# S1 Appendix. Data sources, model description and model inputs

### **Data sources**

Multiple sources of data were used throughout this study, including household type [1], household size [2], children status [2, 3], workflow [4], and population demographics [2]. The household type represents the percentage of households with a specific number of people. The children status is the percentage of households with at least a certain number of children. The workflow is the number of people who live in one and work in another census tract. The workflow data also includes people who live outside of Georgia but work in some census tract in Georgia. We divided the population into five age groups: 0-4, 5-9, 10-19, 20-64, and 65+.

County level confirmed COVID19 infections and deaths were collected from The New York Times [2], based on reports from state and local health agencies. County level hospitalizations were acquired from the Georgia Department of Health [5].

### Agent-based disease spread model

We adapted an agent-based simulation model [6-8] which represents each individual as an agent, tracks the disease status of each individual, and tracks the spread of the disease via a contact network incorporating interactions in households, workplaces, schools, and communities with the transmission rates differing depending on where in the network the interaction happens (e.g., household versus workplace). The probability of severe outcomes, such as hospitalizations and deaths, vary by age group. One million agents are simulated, that is, one agent corresponding to approximately 10 people in the population in Georgia.

The natural history of the disease is modeled as follows. A susceptible person has a probability of being exposed based on age group (0-4, 5-9, 10-19, 20-64, 65+) and interactions (peer group in school, peer group at work, etc.). The exposed/latent phase duration follows a Weibull distribution with a specified mean (in number of days) (see Exposed Duration in Table 1). This is followed by the transition phase, which lasts 12 hours (0.5 days), and leads to the symptomatic or asymptomatic phase, determined by a fixed probability (Probability of Symptomatic in Table 1). (Note that for patients who eventually become symptomatic, the transition phase is the same as the pre-symptomatic duration.) Estimates for the probability of being symptomatic range from 30-90% [9]; in the simulation we use 63%, which is in between the current best estimates of 60% and 65% [9]. An asymptomatic person remains infectious for a certain amount of time (in days) based on an exponential distribution with specified mean (Symptomatic Duration in Table 1), and eventually recovers. A symptomatic person either recovers or becomes hospitalized with an age-dependent probability (*Probability of Hospitalization* in Table 1). Probability of hospitalization (by age group) was estimated based on the CDC report [10] and [5]; to align our results with the number of hospitalizations reported in the State of Georgia, in the simulation runs, we divided the probabilities provided in [10] by 3. A hospitalized person either recovers or dies with an age-dependent probability (*Probability* of Death in Table 1).

The rate at which a susceptible individual becomes exposed is determined by the disease stage of an infectious contact and the mode of contact (e.g., household, peer group, or community). The equations for these rates are defined in the online supplement of [7], and the coefficient of transmission ( $\beta$ ) can be determined from this system of equations.

To seed the model, we utilized the confirmed infection data from The New York Times [2] at the county level for Georgia. To generate census tract level estimates for the seed, we applied the Huntington-Hill method of apportionment to the county level data (the same method used to decide the number of seats that belong to each U.S. congressman in the House of Representatives) [11] to apportion the number of COVID19 infections confirmed on May 15, 2020 to each of the census tracts in the State of Georgia. We seeded the model with 30 initial infections, randomly apportioned to the census tracts of Georgia using the census tract level estimates as a discrete distribution.

The simulation model was implemented using C++.

## Capacity need estimation: description of model inputs

To calculate the daily number of hospital beds (general inpatient and ICU beds) needed, we take the needs from the previous day plus daily new hospitalizations by age group, minus discharged patients. The number of patients who are discharged is based on the average length of stay of a COVID19 patient in the hospital (*Hospitalization Duration* in Table 1). Daily ICU bed needs are found by taking the ICU patients from the previous day plus a percentage of the new hospitalizations by age group (where percentages are determined by the age-dependent *Percentage of hospitalizations that require ICU* in Table 1), minus discharged ICU patients. The *Percentage of hospitalizations that require ICU* is the percentage of COVID19 hospital patients who need ICU care because of the severity of their illness. The number of ICU patients who are discharged is based on the average length of stay in the ICU for a COVID19 patient (*ICU Duration* in Table 1). Daily ventilator needs are calculated by adding to ventilator needs from the previous day a

percentage of the daily new ICU patients (based on the *Percentage of ICU patients who require ventilation* in Table 1), minus discharged ventilation patients. The *Percentage of ICU patients who require ventilation* is defined as the percent of COVID19 patients in the ICU whose illness severity requires respiratory support through mechanical ventilation or ECMO services. The number of ventilation patients who are discharged from ventilation services is based on the average length of time on ventilation for a COVID19 patient (*Ventilation Duration* in Table 1).

A map of the 14 coordination hospital regions of Georgia can be found in [12].

### Calibration and validation of the model

All K-12 schools in Georgia were closed starting March 16, 2020. People with a risk of being infected (e.g., living in a household with an infected person), or with symptoms, or confirmed infections were encouraged to self-isolate or follow voluntary quarantine (VQ). Starting on April 3, 2020 [13], the entire State of Georgia enacted statewide directives for shelter-in-place (SIP) until April 30, 2020; new guidance was issued by the Governor of Georgia on April 20, 2020 that gyms, bowling alleys, tattoo parlors, barbers, hair and nail salons, and massage therapists may reopen for business on April 24, 2020, and theaters and dine-in restaurants may reopen for business on April 27, 2020 [14]. All intervention scenarios included decreasing compliance with voluntary shelter-in-place (VSIP) after the end of SIP. Compliance levels were chosen to be in line with social mobility indicators, based on vehicle miles traveled (VMT) [15] in Georgia and compared to levels in January 2020, before COVID19. During SIP, there was, on average, a 57% decrease in VMT compared to January. Although there was an increase in VMT in the weeks following SIP,

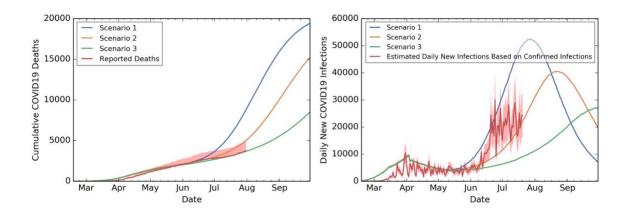
VMT was 42%, 38%, 34%, and 25% below the January level, respectively. Considering the gradual increase in VMT after SIP and the VMT levels staying below January levels during the course of the pandemic, it was assumed that after SIP, VSIP compliance was 60%, 40%, 20%, and 5% weekly following SIP and remained at 5% thereafter.

In Fig A, we present the cumulative number of deaths confirmed by the State of Georgia in comparison to our projections and the confirmed COVID19 infections in Georgia [5] multiplied by 4-8 to account for under-testing and existence of asymptomatic infections [16]. Throughout the course of the pandemic, there has been a discrepancy among testing capacity and testing demand; further, up until April, there were testing criteria in place that limited the amount of testing performed. Considering testing restrictions, variability in COVID19 symptoms, and feedback from the Georgia Department of Public Health, we believe a factor of 6 to be an appropriate multiplier. A more recent CDC report suggests the actual number of infections can be 6-10 times more than the confirmed number of infections [16].

When comparing with our projected new infections, the number of confirmed cases in Georgia are shifted one week earlier to account for the infection incubation period and potential delays in receiving test results.

Fig A. Cumulative number of COVID19 deaths and infections. Cumulative number of COVID19 deaths (left plot) and infections (right plot) of Scenarios 1, 2, 3 with respect to confirmed numbers of Georgia. On the left, the actual COVID19 deaths in Georgia are multiplied by 1-1.25 to account for potential under-reporting [17]. On the right, the confirmed COVID19 infections in Georgia [5] are multiplied by 4-8 to account for under-

testing and existence of asymptomatic infections [16] and shifted one week earlier to account for the incubation period.



One way to assess the validity of the model was to examine how our model performed on urban versus rural counties (see Tables A and B). For example, DeKalb County, an urban county, experienced the earliest peak day on July 26 under Scenario 1, but under Scenario 4 or 7, the peak shifted to August 5–14. Increasing VQ compliance to medium or high would push the peak day to August 19 and September 28, respectively. On the other hand, Lamar County, a rural county, had its earliest peak on July 30 under Scenario 1, but under Scenario 4 or 7, the peak shifted to August 8–16. However, increasing VQ compliance to medium or high would push the peak day to August 30 and September 23.

For instance, the peak infection percentage in Gordon County increased from 0.58% to 0.62% from Scenario 1 to 4 and decreased from 0.62% to 0.59% from Scenario 4 to 7. Similar fluctuations can be observed in other urban and rural counties. The rural county of Webster had a peak percentage decrease from 0.42% to 0.40% from Scenario 1 to 4 and increase from 0.40% to 0.41% from Scenario 4 to 7. Increasing VQ compliance from

low to medium and from medium to high provided approximately 20% and 39% decrease, respectively, in peak infection percentage.

County level risk factors were calculated and are visualized in Fig B.

**Fig B. County level risk factor.** County level risk factor (left plot) and its multiplier (right plot) were derived by applying the principal component analysis on several factors known to impact a higher risk of complications and severe outcomes for COVID19 infections, including the prevalence of asthma, diabetes, obesity, smoking, cardiovascular disease and chronic conditions in general [18].

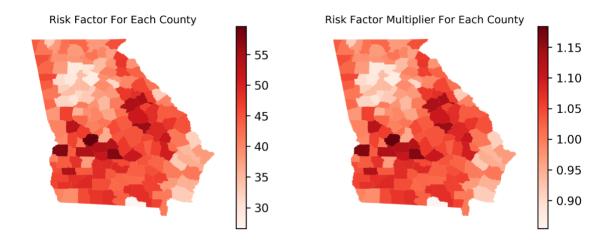


Table A. Peak day in each county.

County Name	NI	sc	1	2	3	4	5	6	7	8	9
	29-Apr	9-May	5-Aug	7-Sep	23-Sep	7-Aug	12-Sep	25-Sep	24-Aug	15-Sep	30-Sep
		10-May			25-Sep				30-Aug		
Bacon	27-Apr	14-May			29-Sep			25-Sep		_	29-Sep
Baker	30-Apr	8-May	7-Aug	20-Aug	4-Sep			28-Sep		28-Sep	27-Sep
Baldwin	28-Apr	7-May	6-Aug	4-Sep	30-Sep	24-Aug	13-Sep	25-Sep	30-Aug		
Banks	23-Apr	26-Apr	31-Jul	8-Sep	22-Sep	11-Aug	3-Sep	27-Sep	26-Aug	11-Sep	28-Sep
Barrow	17-Apr	24-Apr	26-Jul	25-Aug	23-Sep	5-Aug	24-Aug	30-Sep	14-Aug	4-Sep	29-Sep
Bartow	16-Apr	24-Apr	28-Jul	20-Aug	25-Sep	6-Aug	27-Aug	30-Sep	17-Aug	2-Sep	28-Sep
Ben Hill	30-Apr	2-May	30-Aug	2-Sep	24-Sep	3-Aug	19-Sep	20-Sep	31-Aug	29-Sep	24-Sep
Berrien	24-Apr	8-May	16-Aug	17-Aug	24-Sep	16-Aug	22-Sep	13-Sep	3-Sep	8-Sep	20-Sep
Bibb	22-Apr	30-Apr	7-Aug	31-Aug	30-Sep	18-Aug	9-Sep	30-Sep	18-Aug	20-Sep	30-Sep
Bleckley	23-Apr	26-Apr	7-Aug	19-Aug	28-Sep	19-Aug	16-Sep	29-Sep	18-Aug	14-Sep	12-Sep
Brantley	23-Apr	12-May	25-Jul	22-Aug	17-Sep	11-Aug	26-Aug	29-Sep	9-Sep	20-Sep	24-Sep
Brooks	1-May	28-Apr	26-Jul	18-Sep	22-Sep	7-Aug	7-Sep	28-Sep	20-Aug	27-Sep	30-Sep
Bryan	20-Apr	29-Apr	30-Jul	20-Aug	20-Sep	11-Aug	1-Sep	23-Sep	14-Aug	11-Sep	29-Sep
Bulloch	22-Apr	29-Apr	1-Aug	28-Aug	23-Sep	18-Aug	4-Sep	28-Sep	31-Aug	19-Sep	30-Sep
Burke	24-Apr	6-May	8-Aug	29-Aug	22-Sep	5-Aug	28-Aug	19-Sep	26-Aug	9-Sep	27-Sep
Butts	20-Apr	26-Apr	21-Jul	22-Aug	14-Sep	29-Jul	5-Sep	29-Sep	18-Aug	10-Sep	29-Sep
Calhoun	1-May	6-May	19-Aug	9-Sep	27-Sep	28-Aug	28-Sep	30-Sep	8-Sep	9-Sep	15-Sep
Camden	25-Apr	15-May	13-Jul	27-Aug	28-Sep	17-Aug	26-Sep	30-Sep	26-Aug	16-Sep	28-Sep
Candler	28-Apr	7-May	17-Aug	21-Aug	20-Sep	4-Sep	7-Sep	26-Sep	27-Aug	8-Sep	29-Sep
Carroll	18-Apr	28-Apr	27-Jul	15-Aug	28-Sep	6-Aug	5-Sep	26-Sep	21-Aug	7-Sep	29-Sep
Catoosa	24-Apr	4-May	7-Aug	24-Aug	26-Sep	15-Aug	15-Sep	30-Sep	23-Aug	14-Sep	29-Sep
Charlton	11-May	19-May	7-Aug	21-Aug	19-Sep	27-Aug	30-Sep	18-Sep	21-Aug	21-Sep	21-Sep
Chatham	18-Apr	28-Apr	4-Aug	30-Aug	30-Sep	12-Aug	6-Sep	27-Sep	19-Aug	14-Sep	30-Sep
Chattahoochee	30-Apr	14-May	6-Aug	14-Sep	28-Sep	13-Aug	25-Sep	23-Sep	2-Sep	20-Sep	25-Sep
Chattooga	21-Apr	1-May	4-Aug	29-Aug	26-Sep	17-Aug	11-Sep	22-Sep	21-Aug	20-Sep	29-Sep
Cherokee	17-Apr	24-Apr	27-Jul	21-Aug	22-Sep	3-Aug	28-Aug	28-Sep	13-Aug	6-Sep	30-Sep
Clarke	19-Apr	1-May	2-Aug	19-Aug	27-Sep	14-Aug	9-Sep	25-Sep	12-Aug	6-Sep	28-Sep
Clay	30-Apr	16-May	22-Aug	11-Sep	20-Sep	11-Sep	21-Sep	24-Sep	22-Sep	13-Sep	17-Aug
Clayton	16-Apr	23-Apr	22-Jul	16-Aug	18-Sep	2-Aug	30-Aug	28-Sep	14-Aug	7-Sep	30-Sep
Clinch	16-May	23-May	12-Aug	28-Aug	29-Sep	12-Aug	14-Sep	29-Sep	17-Aug	29-Sep	30-Sep
Cobb	18-Apr	22-Apr	26-Jul	20-Aug	27-Sep	1-Aug	24-Aug	29-Sep	13-Aug	6-Sep	29-Sep
Coffee	27-Apr	9-May	3-Aug	1-Sep	23-Sep	11-Aug	7-Sep	30-Sep	18-Aug	16-Sep	29-Sep
Colquitt	24-Apr	23-Apr	1-Aug	27-Aug	27-Sep	7-Aug	9-Sep	29-Sep	31-Aug	24-Sep	29-Sep
Columbia	20-Apr	7-May	1-Aug	4-Sep	25-Sep	15-Aug	1-Sep	28-Sep	17-Aug	17-Sep	30-Sep
Cook	23-Apr	30-Apr	10-Aug	24-Aug	30-Sep	24-Aug	29-Sep	28-Sep	27-Aug	17-Sep	29-Sep
Coweta	19-Apr	24-Apr	27-Jul	23-Aug	28-Sep	6-Aug	2-Sep	30-Sep	16-Aug	6-Sep	30-Sep
Crawford	24-Apr	27-Apr	3-Aug	4-Sep	25-Sep	14-Aug	1-Sep	30-Sep	25-Aug	1-Sep	29-Sep
Crisp	26-Apr	7-May	13-Aug	27-Aug	30-Sep	20-Aug	6-Sep	30-Sep	3-Sep	7-Sep	26-Sep
Dade	1-May	15-May	13-Aug	29-Aug	20-Sep	23-Aug	21-Sep	25-Sep	5-Sep	28-Sep	30-Sep
Dawson	21-Apr	25-Apr	23-Jul	21-Aug	28-Sep	7-Aug	31-Aug	16-Sep	18-Aug	7-Sep	25-Sep

Decatur	4-May	7-May	20-Aug	27-Aug	28-Sen	7-Aug	29-Sen	30-Sep	11-Aug	25-Sen	25-Sen
DeKalb	18-Apr							29-Sep			
Dodge	23-Apr							29-Sep			
Dooly	24-Apr							30-Sep			
Dougherty	22-Apr							27-Sep			
Douglas		22-Apr									
Early		10-May									
Echols	24-Apr				•			30-Sep			•
Effingham		25-Apr									
Elbert		8-May									
Emanuel	29-Apr							30-Sep			
Evans	28-Apr							29-Sep			
Fannin	30-Apr							22-Sep			
Fayette	•	23-Apr						30-Sep			
Floyd	22-Apr				25-Sep			27-Sep			
Forsyth		26-Apr						30-Sep			
Franklin	25-Apr			Ŭ				28-Sep		•	
Fulton		23-Apr									
Gilmer		29-Apr						27-Sep			
Glascock	29-Apr	•						30-Sep			
Glynn	23-Apr							30-Sep			
Gordon		28-Apr									
Grady	20-Apr							26-Sep			
Greene	26-Apr							20-Sep			
Gwinnett		22-Apr									
Habersham		26-Apr			18-Sep			28-Sep			
Hall		20-Apr						29-Sep			
Hancock	25-Apr							29-Sep			
Haralson	•	30-Apr						28-Sep			
Harris	22-Apr							29-Sep			
Hart		6-May									
Heard		28-Apr									
Henry		24-Apr						27-Sep			30-Sep
Houston		30-Apr									
Irwin								28-Sep			
Jackson		25-Apr									
Jasper	23-Apr	25-Apr	18-Jul	19-Aug	26-Sep	13-Aug	11-Sep	30-Sep	13-Aug	3-Sep	29-Sep
Jeff Davis	23-Apr				•			26-Sep	-	•	
Jefferson	•	13-May									
Jenkins	26-Apr				25-Sep			27-Sep			
Johnson	29-Apr		10-Aug					28-Sep			
Jones	21-Apr					11-Aug		29-Sep			
Lamar	23-Apr				23-Sep						26-Sep

Lanier	27-Apr	8-May	14-Aug	28-Aug	15-Sen	12-Aug	29-Sen	27-Sep	15-Aug	29-Sen	30-Sep
Laurens	29-Apr							27-Sep			
Lee	22-Apr							27-Sep			
Liberty	20-Apr	-				5-Aug		27-Sep			
Lincoln	27-Apr	•						30-Sep		Ŭ	•
Long	1	30-Apr						27-Sep			
Lowndes	· ·	30-Apr						30-Sep			
Lumpkin		25-Apr						24-Sep			
McDuffie	22-Apr							20-Sep			
McIntosh	25-Apr							25-Sep			
Macon	28-Apr							26-Sep			
Madison	20-Apr				•			18-Sep			
Marion	1	11-May									
Meriwether		5-May									
Miller		10-May									
Mitchell	27-Apr							27-Sep			
Monroe	21-Apr	30-Apr						27-Sep			
Montgomery	30-Apr	9-May	28-Jul	16-Aug	23-Sep	20-Aug	11-Sep	30-Sep	14-Aug	14-Sep	18-Sep
Morgan	25-Apr	2-May	30-Jul	23-Aug	29-Sep	11-Aug	6-Sep	30-Sep	20-Aug	22-Sep	15-Sep
Murray	18-Apr	2-May	1-Aug	25-Aug	12-Sep	11-Aug	7-Sep	21-Sep	12-Aug	10-Sep	14-Sep
Muscogee*	23-Apr	8-May	7-Aug	8-Sep	30-Sep	28-Aug	18-Sep	30-Sep	4-Sep	30-Sep	30-Sep
Newton	16-Apr	23-Apr	27-Jul	18-Aug	28-Sep	30-Jul	26-Aug	30-Sep	8-Aug	6-Sep	30-Sep
Oconee	21-Apr	30-Apr	31-Jul	18-Aug	23-Sep	18-Aug	3-Sep	25-Sep	17-Aug	6-Sep	30-Sep
Oglethorpe	23-Apr	30-Apr	3-Aug	20-Aug	28-Sep	17-Aug	27-Aug	28-Sep	11-Aug	7-Sep	25-Sep
Paulding	16-Apr	24-Apr	24-Jul	20-Aug	19-Sep	6-Aug	2-Sep	24-Sep	11-Aug	4-Sep	26-Sep
Peach	21-Apr	8-May	2-Aug	26-Aug	28-Sep	18-Aug	11-Sep	29-Sep	22-Aug	13-Sep	24-Sep
Pickens	22-Apr	24-Apr	30-Jul	26-Aug	28-Sep	6-Aug	7-Sep	29-Sep	17-Aug	8-Sep	19-Sep
Pierce	29-Apr	7-May	18-Aug	6-Sep	27-Sep	26-Aug	29-Aug	30-Sep	29-Aug	14-Sep	26-Sep
Pike	23-Apr	25-Apr	31-Jul	23-Aug	26-Sep	11-Aug	30-Aug	26-Sep	8-Aug	26-Aug	29-Sep
Polk	20-Apr	2-May	1-Aug	20-Aug	30-Sep	8-Aug	5-Sep	25-Sep	19-Aug	7-Sep	29-Sep
Pulaski	27-Apr	2-May	10-Aug	10-Sep	27-Sep	15-Aug	29-Aug	29-Sep	23-Aug	4-Sep	29-Sep
Putnam	27-Apr	4-May	5-Aug	8-Sep	28-Sep	17-Aug	1-Sep	26-Sep	18-Aug	9-Sep	30-Sep
Quitman	7-May	25-May	11-Aug	29-Aug	15-Sep	5-Sep	20-Sep	29-Sep	29-Aug	20-Sep	26-Aug
Rabun	1-May	4-May	6-Aug	29-Aug	29-Sep	26-Aug	28-Sep	25-Sep	24-Aug	30-Sep	24-Sep
Randolph	9-May	15-May	10-Sep	25-Sep	18-Sep	5-Sep	29-Sep	23-Sep	20-Sep	29-Sep	29-Aug
Richmond	22-Apr	7-May	3-Aug	29-Aug	30-Sep	10-Aug	8-Sep	30-Sep	18-Aug	17-Sep	29-Sep
Rockdale	17-Apr	26-Apr	28-Jul	19-Aug	27-Sep	6-Aug	31-Aug	28-Sep	12-Aug	8-Sep	28-Sep
Schley	25-Apr	7-May	12-Aug	28-Aug	7-Sep	24-Aug	1-Sep	21-Sep	11-Sep	26-Sep	28-Sep
Screven	26-Apr	5-May	10-Aug	19-Aug	19-Sep	8-Aug	24-Sep	27-Sep	23-Aug	29-Sep	26-Sep
Seminole	1-May	16-May	2-Sep	25-Aug	29-Sep	25-Aug	14-Sep	27-Sep	14-Sep	25-Sep	30-Sep
Spalding	18-Apr	26-Apr	23-Jul	19-Aug	27-Sep	12-Aug	4-Sep	30-Sep	17-Aug	4-Sep	29-Sep
Stephens	24-Apr	2-May	31-Jul	2-Sep	29-Sep	4-Aug	7-Sep	30-Sep	22-Aug	5-Sep	30-Sep
Stewart	29-Apr	17-May	13-Aug	19-Sep	28-Sep	19-Aug	6-Sep	30-Sep	26-Aug	26-Sep	26-Sep

0	00 4	0.14	40 4	00 4	00.0	07 4	40.0	00.0	04 4	40.0	00.0
Sumter	29-Apr				•				31-Aug		•
Talbot	27-Apr								23-Aug		
Taliaferro	•	30-Apr	Ŭ	•		Ŭ	•				•
Tattnall	•	26-Apr							26-Aug		
Taylor	29-Apr								25-Aug		
Telfair	29-Apr	30-Apr	12-Aug	12-Sep	30-Sep	14-Aug	22-Sep	22-Sep	23-Aug	17-Sep	28-Sep
Terrell	27-Apr	2-May	24-Aug	28-Aug	25-Sep	18-Aug	4-Sep	30-Sep	4-Sep	29-Sep	30-Sep
Thomas	24-Apr	28-Apr	5-Aug	8-Sep	29-Sep	11-Aug	19-Sep	28-Sep	1-Sep	29-Sep	29-Sep
Tift	26-Apr	7-May	16-Aug	17-Aug	29-Sep	28-Aug	6-Sep	27-Sep	2-Sep	11-Sep	27-Sep
Toombs	28-Apr	1-May	6-Aug	28-Aug	8-Sep	11-Aug	1-Sep	30-Sep	19-Aug	17-Sep	29-Sep
Towns	4-May	5-May	26-Aug	27-Sep	29-Sep	29-Aug	18-Aug	28-Sep	25-Aug	27-Sep	11-Sep
Treutlen	1-May	15-May	31-Jul	4-Sep	19-Sep	14-Aug	31-Aug	20-Sep	4-Sep	25-Sep	25-Sep
Troup	24-Apr	4-May	4-Aug	21-Aug	22-Sep	8-Aug	6-Sep	30-Sep	20-Aug	25-Sep	30-Sep
Turner	27-Apr	1-May	24-Aug	18-Aug	20-Sep	13-Aug	11-Sep	30-Sep	26-Aug	22-Sep	27-Sep
Twiggs	27-Apr	30-Apr	12-Aug	26-Aug	30-Sep	12-Aug	10-Sep	20-Sep	25-Aug	26-Sep	30-Sep
Union	4-May	5-May	12-Aug	31-Aug	22-Sep	21-Aug	5-Sep	30-Sep	22-Aug	6-Sep	26-Sep
Upson	26-Apr	2-May	6-Aug	21-Aug	25-Sep	10-Aug	19-Sep	29-Sep	24-Aug	21-Sep	29-Sep
Walker	22-Apr	30-Apr	16-Aug	31-Aug	29-Sep	19-Aug	19-Sep	30-Sep	29-Aug	17-Sep	30-Sep
Walton	17-Apr	25-Apr	26-Jul	19-Aug	30-Sep	3-Aug	2-Sep	30-Sep	12-Aug	8-Sep	27-Sep
Ware	28-Apr	9-May	2-Aug	30-Aug	29-Sep	12-Aug	28-Aug	29-Sep	1-Sep	26-Sep	29-Sep
Warren	2-May	10-May	26-Aug	22-Sep	28-Sep	6-Aug	12-Sep	29-Sep	23-Aug	23-Sep	26-Sep
Washington	3-May	9-May	13-Aug	15-Sep	25-Sep	30-Aug	19-Sep	24-Sep	1-Sep	8-Sep	30-Sep
Wayne	24-Apr	5-May	7-Aug	29-Aug	4-Sep	17-Aug	2-Sep	28-Sep	8-Aug	16-Sep	30-Sep
Webster	4-May	9-May	11-Aug	23-Sep	27-Sep	22-Aug	30-Aug	17-Sep	20-Aug	30-Sep	28-Sep
Wheeler	29-Apr	10-May	9-Aug	8-Sep	19-Sep	18-Aug	11-Sep	27-Sep	25-Aug	19-Sep	24-Sep
White	20-Apr	26-Apr	3-Aug	21-Aug	30-Sep	10-Aug	2-Sep	28-Sep	23-Aug	16-Sep	30-Sep
Whitfield	18-Apr	2-May							15-Aug		
Wilcox		•					11-Sep			25-Sep	•
Wilkes	•	10-May							26-Aug		•
Wilkinson		28-Apr				19-Aug			10-Aug		
Worth	•	27-Apr	Ŭ				•		7-Sep		

Peak day in each county in the State of Georgia under all scenarios tested with urban counties highlighted in gray.

Table B. Peak infection percentage in each county.

<b>County Name</b>	NI	SC	1	2	3	4	5	6	7	8	9
Appling	1.69	0.90	0.47	0.43	0.23	0.51	0.36	0.26	0.44	0.41	0.21
Atkinson	1.70	1.14	0.57	0.43	0.27	0.58	0.40	0.26	0.56	0.44	0.24
	1.65	1.00	0.53	0.41	0.25	0.55	0.42	0.23	0.53	0.44	0.24
Baker	1.52	1.11	0.50	0.40	0.30	0.48	0.47	0.29	0.40	0.37	0.24
Baldwin	1.49	1.03	0.51	0.34	0.27	0.46	0.37	0.22	0.45	0.39	0.25
Banks	1.82	1.15	0.64	0.47	0.28	0.57	0.47	0.29	0.52	0.43	0.29
Barrow	2.06	1.26	0.60	0.44	0.28	0.57	0.44	0.30	0.59	0.45	0.29
Bartow	1.91	1.23	0.59	0.43	0.31	0.57	0.43	0.31	0.57	0.44	0.27
Ben Hill	1.47	0.93	0.42	0.43	0.26	0.46	0.45	0.26	0.50	0.40	0.17
Berrien	1.65	0.97	0.44	0.48	0.23	0.47	0.36	0.24	0.41	0.43	0.19
Bibb	1.67	1.00	0.47	0.40	0.29	0.47	0.39	0.24	0.48	0.39	0.22
Bleckley	1.73	1.07	0.51	0.40	0.28	0.54	0.45	0.28	0.53	0.43	0.19
Brantley	1.55	0.99	0.55	0.43	0.24	0.50	0.39	0.24	0.45	0.44	0.22
Brooks	1.52	0.90	0.41	0.37	0.23	0.47	0.35	0.21	0.45	0.41	0.22
Bryan	1.94	1.05	0.54	0.47	0.29	0.49	0.45	0.29	0.51	0.41	0.24
Bulloch	1.72	1.18	0.56	0.38	0.34	0.52	0.46	0.28	0.53	0.46	0.26
Burke	1.72	1.09	0.50	0.42	0.33	0.49	0.38	0.28	0.48	0.47	0.22
Butts	1.97	1.33	0.64	0.43	0.31	0.64	0.45	0.30	0.52	0.45	0.28
Calhoun	1.58	1.08	0.49	0.40	0.34	0.53	0.45	0.25	0.47	0.41	0.17
Camden	1.54	1.03	0.51	0.43	0.25	0.47	0.45	0.29	0.44	0.43	0.22
Candler	1.73	1.09	0.50	0.45	0.35	0.48	0.44	0.24	0.52	0.45	0.24
Carroll	1.89	1.20	0.55	0.42	0.28	0.57	0.44	0.28	0.53	0.41	0.23
Catoosa	1.66	1.02	0.47	0.40	0.26	0.53	0.38	0.27	0.49	0.40	0.16
Charlton	1.28	0.99	0.57	0.47	0.23	0.44	0.35	0.28	0.57	0.40	0.24
Chatham	1.69	1.05	0.51	0.43	0.30	0.53	0.43	0.26	0.52	0.37	0.22
Chattahoochee	1.65	1.10	0.57	0.57	0.31	0.52	0.44	0.25	0.57	0.51	0.14
Chattooga	1.70	1.13	0.53	0.38	0.25	0.49	0.37	0.26	0.63	0.46	0.21
Cherokee	2.08	1.25	0.58	0.44	0.31	0.59	0.44	0.32	0.57	0.47	0.27
Clarke	1.86	1.16	0.53	0.43	0.29	0.52	0.39	0.29	0.58	0.42	0.26
Clay	1.08	0.84	0.41	0.22	0.24	0.47	0.39	0.20	0.44	0.29	0.17
Clayton	2.08	1.27	0.59	0.46	0.28	0.59	0.45	0.30	0.56	0.44	0.28
Clinch	1.43	0.77	0.48	0.28	0.16	0.43	0.35	0.15	0.37	0.29	0.18
Cobb	2.00	1.26	0.57	0.42	0.29	0.57	0.44	0.30	0.56	0.43	0.27
Coffee	1.60	1.01	0.45	0.43	0.27	0.49	0.46	0.23	0.52	0.35	0.21
Colquitt	1.55	0.94	0.48	0.37	0.24	0.44	0.34	0.22	0.49	0.41	0.20
Columbia	1.73	1.04	0.50	0.39	0.25	0.54	0.40	0.28	0.49	0.39	0.25
Cook	1.62	0.98	0.49	0.35	0.26	0.49	0.36	0.23	0.46	0.38	0.21
Coweta	1.94	1.24	0.57	0.44	0.31	0.61	0.46	0.30	0.54	0.44	0.28
Crawford	1.65	1.04	0.50	0.42	0.28	0.54	0.41	0.27	0.53	0.42	0.19
Crisp	1.57	0.92	0.50	0.37	0.22	0.45	0.37	0.21	0.45	0.37	0.27
Dade	1.41	0.87	0.35	0.33	0.22	0.44	0.41	0.13	0.45	0.33	0.16
Dawson	1.89	1.23	0.58	0.42	0.28	0.63	0.42	0.32	0.56	0.44	0.25

Decatur	1.31	0.90	0.45	0.39	0.26	0.44	0.29	0.23	0.40	0.35	0.16
DeKalb	1.94	1.25	0.57	0.43	0.28	0.56	0.43	0.29	0.54	0.42	0.27
Dodge	1.63	1.17	0.48	0.41	0.27	0.49	0.42	0.26	0.47	0.39	0.23
Dooly	1.51	1.05	0.62	0.48	0.24	0.50	0.48	0.30	0.48	0.43	0.23
Dougherty	1.57	0.95	0.43	0.30	0.25	0.43	0.38	0.22	0.42	0.38	0.20
Douglas	2.06	1.25	0.58	0.45	0.30	0.58	0.44	0.29	0.57	0.46	0.28
Early	1.27	0.87	0.43	0.29	0.16	0.38	0.33	0.19	0.34	0.31	0.18
Echols	1.86	1.17	0.57	0.52	0.37	0.61	0.46	0.28	0.57	0.53	0.24
Effingham	1.81	1.12	0.57	0.49	0.30	0.57	0.46	0.32	0.58	0.42	0.26
Elbert	1.42	0.98	0.51	0.37	0.34	0.46	0.36	0.18	0.52	0.39	0.21
Emanuel	1.53	0.93	0.56	0.38	0.20	0.47	0.36	0.19	0.54	0.50	0.19
Evans	1.86	1.17	0.50	0.43	0.35	0.54	0.50	0.24	0.52	0.42	0.26
Fannin	1.31	0.81	0.40	0.34	0.16	0.36	0.30	0.20	0.42	0.31	0.12
Fayette	1.91	1.22	0.56	0.43	0.30	0.58	0.43	0.27	0.53	0.43	0.26
Floyd	1.76	1.19	0.57	0.44	0.25	0.54	0.36	0.29	0.50	0.41	0.21
Forsyth	2.10	1.28	0.63	0.45	0.28	0.60	0.48	0.31	0.60	0.46	0.26
Franklin	1.59	1.02	0.51	0.42	0.30	0.48	0.37	0.26	0.59	0.45	0.18
Fulton	1.91	1.20	0.55	0.41	0.27	0.54	0.42	0.28	0.53	0.41	0.26
Gilmer	1.82	1.02	0.51	0.43	0.24	0.49	0.38	0.24	0.54	0.43	0.23
Glascock	1.84	1.08	0.66	0.43	0.32	0.41	0.39	0.23	0.51	0.42	0.30
Glynn	1.58	0.90	0.48	0.36	0.24	0.48	0.36	0.23	0.42	0.43	0.20
Gordon	1.87	1.23	0.58	0.41	0.35	0.62	0.45	0.35	0.59	0.45	0.26
Grady	1.53	0.90	0.44	0.34	0.23	0.46	0.37	0.19	0.46	0.35	0.22
Greene	1.42	0.81	0.46	0.33	0.19	0.33	0.25	0.16	0.42	0.32	0.16
Gwinnett	2.16	1.34	0.60	0.45	0.28	0.59	0.45	0.30	0.57	0.43	0.29
Habersham	1.80	1.11	0.51	0.39	0.26	0.52	0.41	0.26	0.54	0.43	0.23
Hall	1.94	1.24	0.54	0.38	0.29	0.54	0.46	0.30	0.54	0.43	0.29
Hancock	1.40	0.95	0.63	0.37	0.27	0.42	0.32	0.24	0.51	0.39	0.25
Haralson	1.74	1.34	0.55	0.50	0.35	0.57	0.44	0.25	0.57	0.47	0.27
Harris	1.51	0.96	0.46	0.41	0.27	0.47	0.38	0.22	0.44	0.39	0.19
Hart	1.58	0.99	0.51	0.37	0.27	0.45	0.38	0.27	0.56	0.38	0.19
Heard	1.81	1.15	0.48	0.46	0.28	0.60	0.50	0.33	0.56	0.42	0.26
Henry	2.12	1.31	0.62	0.44	0.30	0.59	0.45	0.28	0.58	0.46	0.29
Houston	1.74	1.11	0.52	0.42	0.28	0.54	0.44	0.28	0.53	0.46	0.23
Irwin	1.47	0.92	0.52	0.37	0.29	0.45	0.42	0.22	0.50	0.37	0.20
Jackson	2.05	1.18	0.58	0.44	0.31	0.56	0.46	0.28	0.56	0.41	0.25
Jasper	1.87	1.28	0.59	0.39	0.31	0.61	0.44	0.35	0.55	0.50	0.20
Jeff Davis	1.60	1.01	0.47	0.47	0.21	0.51	0.44	0.25	0.51	0.38	0.22
Jefferson	1.44	0.97	0.49	0.38	0.18	0.40	0.32	0.19	0.40	0.41	0.17
Jenkins	1.71	0.95	0.60	0.38	0.43	0.52	0.54	0.26	0.53	0.44	0.23
Johnson	1.43	0.98	0.55	0.42	0.22	0.47	0.34	0.23	0.49	0.48	0.16
Jones	1.71	1.11	0.58	0.41	0.30	0.50	0.42	0.31	0.56	0.43	0.27
Lamar	1.93	1.11	0.57	0.42	0.28	0.55	0.40	0.30	0.50	0.41	0.25

Lanier	1.62	1.15	0.47	0.43	0.23	0.53	0.41	0.27	0.52	0.43	0.26
Laurens	1.54	0.92	0.48	0.42	0.22	0.48	0.35	0.27	0.51	0.36	0.22
Lee	1.70	1.03	0.47	0.37	0.31	0.50	0.45	0.28	0.46	0.39	0.19
Liberty	1.92	1.22	0.62	0.51	0.32	0.59	0.44	0.29	0.58	0.45	0.27
Lincoln	1.34	0.84	0.52	0.40	0.18	0.47	0.43	0.27	0.52	0.43	0.20
Long	1.96	1.31	0.67	0.56	0.33	0.61	0.47	0.33	0.61	0.48	0.29
Lowndes	1.51	0.99	0.42	0.40	0.26	0.48	0.35	0.27	0.50	0.38	0.24
Lumpkin	1.75	1.16	0.51	0.46	0.31	0.65	0.43	0.33	0.51	0.47	0.28
McDuffie	1.60	0.99	0.45	0.37	0.25	0.46	0.43	0.23	0.52	0.42	0.27
McIntosh	1.44	1.03	0.55	0.44	0.25	0.49	0.43	0.23	0.45	0.43	0.21
Macon	1.37	1.04	0.55	0.43	0.26	0.47	0.41	0.26	0.40	0.40	0.25
Madison	1.76	1.11	0.55	0.46	0.29	0.51	0.42	0.29	0.61	0.43	0.26
Marion	1.60	0.94	0.58	0.37	0.29	0.45	0.41	0.22	0.41	0.39	0.19
Meriwether	1.77	1.08	0.51	0.40	0.26	0.48	0.41	0.28	0.49	0.44	0.22
Miller	1.21	0.84	0.38	0.32	0.17	0.33	0.32	0.20	0.44	0.34	0.17
Mitchell	1.52	0.93	0.49	0.39	0.24	0.46	0.39	0.21	0.48	0.40	0.17
Monroe	1.74	1.12	0.54	0.40	0.30	0.52	0.43	0.29	0.55	0.44	0.25
Montgomery	1.62	1.02	0.50	0.42	0.28	0.45	0.43	0.23	0.51	0.35	0.25
Morgan	1.72	1.03	0.53	0.45	0.24	0.57	0.39	0.25	0.50	0.41	0.23
Murray	1.78	1.22	0.61	0.47	0.32	0.60	0.44	0.31	0.56	0.47	0.23
Muscogee*	1.55	0.91	0.44	0.35	0.23	0.39	0.34	0.20	0.40	0.35	0.18
Newton	1.99	1.31	0.62	0.44	0.30	0.60	0.43	0.30	0.58	0.43	0.28
Oconee	1.99	1.14	0.55	0.43	0.33	0.56	0.43	0.31	0.62	0.46	0.26
Oglethorpe	1.60	1.07	0.60	0.40	0.31	0.52	0.41	0.26	0.54	0.36	0.27
Paulding	2.15	1.32	0.61	0.48	0.32	0.57	0.46	0.32	0.57	0.45	0.28
Peach	1.69	1.05	0.48	0.43	0.27	0.53	0.43	0.31	0.54	0.46	0.26
Pickens	1.85	1.16	0.58	0.45	0.26	0.54	0.39	0.31	0.51	0.42	0.21
Pierce	1.47	0.80	0.54	0.37	0.19	0.48	0.34	0.23	0.49	0.31	0.19
Pike	1.84	1.18	0.55	0.47	0.31	0.55	0.46	0.31	0.59	0.41	0.23
Polk	1.81	1.16	0.59	0.40	0.30	0.55	0.40	0.29	0.59	0.42	0.23
Pulaski	1.75	1.15	0.52	0.50	0.32	0.62	0.45	0.34	0.50	0.44	0.31
Putnam	1.56	0.96	0.49	0.39	0.26	0.43	0.40	0.26	0.49	0.40	0.23
Quitman	1.14	0.81	0.29	0.26	0.12	0.34	0.32	0.20	0.47	0.20	0.18
Rabun	1.30	0.83	0.40	0.30	0.19	0.44	0.29	0.21	0.34	0.29	0.14
Randolph	1.13	0.62	0.28	0.17	0.18	0.43	0.21	0.12	0.24	0.21	0.14
Richmond	1.59	1.00	0.46	0.39	0.28	0.49	0.37	0.26	0.48	0.37	0.23
Rockdale	2.04	1.35	0.59	0.44	0.29	0.59	0.46	0.31	0.56	0.44	0.29
Schley	1.52	0.99	0.43	0.47	0.22	0.62	0.40	0.30	0.49	0.44	0.29
Screven	1.68	0.96	0.48	0.40	0.31	0.51	0.53	0.20	0.51	0.35	0.20
Seminole	1.38	0.89	0.41	0.40	0.23	0.52	0.28	0.17	0.33	0.32	0.15
Spalding	1.84	1.17	0.57	0.46	0.29	0.50	0.41	0.30	0.56	0.44	0.24
Stephens	1.53	1.03	0.54	0.38	0.25	0.52	0.39	0.29	0.53	0.40	0.15
Stewart	1.47	1.06	0.61	0.49	0.20	0.52	0.34	0.23	0.44	0.37	0.16

Sumter	1.59	0.97	0.44	0.35	0.24	0.51	0.35	0.27	0.45	0.42	0.19
Talbot	1.43	1.01	0.44	0.37	0.24	0.46		0.27	0.43	0.42	0.19
							0.45				
Taliaferro	1.39	1.01	0.51	0.65	0.22	0.45	0.47	0.24	0.56	0.49	0.31
Tattnall	1.81	1.12	0.60	0.52	0.33	0.62	0.46	0.29	0.54	0.38	0.23
Taylor	1.63	1.13	0.50	0.48	0.24	0.53	0.39	0.26	0.45	0.45	0.17
Telfair	1.46	1.07	0.54	0.48	0.26	0.50	0.43	0.33	0.54	0.40	0.24
Terrell	1.49	0.90	0.47	0.35	0.27	0.48	0.41	0.20	0.50	0.36	0.19
Thomas	1.46	0.82	0.41	0.34	0.21	0.47	0.33	0.20	0.45	0.35	0.18
Tift	1.68	0.96	0.51	0.41	0.29	0.45	0.38	0.24	0.49	0.37	0.21
Toombs	1.49	0.95	0.52	0.42	0.19	0.43	0.36	0.26	0.51	0.35	0.19
Towns	1.08	0.67	0.26	0.30	0.16	0.37	0.18	0.08	0.31	0.30	0.13
Treutlen	1.37	0.92	0.52	0.42	0.24	0.50	0.38	0.26	0.66	0.40	0.23
Troup	1.69	1.07	0.49	0.41	0.26	0.52	0.41	0.24	0.50	0.45	0.19
Turner	1.60	1.14	0.57	0.42	0.23	0.53	0.45	0.25	0.51	0.45	0.23
Twiggs	1.58	1.08	0.51	0.44	0.31	0.52	0.47	0.26	0.58	0.47	0.21
Union	1.17	0.73	0.33	0.30	0.15	0.40	0.22	0.15	0.31	0.23	0.16
Upson	1.65	1.04	0.49	0.36	0.21	0.55	0.40	0.25	0.51	0.40	0.22
Walker	1.65	0.99	0.46	0.40	0.26	0.46	0.38	0.23	0.46	0.42	0.17
Walton	1.98	1.27	0.62	0.44	0.29	0.59	0.41	0.27	0.56	0.45	0.25
Ware	1.50	0.86	0.49	0.43	0.21	0.47	0.38	0.24	0.47	0.27	0.20
Warren	1.40	0.98	0.53	0.36	0.21	0.53	0.43	0.25	0.44	0.40	0.26
Washington	1.52	0.98	0.53	0.42	0.18	0.45	0.43	0.20	0.48	0.40	0.22
Wayne	1.69	1.06	0.50	0.46	0.29	0.58	0.43	0.30	0.48	0.43	0.26
Webster	1.26	0.87	0.42	0.41	0.27	0.40	0.37	0.31	0.41	0.38	0.24
Wheeler	1.71	1.20	0.58	0.53	0.25	0.56	0.48	0.26	0.48	0.48	0.29
White	1.65	1.06	0.46	0.40	0.28	0.56	0.44	0.30	0.54	0.38	0.25
Whitfield	1.79	1.21	0.59	0.42	0.29	0.57	0.43	0.31	0.55	0.43	0.22
Wilcox	1.57	1.02	0.52	0.46	0.23	0.50	0.40	0.24	0.49	0.39	0.22
Wilkes	1.31	0.74	0.38	0.33	0.14	0.36	0.31	0.21	0.48	0.33	0.14
Wilkinson	1.63	0.94	0.57	0.40	0.26	0.58	0.41	0.22	0.51	0.40	0.24
Worth	1.50	0.95	0.48	0.36	0.25	0.51	0.46	0.24	0.47	0.42	0.20

Peak infection percentage in each county in the State of Georgia under all scenarios tested with urban counties highlighted in gray.

#### References

- 1. U.S. Census Bureau. American Community Survey, 2017 American Community Survey 5-year Estimates. 2017.
- 2. The New York Times. Coronavirus (Covid-19) Data in the United States. The New York Times; 2020.
- 3. U.S. Census Bureau. Census Summary File 1. U.S. Census Bureau; 2010.
- 4. U.S. Census Bureau. Census Transportation Planning Products, 5-year data. U.S. Census Bureau; 2016.
- 5. Georgia Department of Public Health. Georgia Department of Public Health COVID-19 Daily Status Report 2020 [updated 14 April 2020; cited 2020 14 April 2020]. Available from: https://dph.georgia.gov/covid-19-daily-status-report.
- 6. Shi P, Keskinocak P, Swann JL, Lee BY. The impact of mass gatherings and holiday traveling on the course of an influenza pandemic: a computational model. BMC Public Health. 2010;10(1):778. Epub 2010/12/24. doi: 10.1186/1471-2458-10-778. PubMed PMID: 21176155; PubMed Central PMCID: PMCPMC3022852.
- 7. Ekici A, Keskinocak P, Swann JL. Modeling Influenza Pandemic and Planning Food Distribution. Manufacturing & Service Operations Management. 2014;16(1):11-27. doi: 10.1287/msom.2013.0460.
- 8. Li Z, Swann JL, Keskinocak P. Value of inventory information in allocating a limited supply of influenza vaccine during a pandemic. PLoS One. 2018;13(10):e0206293. doi: 10.1371/journal.pone.0206293.
- 9. CDC. COVID-19 Pandemic Planning Scenarios 2020 [5 June 2020]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/planning-scenarios.html.
- 10. CDC COVID-19 Response Team. Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) United States, February 12–March 16, 2020. Morbidity and Mortality Weekly Report (MMWR): CDC, 2020 18 March 2020. Report No.
- 11. U.S. Census Bureau. Methods of Apportionment 2019 [14 June 2020]. Available from: https://www.census.gov/history/www/reference/apportionment/methods\_of\_apportionment.html.
- 12. Georgia Department of Public Health. Regional healthcare coalitions 2018 [24 July 2020]. Available from: https://northcentralhealthdistrict.org/regional-healthcare-coalitions/.
- 13. The State of Georgia. Executive Order to Ensure a Safe & Healthy Georgia: The State of Georgia; 2020 [cited 2020 24 April 2020]. Available from: https://gov.georgia.gov/document/2020-executive-order/04022001/download.
- 14. Georgia Department of Economic Development. Governor Kemp's Statewide Executive Order: Guidelines for Businesses Georgia Department of Economic Development2020 [cited 2020 24 April 2020]. Available from: https://www.georgia.org/covid19bizguide.
- 15. StreetLight Data Inc. Understand the impact of COVID-19 on traffic, travel patterns, toll revenues and more [cited 2020]. Available from: https://www.streetlightdata.com/covid-transportation-metrics/.
- 16. CDC. Commercial Laboratory Seroprevalence Survey Data [Online]. 2020 [updated 26 June 2020]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/commercial-lab-surveys.html.
- 17. Weinberger DM, Chen J, Cohen T, Crawford FW, Mostashari F, Olson D, et al. Estimation of Excess Deaths Associated With the COVID-19 Pandemic in the United States, March to May 2020. JAMA Internal Medicine. 2020. doi: 10.1001/jamainternmed.2020.3391.
- 18. U.S. Census Bureau. Cartographic Boundary Files Shapefile. https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html 2018.