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# Hotbeds of Infection:

# How ICE Detention Contributed to the Spread of COVID-19 in the U.S.

# (Methodological Appendix)

Gregory Hooks
Department of Sociology
McMaster University
ghooks@mcmaster.ca

Companion report for *Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S.* (available through Detention Watch Network (https://www.detentionwatchnetwork.org/). This report provides details on measurement, methods, and estimation procedures.

I discussed these analyses and this report with Detention Watch Network staff (Bob Libal, Setareh Ghandehari, and Silky Shah) in June 2020. We discussed the likely community transmission of COVID-19 linked to immigrant detention facilities. We agreed that it was an important issue and that I would pursue research on this topic. I collaborated with Bob Libal in preparing *Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S.*. However, Gregory Hooks (and not Detention Watch Network) is solely responsible for the underlying statistical analyses[1] (and any errors or misinterpretations). This report complements *Hotbeds of Infection* by providing details on data sources, measurement decisions, analytic approach and statistical findings. This report is focused on methodological issues; *Hotbeds of Infection* provides detail on the implications of the findings and includes policy recommendations.

ICE detention facilities were uniquely vulnerable to the global COVID-19 pandemic. The US immigrant detention system has long been criticized. Experts have condemned it for violating international norms, placing the health of detained people and staff at risk, and eschewing community-based options while relying on restrictive and punitive detention. While these deficiencies predated 2016, the Trump Administration greatly expanded the detention system, promoted punitiveness, and degraded health and safety conditions.

Immigrant detention centers have been amongst the most-deadly of public institutions. The virus swept through these facilities, impacting at disproportionate rates detained people and those working in these facilities. But the virus did not stay within the confines of ICE detention centers. It rapidly spread in nearby communities and counties. As community transmission surged out of control in the spring and summer, counties with detention facilities (and nearby counties) endured even higher rates

***Counties and multicounty BEA areas***

Due to several advantages they offer, I selected counties as the unit of analysis. Counties cover the entire U.S. territory---therefore understanding dynamics at work at the county level provides insights into national trends. In addition, since counties are nested in states, the role of common factors such as institutional and political issues that affect counties belonging to different states can be assessed (Moller, Alderson and Nielsen 2009). Finally, county boundaries are relatively stable over time and, because data are compiled nationally by centralized agencies, data quality, and availability are greatly enhanced (Isserman et al. 2009).

These analyses also consider the relationship between ICE detention and COVID-19 spread at the level of multicounty BEA economic areas. Because the people who work in, provide services to, and otherwise interact with ICE facilities live and commute across a number of counties, infections linked to ICE facilities are *not* restricted to the counties in which a given facility is located. With commuting patterns being the primary criterion, more than 3,100 counties were sorted into 179 economic areas (Johnson and Cort 2004). The emphasis that BEA economic areas place on commuting makes these geographies well-suited for this analysis of "community spread" related to ICE detention across a multi-county area. Those who work in one county but live in another county are exposed to the novel coronavirus in more than one county, and if they become infected, they can infect people in more than one county. I use these economic areas to get more directly at the question of "community spread" from ICE facilities outward to neighboring counties.

[1] Stata (statistical software for data science, https://www.stata.com/) was employed for all data management and statistical analyses discussed in this report.

To focus on people detained by ICE across the multicounty BEA area, I excluded each county's own ICE detention population in the BEA-level analyses. That is, for each BEA economic area, I aggregated the number of people detained by ICE in every *other* county in the BEA area, but did *not* count those held in the county itself. Thus, the county-level analysis shows how a county's ICE population has contributed to its own COVID-19 caseload, while the BEA area-level analysis shows how the ICE detention activities in *other, nearby, economically-connected counties* may have contributed to the spread of COVID-19.

The main report, *Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S.,* provides an example. Specifically, the Farmville Detention Center[2] (located in Prince Edward County [Virginia]) and the Richmond {Virginia) BEA economic area (thirty-nine [39] counties) is used to highlight the relationship between counties and BEA areas.

***Did ICE detention facilities bring COVID-19 sooner and more severely?***

Data on COVID-19 cases are made available by the *New York Times*. Compiling data provided by state and local health officials, the *New York Times* (2020) has made available: "a series of data files with cumulative counts of coronavirus cases in the United States, at the state and county level, over time. [The *New York* Times collected] this time series data from state and local governments and health departments in an attempt to provide a complete record of the ongoing outbreak." These data are updated daily for each county, making it possible to examine several *unwanted* COVID-19 events:

*Presence:*

- One (1) or more cases (**April 1)**
- More than 1 case (**May 1)**

*Significant:*

- More than 15 cases (**May 1)**
- More than 100 cases (**May 1)**

*Serious outbreak:* More than 250 cases (**May 1)**
*Major outbreak:* More than 2,500 cases (**May 1)**

Logistic regression was employed to assess the degree to which ICE detention contributed to making these events more likely (net of other predictors). For an overview of logistic regression (see Pampel 2000; Statwing 2020).

U.S. Immigration and Customs Enforcement (2020, hereafter ICE) provided data on people detained. The 2010 Census (U.S. Census Bureau 2020) provided data on several control variables: the number of persons detained (in each county and in BEA area), black population, American Indian/Alaskan Native population, Hispanic population, residents of group quarters, and population density). The Robert Wood Johnson Foundation (2020) made available several county-level health indicators: adults *without* health insurance (percentage) and diabetes prevalence (for discussion of this data source and these measures in studies of COVID-19, see Chin *et al.* 2020). Table 1 provides information on the variables included in these analyses, including: data source, mean and standard deviation.

[2] Farmville Detention Center (FDC) website: https://ica-farmville.com/?page_id=43.

**Table 1**
**Information on Data Sources and Descriptive Statistics (3,139 counties)**

| Variable | Unit | Mean | Standard deviation | Source |
|---|---|---|---|---|
| Unwanted COVID-19 milestones (dependent measures) | Two possible values for each of the following milestones: | | | *New York Times* 2020 |
| | • Presence: at least one case as of **April 1st** | 0.697 | 0.459 | |
| | • Presence: more than one case as of **May 1st** | 0.840 | 0.366 | |
| | • Significant: more than 15 cases as of **May 1st** | 0.530 | 0.499 | |
| | • Significant: more than 100 cases as of **May 1st** | 0.230 | 0.421 | |
| | • Serious: more than 250 cases as of **May 1st** | 0.132 | 0.338 | |
| | • Major outbreak: more than 2,500 cases as of **May 1st** | 0.025 | 0.157 | |
| People detained by ICE in county (2020) | Two possible values: 1 if 2 or more people detained; 0 if 0 or 1 people detained | 0.050 | 0.218 | U.S. Immigration and Customs Enforcement 2020 |
| People detained by ICE in multicounty BEA economic area (2020) | Two possible values: 1 if more than 25 people detained; 0 if 25 or fewer people detained | 0.428 | 0.495 | U.S. Immigration and Customs Enforcement 2020 |
| Black population U.S. Census Bureau (2010) | Percent of total population | 8.889 | 14.505 | U.S. Census Bureau 2020 |
| Native American / Alaskan Native population (2010) | Percent of total population | 1.966 | 7.384 | U.S. Census Bureau 2020 |
| Hispanic population (2010) | Percent of total population | 8.292 | 13.197 | U.S. Census Bureau 2020 |
| Persons living in group quarters | Percent of total population | 3.403 | 4.430 | U.S. Census Bureau 2020 |
| Incarcerated persons in county (2010) | Six possible values:<br>1: 0 people (below 1st percentile)<br>2: 1-11 people (1-24th percentile)<br>3: 12-99 people (25th-49th percentile)<br>4: 100- 624 people (50th – 74th percentile)<br>5: 625-2,032 people (75th – 89th percentile) | 3.606 | 1.279 | U.S. Census Bureau 2020 |

| | | | | |
|---|---|---|---|---|
| | 6: more than 2,033 people (90th – 100th percentile) | | | |
| Incarcerated persons in multicounty BEA economic area (2010) | Six possible values:<br>1: 0-1,419 people (1-9th percentile)<br>2: 1,420-4,482 people (10th - 24th percentile)<br>3: 4,483-12,438 people (25th-49th percentile)<br>4: 12,439 – 24,419 people (50th – 74th percentile)<br>5: 24,420 – 41,148 people (75th – 89th percentile)<br>6: more than 41,148 people (90th – 100th percentile) | 3.503 | 1.432 | U.S. Census Bureau 2020 |
| Adults *without* health insurance (2017) | Percent of adult population | 13.279 | 6.083 | Robert Wood Johnson Foundation 2019 |
| Diabetes prevalence (2017) | Percent of population | 11.626 | 2.596 | Robert Wood Johnson Foundation 2019 |
| Population density (persons per square mile) | Natural log | 3.862 | 1,635 | U.S. Census Bureau 2020 |

Logistic regression models were estimated for each of the COVID-19 milestones. The results are summarized in Table 2 (next page).Because the focus is on the degree to which ICE detention increases the likelihood of unwanted COVID-19 events, Table 2 report odds ratios for independent variables (for guidance on interpreting odds ratios, see UCLA Statistical Consulting Group 2020).

**Table 2: Summary of Logistic Regression Analysis for Variables Predicting COVID-19 Events (odds ratio, 3,139 counties)**

| | Presence: > 0 (April 1) | Presence: > 2 (May 1) | Significant: > 15 cases (May 1) | Significant: > 100 cases (May 1) | Serious outbreak: > 250 cases (May 1) | Major outbreak: > 2,500 cases (May 1) |
|---|---|---|---|---|---|---|
| **People detained by ICE (county)** | 2.619** | 3.592* | 1.866* | 1.345 | 2.247** | 2.873* |
| **(dummy variable, see Table 1)** | (0.950) | (2.045) | (0.539) | (0.336) | (0.605) | (1.402) |
| **People detained by ICE (BEA)** | 1.047 | 0.910 | 1.512** | 1.486** | 1.450* | 4.431** |
| **(dummy variable, see Table 1)** | (0.119) | (0.129) | (0.184) | (0.219) | (0.270) | (0.207) |
| **Incarcerated persons (county)** | 1.729*** | 1.826*** | 1.965*** | 2.089*** | 2.530*** | 4.519*** |
| **(ordinal measure, see Table 1)** | (0.103) | (0.148) | (0.120) | (0.149) | (0.227) | (1.259) |
| **Incarcerated persons (BEA)** | 1.028 | 1.028 | 0.933 | 1.075 | 0.947 | 1.343# |
| **(ordinal measure, see Table 1)** | (0.045) | (0.056) | (0.044) | (0.061) | (0.067) | (0.218) |
| **African-American** | 1.043*** | 1.068*** | 1.068*** | 1.052*** | 1.038*** | 1.014 |
| **(percentage, 2010)** | (0.005) | (0.009) | (0.005) | (0.006) | (0.008) | (0.020) |
| **Hispanic** | 0.999 | 1.007 | 1.011* | 1.021** | 1.035*** | 1.065** |
| **(percentage, 2010)** | (0.005) | (0.006) | (0.005) | (0.007) | (0.008) | (0.023) |
| **Native Amer. / Alaskan Native** | 1.021** | 1.013# | 1.030*** | 1.055*** | 1.077*** | 0.312 |
| **(percentage, 2010)** | (0.006) | (0.007) | (0.008) | (0.010) | (0.011) | (0.243) |
| **Persons living in group quarters** | 0.887*** | 0.882*** | 0.860*** | 0.855*** | 0.818*** | 0.768# |
| **(percentage, 2010)** | (0.012) | (0.015) | (0.013) | (0.019) | (0.028) | (0.114) |
| **Adults *without* health insurance** | 0.997 | 1.002 | 1.001 | 0.977 | 0.942** | 0.809*** |
| **(percentage, 2017)** | (0.011) | (0.013) | (0.012) | (0.014) | (0.018) | (0.047) |
| **Diabetes prevalence** | 0.828*** | 0.785*** | 0.821*** | 0.778*** | 0.776*** | 0.968 |
| **(percentage, 2017)** | (0.020) | (0.024) | (0.021) | (0.027) | (0.035) | (0.123) |
| **Population density** | 2.238*** | 3.820*** | 3.738*** | 3.051*** | 2.778*** | 4.038*** |
| **(natural log, see Table 1)** | (0.128) | (0.291) | (0.252) | (0.210) | (0.222) | (0.944) |
| **Constant** | 0.173*** | 0.142*** | 0.007*** | 0.001*** | 0.001*** | 0.000*** |
| | (0.054) | (0.054) | (0.003) | (0.001) | (0.000) | (0.000) |
| | | | | | | |
| **Pseudo $R^2$** | 0.322 | 0.444 | 0.463 | 0.497 | 0.550 | 0.708 |

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$; # $P < 0.10$

For each independent measure, Table 2 reports the odds ratio, standard error, and statistical significance. As reported below the table, when the p-value is less than 0.001, there is less than 1 chance in 1,000 that this finding would occur by chance. If the p-value is less than 0.01, this would occur less often than 1 time in 100 (and so on). The odds-ratio estimates the impact of the independent measure in making the outcome of interest more likely. For example, consider the "people detained by ICE (county)" variable's impact on the likelihood of one or more cases confirmed by April 1st. The reported odds-ratio is 2.619 and the p-value is less than 0.01 (indicating that the variable is highly significant). When compared to a county with 1 or 0 persons detained by ICE, a county with two (2) pr more person detained was 261.9% more likely to have at least one case confirmed on April 1st. The "people detained by ICE (county)" variable is a dummy variable, with only two possible values. Interpreting continuous measures and categorical variables is more challenging but follows the same basic logic. The odds-ratio reported in Table 2 can be interpreted as the percentage change in the likelihood an event occurs. An odds-ratio above 1.00 (above 100%) suggests that this variable makes the event more likely; an odds ratio below 1.00 (less than 100%) indicates that the variable makes the event less likely. Additional steps were taken to assist interpretation; these are presented in Table 3 (see below).

In broad terms, the control variables performed as anticipated. Incarcerated persons (county) and population density were found to increase the likelihood of each of the COVID-19 milestones; persons living in group quarters decreased the likelihood of each of these milestones. With the exception of the most severe outbreak (more than 2,500 cases confirmed by May 1st), percent black population also heightened the risk of these unwanted events. The impacts of other controls were mixed. The percentage Hispanic and American Indian / Alaskan Native only had a statistically significant impact on several of these milestones, but these variables failed to attain statistical significance in several others. With the exception of the most severe outbreak (more than 2,500 cases), the number of incarcerated persons across the BEA area failed to attain statistical significance. Results for the several measures of health in the county were weak and inconsistent. Diabetes prevalence tended to make COVID-19 events *less* likely (odds ratio below 1.00), while percentage of adults without health insurance was linked to decreased likelihood of more serious COVID-19 events.

Net of these controls, it is clear than ICE detention facilities elevated the risk of unwanted COVID-19 events. For both the number of persons detained in the county and in the multicounty BEA economic area, increased the likelihood of these unwanted COVID-19 events. At the county-level, ICE detention increased the risk of each of the COVID-19 milestones (with the exception of more than 100 cases), including the most severe outbreaks (250 cases and 2,500 cases). For models in which ICE detention in the county achieved statistical significance, the odds-ratio ranged from 1.866 (more than 15 cases as of May 1st) to 3.592 (more than 2 cases as of May 1st). Stated otherwise, this indicates that ICE detention in a county nearly doubled the likelihood of COVID-19 events on the low end, i.e., 186.6% greater likelihood of having more than 15 cases (May 1st) and more than tripled the likelihood (359.2%) of having more than 2 cases (May 1st). For the other COVID-19 milestones estimated (Table 2), ICE detention increased the likelihood between 200% and 300%.

When the focus is on the impact of ICE detention in the BEA area, a similar, but less pronounced trend is in evidence. For this variable, the odds ratio was *not* statistically significant for measured focused on the early arrival of COVID-19 (at least one case as of April 1 and more than 2 cases as of May 2). However, ICE detention across the BEA area (more than 25 people detained) did place all counties in the BEA at heightened risk of more serious outbreaks as of May 1st. In three models (more than 15 cases, more than 100 cases, more than 250 cases), the odds-ratio ranged from 1.450 to 1,512 – suggestion that counties in a BEA area with high levels of Ice detention were roughly 150% more likely to have experienced these COVID-19 milestones. When the focus is on the most severe COVID-19 outbreak (more than 2,500 cases), the odds-ratio is 4.431. While relatively few counties endured an outbreak of such magnitude by May 1st, counties situated in BEA areas with high levels of ICE detention (more than 25 people detained), were more than 4 times more likely (443.1%) to be among these unfortunate enough to confront such a major outbreak.

While Table 2 is helpful in demonstrating that mass incarceration made COVID-19 outbreaks more likely, discussing this in terms of odds ratio is not intuitive (Social Science Computing Cooperative 2014). Results "can often be made more tangible by computing predicted or expected values for hypothetical or prototypical cases…. Such predictions are sometimes referred to as margins" (Williams 2012, pp. 308-09). To facilitate interpretation, the logistic regression estimates were used to calculate the marginal impact of ICE detention: all other variables in the model were held constant (at their respective means) and ICE detention was estimated. The results of these estimations are presented in Tables 3.

**Table 3**
**Marginal Impact of ICE Detention (in county and across BEA area) on COVID-19 Events (3,071 counties)**
**(likelihood of COVID-19 event when all other variables held constant, at their respective means)**

| | ICE detention in County | | ICE detention in Multicounty BEA area | |
|---|---|---|---|---|
| **COVID-19 milestones** | **Zero (0) or 1 person detained** | **More than 1 person detained** | **0 – 25 people detained** | **More than 25 people detained** |
| **Presence: 1 or more cases (April 1)** | 69.4% | 81.2% | N/A* | N/A* |
| **Presence: more than 2 cases (May 1)** | 79.6% | 89.1% | N/A* | N/A* |
| **Significant: more than 15 cases (May 1)** | 52.7% | 60.1% | 50.8% | 55.8% |
| **Significant: more than 100 cases (May 1)** | N/A* | N/A* | 21.4% | 24.7% |
| **Serious outbreak: more than 250 cases (May 1)** | 12.8% | 17.5% | 12.3% | 14.2% |
| **Major outbreak: more than 2,500 cases (May 1)** | 2.3% | 3.5% | 1.5% | 3.0% |

*Note:* These results are displayed in Figure 1 and Figure 2 in *Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S..*

* This variable did *not* achieve statistical significance in logistic regression estimates (see Table 2). For this reason, margins were not calculated.

Table 3 examines "scenarios" focused on ICE detention. For each scenario, a specified level of ICE detention is assumed; all other variables (see Table 2) are held constant at their respective means (an "average county"). The results are estimates of the percentage of counties that would experience a COVID-19 milestone. For example, if there were zero or 1 person detained in an "average county", we would expect that 69.4% would have confirmed at least one case of COVID-19 by April 1st. The likelihood goes up if ICE detained more than one person in the county: more than four-fifths (81.2%) of otherwise average counties would have at least one case by April 1st. The trends are comparable for each COVID-19 milestone (with the exception of "Major outbreak: more than 100 cases" where this variable did not attain statistical significance). For example, an otherwise "average" county with 2 or more persons are detained by ICE is nearly 5% more likely to have confirmed 250 or more cases by May 1st (17.5% vs. 12.8%).

Table 3 also reports margins for ICE detention across the multicounty BEA area (and not the county itself). As noted, BEA-level measures of ICE detention did *not* achieve statistical significance when focused on early presence of the disease (at least one case by April 1 and more than 2 case as of May 1st, see Table 2). For this reason, margins were not calculated. For the remaining milestones, BEA-level ICE detention heightened the risk for counties in the area. For example, roughly half (50.8%) of "average" county in a BEA area with little ICE detention (25 or fewer people detained) would expect more than 15 confirmed cases as of May 1st. However, an "average" county in a BEA area with higher levels of ICE detention (more than 25 people detained) were 5% more likely to have more than 15 cases (55.8%). Similar differences are in evidence for more severe outbreaks (more than 100 cases and more than 250 cases). An "average" county in a BEA with high levels of ICE detention was twice as likely (3.0% vs. 1.5%) to be confronting the most severe outbreak (more than 2,500 cases as of May 1st).

***Did ICE detention facilities contribute to higher COVID-19 caseloads?***

The examination of ICE detention's contribution to COVID-19 caseloads makes use of the same data sources (for the most part) but employs different estimation procedures. Using county-level data made publicly available by the *New York Times* (2020), I calculated the number COVID-19 cases confirmed between May 1st and August 1st (of 2020). As is common in health research, the dependent variable is *not* the absolute number of cases. Instead, it is the number of COVID-19 cases per 100,000 residents. Poisson regression was employed to estimate impacts on COVID-19 caseloads per 100,000 residents. When the dependent measure is a count (as it is in this case): "Poisson distributions represent an efficient method of estimating probabilities of events, particularly where the population size is large and the probability of an event is relatively low. This technique is often used with highly positively skewed distributions" (Osborne 2017, p. 283). In cases in which a dependent variable is not positively skewed and Poisson regression is not required, Poisson regression does *not* generate biased results. Rather, estimates based on Poisson regression converge with ordinary least squares regression (ibid.). Because studies of population health often rely on count data (comparable to the dependent variable in these analyses), health researchers frequently rely on Poisson regression (see, for example, Frome and Checkoway 1985; Population Health Methods [Columbia University] 2020).

Many of the same independent variables that were included in logistic regression models that estimated the likelihood of COVID-19 events (see above, Tables 1 and 2) were also used in these estimates. There are, however, several important differences. First, and most important, whereas a dummy variable was used to measure ICE detention for purposes of logistic regression (see above, Table 2), the actual number of people detained is employed for purposes of Poisson regression estimates. Second, both the county and BEA-level measure of mass incarceration are focused on the density of mass incarceration, i.e., the number of incarcerated persons per square mile. Third, preliminary models also provided evidence that the impact of mass incarceration is different in metro and nonmetro counties. In light of this preliminary finding, I created slope-dummy interaction terms (Yobero 2017), yielding the following four measures of mass incarceration:

- Incarcerated persons per square mile (***county***) if ***metro*** (0 if *nonmetro*)
- Incarcerated persons per square mile (***county***) if ***nonmetro*** (0 if *metro*)
- Incarcerated persons per square mile (***multicounty BEA area***) if ***metro*** (0 if *nonmetro*)
- Incarcerated persons per square mile (***multicounty BEA area***) if ***nonmetro*** (0 if *metro*).

Finally, it is likely that the state-level institutional context and public health response influences the spread of COVID-19. For this reason, state fixed effects (a dummy variable for each state is included in the model) are incorporated into the analysis to capture omitted information about state-wide factors such as public policies and pandemic mitigation efforts. Table 4 provides information on the variables included in these analyses, including: data source, mean and standard deviation.

**Table 4**
**Information on Data Sources and Descriptive Statistics**

| Variable | Unit | Mean | Standard deviation | Source |
|---|---|---|---|---|
| Confirmed cases of COVID-19 per 100,000 residents – May 1- August 1 (dependent measure)* | Cases per 100,000 residents | 514.835 | 767.135 | *New York Times* 2020 |
| Confirmed cases of COVID-19 per 100,000 residents – as of May 1st* | Cases per 100,000 residents | 21.663 | 58.856 | *New York Times* 2020 |
| People detained by ICE in county (2020) | Count | 13.116 | 119.335 | U.S. Immigration and Customs Enforcement 2020 |
| People detained by ICE in multicounty BEA economic area (2020) | Count | 245.599 | 548.525 | U.S. Immigration and Customs Enforcement 2020 |
| Incarcerated persons per square mile (***county***)-- ***metro*** | Incarcerated persons per square mile | 0.890 | 5.045 | U.S. Census Bureau 2020 |
| Incarcerated persons per square mile (***county***)-- ***nonmetro*** | Incarcerated persons per square mile | 0.382 | 1.317 | U.S. Census Bureau 2020 |
| Incarcerated persons per square mile ***(BEA economic area***) ***-- metro*** | Incarcerated persons per square mile | 0.461 | 0.846 | U.S. Census Bureau 2020 |
| Incarcerated persons per square mile ***(BEA economic area***) ***-- nonmetro*** | Incarcerated persons per square mile | 0.463 | 0.638 | U.S. Census Bureau 2020 |
| Black population U.S. Census Bureau (2010) | Percent of total population | 8.885 | 14.503 | U.S. Census Bureau 2020 |
| Native American / Alaskan Native population (2010) | Percent of total population | 1.965 | 7.382 | U.S. Census Bureau 2020 |
| Hispanic population (2010) | Percent of total population | 8.291 | 13.195 | U.S. Census Bureau 2020 |
| Asian-American population (2010) | Percent of total population | 1.374 | 2.812 | U.S. Census Bureau 2020 |

| | | | | |
|---|---|---|---|---|
| Population density | Persons per square mile | 259.281 | 1,724.937 | U.S. Census Bureau 2020 |
| Less than 9th grade education (2010) | Percent of adult population | 5.035 | 3.612 | U.S. Census Bureau 2020 |
| Non-citizens (2010) | Percent of population | 55.413 | 19.053 | U.S. Census Bureau 2020 |
| Residents of nursing homes (2010) | Count | 478.390 | 1307.910 | U.S. Census Bureau 2020 |
| Residents of group quarters (other than prisons, nursing homes, military bases and university dormitories) (2010) | Count | 24.356 | 104.117 | U.S. Census Bureau 2020 |
| Meatpacking plants experiencing severe COVID-19 outbreaks (county) | Dummy | 0.024 | 0.152 | Environmental Working Group 2020 |
| Meatpacking plants experiencing severe COVID-19 outbreaks (BEA economic area) | Dummy | 0.677 | 1.136 | Environmental Working Group 2020 |

*Note:* A dummy variable for each state was included in addition to the variables listed above.

*For several cities (New York City, Kansas City [Missouri], and Joplin [Missouri]), local authorities only provide COVID-19 information for the city. And, these cities spanned county boundaries. I distributed COVID-19 data to counties on the basis of population shares. This is not an ideal solution and, no doubt, introduced measurement imprecision.

As reported in Table 4, the 2010 Census (U.S. Census Bureau 2020) provides data for most sociodemographic measures (including the number of people incarcerated in each county and BEA area). News reports emphasized the frequency and severity of COVID-19 outbreaks at meatpacking plants. For this reason, making use of data compiled and shared by the Environmental Working Group, counties and BEA areas impacted by meatpacking plant outbreaks were identified (dummy variable). Table 4 does not include public health measures compiled and made available by the Robert Wood Johnson Foundation (2020). In preliminary models, a wide range of control variables – including these public health variables and other sociodemographic measures (e.g., poverty rate, median household income, etc.) were included. However, these models displayed high levels of collinearity. The control variables summarized in Table 5 were found to play a role in predicting COVID-19 caseloads (without collinearity).

**Table 5**
**Predicting Confirmed COVID-19 Cases (May 1 – August 1, 2020): Poisson Regression Model**
**(N= 3,114 counties, coefficient and standard error multiplied by 100 to improve readability)**

| | Coefficient / Standard Error |
|---|---|
| **Confirmed cases of COVID-19 per 100,000 residents – as of May 1st** | 0.014*** |
| | (0.000) |
| **People detained by ICE in county (2020)** | -0.004 |
| | (0.005) |
| **People detained by ICE in multicounty BEA economic area (2020)** | 0.006** |
| | (0.002) |
| **Incarcerated persons per square mile (*county*)--** *metro* | 0.330 |
| | (0.003) |
| **Incarcerated persons per square mile (*county*)--** *nonmetro* | 3.967*** |
| | (1.110) |
| **Incarcerated persons per square mile** *(BEA econ. area*) *-- metro* | 10.362*** |
| | (2.184) |
| **Incarcerated persons per square mile** *(BEA econ. area*) *-- nonmetro* | 7.351** |
| | (2.474) |
| **Black population U.S. Census Bureau (2010)** | 1.045*** |
| | (0.104) |
| **Native American / Alaskan Native population (2010)** | 1.212*** |
| | (0.229) |
| **Hispanic population (2010)** | 1.909*** |
| | (0.175) |
| **Asian-American population (2010)** | 2.013*** |
| | (0.603) |
| **Population density** | -0.003* |
| | (0.001) |
| **Less than 9th grade education (2010)** | 1.560*** |
| | (0.579) |
| **Non-citizens (2010)** | 0.483** |
| | (0.070) |
| **Residents of nursing homes (2010)** | 0.006*** |
| | (0.001) |
| **Residents of group quarters (other than prisons, nursing homes,** | -0.032** |
| **military bases and university dormitories) (2010)** | (0.011) |
| **Meatpacking plants experiencing severe COVID-19 outbreaks** | 21.211** |
| **(county)** | (6.140) |
| **Meatpacking plants experiencing severe COVID-19 outbreaks** | 4.467*** |
| **(BEA economic area)** | (1.183) |
| | |
| **Pseudo R-square** | 0.6212 |

*** P < 0.001; ** P < 0.01; * P < 0.05; # P < 0.10

In Poisson regression analysis, an influential case exerts an outsized influence on the estimation. In so doing, the estimation is distorted by the influential case, making it less accurate for remaining cases included in the model. Preliminary models were inspected for influential cases (focusing on the Cooks D statistic). A number of the least populated counties exerted an outsized influence on the estimates (for several counties, Cooks D was above 25 – and in one case above 100). Recall that the dependent measure is the number of cases per 100,000. As such, even a modest increase in COVID-19 cases for a county with a small population results in a dramatic spike in the dependent variable. Data on outbreaks at meatpacking plants (Environmental Working Group 2020) were incorporated into the analyses in an effort to address these problems. While doing so proved helpful, problems persisted. Recent reporting indicates that meatpacking plants are not the only factor leading to COVID-19 outbreaks in nonmetro counties. There have been outbreaks across a range of agricultural sectors, including canning and poultry facilities. Detailed county-level data on these outbreaks were *not* available when these analyses were conducted; it is recommended that future research attempt to include more fine-grained analyses of outbreaks in the agriculture and food processing sectors.

To reduce biases in the estimates, twenty-six (26) counties (Cooks D above 3) were dropped from the sample when generating the estimates presented in Table 6 (leaving 3,114 of 3,140 counties in the sample). The total population in counties dropped from the analysis tended to be quite low: half of these counties were home to fewer than 10,000 people; 35 counties had fewer than 75,000 people. However, likely reflecting the severe outbreak in the city and the reporting challenges for counties comprising New York City (see above), two of New York's boroughs (the Bronx and Manhattan) were also identified as influential cases and dropped from these analyses.

On the whole, control variables performed as anticipated (Table 5). That is, the following variables were found to be statistically significant and the impact was in the expected direction:

- Confirmed cases of COVID-19 per 100,000 residents – as of May 1st
- Black population U.S. Census Bureau (2010)
- Native American / Alaskan Native population (2010)
- Hispanic population (2010)
- Asian-American population (2010)
- Incarcerated persons per square mile (several measures, see Tables 4 and 5)
- Less than 9th grade education (2010)
- Non-citizens (2010)
- Residents of group quarters (other than prisons, nursing homes, military bases and university dormitories) (2010)
- Meatpacking plants experiencing severe COVID-19 outbreaks (county)
- Meatpacking plants experiencing severe COVID-19 outbreaks (BEA economic area)

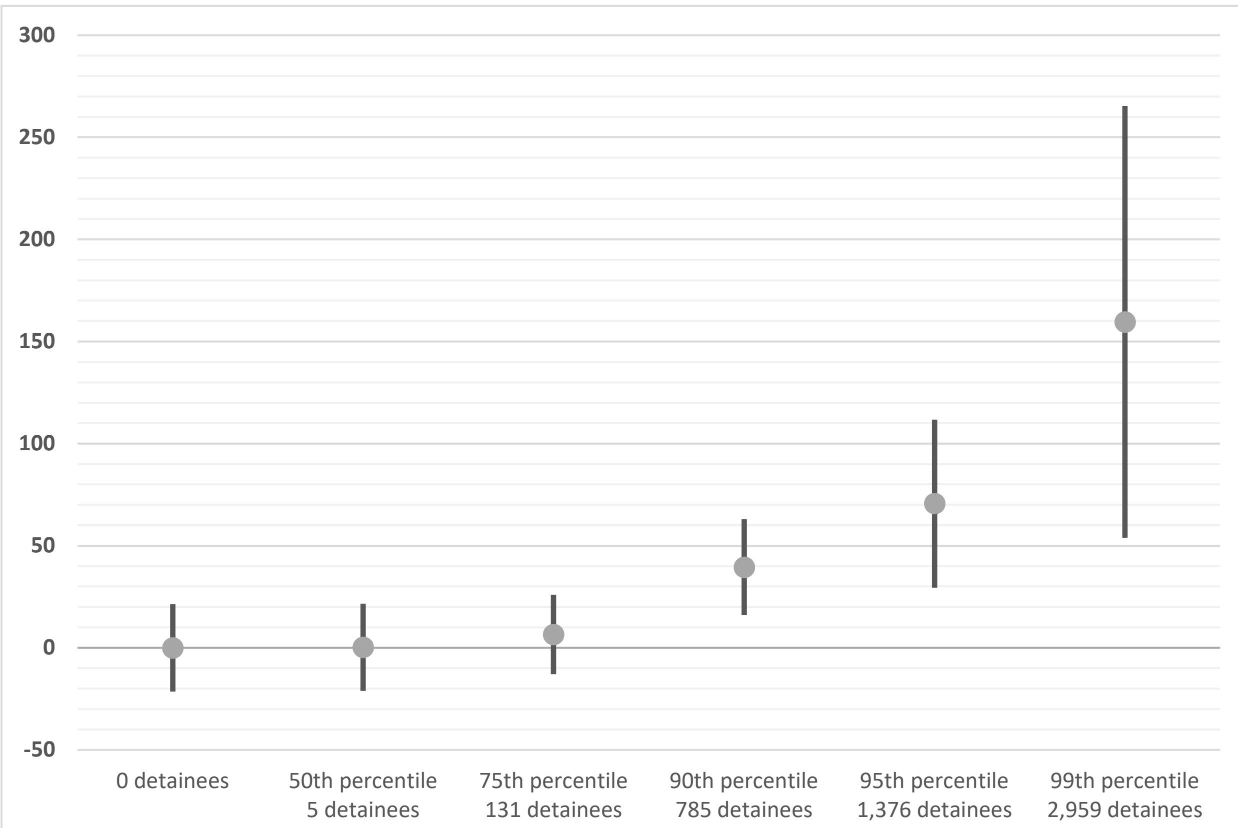
It was not anticipated that population density would be inversely (negative coefficient) and significantly linked to COVID-19 growth. This may reflect that in contrast to the initial wave, COVID-19 spread more rapidly outside of major metropolitan areas in the summer of 2020.

I now shift the focus to the independent variables of interest: the number of people detained by ICE (in the county and in the multicounty BEA area. The Poisson regression estimates *did not* provide evidence that ICE facilities impacted the growth of COVID-19 in the county in which they were located[3]. However,

[3] These analyses may understate the impact that ICE facilities. Preliminary models used an alternative measure: the number of people detained by ICE per square mile. Using this measure, there was evidence that ICE facilities had an impact on the growth of COVID-19 in the county. A decision was made to report results with a simple count of people detained by ICE on the grounds that the results are easier to interpret. As such, these

providing additional evidence that the callous mismanagement of ICE facilities contributed to community spread, these analyses did provide evidence that people detained by ICE across the multicounty BEA economic area contributed to higher rates of infection (see below, Figure 1; these data are also summarize in Table 1 of the companion report, *Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S.*).

Figure 1
Impact of ICE Detention Facilities across BEA Economic Areas:
Additional Cases of COVID-19 per 100,000 Residents
between May 1 and August 1, 2020 (3,114 counties)




* Figure 1 displays additional cases attributable to ICE facilities in the BEA economic area. The chart focuses on an "average" county, i.e., the mean was assumed for all variables in the Poisson regression model, except ICE detainees in the BEA area. If there were no (0) people detained in the BEA area, it is estimated that this "average" county confirmed 791 COVID-19 cases (per 100,000 residents) between May 1st and August 1st. Figure 1 displays the additional COVID-19 cases per 100,000 on top of this baseline as the number of people detained by Ice increases. The horizontal axis refers to the number of people in detention` in the multicounty BEA area.

results are based on a conservative (and not altogether plausible) assumption that ICE facilities did not lead to additional cases in the county in which they were located.

Figure 1 displays a point estimate (circle) and the upper and lower bound of the 95% confidence interval (vertical line), i.e., 95% of all cases will fall into this interval. Here, the focus is on the number of people in ICE detention across the larger BEA economic area (and not on the number of people detained in the county). Figure 1 displays the impact of ICE detention facilities relative to the baseline number of COVID-19 cases while holding other variables constant. That is, when all variable in the model are held constant (at their respective means) and there were no (0) people detained by ICE in the BEA area, 791 new cases per 100,000 were confirmed over the period.

Beginning at the left of Figure 1, counties in economic areas with relatively few people in ICE detention do not diverge significantly from the baseline estimate. In fact, at the $50^{th}$ percentile (5 persons detained in the BEA area), a county might expect a negligible increase (less than 1 additional case per 100,000 on top of the baseline estimate). However, as the detained population increases so does the severity of the COVID-19 outbreak. Counties in a BEA economic areas at the $75^{th}$ percentile (131 people detained) were expected to confirm approximately 8 additional cases per 100,000, and the caseload increased by 39 per 100,000 residents for counties at the $90^{th}$ percentile. The situation was worse still for counties in BEA areas at the $95^{th}$ percentile (1,376 people detained): 70 additional cases per 100,000 residents. At the extreme ($99^{th}$ percentile, 2,959 or more people detained in the economic area), it is estimated that the number of additional cases was more than 150 cases (per 100,000 residents) higher. As there are only a handful of counties at this $99^{th}$ percentile, the confidence interval (represented by the vertical bar in Figure 3) is quite broad. As a result, the number of additional cases for counties at the $99^{th}$ percentile could be as low as a 50 additional cases per 100,000 residents and as high as 265 more cases per 100,000 (on top of the baseline of 791 cases per 100,000 residents). In sum, we anticipated, and we found the ICE detention facilities contributed to a spike in COVID-19 cases over the summer of 2020.

Table 6 (next page) continues to focus on the interpretation of the Poisson regression estimation summarized in Table 5. Whereas Figure 1 presented hypothetical “average” counties, the attention shifts to tracking the experiences of several counties. In preparing *Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S.*, we used the Farmville Detention Center (FDC) located in the Richmond (Virginia) economic area as an example. The experiences of four counties in this BEA economic area are highlighted in Table 6. Two are metropolitan counties: Richmond City County and Caroline County; two are non-metropolitan counties: Prince Edward County and Brunswick County. Two counties had no ICE detainees (Richmond City and Brunswick County). One of the metro counties, Caroline County, is home to the Caroline County Detention Center, with an average population of 270.62 detained by ICE in 2020). The aforementioned Farmville Detention Center (605.30 people detained) is located in Prince Edward County (nonmetro).

**Table 6**
**Impact of ICE Detention on Confirmed COVID-19 Cases (May 1 – August 1)**
**Selected Counties, Richmond (Virginia) BEA Economic Area**

| | | People detained by ICE in: | | ICE detention's contribution to COVID-19 caseload (cases per 100,000 residents) | | | |
|---|---|---|---|---|---|---|---|
| **County** | **Popul-ation (2018)** | **County** | **BEA area (other than own county)** | **Persons detained in BEA area (a)** | **All other causes (b)** | **Total cases per 100K a + b** | **Additional cases: ICE detention[b]** |
| **Caroline (metro)** | 30,184 | 270.62 | 605.30 | 28.88 (3.7%) | 753.71 (96.3%) | 782.59 (100%) | 8.72 |
| **Richmond City (metro)** | 223,787 | 0 | 875.93 | 66.95 (5.3%) | 1,197.51 (94.7%) | 1,264.47 (100%) | 149.83 |
| **Prince Edward (nonmetro)** | 22,956 | 605.30 | 270.62 | 15.86 (1.7%) | 935.41 (98.3%) | 951.27 (100%) | 3.64 |
| **Brunswick (nonmetro)** | 16,665 | 0 | 875.93 | 67.70 (5.3%) | 1,210.79 (94.7%) | 1,278.49 (100%) | 11.28 |

[a] Recall (see Table 5) that Poisson regression estimation did *not* find a statistically significant relationship between persons detained by ICE in the county and COVID-19 caseloads. For this reason, the number of people detained by ICE in counties was *ignored* when calculating the contribution of ICE detention to COVID-19 caseloads.

[b] In the Poisson regression estimation, the dependent measure is COVID-19 cases per 100,000 residents. To calculate the number of additional cases due to ICE detention, the population of the county must be considered: cases per 100,000 * (population / 100,000):

- Caroline: 28.88 * (30,184 / 100,000) = 8.72
- Richmond City: 66.95 * (223,787 / 100,000) = 149.83
- Prince Edward: 15.86 * (22,956 / 100,000) = 3.64
- Brunswick: 67.70 * (16,665 / 100,000) = 11.28

Table 6 highlights the implications of the central findings presented in Table 5: ICE detention in a county did not exert a statistically significant influence on the COVID-19 caseload; but ICE detention in larger BEA area did increase community transmission. ICE detention's contribution to community spread is uneven across counties. Because ICE detained 975.93 (average daily population in 2020) in the Richmond BEA area, immigrant detention contributed to heightened COVID-19 caseloads in each of the four counties. In Table 6, the counties *with* ICE detention facilities (Caroline and Prince Edward Counties) absorbed relatively few additional cases. However, counties in the same BEA – *without* an ICE detention facility (Richmond City and Brunswick) – faced a heightened risk. This finding is counterintuitive. Future research can and should examine if and how ICE detention facilities continued to place the counties in which they were located at higher risk. For now, taking the findings summarized in Table 5 at face value. It may be the case that by the summer of 2020, the community transmission linked to COVID-19 outbreaks in ICE facilities had largely played out in the host counties. However, the community transmission of COVID-19 continued to diffuse outward over the summer months – impacting nearby counties.

*Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S.* closes by reporting the total number of COVID-19 cases in states, BEA economic areas, and nation. These estimates were based on the calculations reported here. That is, Table 6 shows the manner in which the Poisson regression estimation (summarized in Table 5) was used to estimate the impact of ICE detention on specific counties. These calculations were performed for every county in the United States. The results were aggregated to the states (see Appendix 1 for listing of all states and the District of Colombia) and the multicounty BEA areas (see Appendix 2 for a listing of all 179 BEA areas). They were also aggregated to the national level. As of August 1st, the United States had confirmed 4,456,389 cases of COVID-19 (World Health Organization 2020). Based on the Poisson regression model reported here, I estimate that 245,581 COVID-19 cases in the United States (5.5%) are linked to immigrant detention facilities.

***Conclusion***

The conclusion of the companion report (*Hotbeds of Infection: How ICE Detention Contributed to the Spread of COVID-19 in the U.S.*) comments on the social and political implications of these findings, and this discussion will not be repeated here. The conclusion to this methodological report will be brief, and the focus will stay close to estimation decisions and their implications.

These is reason to believe that the estimations presented here should be seen as lower-bound estimates. That is, efforts were made to avoid overstating the impact of ICE detention. As noted, the Poisson regression estimates did *not* find a statistically significant relationship between ICE detention in a county and COVID-19 cases. For this reason, when calculating the overall impact of immigrant detention on COVID-19 caseloads, it was assumed that ICE facilities in a county had no impact. This finding is surprising – and in important respects – counterintuitive. However, given the findings reported in Table 5, I believe that this is the appropriate decision. Future research can and should take steps to address influential cases and the surprising finding that the number of persons detained in a county does not influence the spread of COVID-19. Doing so, might provide evidence that this report has understated the impact of mass incarceration on the spread of COVID-19.

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**Appendix 1**
**Impact of ICE Detention on States (50 states and District of Colombia)**
**Ranked by Net Additional Cases of COVID-19 Confirmed (May 1- August 1)**

| Rank | State | Net additional cases | Total population | Net additional cases per 100,000 residents |
|---|---|---|---|---|
| **1** | California | 111,415.9 | 39,148,760 | 284.6 |
| **2** | Texas | 35,564.4 | 27,885,196 | 127.5 |
| **3** | Arizona | 28,793.7 | 6,946,685 | 414.5 |
| **4** | Florida | 19,906.5 | 20,598,140 | 96.6 |
| **5** | New York | 11,429.9 | 19,618,452 | 58.3 |
| **6** | Illinois | 10,840.3 | 12,821,497 | 84.5 |
| **7** | New Jersey | 5,305.8 | 8,881,845 | 59.7 |
| **8** | Louisiana | 4,866.7 | 4,663,616 | 104.4 |
| **9** | Mississippi | 3,006.8 | 2,988,762 | 100.6 |
| **10** | Washington | 1,673.5 | 7,294,336 | 22.9 |
| **11** | Massachusetts | 1,601.1 | 6,830,193 | 23.4 |
| **12** | Connecticut | 1,501.3 | 3,581,504 | 41.9 |
| **13** | Georgia | 1,232.3 | 10,297,484 | 12.0 |
| **14** | Colorado | 1,129.4 | 5,531,141 | 20.4 |
| **15** | Minnesota | 990.9 | 5,527,358 | 17.9 |
| **16** | Virginia | 983.2 | 8,413,774 | 11.7 |
| **17** | Pennsylvania | 793.4 | 12,791,181 | 6.2 |
| **18** | Alabama | 792.0 | 4,864,680 | 16.3 |
| **19** | New Mexico | 441.9 | 2,092,434 | 21.1 |
| **20** | Tennessee | 406.7 | 6,651,089 | 6.1 |
| **21** | Indiana | 370.4 | 6,637,426 | 5.6 |
| **22** | Michigan | 333.6 | 9,957,488 | 3.3 |
| **23** | Maryland | 326.2 | 6,003,435 | 5.4 |
| **24** | Nevada | 290.0 | 2,922,849 | 9.9 |
| **25** | Rhode Island | 268.9 | 1,056,611 | 25.4 |
| **26** | Ohio | 259.0 | 11,641,879 | 2.2 |
| **27** | Wisconsin | 218.8 | 5,778,394 | 3.8 |
| **28** | Oklahoma | 172.9 | 3,918,137 | 4.4 |
| **29** | Washington, DC | 101.3 | 684,498 | 14.8 |
| **30** | New Hampshire | 101.1 | 1,343,622 | 7.5 |
| **31** | Missouri | 68.9 | 6,090,062 | 1.1 |
| **32** | Utah | 66.7 | 3,045,350 | 2.2 |
| **33** | Iowa | 66.7 | 3,132,499 | 2.1 |
| **34** | Kansas | 58.4 | 2,908,776 | 2.0 |
| **35** | Delaware | 48.9 | 949,495 | 5.1 |
| **36** | Arkansas | 36.8 | 2,990,671 | 1.2 |

Appendix 1 – Impact of ICE Detention on States

| **Rank** | State | Net additional cases | Total population | Net additional cases per 100,000 residents |
|---|---|---|---|---|
| **37** | Kentucky | 30.8 | 4,440,204 | 0.7 |
| **38** | Wyoming | 29.9 | 581,836 | 5.1 |
| **39** | Oregon | 15.7 | 4,081,943 | 0.4 |
| **40** | Nebraska | 15.4 | 1,904,760 | 0.8 |
| **41** | South Carolina | 7.6 | 4,955,925 | 0.2 |
| **42** | Vermont | 5.3 | 624,977 | 0.8 |
| **43** | West Virginia | 4.3 | 1,829,054 | 0.2 |
| **44** | South Dakota | 3.6 | 849,954 | 0.4 |
| **45** | Idaho | 2.0 | 1,687,809 | 0.1 |
| **46** | North Carolina | 1.6 | 10,155,624 | 0.0 |
| **47** | North Dakota | 0.1 | 752,201 | 0.0 |
| **48** | Maine | 0.0 | 1,332,813 | 0.0 |
| **49** | Montana | 0.0 | 1,041,732 | 0.0 |
| **50** | Alaska | 0.0 | 730,318 | 0.0 |
| **51** | Hawaii | 0.0 | 1,422,029 | 0.0 |

**Appendix 2**
**Impact of ICE Detention on BEA Economic Areas (179 BEA Economic Areas)**
**Ranked by Net Additional Cases of COVID-19 Confirmed (May 1- August 1)**

| Rank | BEA Economic Area | Net additional cases | Total population | Additional cases per 100,000 residents |
|---|---|---|---|---|
| 1 | Los Angeles-Long Beach-Riverside, CA | 112,563.34 | 20,678,296 | 544.35 |
| 2 | Phoenix-Mesa-Scottsdale, AZ | 27,549.25 | 5,260,048 | 523.75 |
| 3 | New York-Newark-Bridgeport,NY-NJ-CT-PA | 18,524.92 | 23,602,788 | 78.49 |
| 4 | Miami-Fort Lauderdale-Miami Beach, FL | 18,165.58 | 6,855,487 | 264.98 |
| 5 | Houston-Baytown-Huntsville, TX | 13,186.97 | 7,809,735 | 168.85 |
| 6 | Chicago-Naperville-Michigan City, IL-IN-WI | 11,137.79 | 10,457,692 | 106.50 |
| 7 | San Antonio, TX | 8,871.77 | 2,736,961 | 324.15 |
| 8 | Dallas-Fort Worth, TX | 6,931.79 | 8,892,231 | 77.95 |
| 9 | McAllen-Edinburg-Pharr, TX | 4,390.97 | 1,356,787 | 323.63 |
| 10 | Lafayette-Acadiana, LA | 3,503.81 | 867,513 | 403.89 |
| 11 | Jackson-Yazoo City, MS | 3,055.79 | 1,661,397 | 183.93 |
| 12 | Boston-Worcester-Manchester, MA-NH | 1,969.20 | 8,594,883 | 22.91 |
| 13 | Jacksonville, FL | 1,871.67 | 1,884,231 | 99.33 |
| 14 | Seattle-Tacoma-Olympia, WA | 1,670.95 | 5,168,694 | 32.33 |
| 15 | El Paso, TX | 1,257.71 | 1,208,018 | 104.11 |
| 16 | Denver-Aurora-Boulder, CO | 1,155.67 | 4,558,349 | 25.35 |
| 17 | Minneapolis-St. Paul-St. Cloud, MN-WI | 1,047.85 | 5,533,996 | 18.93 |
| 18 | Richmond, VA | 825.03 | 1,745,675 | 47.26 |
| 19 | Shreveport-Bossier City-Minden, LA | 814.37 | 557,323 | 146.12 |
| 20 | Columbus-Auburn-Opelika, GA-AL | 771.65 | 494,720 | 155.98 |
| 21 | Washington-Baltimore-Northern Virginia, DC-MD-VA- WV | 575.79 | 10,040,033 | 5.73 |
| 22 | Austin-Round Rock, TX | 543.27 | 2,181,797 | 24.90 |
| 23 | Albany, GA | 523.11 | 607,225 | 86.15 |
| 24 | Memphis,TN-MS-AR | 518.79 | 2,047,494 | 25.34 |
| 25 | Monroe-Bastrop,LA | 427.11 | 337,021 | 126.73 |
| 26 | Corpus Christi-Kingsville, TX | 406.92 | 888,458 | 45.80 |
| 27 | Las Vegas-Paradise-Pahrump, NV | 392.53 | 2,614,169 | 15.02 |
| 28 | Detroit-Warren-Flint, MI | 267.43 | 6,837,098 | 3.91 |
| 29 | Huntsville-Decatur, AL | 256.66 | 1,136,616 | 22.58 |

Appendix 2 – Impact of ICE Detention on BEA Economic Areas

| Rank | BEA Economic Area | Net additional cases | Total population | Additional cases per 100,000 residents |
|---|---|---|---|---|
| 30 | Harrisburg-Carlisle-Lebanon, PA | 227.63 | 2,231,844 | 10.20 |
| 31 | Atlanta-Sandy Springs-Gainesville, GA-AL | 199.62 | 8,014,119 | 2.49 |
| 32 | Sacramento-Arden-Arcade-Truckee, CA-NV | 189.73 | 2,925,434 | 6.49 |
| 33 | Philadelphia-Camden-Vineland, PA-NJ-DE-MD | 187.79 | 7,145,289 | 2.63 |
| 34 | Cincinnati-Middletown-Wilmington, OH-KY-IN | 159.55 | 2,392,211 | 6.67 |
| 35 | Tulsa-Bartlesville, OK | 143.47 | 1,402,716 | 10.23 |
| 36 | Killeen-Temple Fort Hood, TX | 132.65 | 747,217 | 17.75 |
| 37 | Milwaukee-Racine-Waukesha, WI | 128.74 | 2,362,430 | 5.45 |
| 38 | Albuquerque, NM | 121.01 | 953,990 | 12.68 |
| 39 | Rochester-Batavia-Seneca Falls, NY | 97.30 | 1,517,322 | 6.41 |
| 40 | Indianapolis-Anderson-Columbus, IN | 90.99 | 3,556,695 | 2.56 |
| 41 | Cleveland-Akron-Elyria, OH | 85.56 | 4,533,215 | 1.89 |
| 42 | Grand Rapids-Muskegon-Holland, MI | 64.97 | 1,992,050 | 3.26 |
| 43 | Des Moines-Newton-Pella, IA | 61.31 | 1,316,289 | 4.66 |
| 44 | Tallahassee, FL | 45.12 | 543,410 | 8.30 |
| 45 | St. Louis-St. Charles-Farmington, MO-IL | 39.20 | 3,388,001 | 1.16 |
| 46 | Wichita-Winfield, KS | 37.79 | 1,085,754 | 3.48 |
| 47 | Dover, DE | 37.42 | 618,534 | 6.05 |
| 48 | Columbus-Marion-Chillicothe, OH | 35.35 | 2,850,691 | 1.24 |
| 49 | Lake Charles-Jennings, LA | 30.35 | 351,954 | 8.62 |
| 50 | Salt Lake City-Ogden-Clearfield, UT | 27.11 | 2,836,584 | 0.96 |
| 51 | San Angelo, TX | 26.04 | 150,631 | 17.29 |
| 52 | Kansas City-Overland Park-Kansas City, MO-KS | 25.85 | 2,741,889 | 0.94 |
| 53 | Portland-Vancouver-Beaverton, OR-WA | 18.25 | 3,341,379 | 0.55 |
| 54 | Tampa-St. Petersburg-Clearwater, FL | 17.60 | 3,030,047 | 0.58 |
| 55 | Hartford-West Hartford-Willimantic, CT | 17.50 | 2,295,996 | 0.76 |
| 56 | New Orleans-Metairie-Bogalusa, LA | 15.49 | 1,706,546 | 0.91 |
| 57 | Toledo-Fremont,OH | 14.43 | 979,303 | 1.47 |
| 58 | Sarasota-Bradenton-Venice, FL | 13.76 | 2,081,951 | 0.66 |
| 59 | Cape Girardeau-Jackson, MO-IL | 12.46 | 297,625 | 4.19 |
| 60 | Orlando-The Villages, FL | 12.35 | 5,072,299 | 0.24 |

Appendix 2 – Impact of ICE Detention on BEA Economic Areas

| Rank | BEA Economic Area | Net additional cases | Total population | Additional cases per 100,000 residents |
|---|---|---|---|---|
| **61** | Omaha-Council Bluffs-Fremont, NE-IA | 11.33 | 1,115,584 | 1.02 |
| **62** | Topeka, KS | 10.99 | 479,039 | 2.29 |
| **63** | Abilene, TX | 8.41 | 229,642 | 3.66 |
| **64** | Kearney, NE | 7.39 | 328,178 | 2.25 |
| **65** | Columbia, MO | 7.32 | 519,968 | 1.41 |
| **66** | Charleston-North Charleston, SC | 4.42 | 796,815 | 0.55 |
| **67** | State College, PA | 3.82 | 794,772 | 0.48 |
| **68** | Springfield, MO | 3.73 | 1,040,357 | 0.36 |
| **69** | Colorado Springs, CO | 3.52 | 779,130 | 0.45 |
| **70** | Mobile-Daphne-Fairhope, AL | 2.78 | 765,497 | 0.36 |
| **71** | Columbia-Newberry, SC | 2.19 | 1,116,404 | 0.20 |
| **72** | Louisville-Elizabethtown-Sconsburg, KY-IN | 2.16 | 1,656,018 | 0.13 |
| **73** | Little Rock-North Little Rock-Pine Bluff, AR | 1.55 | 1,572,035 | 0.10 |
| **74** | Syracuse-Auburn, NY | 1.47 | 1,994,448 | 0.07 |
| **75** | Marinette, WI-MI | 1.47 | 327,294 | 0.45 |
| **76** | Cedar Rapids, IA | 1.38 | 536,484 | 0.26 |
| **77** | Reno-Sparks, NV | 1.16 | 736,401 | 0.16 |
| **78** | Boise City-Nampa, ID | 1.12 | 798,302 | 0.14 |
| **79** | Oklahoma City-Shawnee, OK | 1.11 | 2,192,918 | 0.05 |
| **80** | Charlotte-Gastonia-Salisbury, NC-SC | 1.09 | 3,179,708 | 0.03 |
| **81** | Myrtle Beach-Conway-Georgetown, SC | 1.07 | 1,148,965 | 0.09 |
| **82** | Montgomery-Alexander City, AL | 0.99 | 552,240 | 0.18 |
| **83** | Pittsburgh-New Castle, PA | 0.86 | 2,850,837 | 0.03 |
| **84** | Charleston, WV | 0.85 | 1,163,888 | 0.07 |
| **85** | Lexington-Fayette-Frankfort-Richmond, KY | 0.76 | 1,555,777 | 0.05 |
| **86** | Sioux City-Vermillion, IA-NE-SD | 0.70 | 377,219 | 0.18 |
| **87** | Idaho Falls-Blackfoot, ID | 0.41 | 358,863 | 0.11 |
| **88** | Amarillo, TX | 0.40 | 503,671 | 0.08 |
| **89** | Buffalo-Niagara-Cattaraugus, NY | 0.39 | 1,444,680 | 0.03 |
| **90** | Twin Falls, ID | 0.35 | 194,697 | 0.18 |
| **91** | Sioux Falls, SD | 0.30 | 522,564 | 0.06 |
| **92** | Grand Forks, ND-MN | 0.24 | 208,430 | 0.11 |
| **93** | Nashville-Davidson-Murfreesboro-Columbia, TN | 0.18 | 3,095,166 | 0.01 |
| **94** | Casper, WY | 0.11 | 370,320 | 0.03 |
| **95** | Lubbock-Levelland, TX | 0.10 | 466,262 | 0.02 |
| **96** | Fort Smith, AR-OK | 0.09 | 341,675 | 0.03 |

Appendix 2 – Impact of ICE Detention on BEA Economic Areas

| Rank | BEA Economic Area | Net additional cases | Total population | Additional cases per 100,000 residents |
|---|---|---|---|---|
| **97** | Texarkana, TX-Texarkana, AR | 0.07 | 314,091 | 0.02 |
| **98** | Harrisonburg, VA | 0.05 | 327,344 | 0.02 |
| **99** | Waterloo-Cedar Falls, IA | 0.05 | 225,921 | 0.02 |
| **100** | Portland-Lewiston-South Portland, ME | 0.05 | 1,009,674 | 0.00 |
| **101** | Rapid City, SD | 0.02 | 238,686 | 0.01 |
| **102** | Great Falls, MT | 0.02 | 147,904 | 0.01 |
| **103** | Erie, PA | 0.01 | 500,725 | 0.00 |
| **104** | Farmington, NM | 0.01 | 224,636 | 0.00 |
| **105** | Burlington-South Burlington, VT | 0.01 | 396,062 | 0.00 |
| **106** | Anchorage, AK | 0.00 | 730,318 | 0.00 |
| **107** | Aberdeen, SD[a] | 0 | 82,805 | 0 |
| **108** | Albany-Schenectady-Amsterdam, NY | 0 | 1,386,317 | 0 |
| **109** | Alpena, MI | 0 | 228,950 | 0 |
| **110** | Appleton-Oshkosh-Neenah, WI | 0 | 870,776 | 0 |
| **111** | Asheville-Brevard, NC | 0 | 723,270 | 0 |
| **112** | Augusta-Richmond County, GA-SC | 0 | 649,218 | 0 |
| **113** | Bangor, ME | 0 | 323,139 | 0 |
| **114** | Baton Rouge-Pierre Part, LA | 0 | 861,346 | 0 |
| **115** | Beaumont-Port Arthur, TX | 0 | 466,693 | 0 |
| **116** | Bend-Prineville, OR | 0 | 241,191 | 0 |
| **117** | Billings, MT | 0 | 369,157 | 0 |
| **118** | Birmingham-Hoover-Cullman, AL | 0 | 1,772,590 | 0 |
| **119** | Bismarck, ND | 0 | 203,971 | 0 |
| **120** | Champaign-Urbana, IL | 0 | 547,732 | 0 |
| **121** | Clarksburg, WV+Morgantown, WV | 0 | 346,893 | 0 |
| **122** | Davenport-Moline-Rock Island, IA-IL | 0 | 486,334 | 0 |
| **123** | Dayton-Springfield-Greenville, OH | 0 | 1,370,927 | 0 |
| **124** | Dothan-Enterprise-Ozark, AL | 0 | 313,919 | 0 |
| **125** | Duluth, MN-WI | 0 | 352,749 | 0 |
| **126** | Eugene-Springfield, OR | 0 | 840,261 | 0 |
| **127** | Evansville, IN-KY | 0 | 770,228 | 0 |
| **128** | Forgo-Wahpeton, ND-MN | 0 | 327,423 | 0 |
| **129** | Fayetteville-Springdale-Rogers, AR-MO | 0 | 590,637 | 0 |
| **130** | Flagstaff, AZ | 0 | 147,567 | 0 |
| **131** | Fort Wayne-Huntington-Auburn, IN | 0 | 803,095 | 0 |
| **132** | Fresno-Madera, CA | 0 | 1,761,235 | 0 |
| **133** | Gainesville, FL | 0 | 501,152 | 0 |
| **134** | Greensboro-Winston-Salem-High Point, NC | 0 | 2,019,723 | 0 |

| Rank | BEA Economic Area | Net additional cases | Total population | Additional cases per 100,000 residents |
|---|---|---|---|---|
| 135 | Greenville, NC | 0 | 726,411 | 0 |
| 136 | Greenville-Spartanburg-Anderson, SC | 0 | 1,472,084 | 0 |
| 137 | Gulfport-Biloxi-Pascagoula, MS | 0 | 433,378 | 0 |
| 138 | Helena, MT | 0 | 281,436 | 0 |
| 139 | Honolulu, HI | 0 | 1,422,029 | 0 |
| 140 | Johnson City-Kingsport-Bristol (Tri-Cities), TN-VA | 0 | 860,786 | 0 |
| 141 | Jonesboro, AR | 0 | 314,001 | 0 |
| 142 | Joplin, MO | 0 | 370,331 | 0 |
| 143 | Kennewick-Richland-Pasco, WA | 0 | 598,390 | 0 |
| 144 | Knoxville-Sevierville-La Follette, TN | 0 | 1,250,325 | 0 |
| 145 | La Crosse, WI-MN | 0 | 262,475 | 0 |
| 146 | Lewiston, ID-WA | 0 | 93,538 | 0 |
| 147 | Lincoln, NE | 0 | 433,545 | 0 |
| 148 | Macon-Warner Robins-Fort Valley, GA | 0 | 672,993 | 0 |
| 149 | Madison-Baraboo, WI | 0 | 1,223,576 | 0 |
| 150 | Mason City, IA | 0 | 155,260 | 0 |
| 151 | Midland-Odessa, TX | 0 | 659,159 | 0 |
| 152 | Minot, ND | 0 | 166,435 | 0 |
| 153 | Missoula, MT | 0 | 320,831 | 0 |
| 154 | Paducah, KY-IL | 0 | 243,389 | 0 |
| 155 | Panama City-Lynn Haven, FL | 0 | 305,449 | 0 |
| 156 | Pendleton-Hermiston, OR | 0 | 147,565 | 0 |
| 157 | Pensacola-Ferry Pass-Brent, FL | 0 | 748,559 | 0 |
| 158 | Peoria-Canton, IL | 0 | 868,156 | 0 |
| 159 | Pueblo, CO | 0 | 244,628 | 0 |
| 160 | Raleigh-Durham-Cary, NC | 0 | 3,512,772 | 0 |
| 161 | Redding, CA | 0 | 361,246 | 0 |
| 162 | Roanoke, VA | 0 | 826,022 | 0 |
| 163 | Salina, KS | 0 | 189,056 | 0 |
| 164 | San Diego-Carlsbad-San Marcos, CA[b] | 0 | 3,302,833 | 0 |
| 165 | San Jose-San Francisco-Oakland, CA | 0 | 10,432,077 | 0 |
| 166 | Santa Fe-Espanola, NM | 0 | 276,447 | 0 |
| 167 | Savannah-Hinesville-Fort Stewart, GA | 0 | 902,118 | 0 |
| 168 | Scotts Bluff, NE | 0 | 90,092 | 0 |
| 169 | Scranton-Wilkes-Barre, PA | 0 | 649,802 | 0 |
| 170 | South Bend-Mishawaka, IN-MI | 0 | 960,164 | 0 |
| 171 | Spokane, WA | 0 | 890,628 | 0 |
| 172 | Springfield, IL | 0 | 618,179 | 0 |

| Rank | BEA Economic Area | Net additional cases | Total population | Additional cases per 100,000 residents |
|---|---|---|---|---|
| **173** | Traverse City, MI | 0 | 284,840 | 0 |
| **174** | Tucson, AZ | 0 | 1,192,585 | 0 |
| **175** | Tupelo, MS | 0 | 549,141 | 0 |
| **176** | Virginia Beach-Norfolk-Newport News, VA-NC | 0 | 1,921,391 | 0 |
| **177** | Wausau-Merrill, WI | 0 | 518,243 | 0 |
| **178** | Wenatchee, WA | 0 | 273,078 | 0 |
| **179** | Wichita Falls, TX | 0 | 187,998 | 0 |

[a] Beginning with the Aberdeen (South Dakota) BEA area (ranked 107) and thereafter (ranked 108-179), there were no people detained by ICE in the multicounty BEA area. As such, no additional cases of COVID-19 are projected for these BEA areas. From 107-179, the BEA areas for which ICE reports no one was detained, BEA areas are listed alphabetically.

[b] San Diego (ranked 164) is an anomaly. San Diego County is the sole county in the San Diego-Carlsbad-San Marcos, CA BEA economic area. Recall that ICE detention in the county is *ignored* when estimating additions to the COVID-19 caseload. The measure of ICE detention at the BEA level excludes the county; this results in San Diego County having zero (0) people detained by ICE in the BEA area. This quirk in measurement likely results in an underestimation of the impact of ICE detention in this county. The "average" county saw an additional 78.21 cases per 100,000 residents. If San Diego – with a population of 3.3 million -- was average in this respect, roughly 2,581 cases of COVID-19 would have been linked to ICE detention.