	-	-	-	73.4	-
13	87.7	-	-	97.3	-	-	-	-	97.0	-	-	-	-	-	-	82.8	99.8	96.3	59.6	91.5	-	-	87.0	99.7	-	68.1	-
14	70.2	-	69.4	44.9	40.5	80.0	69.1	62.4	78.4	84.4	84.6	99.6	98.1	96.5	76.9	75.7	68.9	90.5	36.8	66.3	70.0	33.5	84.6	78.2	71.3	56.4	-
15	67.4	53.8	69.4	40.6	35.7	77.5	62.3	82.7	71.5	82.7	80.1	99.6	96.7	80.5	75.7	59.2	73.6	68.9	40.5	64.7	70.0	47.6	75.4	81.3	71.3	52.4	-
16	64.6	51.6	67.6	36.9	40.5	70.0	55.4	58.7	67.5	78.3	77.9	63.4	75.8	69.6	65.6	52.3	96.6	65.5	28.9	68.4	62.7	-	84.2	78.5	98.2	45.4	80.7
17	64.5	53.8	64.4	33.0	26.2	74.5	58.7	51.7	72.7	73.5	76.0	95.6	86.6	59.3	68.7	54.7	66.5	73.3	28.9	50.5	62.7	33.5	83.5	84.6	68.1	44.8	96.7
18	62.4	51.6	62.8	25.0	26.3	74.1	50.8	45.3	67.5	72.9	71.6	90.5	78.3	55.5	67.0	47.3	71.9	69.1	30.4	58.1	62.1	33.5	73.3	78.5	70.3	44.9	80.2
19	61.4	45.0	44.3	22.3	20.0	71.9	50.0	43.7	68.3	70.7	76.7	67.8	89.9	48.0	63.2	42.0	70.9	71.3	33.0	54.8	61.8	33.5	83.3	75.9	47.9	43.2	88.5
20	59.9	48.5	50.5	21.4	20.6	67.5	44.0	40.9	61.4	63.5	73.6	70.0	78.2	50.9	58.5	39.3	60.4	69.4	32.4	48.5	63.3	25.3	72.1	76.5	41.8	43.2	68.9
21	57.7	35.7	48.5	25.0	18.1	69.5	39.4	37.8	57.5	59.0	66.2	67.3	70.0	41.3	51.9	38.1	54.3	69.5	36.8	43.8	50.6	30.5	68.6	76.7	50.4	41.3	72.8
22	54.7	29.8	42.2	21.5	17.1	70.8	37.9	32.3	55.2	47.9	68.9	55.3	60.5	37.5	54.2	38.9	59.2	70.1	25.0	48.4	54.7	15.0	63.8	73.3	40.4	41.0	56.6
23	51.8	25.3	43.2	24.5	16.3	64.4	34.0	35.8	53.8	46.1	63.4	67.8	51.1	32.6	47.5	37.3	48.4	60.7	26.5	42.5	56.6	26.8	62.9	78.6	35.0	36.2	66.4
24	49.3	27.7	43.3	22.7	14.3	61.8	34.8	24.4	47.3	43.8	63.8	79.5	51.7	30.9	47.8	41.5	53.1	53.0	25.9	36.9	45.5	16.4	59.7	75.8	36.7	34.3	62.1
25	45.5	27.5	39.8	24.0	15.3	55.0	27.1	24.8	44.3	47.4	58.6	82.1	39.5	35.7	42.5	38.9	52.1	57.9	27.4	43.4	51.3	15.4	52.4	70.7	29.7	30.7	59.2
26	42.3	28.8	38.0	22.0	19.2	51.3	24.5	24.1	41.4	47.4	59.7	77.7	39.1	34.5	41.5	39.5	51.7	46.6	26.7	35.1	47.0	23.7	50.0	55.2	27.5	27.2	74.0
27	40.4	27.9	27.9	25.9	17.5	53.0	25.9	21.7	34.6	47.7	55.1	42.2	39.9	35.6	41.9	38.0	48.5	47.4	26.9	34.9	35.9	14.2	48.4	55.1	25.3	27.0	60.2
28	37.9	24.4	35.6	32.9	22.3	48.3	26.6	24.0	34.0	45.3	52.6	38.5	38.2	41.4	43.1	27.0	44.1	41.2	24.0	37.1	49.3	22.4	46.2	47.0	25.8	25.5	58.0
29	37.2	26.4	34.4	23.7	29.9	46.2	35.8	23.0	38.7	50.3	49.8	37.7	31.6	45.2	42.3	29.9	47.1	49.1	29.3	31.3	40.5	17.2	43.2	43.3	22.7	23.0	63.1
30	35.7	29.7	34.6	37.2	25.0	47.6	28.9	22.5	32.4	41.5	50.7	38.5	30.2	64.9	39.4	33.6	46.7	42.5	16.8	41.3	38.1	20.5	42.0	42.5	28.2	24.1	52.3
31	38.0	28.4	37.8	37.1	23.0	49.3	48.7	20.2	30.9	49.9	52.4	36.9	34.4	54.5	43.3	33.3	48.7	43.2	19.8	45.5	35.5	14.5	43.6	35.1	24.9	25.4	51.0
32	36.8	37.7	38.9	34.1	25.4	52.6	44.3	19.3	31.7	58.4	46.6	36.7	27.3	43.2	36.6	29.9	48.2	45.5	20.6	43.0	36.6	18.5	41.0	36.4	30.9	22.8	43.9
33	37.6	48.4	37.2	24.7	39.6	44.2	47.1	26.6	28.7	57.7	45.3	41.7	43.2	56.1	47.8	35.1	47.4	41.8	21.5	42.7	30.6	35.2	41.8	32.5	28.2	23.2	56.2
34	36.9	36.5	45.3	31.3	24.1	42.2	54.1	29.7	31.8	67.2	39.2	36.2	-	46.1	39.9	35.7	45.9	41.8	19.9	42.7	24.4	26.8	38.5	36.7	29.6	23.3	41.7
35	39.2	40.1	48.1	34.0	28.0	41.7	66.3	33.3	30.8	63.2	43.9	39.2	-	57.7	41.5	40.9	47.3	41.4	22.7	50.9	32.1	30.0	39.6	38.0	37.1	23.0	43.6
36	39.3	38.7	49.2	32.3	26.2	47.4	43.4	29.1	24.8	67.7	46.3	33.7	-	51.6	47.1	41.2	51.1	38.9	22.0	50.2	41.1	28.6	42.6	47.7	37.9	24.9	41.3
37	41.8	40.5	48.6	44.1	26.2	48.4	57.8	40.5	31.5	65.0	46.8	35.7	-	55.8	51.6	42.7	51.1	40.4	24.5	58.2	36.7	31.9	40.4	51.0	40.0	24.1	51.0
38	40.2	40.4	47.7	30.2	37.2	44.5	50.5	36.7	32.1	66.0	40.3	36.7	-	47.5	51.3	42.4	49.8	38.7	22.3	53.2	30.3	33.5	43.6	44.5	47.0	26.8	44.3
39	42.9	46.0	46.0	29.3	37.2	47.1	63.1	39.9	31.6	63.9	44.9	39.1	-	48.3	48.5	45.8	53.1	43.2	24.2	63.8	41.2	60.9	40.2	50.7	46.6	32.9	46.4
40	41.9	40.2	45.1	39.7	24.2	43.0	52.8	-	33.1	65.1	43.2	35.3	-	60.0	51.8	44.2	57.6	38.1	22.4	55.3	36.0	56.0	38.9	53.0	47.3	26.3	46.5
41	43.6	38.1	50.7	30.4	31.3	46.2	64.5	-	35.9	61.0	40.9	37.8	-	55.0	49.3	46.1	55.7	41.0	21.9	70.7	46.0	70.8	42.0	61.0	42.6	31.6	56.7

Empty cells indicate no cases reported that week. At the time when the data were downloaded, ES and MT had delays in reporting the most recent weeks.

Table S8.

Expected and observed direction of correlations between selected variables.

	STR	CTN	SD	HIc	HId	PCTc	PCTd	DSTc	DSTd
STR		(+): Brazil, AC, AL, AM, AP, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RS, SC, SE, SP, TO	(+): AC, AP, ES, GO, MA, PA, PB, PI, RN, SC, SE (-): PR, RO, RR, RS, BA, MS	(+): AM, GO, SC (-): AL, BA, MS, PR, RO, RR,SP	(+): AC, GO, SC (-): AL, AP, BA,MS, PA, PR, RO, SP	(-): AC, GO, SC (+): AL, AM, BA, MA, MS, PA, PE, PR, RR, SP	(+): Brazil, AL, AM, AP, BA, MA, MS, PA, PE, PR, RJ, RN, RR, SP (-): GO, SC	(-): AC, ES, MG, MS, PA, PB, PI, RJ, RN, SE (+): AM, AP, RO, RS, TO	(-): AC,AP, ES, MA, MG, MS, PB, PE, PI, PR (+): AM, RO, RS, TO
CTN	(+) as CTN is STR plus use of masks		(+): Brazil, AC, AL, AM, AP, BA, CE, DF, ES, GO, MA, PA, PB, PE, PI, RJ, RN, SC, SE, SP, TO (-): MS, PR	(+): Brazil, AM, BA, ES, GO, RS, SC, SE (-): MS, PR	(+): Brazil, AC, BA, GO, RS, SC (-): MS, PR	(-): Brazil, DF, GO, RS, SC (+): MS, PR	(-): DF, GO, RS, SC (+): AP, MA, MS, PA, PR	(-): AC, AL, BA, CE, ES, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, SE, SP (+): AP, RO, RS, TO	(-): AC, AL, AP, BA, CE, ES, MA, MS,PA, PB, PE, PI, PR,SP (+): Brazil, AM, GO, MT, RS, TO
SD	(+) higher social distancing is likely to follow high STR	(+) higher social distancing is likely to follow high CTN		(+): Brazil, AL, BA, ES, GO, MA, MG, MS, MT, PB, PE, PI, PR, RJ, RN, RO, RR, RS, SC, SE, SP, TO (-): AP	(+): Brazil, AL, BA, ES, GO, MA, MG, MS, MT, PB, PE, PI, PR, RJ, RO, RS, SC, SE, SP, TO (-): RR	(-): Brazil, AM, BA, CE, DF, ES, GO, MA, MG, MS, PA, PE, PI, PR, RJ, RS, SC, SP, TO	(-): Brazil, BA, DF, ES, GO, MG, MS,PB, PI, PR, RS, SC, SP, TO (+): PA	(-): AC, AL, AM, BA, CE, ES, MA ,MT, PA, PB, PE, PI, RN, RO, RS, SC, SE, SP (+): MS, TO	(-): AC, AL, BA, CE, ES, MA, PA, PB, PE, RO, SC, SP (+): Brazil, GO, MG, MS, MT, PR, RJ, RN
HIc	(+) as the higher the STR, the lower the likelihood cases will move to the interior	(+) as the higher the CTN, the lower the likelihood cases will move to the interior	(+) the higher the SD, the more concentrated cases the lower the likelihood cases will move to the interior		(+): Brazil, AC, AL, BA, CE, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RS, SC, SE, SP, TO	(-): Brazil, AC, AL, BA, CE, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RS, SC, SE, SP, TO	(-): Brazil, AC, AL, AM, BA, CE, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RS, SC, SE, SP, TO	(-): AL, BA, ES, MA, MT, PA, PB, PE, PI, RO, SE, SP (+): Brazil, MS, RJ, RR, TO	(-): AC, AL, BA, MA, PE, RO, SP (+): Brazil, AM, GO, MG, MS, MT, PR, RJ, RN RR, RS
HId	(+) as the higher the STR, the lower the likelihood deaths will move to the interior	(+) as the higher the CTN, the lower the likelihood deaths will move to the interior	(+) the higher the SD, the more concentrated cases the lower the likelihood deaths will move to the interior	(+) if as cases move to the interior, so do deaths; (-) if policies prevent deaths despite movement of cases to the interior		(-): Brazil, AC, AL, AM, AP, BA, CE, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RR, RS, SC, SE, SP, TO	(-): Brazil, AC, AL, AM, AP, BA, CE, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RR, RS, SC, SE, SP, TO	(-): AL, AM, AP, BA, ES, MA, MG, MT, PB, PE, RO, SP (+): MS, RR, TO	(-): AC, AL, BA, PE, RO, SP (+): Brazil, GO, MS, MT, PA, PI, PR, RJ, RN, RR, SE
PCTc	(-) the higher the STR, the lower the transmission and thus the fewer the cases in that week	(-) the higher the CTN, the lower the transmission and thus the fewer the cases in that week	(-) the higher the SD, the lower the transmission and thus the fewer the cases in that week	(-) the more cases are concentrated, the lower the percentage of cases in that week	(-) the more deaths are concentrated, the lower the percentage of cases in that week (unless cases moved faster to the interior)		(+): Brazil, AC, AL, AM, AP, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RR, RS, SC, SE, SP, TO	(-): Brazil, MS, PR, TO (+): AL, AM, BA, ES, MA, MG, MT, PA, PE, RO, SP	(-): Brazil, GO, MS, PI, PR, RJ, RN, RS, TO (+): BA, PE, SP
PCTd	(-) the higher the STR, the lower the transmission and thus the fewer the deaths in that week	(-) the higher the CTN, the lower the transmission and thus the fewer the deaths in that week	(-) the higher the STR, the lower the transmission and thus the fewer the deaths in that week	(-) the more cases are concentrated, the lower the percentage of deaths in that week (unless deaths moved faster to the interior)	(-) the more deaths are concentrated, the lower the percentage of deaths in that week	(+) as cases increase so do deaths (unless policies in place prevent deaths more than cases)		(-): Brazil, MS, PR, RJ, RR, TO (+): AP, BA, MG, MT, SP	(-): Brazil, CE, GO, MS, MT, PA, PI, PR, RN, RS (+): BA, SP
DSTc	(-) the higher the STR, the lower the transmission and thus the lower the likelihood that the geographic center will shift by much	(-) the higher the CTN, the lower the transmission and thus the lower the likelihood that the geographic center will shift by much	(-) the higher the SD, the lower the likelihood that the geographic center will shift by much	(-) the more cases are concentrated, the lower the likelihood that the geographic center of cases will shift by much	(-) the more deaths are concentrated, the lower the likelihood that the geographic center of cases will shift by much (unless cases moved faster to the interior)	Could be either. Depends on the concentration (locational Hoover Index)	Could be either. Depends on the concentration (locational Hoover Index)		(+): Brazil, AC, AL, AM, BA, CE, ES, MA, MG, MS, PA, PB, PE, RO, RR, RS, SC, SP, TO (-): MT
DSTd	(-) the higher the STR, the lower the transmission and thus the lower the likelihood that the geographic center will shift by much	(-) the higher the CTN, the lower the transmission and thus the lower the likelihood that the geographic center will shift by much	(-) the higher the SD, the lower the likelihood that the geographic center will shift by much	(-) the more cases are concentrated, the lower the likelihood that the geographic center of deaths will shift by much (unless deaths moved faster to the interior)	(-) the more deaths are concentrated, the lower the likelihood that the geographic center of deaths will shift by much	Could be either. Depends on the concentration (locational Hoover Index)	Could be either. Depends on the concentration (locational Hoover Index)	(+) if cases are shifting, most likely deaths will shift as well (if they don't, then policies played a role)	

Table S9.

Stringency Index (STR) by state and epidemiological week. Cell colors vary from red (higher values) to blue (lower values).

Epi week	Brazil	AC	AL	AM	AP	BA	CE	DF	ES	GO	MA	MG	MS	MT	PA	PB	PE	PI	PR	RJ	RN	RO	RR	RS	SC	SE	SP	TO
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	0	0	0	0	0	0	13	0	5	0	0	0	0	0	0	2	0	0	9	0	0	0	0	0	0	5	0
12	21	19	14	18	14	22	19	37	18	41	15	12	7	10	19	11	34	22	19	39	22	21	32	12	36	26	25	13
13	43	45	52	42	44	32	54	45	46	56	43	39	21	27	38	38	43	42	39	45	54	52	56	28	50	49	35	44
14	45	43	48	43	49	32	59	44	52	56	47	39	22	47	38	38	43	48	39	49	54	53	58	44	50	44	39	47
15	47	43	43	45	58	32	60	44	51	56	58	39	22	53	42	38	43	49	39	47	57	49	58	54	51	44	39	47
16	47	48	43	46	58	36	60	44	51	56	63	41	22	53	47	39	43	49	39	46	63	52	58	48	58	49	39	25
17	49	61	47	46	63	40	60	44	57	57	61	51	22	41	49	49	47	49	39	49	61	61	58	46	54	55	41	30
18	51	61	47	46	63	40	60	55	57	57	62	52	22	32	52	50	49	59	44	49	58	58	58	53	53	58	43	38
19	53	56	53	46	63	41	56	57	55	57	64	53	22	32	61	50	49	61	51	51	62	59	58	65	53	61	48	45
20	54	54	56	51	63	41	65	57	58	57	64	53	22	32	65	51	49	63	51	57	67	62	58	53	53	61	51	52
21	55	34	53	56	71	41	65	54	58	57	65	53	22	32	63	56	56	63	51	57	67	67	58	53	53	61	51	56
22	54	32	50	56	75	41	65	46	59	57	67	53	22	32	63	56	56	62	51	57	67	67	63	58	53	61	51	40
23	54	32	60	51	68	41	57	46	61	57	64	53	22	32	61	66	56	62	51	54	70	66	67	58	48	61	56	40
24	54	32	61	50	62	41	51	50	61	57	64	53	22	30	61	61	56	61	51	61	75	64	67	58	47	61	57	40
25	53	32	61	50	61	41	51	46	61	57	64	53	22	30	61	44	56	62	51	61	75	61	67	51	47	58	57	40
26	53	43	59	50	61	41	52	46	61	57	64	53	33	34	61	44	51	63	51	61	75	58	67	50	47	58	57	40
27	53	44	43	50	65	41	63	38	59	66	61	60	35	34	61	44	50	63	53	61	65	58	67	52	47	46	57	40
28	53	38	56	50	67	41	67	36	47	68	58	65	54	34	61	44	50	62	54	57	58	58	67	53	38	44	61	40
29	51	38	56	50	67	41	67	50	47	39	58	65	35	34	51	38	50	62	54	56	58	58	67	53	44	47	58	40
30	51	44	56	50	67	41	67	50	47	35	58	65	42	34	47	38	50	63	54	56	58	58	67	53	39	47	50	40
31	52	44	56	50	67	41	67	50	47	35	58	65	47	51	46	39	50	61	54	56	55	63	67	53	47	47	50	40
32	51	33	56	50	67	41	67	50	48	35	57	65	46	52	42	42	50	56	54	44	45	67	67	53	47	47	49	40
33	49	33	52	45	67	41	67	50	44	35	58	65	46	52	42	42	48	46	54	39	40	66	67	53	47	47	46	40
34	48	33	50	44	67	41	67	50	43	35	58	65	46	42	42	42	44	35	54	39	36	64	67	53	47	39	46	40
35	46	33	50	44	67	40	65	50	38	35	54	61	47	29	39	42	44	33	54	39	36	64	67	53	44	39	43	40
36	44	33	50	44	67	40	58	50	38	35	42	42	53	29	28	42	44	33	54	38	36	64	67	51	31	39	35	40
37	44	33	50	44	67	40	58	50	38	39	42	42	55	29	25	42	44	33	54	33	36	64	67	48	31	39	35	40
38	43	33	50	44	48	40	58	50	38	46	42	40	51	29	25	42	43	33	54	34	36	64	67	47	32	39	35	40
39	41	33	50	37	33	40	54	50	35	46	42	20	51	29	25	38	39	33	54	36	36	64	67	55	36	39	35	40
40	39	33	37	28	33	40	46	50	34	46	35	19	46	29	25	31	29	33	54	36	36	64	67	50	34	39	35	37
41	37	33	33	28	33	40	39	50	22	46	28	15	46	32	25	31	28	33	53	36	36	64	67	47	31	39	35	35

Table S10.

Containment Index (CTN) by state and epidemiological week. Cell colors vary from red (higher values) to blue (lower values).

Epi week	Brazil	AC	AL	AM	AP	BA	CE	DF	ES	GO	MA	MG	MS	MT	PA	PB	PE	PI	PR	RJ	RN	RO	RR	RS	SC	SE	SP	TO
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	2	0	0	0	0	0	0	15	0	6	0	0	0	0	0	0	3	0	0	11	0	0	0	0	0	0	6	0
12	25	23	17	21	17	26	22	44	22	50	18	14	9	11	23	14	40	27	23	47	26	25	36	14	43	28	30	15
13	51	55	62	51	53	38	65	54	55	67	52	47	25	33	45	45	52	50	47	54	65	63	62	33	60	50	42	47
14	53	52	57	52	56	38	71	53	55	67	54	47	27	52	45	45	52	57	47	58	65	63	65	53	60	53	47	47
15	53	52	52	46	60	38	72	53	52	67	59	47	27	54	51	45	52	58	47	56	65	58	65	65	54	53	47	47
16	53	54	52	45	60	38	72	53	52	67	65	47	27	54	56	45	52	58	47	55	65	58	65	58	60	55	47	24
17	52	58	52	45	60	38	72	53	58	53	59	47	27	36	58	45	54	58	47	58	65	58	65	55	55	55	47	31
18	52	58	52	45	60	38	72	53	58	53	59	48	27	23	58	45	54	58	47	58	65	55	65	59	53	55	47	40
19	53	53	52	45	60	38	68	53	55	53	65	49	27	23	63	45	54	58	47	58	65	56	65	68	53	58	47	45
20	53	50	52	49	60	38	78	53	55	53	65	49	27	23	65	46	52	61	47	58	65	59	65	48	53	58	47	48
21	53	38	49	52	71	38	78	50	55	53	65	49	27	23	61	52	52	60	47	58	65	65	65	48	53	58	47	52
22	52	38	45	52	75	38	78	40	55	53	65	49	27	23	61	53	52	59	47	58	65	65	65	54	53	58	47	33
23	52	38	56	46	66	38	69	40	58	53	62	49	27	23	59	64	52	59	47	52	69	64	65	55	48	58	52	33
24	52	38	58	45	59	38	62	45	58	53	62	49	27	21	58	58	52	58	47	58	75	61	65	55	47	58	53	33
25	50	38	58	45	58	38	62	40	58	53	62	49	27	21	58	38	52	59	47	58	75	58	65	46	47	54	53	33
26	50	38	55	45	58	38	62	40	58	53	62	49	27	26	58	38	46	60	47	58	75	55	65	45	47	55	53	33
27	49	38	36	45	63	38	65	31	56	65	58	57	27	26	58	38	45	61	49	58	64	55	65	47	47	41	53	33
28	49	30	52	45	65	38	65	28	42	67	55	63	50	26	58	38	45	59	50	54	55	55	65	48	35	38	58	33
29	47	30	52	45	65	38	65	45	42	32	55	63	27	26	46	31	45	59	50	52	55	55	65	48	43	41	55	33
30	46	38	52	45	65	38	65	45	42	27	55	63	35	26	42	30	45	60	50	52	55	55	65	48	37	42	45	33
31	48	38	52	45	65	38	65	45	42	27	55	63	42	47	40	31	45	58	50	52	51	61	65	48	47	42	45	33
32	46	25	52	45	65	38	65	45	43	27	53	63	40	48	35	35	45	52	50	37	39	65	65	48	47	42	44	33
33	45	25	47	39	65	38	65	45	38	27	55	63	40	48	35	35	43	40	50	32	33	64	65	48	47	42	40	33
34	43	25	45	38	65	38	65	45	37	27	55	63	40	36	35	35	38	27	50	32	28	62	65	48	47	32	40	33
35	41	25	45	38	65	37	64	45	30	27	49	59	42	20	32	35	38	25	50	32	28	62	65	48	43	32	36	33
36	38	25	45	38	65	37	55	45	30	27	35	36	49	20	19	35	38	25	50	31	28	62	65	46	27	32	27	33
37	38	25	45	38	65	37	55	45	30	32	35	36	51	20	15	35	38	25	50	25	28	62	65	43	27	32	27	33
38	37	25	45	38	42	37	55	45	30	40	35	33	47	20	15	35	36	25	50	26	28	62	65	42	29	32	27	33
39	35	25	45	30	25	37	50	45	27	40	35	9	46	20	15	31	32	25	50	28	28	62	65	51	33	32	27	33
40	32	25	29	18	25	37	40	45	26	40	27	8	40	20	15	22	20	25	50	28	28	62	65	45	30	32	27	30
41	30	25	25	18	25	37	32	45	12	40	18	3	40	23	15	22	18	25	48	28	28	62	65	42	27	32	27	27

Table S11.

Social Distancing Index (SD) by state and epidemiological week. Cell colors vary from red (higher values) to green (lower values).

Epi Week	AC	AL	AP	AM	BA	CE	DF	ES	GO	MA	MT	MS	MG	PA	PB	PR	PE	PI	RJ	RN	RS	RO	RR	SC	SP	SE	TO
9	36.7	33.8	35.2	37.5	32.7	36.0	34.8	35.4	33.4	33.8	34.1	34.3	34.5	34.8	32.7	34.5	34.8	32.2	37.7	32.6	34.6	35.7	34.1	33.8	33.9	32.6	31.0
10	35.1	30.0	32.7	35.1	29.8	32.8	30.9	31.9	30.2	31.5	31.9	31.3	31.2	32.6	29.8	31.4	32.0	29.2	33.6	29.6	31.2	33.7	31.4	31.8	30.5	29.4	28.4
11	36.4	31.2	33.1	36.7	31.5	34.5	32.3	32.3	30.9	33.2	32.9	32.4	31.2	34.0	31.6	32.1	31.7	31.2	32.9	31.7	32.0	34.1	32.5	32.9	31.1	31.1	29.5
12	42.8	37.2	42.7	41.5	37.4	42.4	41.2	38.8	38.3	37.5	37.3	38.3	37.6	38.0	36.9	38.5	39.9	37.6	43.1	36.4	40.7	39.9	37.1	45.2	38.7	37.5	36.9
13	55.1	52.9	55.3	52.3	52.3	57.0	57.4	53.6	52.5	50.5	51.2	53.5	52.5	49.6	52.9	55.4	55.2	54.3	56.0	50.7	59.4	53.9	50.2	62.6	54.2	50.8	48.5
14	50.4	48.3	50.3	51.8	47.5	51.5	51.0	48.7	46.7	46.6	45.7	47.7	48.1	46.3	47.9	50.5	51.2	48.9	52.2	46.8	53.7	47.9	45.0	53.6	51.1	46.1	42.4
15	49.4	45.8	50.0	54.6	46.6	50.5	49.6	47.4	45.0	46.3	45.1	45.0	47.1	47.0	46.4	48.6	50.0	48.0	51.8	45.7	51.4	47.2	45.1	49.8	49.8	44.4	41.9
16	48.5	43.7	48.3	52.9	44.3	48.6	47.4	44.7	42.9	44.8	42.1	42.2	44.0	46.7	44.2	45.0	48.7	45.1	49.7	43.7	47.6	45.8	43.3	45.4	47.2	42.3	38.9
17	49.2	44.9	48.0	54.0	45.6	49.4	47.8	46.3	42.4	46.2	42.6	42.9	44.6	48.7	44.7	45.1	50.0	45.2	50.8	43.8	47.4	46.1	43.0	45.6	47.3	43.3	40.4
18	47.5	44.7	49.3	51.2	43.3	47.6	45.8	44.4	40.6	45.6	41.3	41.8	43.3	49.2	43.2	43.7	48.5	43.9	49.7	42.0	46.4	44.9	42.5	44.4	46.0	40.4	39.3
19	47.5	43.2	49.3	48.9	41.9	48.5	43.3	42.1	38.4	47.7	39.7	39.8	40.8	48.2	42.9	41.0	46.4	43.6	48.0	41.0	42.8	43.2	41.8	41.2	44.1	40.8	38.3
20	48.7	45.2	51.6	48.6	43.2	51.2	43.0	42.3	37.8	49.2	39.1	39.8	40.3	50.6	45.6	39.9	48.6	45.6	48.0	43.2	42.8	44.2	42.2	40.4	43.9	41.5	38.8
21	50.3	45.9	55.3	47.7	43.9	49.3	43.1	42.0	38.2	45.3	39.5	39.5	40.1	49.6	45.6	40.3	50.3	45.2	46.5	42.8	42.8	44.9	43.6	40.6	43.6	43.3	40.5
22	48.8	45.7	52.4	45.0	44.1	47.6	42.5	41.7	38.0	43.0	39.5	39.4	40.1	45.1	44.2	39.8	47.8	43.9	45.7	42.4	41.8	43.9	43.1	40.0	43.9	41.2	38.4
23	45.8	42.7	47.1	42.8	41.5	44.2	41.1	40.3	36.9	40.6	39.0	39.3	38.7	41.3	43.6	39.8	44.0	42.1	43.2	41.3	41.2	43.4	41.4	40.2	41.7	39.5	36.5
24	45.0	42.0	44.8	42.7	40.6	42.5	41.0	40.7	37.3	39.3	39.8	38.2	38.8	40.4	41.5	39.8	42.2	40.8	42.2	43.0	41.7	48.5	42.4	40.0	40.3	39.2	36.5
25	44.0	41.4	43.8	41.0	39.5	40.9	40.4	40.0	36.4	38.1	39.2	37.4	37.6	39.0	40.6	38.4	41.2	40.5	41.3	40.8	39.4	42.8	40.9	38.4	39.4	37.9	35.4
26	44.8	40.9	44.0	41.5	40.4	41.1	41.0	39.7	37.1	38.1	41.4	39.4	38.4	39.3	39.7	40.0	41.1	41.7	41.3	40.5	41.3	42.8	41.0	39.6	40.4	39.4	35.5
27	44.7	41.6	43.4	41.6	41.4	42.0	41.8	41.2	38.6	39.3	42.5	39.6	39.6	39.4	40.6	41.2	41.5	43.7	42.1	41.0	43.0	43.3	40.8	41.0	40.6	39.8	35.6
28	44.5	42.0	42.6	41.2	42.8	42.9	41.3	40.1	39.1	39.5	42.2	39.1	39.1	39.2	41.8	41.4	41.8	44.4	40.9	42.2	44.5	43.0	40.3	40.8	39.8	41.3	36.2
29	43.9	41.1	41.8	41.3	42.1	42.0	41.0	40.0	38.2	39.1	41.5	39.2	38.9	38.9	40.8	39.8	41.7	43.7	41.3	40.8	42.7	42.5	40.1	40.4	39.7	41.3	36.5
30	44.6	41.4	42.5	41.7	42.3	42.3	41.3	39.9	38.3	39.8	41.4	39.9	39.1	39.8	40.8	39.2	41.0	44.0	40.5	40.6	41.4	42.6	40.9	40.9	39.3	41.3	37.0
31	43.3	40.4	41.6	41.4	41.4	41.5	41.1	40.3	38.0	39.2	40.0	39.5	38.9	39.4	40.0	39.9	40.8	42.9	41.3	39.8	42.1	41.5	39.4	41.6	39.8	40.8	37.2
32	42.3	38.8	39.7	39.8	40.2	40.1	39.5	37.7	36.2	37.8	38.0	37.2	37.1	37.9	38.5	37.1	38.9	41.1	38.6	37.9	38.6	39.9	37.5	37.9	37.5	38.9	36.0
33	42.0	38.6	39.6	40.0	39.9	40.3	39.1	37.2	36.0	38.2	37.8	37.1	36.9	38.4	38.4	38.0	39.3	41.4	38.6	38.3	40.1	39.9	37.8	38.3	37.5	38.8	36.2
34	43.2	38.6	39.9	40.0	39.2	40.1	39.4	38.3	36.5	38.0	39.0	40.8	38.2	38.4	38.2	40.8	39.2	40.8	41.0	37.9	39.5	40.9	38.0	39.6	40.1	38.0	36.6
35	41.8	38.9	39.7	40.0	39.4	39.8	39.5	38.3	36.5	37.6	38.2	38.7	37.4	38.3	37.7	37.5	38.9	40.0	39.6	37.7	39.2	40.1	37.6	38.3	37.9	37.7	36.5
36	39.9	37.5	38.6	38.8	37.9	38.8	38.1	36.1	35.5	36.8	37.1	36.4	36.1	36.9	36.7	35.9	37.9	38.9	38.0	36.5	39.7	38.7	35.9	37.1	36.5	36.3	35.2
37	41.4	37.9	39.2	39.3	39.2	40.1	38.6	37.2	36.6	38.6	38.5	37.6	37.3	38.1	37.9	37.7	38.6	40.0	38.7	37.8	41.3	40.1	37.3	39.0	37.4	37.4	37.2
38	40.2	38.0	38.7	38.7	38.0	39.1	37.6	35.6	35.1	37.3	37.1	36.5	35.7	36.9	37.2	35.9	37.8	39.1	37.9	36.9	38.4	38.7	36.4	35.9	36.3	36.4	34.6
39	39.4	36.5	37.1	38.4	37.1	38.4	36.9	35.8	34.2	36.7	36.5	35.7	35.6	36.0	36.8	35.4	37.3	38.1	39.2	36.3	36.5	38.0	35.2	35.2	36.4	35.4	33.3
40	38.5	36.3	36.5	37.6	36.6	38.0	36.3	34.3	33.7	36.3	35.8	35.0	35.0	35.4	35.9	34.9	37.0	37.6	37.0	35.9	38.3	37.2	34.3	35.0	35.4	34.6	32.7
41	38.8	35.8	36.5	37.5	36.6	38.2	36.0	34.3	33.7	36.3	35.6	34.7	35.0	35.3	36.4	34.7	36.5	38.3	37.2	35.9	35.9	37.0	35.0	35.2	35.5	34.6	34.0

Table S12.

Percentage of cases reported in each state by epidemiological week.

Epi week	Brazil	RO	AC	AM	RR	PA	AP	TO	MA	PI	CE	RN	PB	PE	AL	SE	BA	MG	ES	RJ	SP	PR	SC	RS	MS	MT	GO	DF
9	0.00																				0.00							
10	0.00																0.00			0.00	0.00							0.00
11	0.00			0.00								0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.01	0.00	0.00	0.00	0.00		0.00	0.00
12	0.02	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.00	0.01	0.06
13	0.05	0.00	0.05	0.07	0.03	0.01	0.01	0.01	0.01	0.01	0.09	0.08	0.01	0.02	0.01	0.01	0.03	0.05	0.03	0.16	0.08	0.05	0.05	0.06	0.02	0.02	0.02	0.07
14	0.13	0.01	0.07	0.14	0.05	0.03	0.05	0.01	0.04	0.01	0.16	0.14	0.02	0.07	0.01	0.02	0.07	0.07	0.08	0.24	0.31	0.14	0.08	0.10	0.04	0.08	0.02	0.11
15	0.21	0.03	0.09	0.50	0.07	0.07	0.33	0.01	0.17	0.02	0.36	0.15	0.05	0.42	0.02	0.02	0.10	0.10	0.17	0.48	0.38	0.15	0.17	0.11	0.05	0.09	0.05	0.07
16	0.32	0.14	0.24	0.57	0.28	0.17	0.42	0.01	0.45	0.10	0.54	0.37	0.11	0.86	0.09	0.03	0.17	0.10	0.53	0.68	0.53	0.14	0.11	0.10	0.08	0.08	0.07	0.11
17	0.43	0.30	0.40	1.18	0.34	0.46	0.59	0.04	0.57	0.18	1.02	0.36	0.21	0.90	0.41	0.10	0.28	0.13	0.43	0.81	0.59	0.10	0.11	0.14	0.07	0.11	0.06	0.12
18	0.78	0.48	1.01	1.65	0.24	0.83	1.01	0.27	1.02	0.39	1.02	0.78	0.53	3.02	0.98	0.56	0.37	0.17	1.08	1.31	1.09	0.19	0.49	0.23	0.06	0.13	0.13	0.32
19	1.19	0.90	2.70	3.99	1.31	1.38	2.65	0.62	1.99	0.53	2.92	0.71	0.79	2.82	0.90	1.24	0.58	0.34	0.98	2.19	1.27	0.15	0.47	0.41	0.11	0.25	0.10	0.47
20	1.55	0.97	1.82	5.27	0.98	2.71	2.72	0.84	2.75	0.95	2.97	1.51	1.51	3.93	1.58	1.94	0.96	0.41	1.68	1.71	1.62	0.24	0.58	0.54	0.22	0.54	0.27	0.77
21	2.31	1.75	6.90	6.21	1.48	4.48	3.69	1.61	4.87	1.12	4.12	2.19	2.66	5.41	2.29	2.51	1.38	0.57	2.57	4.44	1.87	0.45	0.83	1.24	0.46	0.76	0.34	1.09
22	3.05	2.42	7.60	8.00	1.96	5.77	7.42	2.20	7.54	1.51	4.90	3.85	4.34	4.33	4.03	2.10	1.41	1.04	2.72	6.23	2.56	0.73	1.05	1.35	0.86	1.59	0.52	1.68
23	3.47	4.36	5.00	5.59	3.98	6.73	6.11	2.15	7.19	2.47	5.99	2.81	5.50	3.86	6.27	2.73	3.00	1.65	4.30	4.39	3.23	1.13	1.08	1.31	1.02	2.10	0.94	3.31
24	3.50	5.76	6.91	4.86	2.61	6.14	8.10	1.76	6.35	2.63	4.74	5.97	6.11	3.46	6.83	4.90	2.67	1.75	5.51	5.08	3.12	1.39	0.89	1.21	1.58	2.99	0.95	3.10
25	4.41	4.94	5.95	4.58	2.42	6.81	10.65	2.28	6.10	4.02	6.45	7.39	7.21	4.19	7.66	7.02	2.65	2.08	6.41	5.95	4.16	2.34	1.71	2.12	2.41	5.39	3.27	5.12
26	4.93	7.06	5.68	4.33	12.00	6.64	12.83	2.65	4.66	4.79	5.73	6.35	6.15	3.89	6.55	6.13	6.21	4.39	5.78	4.69	4.81	3.14	2.98	2.74	2.78	7.46	2.80	5.10
27	5.18	3.69	4.13	4.41	8.82	5.61	3.87	3.17	6.16	6.77	5.61	14.47	6.41	4.15	6.44	8.09	5.92	4.68	7.81	4.11	4.54	5.63	3.64	3.09	3.73	9.44	2.92	6.84
28	5.30	6.27	6.78	5.26	6.50	4.97	2.58	3.74	5.21	6.72	5.66	6.01	6.45	5.16	6.06	7.91	5.74	5.66	8.34	3.26	5.25	5.33	4.54	3.32	4.16	10.66	3.39	6.50
29	4.66	3.84	3.05	4.97	6.16	4.94	5.08	3.74	4.25	6.20	3.93	6.65	5.20	4.65	5.57	8.84	4.87	5.40	6.01	1.90	4.36	6.68	4.71	3.80	4.29	8.49	1.92	6.14
30	6.38	8.49	5.83	3.78	8.41	4.57	3.20	5.65	4.24	6.60	6.15	4.78	6.95	5.23	5.79	7.95	8.11	6.07	5.01	7.47	6.52	6.31	6.57	5.73	6.84	15.94	6.50	6.56
31	6.26	6.83	4.38	3.86	6.47	3.37	2.91	6.51	4.51	6.79	5.60	6.38	6.15	6.35	7.03	12.97	7.09	5.38	5.60	3.85	7.04	6.45	8.58	5.28	6.02	15.07	6.17	6.81
32	6.11	6.40	5.43	3.16	6.28	4.77	3.13	7.33	4.55	6.84	4.68	4.94	5.12	4.69	6.45	5.73	6.83	6.40	5.72	3.99	6.70	6.89	7.72	6.17	7.15	15.74	6.57	7.09
33	5.88	5.62	3.50	3.27	6.22	4.33	2.62	7.68	3.69	5.96	3.53	3.46	4.53	4.86	5.99	4.30	7.04	6.68	5.92	4.27	7.33	6.61	6.59	6.47	7.35	3.08	7.21	6.57
34	5.11	4.93	3.96	2.81	4.11	4.76	3.25	9.29	4.25	5.69	2.86	2.39	4.25	3.96	3.80	3.20	5.69	6.38	5.33	7.01	5.00	6.85	5.14	5.32	7.59	0.00	6.47	6.01
35	4.94	5.17	3.22	3.05	3.37	4.15	3.53	9.53	3.94	5.20	3.65	2.06	3.64	3.77	3.42	2.54	6.82	6.58	3.42	4.41	4.54	5.29	6.25	7.28	8.07	0.00	6.32	6.24
36	5.53	4.96	2.75	2.63	3.22	3.56	3.88	7.31	3.89	4.68	3.13	3.79	3.19	6.12	2.22	1.70	4.91	5.85	3.99	3.37	5.49	7.70	18.43	8.94	6.65	0.00	7.39	4.44
37	3.66	3.69	2.54	2.19	2.40	2.83	2.25	5.51	2.60	4.28	1.88	1.93	2.51	2.91	1.98	1.43	2.86	5.74	2.84	2.92	3.63	5.89	3.82	5.96	7.48	0.00	6.73	3.44
38	4.16	3.43	3.14	3.15	3.52	2.58	1.92	5.74	2.72	3.89	2.51	2.64	3.09	3.07	2.16	1.26	4.66	5.62	3.81	3.70	3.96	5.53	3.57	8.34	6.39	0.00	9.01	3.65
39	3.65	3.29	2.76	3.13	3.08	3.05	2.04	4.38	2.32	4.07	1.94	2.12	2.49	2.60	2.44	1.45	3.40	5.81	3.90	2.95	3.80	5.50	3.05	5.17	5.68	0.00	7.10	2.75
40	3.54	2.44	2.80	4.06	2.69	2.64	1.74	4.08	2.10	3.72	1.64	2.83	2.38	2.86	2.03	1.40	3.02	5.84	0.00	4.22	3.15	5.08	3.03	8.14	4.87	0.00	7.08	3.07
41	3.30	1.83	1.27	3.33	0.98	1.64	1.42	1.85	1.87	3.84	6.21	2.85	2.42	2.41	0.99	1.89	3.14	5.04	0.00	4.18	3.04	3.89	3.75	5.29	3.96	0.00	5.66	2.39

Table S13.

Percentage of deaths reported in each state by epidemiological week.

Epi week	Brazil	RO	AC	AM	RR	PA	AP	TO	MA	PI	CE	RN	PB	PE	AL	SE	BA	MG	ES	RJ	SP	PR	SC	RS	MS	MT	GO	DF
9																												
10																												
11																												
12	0.01																			0.02	0.02							
13	0.05			0.02						0.05		0.04		0.05						0.05	0.16	0.04	0.03	0.04			0.02	
14	0.23	0.07		0.26	0.15	0.02	0.14		0.05	0.14	0.24	0.12	0.10	0.11	0.09	0.14	0.10	0.08	0.17	0.23	0.51	0.11	0.31	0.08	0.07	0.05	0.02	0.22
15	0.47	0.07	0.30	0.94	0.30	0.15	0.55		0.57	0.14	0.56	0.37	0.34	0.69	0.05	0.05	0.20	0.14	0.09	0.50	0.81	0.40	0.38	0.19	0.07	0.09	0.15	0.22
16	0.83	0.14	0.59	2.53	0.00	0.33	0.69	0.10	0.62	0.14	1.17	0.53	0.55	1.57	0.23	0.05	0.26	0.28	0.58	1.20	1.16	0.45	0.38	0.16	0.21	0.09	0.15	0.32
17	1.14	0.14	0.74	2.98	0.15	0.93	1.38	0.10	1.66	0.36	1.60	0.66	0.69	2.07	0.89	0.19	0.45	0.24	0.63	1.18	1.82	0.47	0.34	0.21	0.14	0.18	0.12	0.10
18	1.84	1.22	1.63	5.08	0.45	3.18	2.76	0.20	3.24	0.45	3.42	0.62	0.93	2.94	1.36	0.24	0.72	0.38	1.50	1.84	2.46	0.45	0.34	0.58	0.14	0.09	0.10	0.16
19	2.63	1.29	2.67	10.91	1.66	4.58	4.00	0.70	3.68	0.63	4.65	1.03	1.65	4.10	2.63	0.86	1.02	0.38	1.93	3.54	2.76	0.36	0.41	0.62	0.14	0.18	0.37	0.19
20	3.37	2.01	2.82	9.75	4.22	9.22	5.38	1.60	4.40	1.35	6.04	2.09	2.02	5.81	3.95	1.01	1.28	0.39	2.88	4.97	2.90	0.34	0.58	0.80	0.28	0.46	0.39	0.54
21	4.37	3.22	4.15	8.71	3.32	13.95	6.76	2.40	5.28	1.53	7.56	1.97	2.57	8.06	4.79	1.58	1.80	0.86	4.15	6.71	3.65	0.55	0.76	0.74	0.14	0.46	0.48	1.08
22	4.51	2.65	8.01	7.15	6.94	11.61	8.00	2.00	5.20	2.48	7.11	4.93	2.95	7.06	5.73	3.02	3.18	0.52	4.78	7.12	3.98	0.66	1.13	0.82	0.21	0.97	0.58	1.91
23	4.80	5.44	8.90	4.37	3.92	11.22	6.21	2.50	5.57	3.52	11.03	4.23	4.19	6.25	7.42	2.82	2.94	1.25	6.34	7.01	4.08	1.10	1.00	1.27	0.07	1.98	0.93	1.37
24	4.54	5.87	8.16	5.50	8.45	7.89	8.14	3.20	6.91	5.41	9.34	5.05	5.39	6.02	6.58	5.17	3.16	1.04	6.43	4.99	4.11	1.70	0.96	1.19	0.70	4.43	0.77	2.33
25	4.93	7.16	6.08	4.37	7.54	5.95	4.69	4.70	6.42	5.68	7.64	6.73	4.12	4.30	6.67	6.32	3.94	2.24	7.75	6.39	5.14	2.46	1.51	1.65	0.98	6.46	1.60	3.35
26	4.72	5.16	8.01	2.88	5.13	3.95	7.31	1.70	6.71	5.86	5.19	8.13	5.25	6.60	5.92	7.52	4.94	3.06	6.05	4.99	4.75	2.85	2.30	2.43	1.61	8.63	2.70	3.85
27	4.86	3.72	5.19	3.45	13.27	3.60	4.83	2.80	6.27	7.58	4.92	13.38	6.38	4.77	6.81	8.52	4.98	3.66	7.23	4.34	4.67	3.97	2.65	3.13	3.42	11.12	3.58	3.82
28	4.80	6.02	4.90	2.48	4.37	2.64	4.00	3.40	6.24	6.90	4.64	7.31	5.77	5.21	6.11	8.19	5.46	4.35	6.74	4.03	4.57	5.31	3.58	4.44	3.07	11.16	4.34	5.93
29	4.88	4.94	4.90	2.50	4.98	3.06	4.83	3.80	6.47	7.40	3.22	7.84	7.79	4.40	5.50	7.52	5.03	4.96	5.91	2.69	5.21	6.12	6.09	5.57	4.26	14.07	4.63	5.80
30	5.06	8.24	4.60	1.91	6.79	2.15	6.76	5.29	5.75	6.45	3.55	3.98	6.79	4.30	4.93	6.51	4.85	5.27	5.24	4.59	5.04	7.33	7.43	6.31	5.72	11.30	5.67	5.89
31	4.79	5.59	7.72	1.61	6.03	2.12	1.93	4.90	3.50	5.68	2.43	8.58	5.42	3.53	4.42	9.62	5.29	4.20	5.19	3.88	4.59	6.84	9.39	7.67	6.98	13.24	6.01	5.99
32	4.72	4.30	3.56	1.82	5.13	1.69	4.41	5.59	3.16	5.01	2.77	3.78	5.15	3.78	3.95	6.08	5.39	7.91	4.41	2.67	4.80	7.20	9.01	7.77	7.33	11.35	6.19	6.66
33	4.43	5.23	2.52	2.55	2.71	0.80	1.79	5.99	2.56	5.77	1.91	4.06	5.32	2.79	3.62	5.79	6.21	8.06	3.95	2.35	4.70	7.28	12.04	5.86	8.16	3.69	5.78	7.26
34	4.59	3.51	3.26	2.22	1.81	1.73	2.34	7.39	2.25	4.78	1.72	4.23	5.15	2.44	3.20	3.54	6.94	9.02	4.38	3.85	4.35	6.16	8.84	7.79	7.82	0.00	8.09	8.79
35	3.79	4.58	1.48	1.82	1.21	0.87	4.00	7.89	2.18	4.56	1.07	2.18	4.60	2.13	2.82	3.26	6.58	6.21	3.29	3.88	3.52	4.86	6.60	6.58	7.89	0.00	6.42	5.83
36	4.04	3.94	2.37	4.89	1.51	2.00	1.66	8.39	1.94	3.52	2.01	2.63	3.67	2.23	2.54	2.20	4.55	6.79	3.34	2.64	4.34	7.33	5.95	6.41	8.03	0.00	7.38	7.20
37	3.18	4.23	1.93	1.11	1.81	1.36	0.97	5.09	1.81	3.34	1.29	1.31	2.99	2.08	2.26	2.92	3.39	5.04	2.45	2.40	3.36	5.56	4.33	6.33	6.91	0.00	6.63	5.48
38	3.49	4.08	1.48	1.58	0.45	1.69	1.79	6.69	1.94	3.16	1.30	1.44	2.68	1.78	1.97	1.39	4.98	5.76	2.19	3.35	3.66	6.09	4.16	6.48	7.47	0.00	6.71	4.84
39	3.17	2.65	1.19	1.56	3.32	1.67	1.52	5.09	1.84	2.62	1.19	0.99	3.19	1.91	1.69	1.82	4.62	6.14	2.39	3.19	3.01	5.35	3.40	4.75	6.28	0.00	6.98	3.95
40	3.01	2.72	1.78	3.49	3.62	0.81	1.79	4.90	1.86	2.44	1.49	1.23	1.99	1.93	1.93	1.87	4.78	5.61	0.00	2.60	2.95	4.88	3.47	5.51	6.21	0.00	6.32	3.76
41	2.73	1.79	1.04	1.56	0.75	0.81	1.38	3.60	1.92	3.07	0.93	0.57	2.37	1.09	1.93	1.82	2.96	6.19	0.00	2.78	2.92	3.78	2.61	4.61	5.72	0.00	6.92	3.15

Table S14.

Weekly estimated R_t by state. Cell colors vary from red (higher values) to blue (lower values).

Epi week		11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Start date		**3/8**	**3/15**	**3/22**	**3/29**	**4/5**	**4/12**	**4/19**	**4/26**	**5/3**	**5/10**	**5/17**	**5/24**	**5/31**	**6/7**	**6/14**	**6/21**	**6/28**	**7/5**	**7/12**	**7/19**	**7/26**	**8/2**	**8/9**	**8/16**	**8/23**	**8/30**	**9/6**	**9/13**	**9/20**	**9/27**	**10/4**
States	**AC**							1.10	1.39	1.30	1.43	1.31	0.94	0.89	1.13	0.93	0.85	0.99	1.05	1.00	0.88	1.01	1.00	0.89	0.97	0.99	0.87	1.02	0.99	0.82	1.04	1.25
	AL					1.62	1.94	1.78	1.47	1.34	1.24	1.08	1.02	0.95	1.00	0.94	0.89	0.82	0.96	0.94	0.86	0.90	0.88	0.85	0.88	0.98	0.97	0.92	0.94	1.09	0.89	0.93
	AP							1.91	1.70	1.30	1.21	1.02	1.04	1.05	1.01	0.83	0.82	0.82	1.00	1.08	0.89	1.00	1.04	1.09	1.10	0.79	0.91	0.91	1.14	1.14	1.03	1.43
	AM				2.11	1.69	1.42	1.17	1.08	1.07	0.96	0.82	0.80	0.85	0.98	0.91	0.92	0.94	0.99	0.99	0.94	0.96	1.04	0.92	1.04	1.06	0.99	1.05	1.12	1.04	0.96	1.02
	BA			1.84	1.20	1.30	1.38	1.64	1.18	1.24	1.25	1.21	1.15	1.05	1.06	1.02	0.99	0.96	1.05	1.03	0.98	0.91	0.92	0.92	0.99	0.97	0.87	0.95	0.99	0.98	0.95	1.05
	CE		2.20	2.33	1.41	1.31	1.33	1.37	1.30	1.27	1.10	0.93	0.85	0.85	0.94	0.97	0.93	0.89	0.94	0.94	0.92	0.94	0.91	0.92	1.01	1.00	0.89	0.95	1.04	1.00	0.93	0.90
	DF				1.22	1.06	1.07	1.19	1.20	1.47	1.35	1.21	1.17	1.18	1.25	1.14	1.10	1.04	1.07	1.02	1.00	1.02	0.99	0.93	0.96	0.92	0.87	0.88	0.93	0.96	0.94	0.94
	ES				1.46	1.50	1.22	1.18	1.27	1.27	1.17	1.11	1.10	1.02	1.05	1.00	0.94	0.97	0.90	0.87	0.93	0.93	0.97	0.96	0.97	0.91	0.88	0.89	1.02	1.00	0.97	1.07
	GO				1.32	1.27	1.13	1.02	1.17	1.39	1.20	1.16	1.12	1.16	1.35	1.20	1.26	1.14	1.11	1.03	0.94	1.04	1.06	0.99	1.03	1.04	0.92	0.93	0.98	0.98	0.89	0.91
	MA			1.80	1.83	1.79	1.57	1.24	1.10	1.14	1.03	0.87	0.89	0.84	0.89	0.95	0.94	0.87	0.89	0.98	0.91	0.93	0.97	1.00	1.01	0.93	0.88	1.03	0.95	0.88	0.88	0.98
	MT				1.37	1.16	1.04	0.87	1.42	1.46	1.52	1.29	1.30	1.15	1.09	1.15	1.12	1.02	1.01	0.96	0.92	0.99	1.01	0.98	1.07	0.92	0.82	0.96	1.01	1.01	0.90	0.89
	MS				1.05	1.35	0.93	0.74	1.08	1.51	1.36	1.61	1.28	1.03	1.33	1.35	1.09	1.07	1.28	1.12	1.05	1.04	1.09	0.93	0.99	1.05	0.93	0.95	1.00	1.00	0.94	0.86
	MG			2.11	1.34	1.01	1.04	0.99	1.15	1.35	1.21	1.12	1.19	1.19	1.33	1.21	1.15	1.08	1.08	1.01	0.97	0.97	0.93	0.96	1.03	1.00	0.95	1.00	0.97	0.95	0.94	0.95
	PA			1.63	1.69	1.98	1.85	1.50	1.30	1.13	1.06	0.90	0.84	0.83	0.91	0.94	0.92	0.87	0.97	0.99	0.97	0.95	0.96	0.92	1.01	1.00	0.90	0.90	0.96	1.01	0.88	1.00
	PB					1.73	1.35	1.37	1.59	1.38	1.25	1.09	1.09	0.98	0.92	0.94	0.95	0.98	1.03	0.97	0.93	0.98	0.95	0.92	0.90	1.01	0.99	0.95	0.95	0.96	0.95	1.02
	PR			2.36	1.32	0.96	0.86	1.02	1.12	1.22	1.19	1.20	1.18	1.29	1.28	1.21	1.14	1.03	1.09	1.10	0.97	0.94	1.01	0.98	0.99	0.97	0.98	1.02	0.93	0.92	0.90	0.95
	PE	1.15	1.81	1.86	1.27	1.63	1.55	1.29	1.18	1.10	1.02	0.97	0.90	0.87	0.93	0.92	0.91	0.91	1.02	1.04	0.99	0.95	0.84	0.84	0.93	0.88	0.88	0.93	0.95	0.91	0.86	1.06
	PI					1.29	1.45	1.58	1.49	1.23	1.25	1.20	1.12	1.07	1.21	1.13	1.05	0.96	0.98	0.99	0.89	0.86	0.90	0.98	1.09	0.95	0.85	0.99	1.04	0.97	0.94	1.00
	RJ		2.57	2.01	1.54	1.46	1.34	1.25	1.18	1.08	0.97	0.91	0.87	0.83	0.91	0.91	0.92	0.93	1.00	1.00	0.97	1.03	1.01	0.98	1.02	1.02	1.03	1.03	0.97	0.94	0.92	1.04
	RN				1.26	1.12	1.18	1.23	1.33	1.37	1.26	1.19	1.16	1.10	1.16	1.03	0.94	0.88	0.91	0.92	0.85	0.87	0.88	0.87	0.90	0.83	0.94	1.02	0.92	0.89	0.92	1.13
	RS			1.96	1.30	0.93	1.08	1.30	1.33	1.04	1.04	1.05	1.01	1.02	1.24	1.23	1.19	1.10	1.10	1.14	1.06	1.00	1.00	0.98	0.98	1.00	0.98	0.95	0.92	0.91	0.98	0.99
	RO							1.70	1.38	1.19	1.11	1.10	1.19	1.20	1.11	1.05	1.00	0.97	0.97	1.01	0.93	1.07	1.03	0.91	1.04	0.94	0.87	0.97	0.89	0.84	0.76	0.90
	RR								1.66	1.52	1.09	1.23	1.42	1.11	1.09	0.99	0.86	0.91	1.01	0.94	0.94	0.86	0.87	0.99	0.83	0.89	1.04	0.83	0.91	1.47	1.08	1.05
	SC			1.81	1.21	0.92	0.81	1.04	1.23	1.08	1.10	1.19	1.19	1.03	1.24	1.24	1.26	1.13	1.24	1.18	1.08	1.00	0.90	0.89	0.88	0.88	0.91	0.85	0.94	0.93	0.93	1.05
	SP	2.66	2.64	1.88	1.35	1.07	1.04	1.16	1.15	1.09	1.07	1.04	0.99	0.97	1.03	1.01	0.98	0.97	1.06	1.03	0.95	0.94	0.95	0.94	0.96	0.96	0.94	0.97	0.95	0.95	0.95	0.94
	SE					1.11	1.44	1.32	1.42	1.68	1.23	1.06	1.20	1.13	1.16	1.19	1.14	1.01	1.07	1.02	0.92	0.87	0.83	0.80	0.83	0.90	0.90	1.06	0.94	0.90	1.01	1.26
	TO									1.69	1.34	1.12	0.94	1.11	1.13	0.98	1.01	1.00	1.09	1.17	1.04	0.97	1.09	1.08	1.09	1.01	1.01	0.94	0.88	0.91	0.83	0.74

Movie S1.
Weekly trajectory of the COVID-19 case-weighted geographic center in Brazil.

Movie S2.
Weekly trajectory of the COVID-19 death-weighted geographic center in Brazil.

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