COVID-19 Trends by Hospital Referral Region

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COVID-19 Trends by Hospital Referral Region

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Introduction and Executive Summary

Data on COVID-19 cases and deaths in the U.S. are widely available by state and county. However, data that are relevant to health insurance in the U.S. are often reported by hospital referral regions (HRRs) as developed by the Dartmouth Atlas Project (Dartmouth 2020). This study estimates the number of COVID-19 confirmed cases and reported deaths by HRR using Johns Hopkins University COVID-19 data by U.S. county and the Dartmouth Atlas Project division of counties into HRRs.

The 306 HRRs are geographic divisions of the U.S. that represent healthcare markets for tertiary medical care. The divisions are organized by where the greatest proportion of the Medicare residents are hospitalized, with minor adjustments to achieve geographic contiguity. An HRR may contain several hospitals, but at least one of them must perform major cardiovascular procedures and neurosurgery. (Dartmouth 2020).

For this study, HRRs are categorized by their levels of confirmed COVID-19 cases per million of population (CPM) and reported COVID-19 deaths per million of population (DPM). The study also looks at a fourth category that is defined by case fatality rate (CFR) and CPM. For this analysis, case fatality rate is the number of confirmed COVID-19 cases divided by the number of reported COVID-19 deaths. The four HRR categories are defined in Table 1.

Table 1

HRR CATEGORY BOUNDARIES

Metric	Highest DPM, Highest CPM	Higher DPM, Higher CPM	Lower DPM, Higher CPM	Higher CFR, Higher CPM
Deaths per million	Minimum 1,000	Minimum 400 Maximum 1,000	Maximum 400	N/A
Cases per million	Minimum 15,000	Minimum 1,000 Maximum 15,000	Minimum 1,000 Maximum 15,000	Minimum 1,000 Maximum 15,000
Case fatality rate	N/A	N/A	N/A	Minimum 7%
Other	N/A	N/A	N/A	Not in another category

Table 2 provides a high-level data summary of each category, as well as for all HRRs. Demographic data for the COVID-19 cases and deaths are not available in the Johns Hopkins University database for investigation into potential reasons for varying experience across HRRs. However, the Dartmouth data includes the percentage of population that is age 65 or older and has at least two underlying medical conditions. This study found no direct correlation between this percentages and HRR COVID-19 experience.

Table 2

HRR COVID-19 DATA SUMMARY, MAY 17, 2020

	Total	Highest DPM, Highest CPM	Higher DPM, Higher CPM	Lower DPM, Higher CPM	Higher CFR, Higher CPM
Number of HRRs	306	10	27	25	31
Generalized summary of HRRs in this category	All U.S. HRRs	Greater New York City metropolitan area, New Orleans and Albany, Georgia.	Larger metropolitan areas other than New York City area.	Various cities as well as areas with meat packing or food processing plants.	Smaller cities and industrial areas.
Confirmed cases per million					
• Unweighted average	3,524	21,341	9,517	7,278	2,066
• Population-weighted average	4,395	18,847	10,805	6,512	2,102
					2,102
• Total	4,395	18,847	10,805	6,512	
Reported deaths per million					
• Unweighted average	189	1,421	693	230	192
• Population-weighted average	264	1,626	721	249	176
• Total	264	1,626	721	249	176
Case fatality rate					
• Unweighted average	4.6%	7.0%	7.6%	3.4%	9.4%
• Population-weighted average	4.8%	9.1%	7.0%	4.0%	8.5%
• Total	6.0%	8.6%	6.7%	3.8%	8.4%

Data source: Johns Hopkins University. Novel Coronavirus (COVID-19) Cases, Provided by JHU CSSE. https://github.com/CSSEGISandData/COVID-19, (accessed May 18, 2020). The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth Atlas Data, https://atlasdata.dartmouth.edu/ (accessed May 18, 2020). Author's tabulations.

Hospital Referral Region Categories

Each of the 306 HRRs is represented by a dot in Figure 1, where COVID-19 confirmed CPM are plotted along the x-axis against reported COVID-19 deaths per million along the y-axis. The boundaries of three of the four HRR categories are outlined on Figure 1 and the dots of HRRs in each category are colored the same color as the boundary outlines.

Figure 1
CONFIRMED COVID-19 CPM AND REPORTED COVID-19 DPM BY HRR, MAY 17, 2020
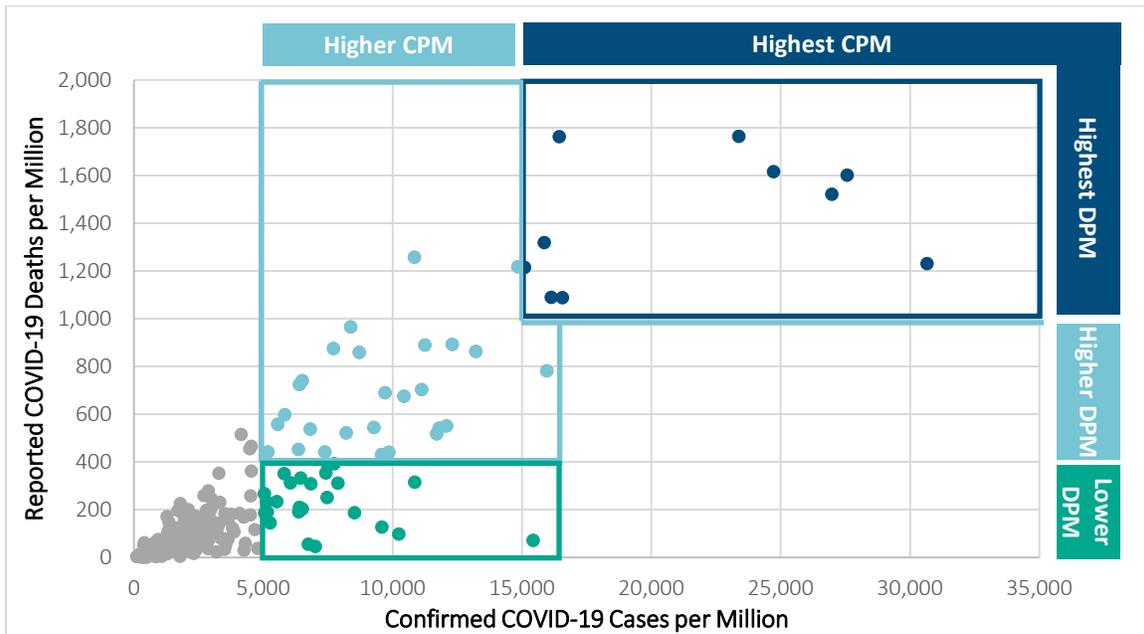
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Figure 2 graphs HRR COVID-19 case fatality rate (CFR) along the x-axis against reported COVID-19 deaths per million (DPM) along the y-axis. Colored dots from Figure 1 appear in Figure 2 in the same color. In addition, HRRs indicated by gray dots in Figure 1 which have a CFR as of May 17, 2020, of at least 7.0% appear as yellow dots in Figure 2. The unweighted average CFR for all HRRs is 4.6%, and the population-weighted average CFR is 4.8%. The total U.S. CFR (total reported COVID-19 deaths divided by total confirmed COVID-19 cases) is 6.0%.

Figure 2
COVID-19 CASE FATALITY RATE AND REPORTED COVID-19 DPM BY HRR
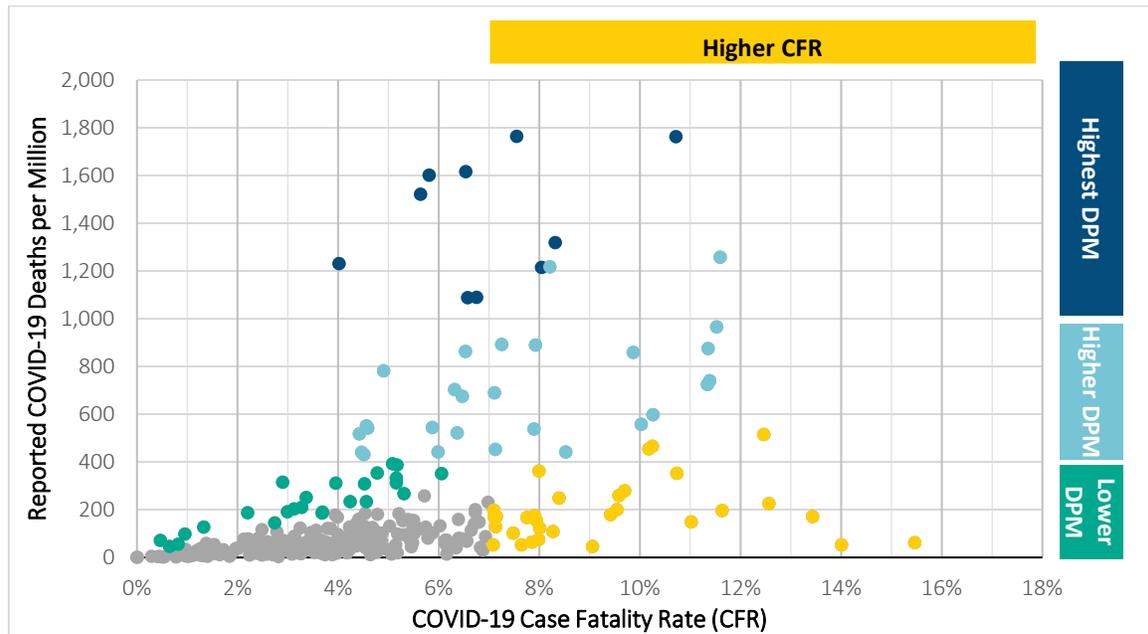
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

The Centers for Disease Control (CDC) in the U.S. and the National Institute for Demographic Studies (INED) in Europe have noted that COVID-19 death rates are significantly greater among elderly people than working-age people. (CDC, May 20, 2020) (INED, 2020). The Johns Hopkins University COVID-19 data does not include demographic information about the cases and deaths, but the Dartmouth Atlas Project data includes for each HRR the percentage of population over age 65 that has two or more underlying conditions. Figure 3 plots that percentage against deaths per million. That percentage does not appear to be directly correlated with the level of COVID-19 deaths per million, nor does it appear to be directly correlated with high case fatality rates (Figure 4).

Figure 3

PERCENTAGE OF AGE 65+ POPULATION WITH 2+ UNDERLYING CONDITIONS AND DPM BY HRR, MAY 17, 2020
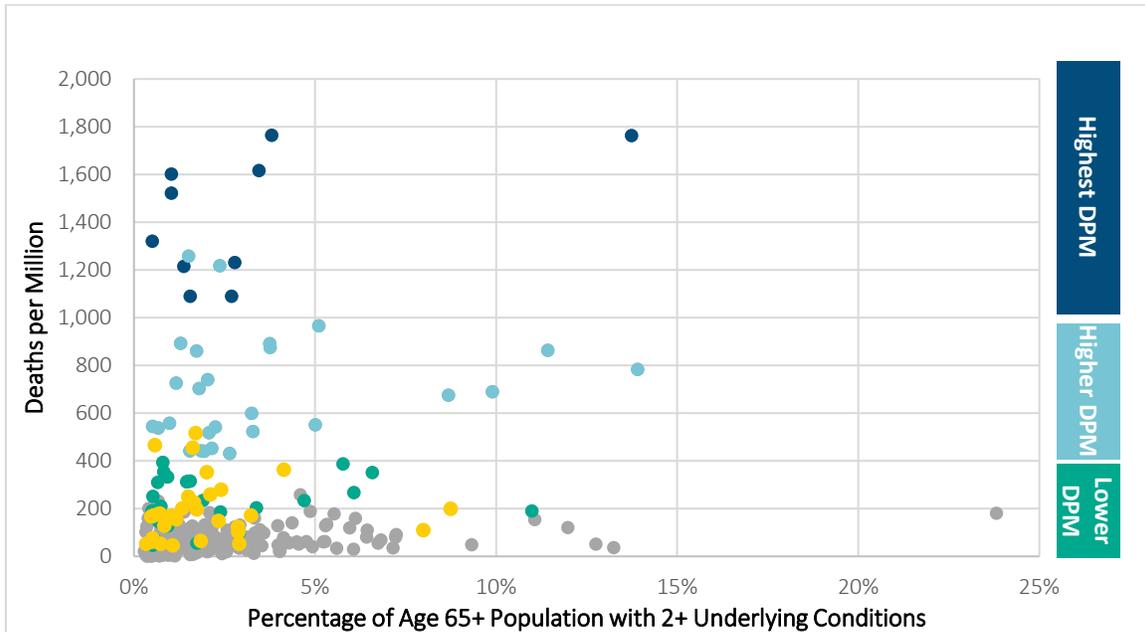
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Figure 4

PERCENTAGE OF AGE 65+ POPULATION WITH 2+ UNDERLYING CONDITIONS AND CFR BY HRR, MAY 17, 2020
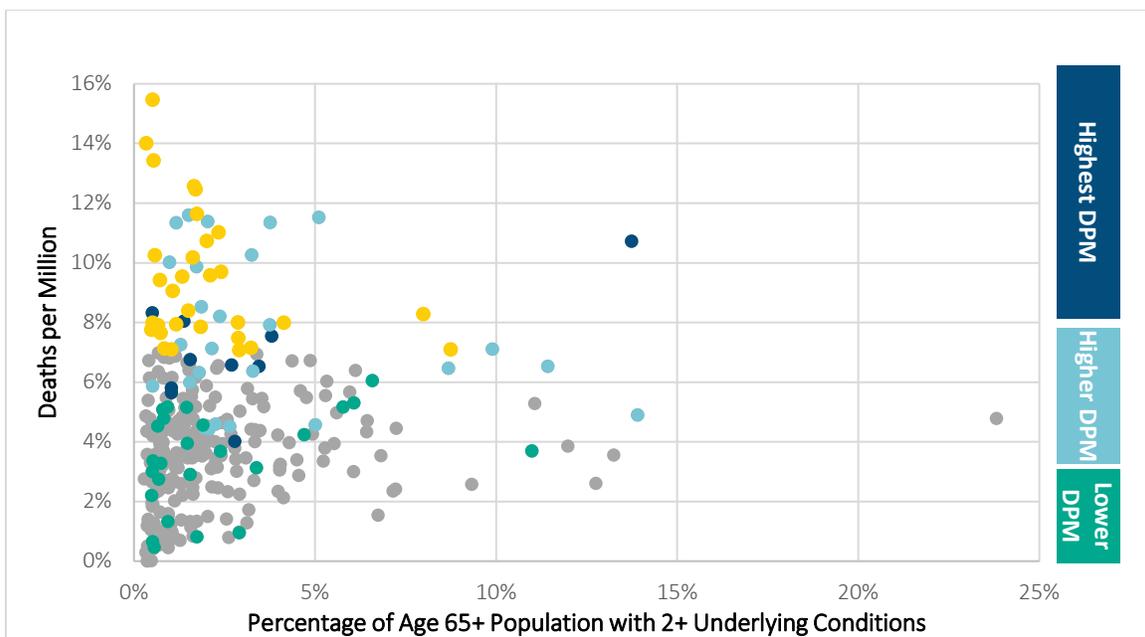
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

The remainder of this analysis focuses on only the HRRs that appear as colored dots in Figure 1 through Figure 4. All of these HRRs report at least 5,000 confirmed COVID-19 CPM as of May 17, 2020.

Highest Deaths Per Million With Highest Cases Per Million

Ten HRRs meet the following criteria as of May 17, 2020 (Figure 5):

- At least 1,000 reported COVID-19 deaths per million
- At least 15,000 confirmed COVID-19 cases per million

Eight of the ten HRRs with the highest CPM and highest DPM are in the New York City area. The four HRRs with the very highest CPM and very highest DPM are in New Jersey suburbs of New York City.

Figure 5

HRRS WITH HIGHEST CPM AND HIGHEST DPM, MAY 17, 2020
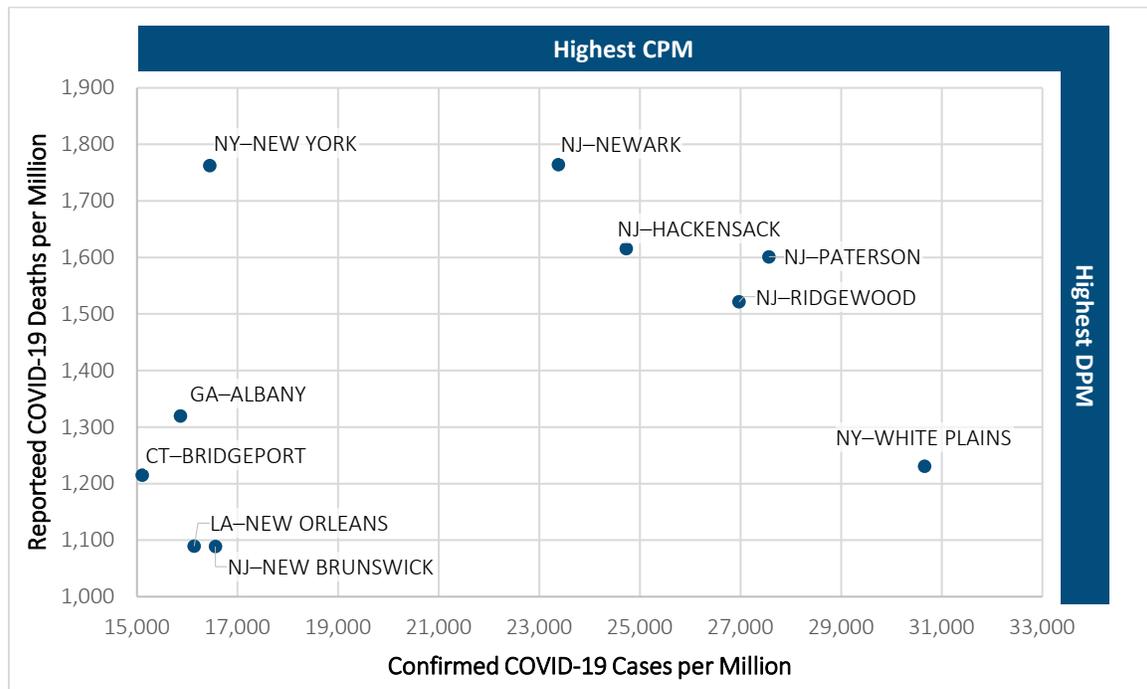
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

The average and total confirmed COVID-19 cases per million and reported COVID-19 death per million are shown in Table 3.

Table 3

AVERAGE AND TOTAL CPM AND DPM FOR HRRS WITH HIGHEST CPM AND HIGHEST DPM, MAY 17, 2020

	Confirmed COVID-19 Cases Per Million	Reported COVID-19 Deaths Per Million
Unweighted average	21,341	1,421
Population-weighted average	18,847	1,626
Total	18,847	1,626

Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

With the exception of the New Orleans HRR, these HRRs saw steadily rising cases per million (Figure 6). All of them saw steadily rising deaths per million (Figure 7), although the Paterson, NJ HRR saw a steeper increase than the other HRRs in this category.

Figure 6

CONFIRMED COVID-19 CPM SINCE MARCH 22, 2020, IN HRRS WITH HIGHEST CPM AND HIGHEST DPM
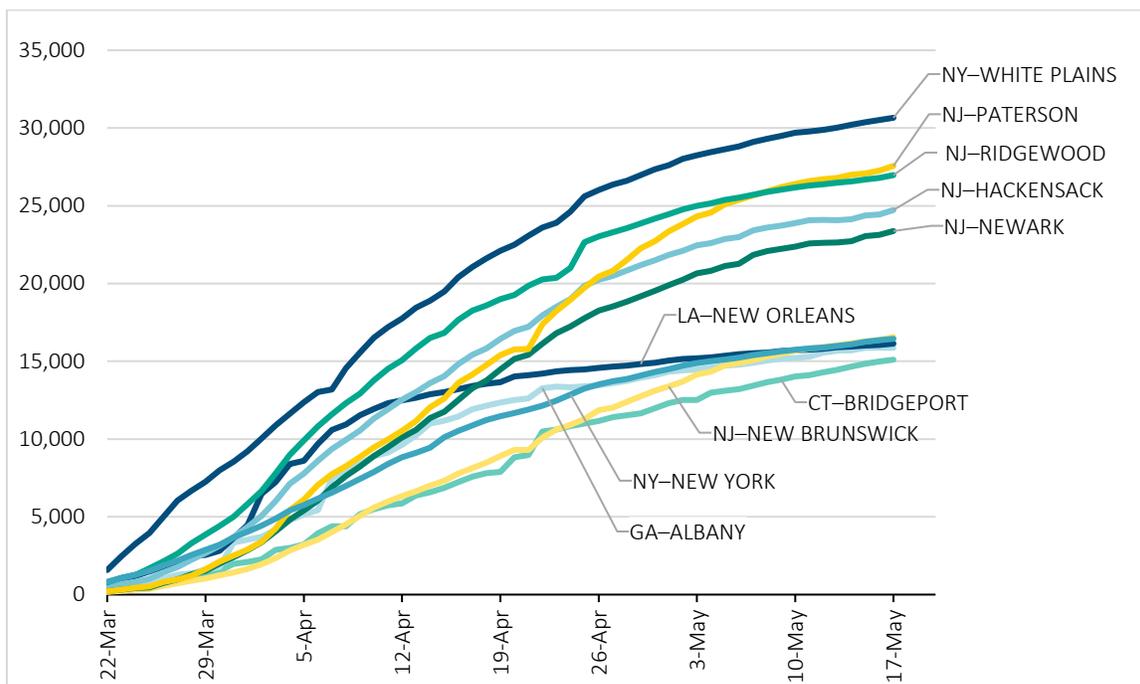
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Figure 7

CONFIRMED COVID-19 DPM SINCE MARCH 22, 2020, IN HRRS WITH HIGHEST CPM AND HIGHEST DPM
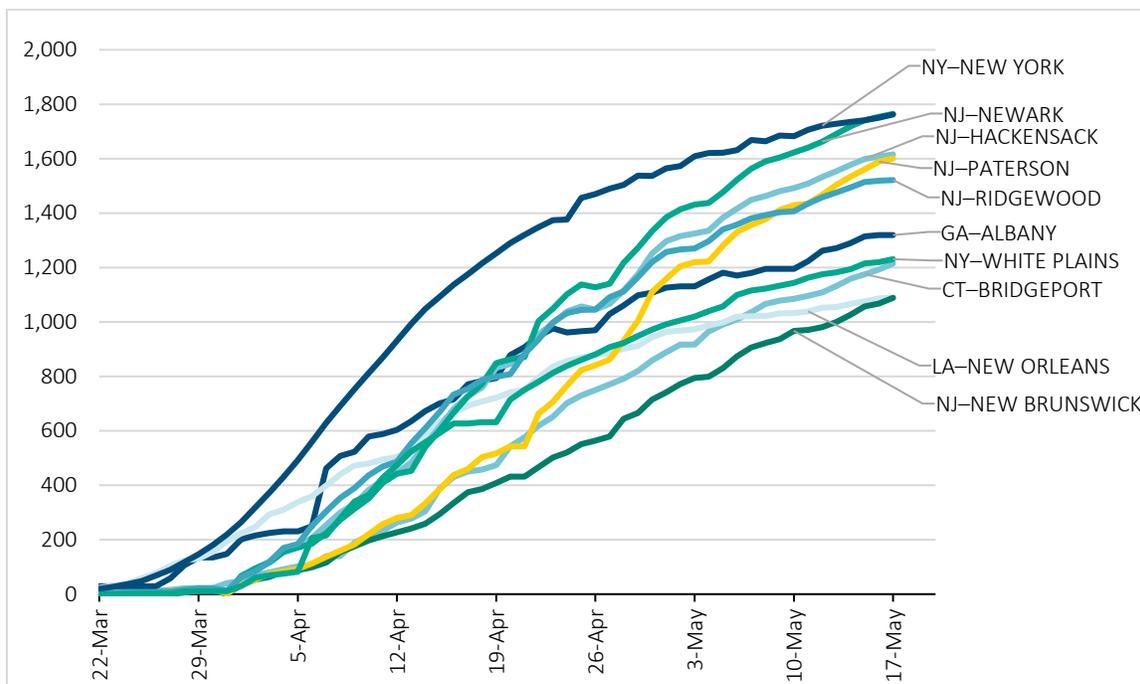
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

As of May 17, 2020, the case fatality rates for this group of HRRs range from 4.0% to 10.7% (Figure 8). The unweighted average CFR for this category is 7.0%, but the population-weighted average CFR is greater at 9.1%. The total CFR for these HRRs is 8.6%

Figure 8
COVID-19 CASE FATALITY RATES, MAY 17, 2020, IN HRRS WITH HIGHEST CPM AND HIGHEST DPM
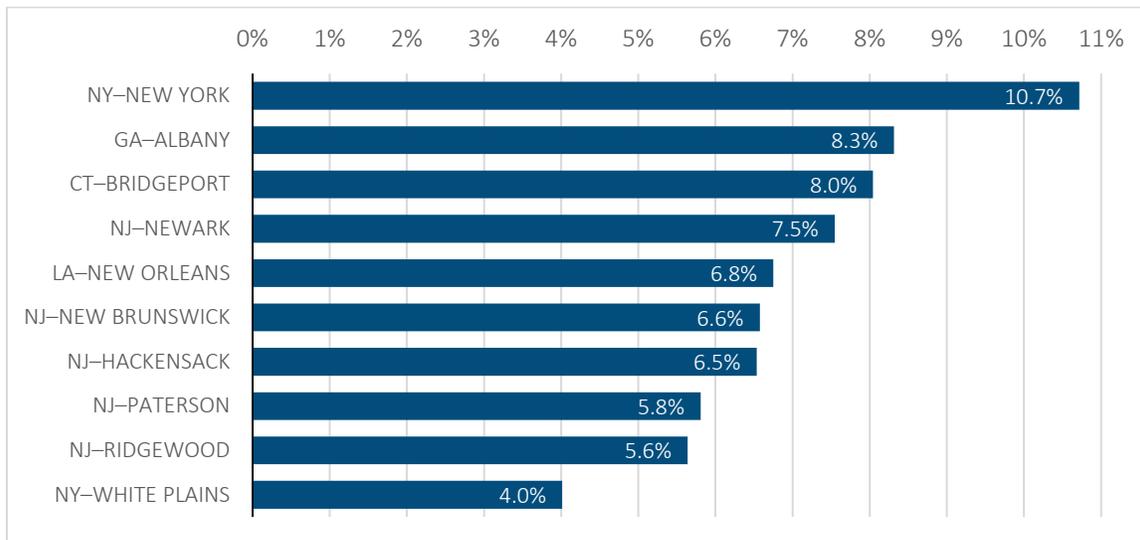
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Higher Deaths Per Million With Higher Cases Deaths Per Million

The HRRS with higher COVID-19 cases per million and higher COVID-19 deaths per million meet the following criteria as of May 17, 2020:

- At least 400 but less than 1,000 reported COVID-19 deaths per million
- At least 5,000 but less than 15,000 confirmed COVID-19 cases per million

The 27 HRRs in this category are primarily in larger metropolitan areas (Figure 9). Their average and total confirmed COVID-19 cases per million and reported COVID-19 death per million are presented in Table 4.

Figure 9
HRRS WITH HIGHER CPM AND HIGHER DPM, MAY 17, 2020
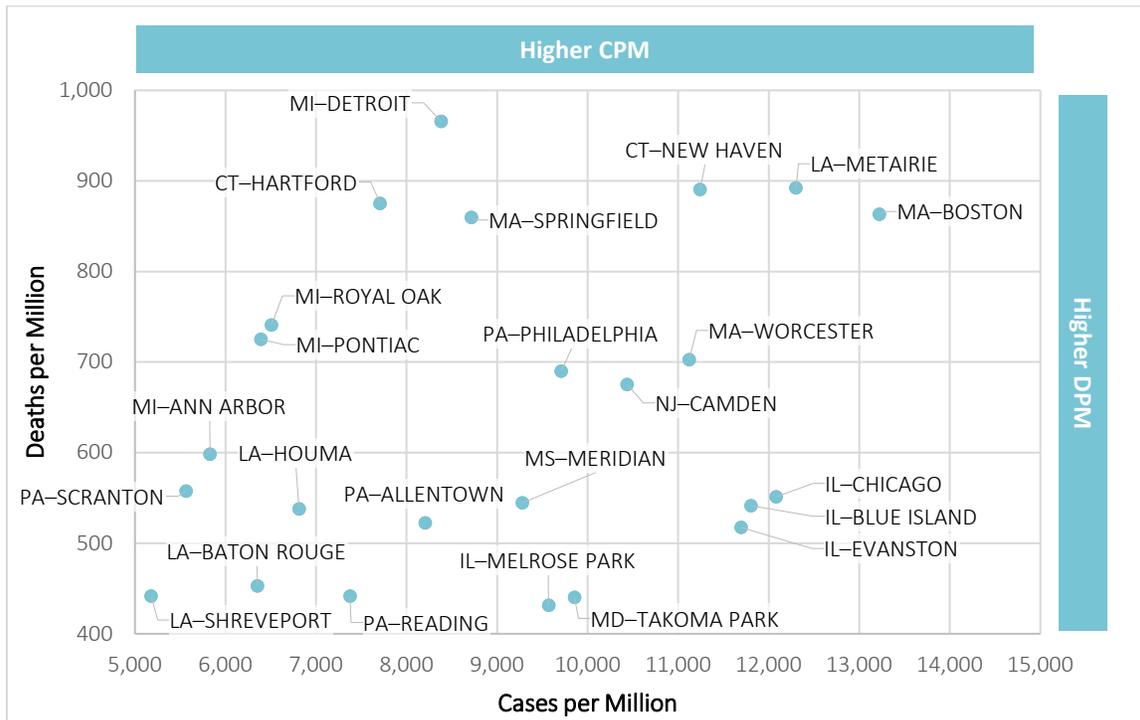
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Table 4
AVERAGE AND TOTAL CPM AND DPM FOR HRRS WITH HIGHER CPM AND HIGHER DPM, MAY 17, 2020

	Confirmed COVID-19 Cases Per Million	Reported COVID-19 Deaths Per Million
Unweighted average	9,517	693
Population-weighted average	10,805	721
Total	10,805	721

Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

With respect to the progression since March 22, 2020, of cases per million (Figure 10) and deaths per million (Figure 11), little differentiates the HRRs other than their levels. Both CPM and DPM have increased fairly smoothly in this group of HRRs. The one exception is Meridian, Mississippi, which serves a population of approximately 185,000 and whose COVID-19 cases per million showed a sharp incline starting April 22, 2020.

Figure 10

CONFIRMED COVID-19 **CPM** SINCE MARCH 22, 2020, IN HRRS WITH HIGHER CPM AND HIGHER DPM
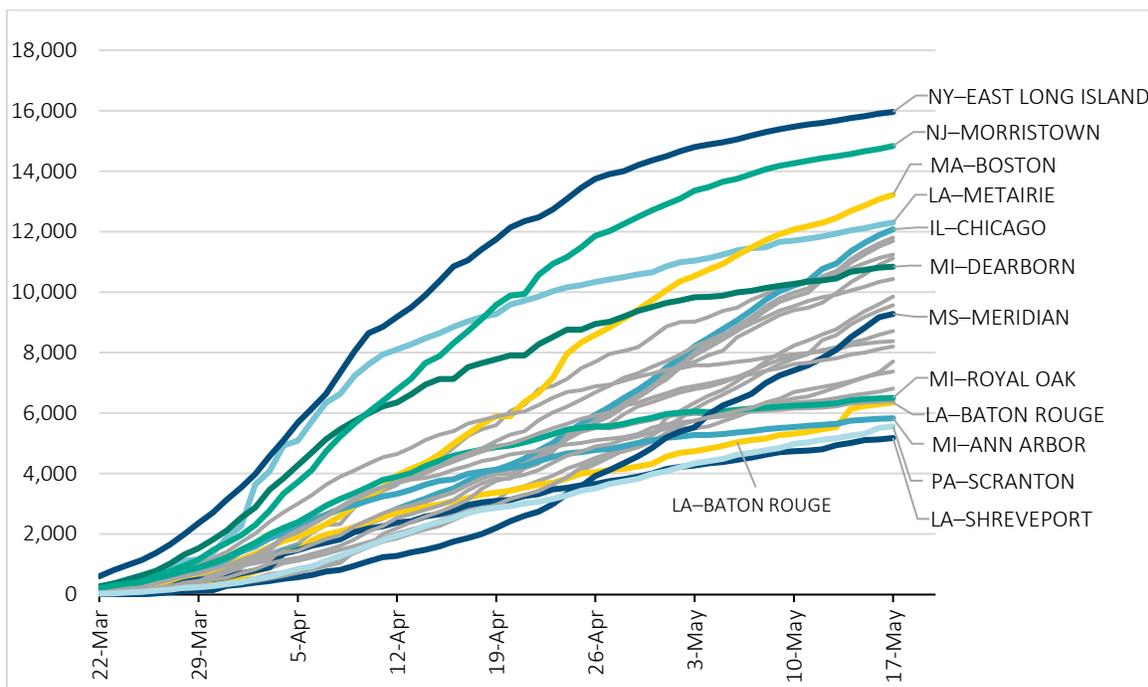
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Figure 11

CONFIRMED COVID-19 **DPM** SINCE MARCH 22, 2020, IN HRRS WITH HIGHER CPM AND HIGHER DPM
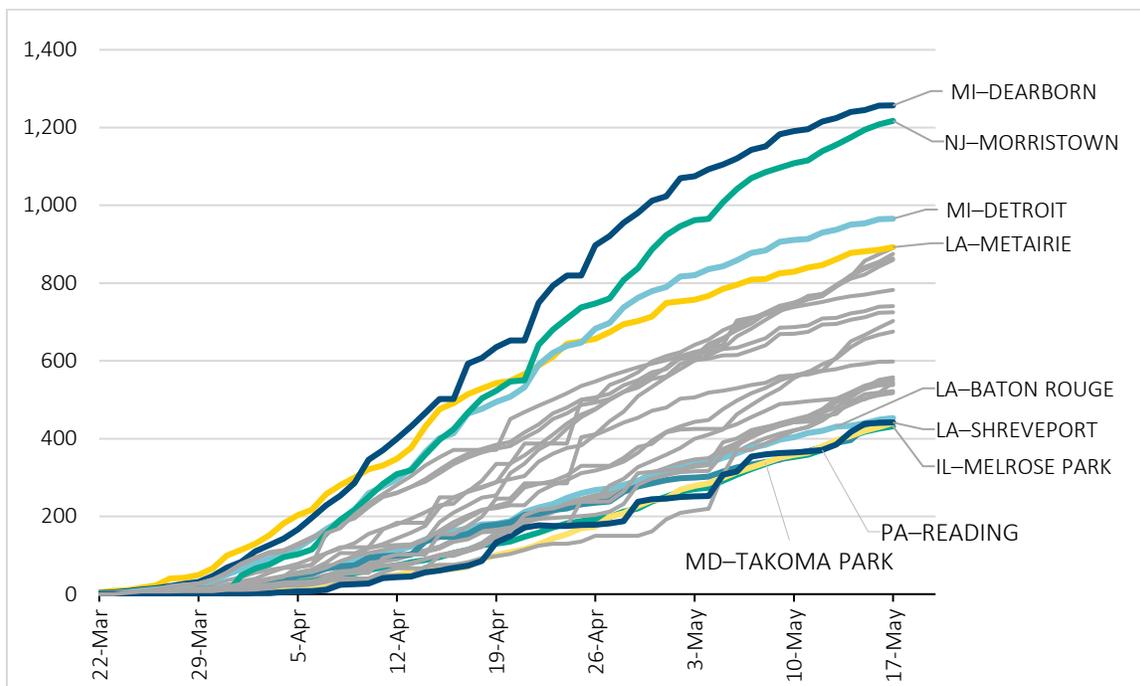
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

The case fatality rates as of May 17, 2020, for the 27 HRRs that have higher CPM and higher DPM range from 4.4% to 11.6% (Figure 12). The unweighted average CFR for this category is 7.6%, and the population-weighted average CFR is slightly lower at 7.0%. The total CFR for this group of HRRs is 6.7%.

Figure 12

COVID-19 CASE FATALITY RATES, MAY 17, 2020, IN HRRS WITH HIGHER CPM AND HIGHER DPM
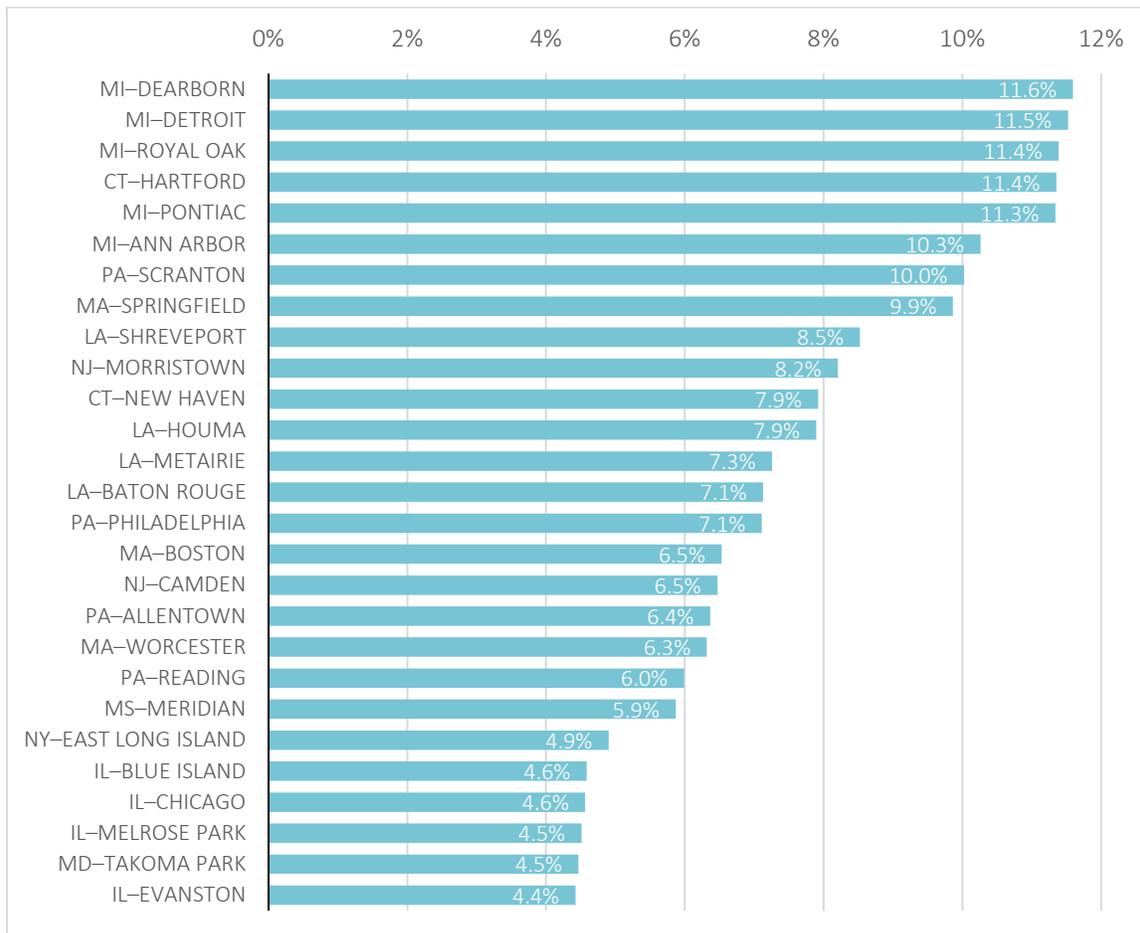
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Lower Deaths Per Million With Higher Cases Per Million

This study categorizes HRRs as "higher CPM with Lower DPM" when they meet the following criteria as of May 17, 2020:

- At least 5,000 but less than 15,000 COVID-19 cases per million, and
- Less than 400 COVID-19 deaths per million

The 25 HRRs in this category are identified in Figure 13. Several of these HRRs are regions that contain meat packing or food processing plants. Further, most of the HRRs whose CPM curves show sharp increases (Figure 14) contain meat packing or food processing plants, including Sioux City and Waterloo, Iowa; Salisbury, Maryland; Providence, Rhode Island; Amarillo, Texas; St. Cloud, Minnesota; and Sioux Falls, South Dakota (Meat Packing, 2020).

Figure 13
HRRS WITH HIGHER CPM AND LOWER DPM, MAY 17, 2020
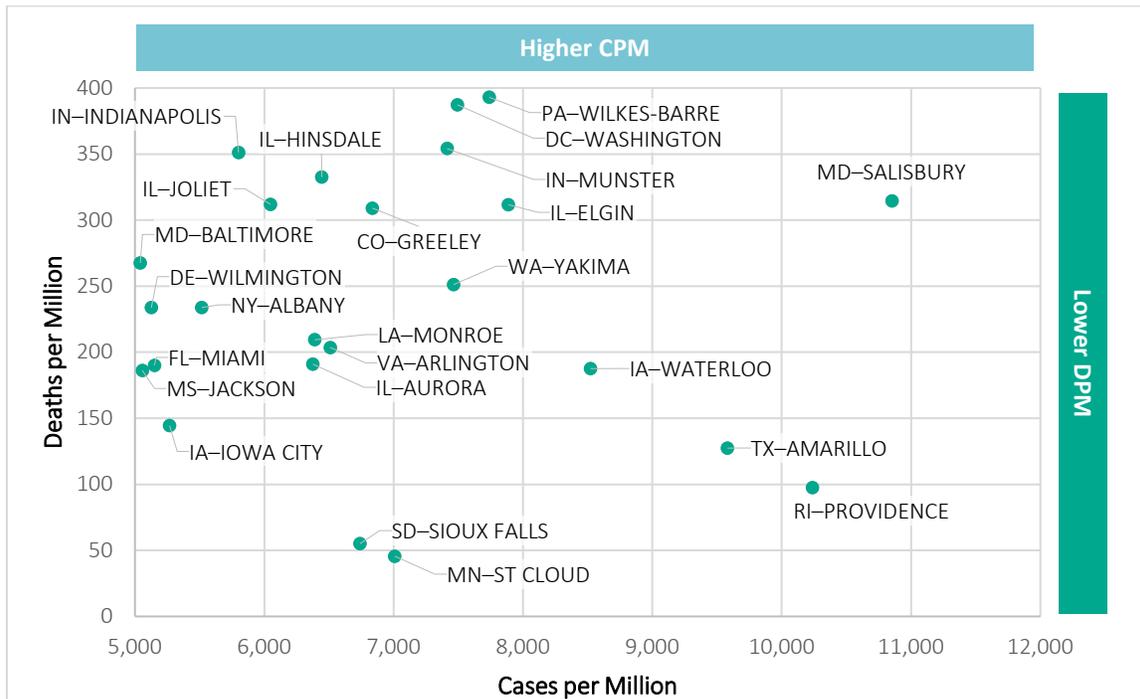
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Table 5 shows the average and total confirmed COVID-19 cases per million and reported COVID-19 death per million for this group of HRRs.

Table 5
AVERAGE AND TOTAL CPM AND DPM FOR HRRS WITH HIGHER CPM AND LOWER DPM, MAY 17, 2020

	Confirmed COVID-19 Cases Per Million	Reported COVID-19 Deaths Per Million
Unweighted average	7,278	230
Population-weighted average	6,512	249
Total	6,512	249

Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Interestingly, the DPM curves of these HRRs do not show a corresponding sharp increase (Figure 15). One possible explanation for why deaths remain relatively low among these HRRs is that the average worker in meat or food processing facilities may be younger than the average age of cases in other HRRs. As previously noted, data to date indicates that COVID-19 death rates are significantly greater among elderly people than working-age people. (CDC May 20, 2020) (INED 2020). However, demographic data of the cases and deaths is not available in the Johns Hopkins database to test this possibility.

Figure 14

CONFIRMED COVID-19 **CPM** SINCE MARCH 22, 2020, IN HRRS WITH HIGHER CPM AND LOWER DPM
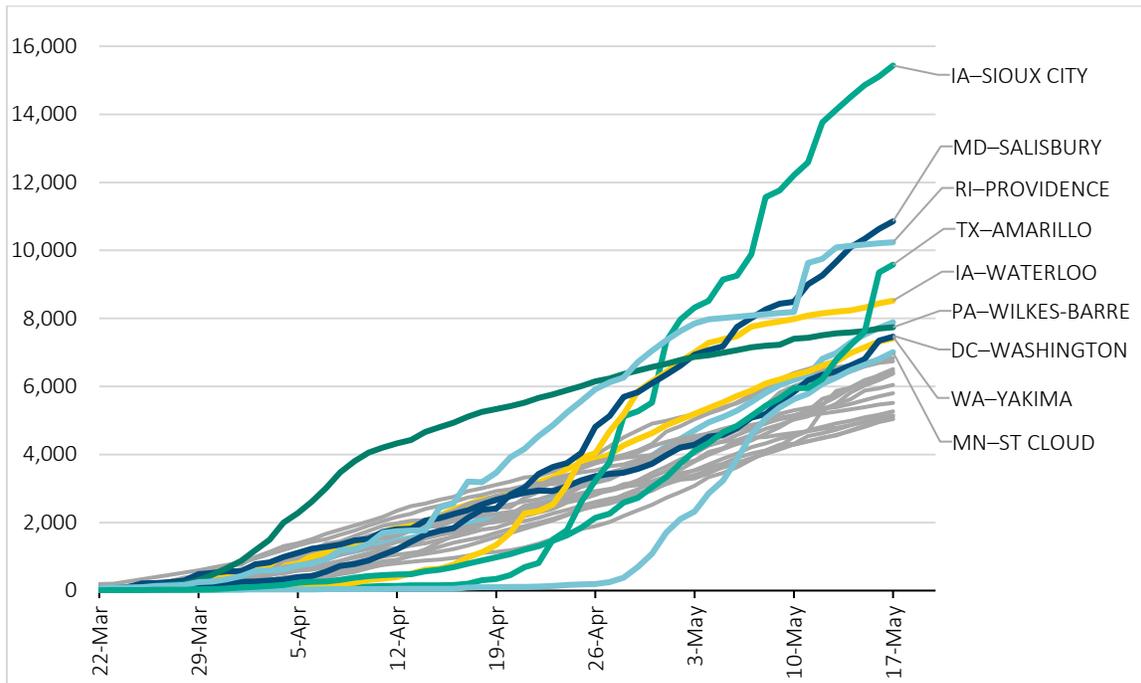
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Figure 15

CONFIRMED COVID-19 **DPM** BY HRR SINCE MARCH 22, 2020, INHRRS WITH HIGHER CPM AND LOWER DPM
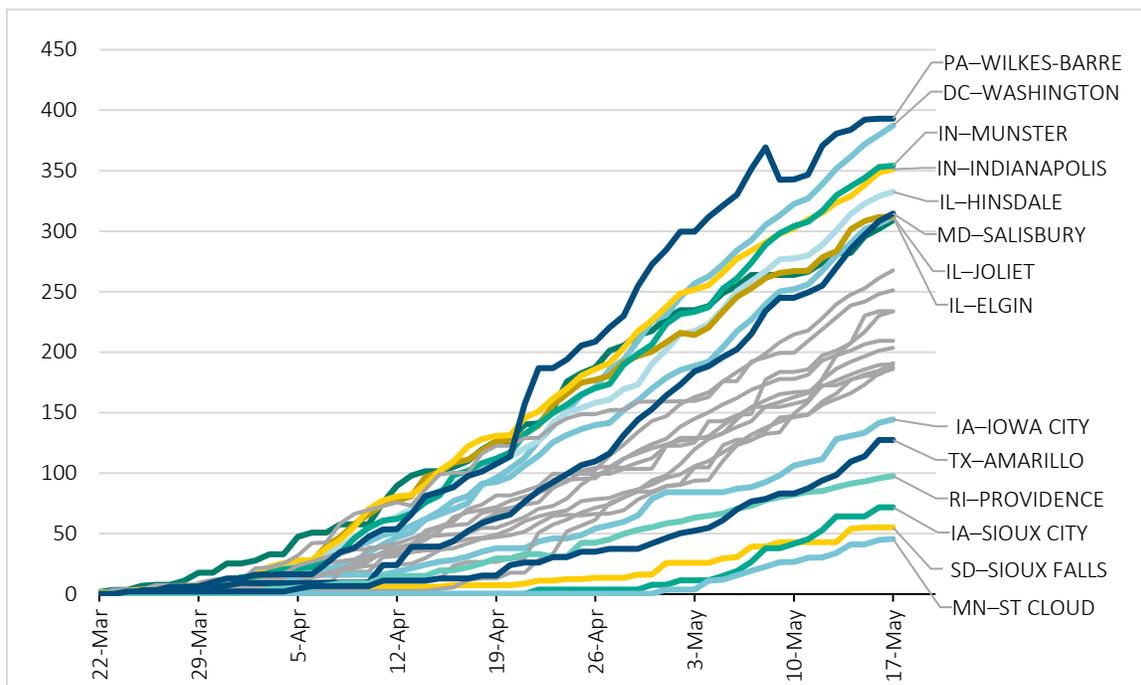
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

The case fatality rates for these HRRs are generally lower than the previous two categories (Figure 16). CFRs as of May 17, 2020, for this category range from 0.5% to 6.1%. The unweighted average CFR is 3.4%, and the population-weighted average CFR is slightly greater at 4.0%. The total CFR for this set of HRRs is 3.8%.

Figure 16

COVID-19 CASE FATALITY RATES, MAY 17, 2020, IN HRRS WITH HIGHER CPM AND LOWER DPM
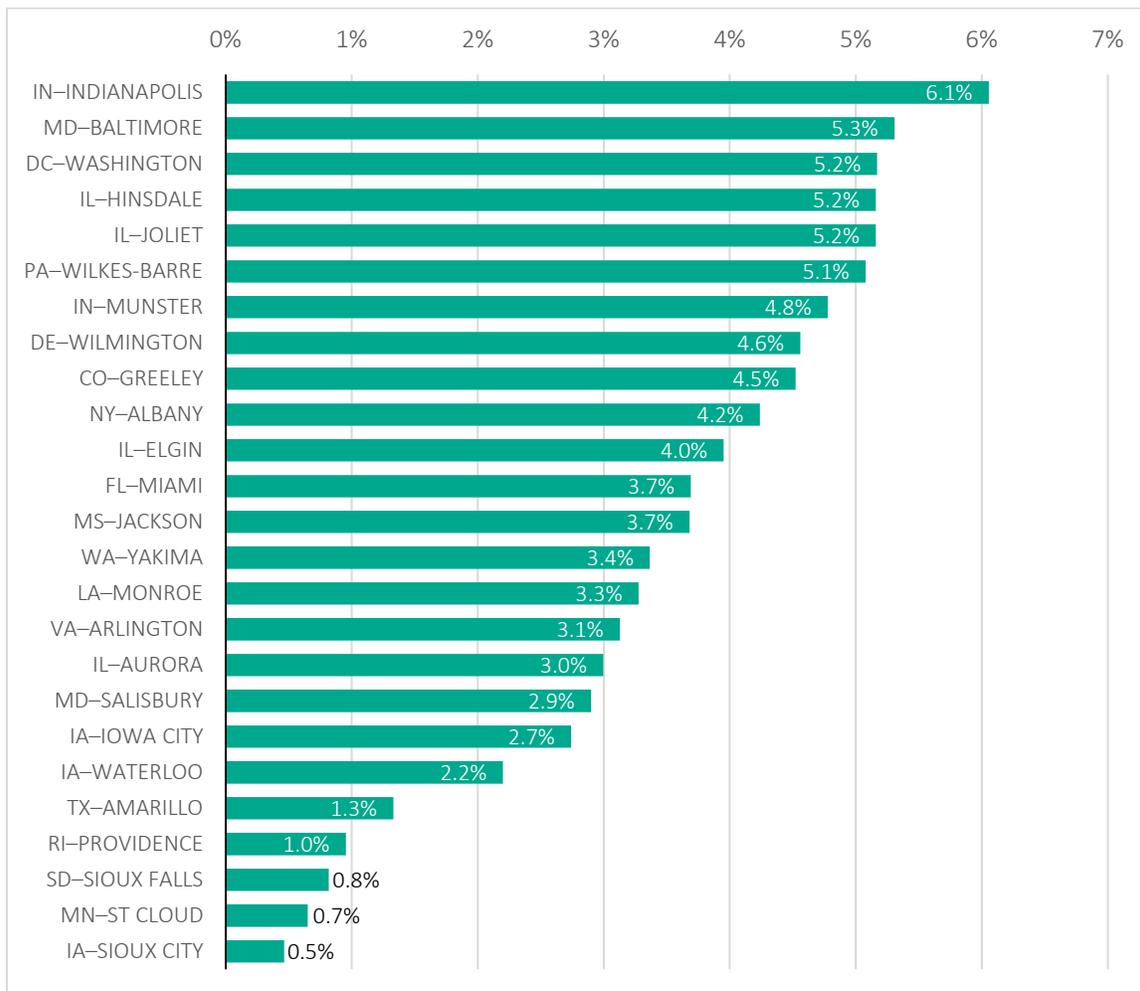
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Higher Case Fatality Rate With Higher Cases Deaths Per Million

The second category of HRRs for this study is defined by the following criteria:

- At least 5,000 confirmed COVID-19 cases per million,
- COVID-19 CFR of at least 7.0%, and
- Not in one of the previously discussed categories in this study.

The 31 HRRs that meet these criteria are shown in Figure 17. Many HRRs in this group are around smaller cities and industrial areas. Immediately following Figure 17, Table 6 shows average and total confirmed COVID-19 cases per million and reported COVID-19 death per million for these HRRs.

Figure 17
CASE FATALITY RATE AND DEATHS PER MILLION BY HRR
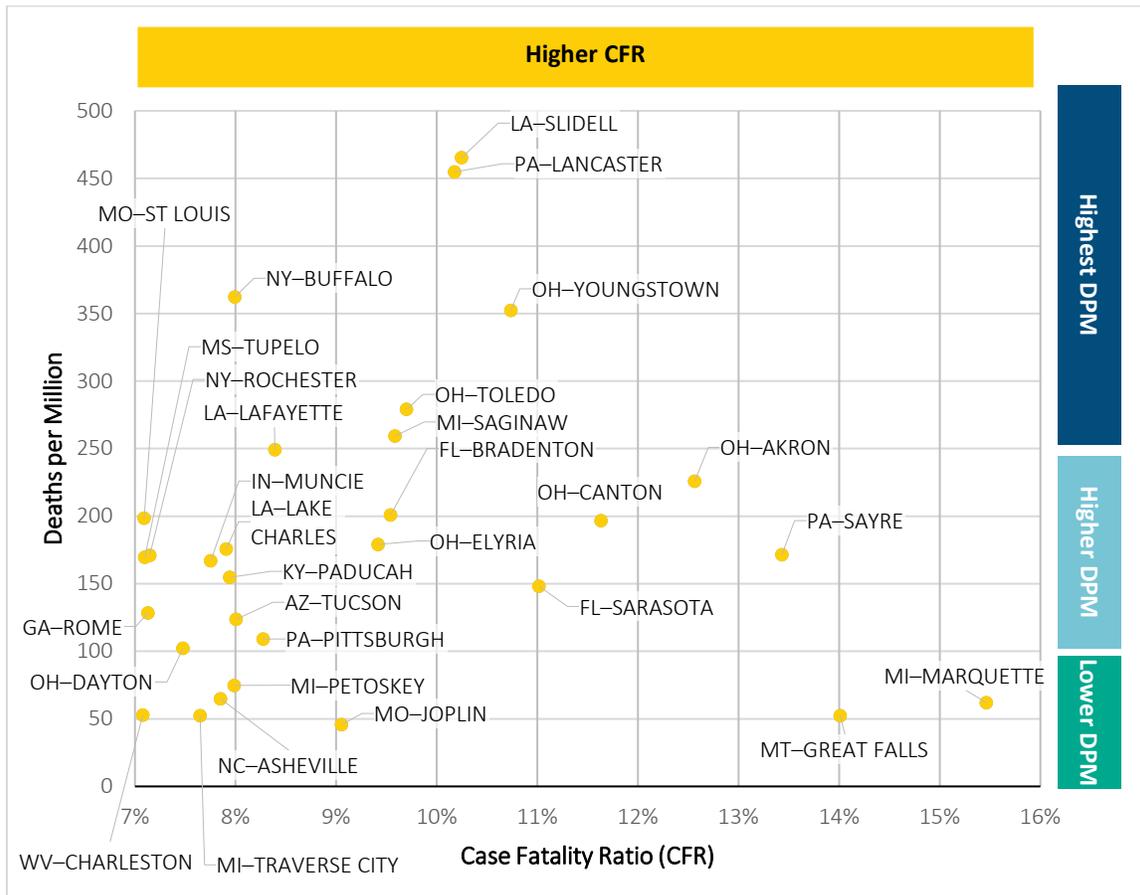
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Table 6
AVERAGE AND TOTAL CPM AND DPM FOR HRRS WITH HIGHER CPM AND HIGHER DPM, MAY 17, 2020

	Confirmed COVID-19 Cases Per Million	Reported COVID-19 Deaths Per Million
Unweighted average	2,066	192
Population-weighted average	2,102	176
Total	2,102	176

Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Four of these 31 HRRs—Slidell, Louisiana, Buffalo, New York; Lancaster, Pennsylvania; and Flint, Michigan— are showing significantly steeper increases in both the number of confirmed COVID-19 cases per million (Figure 18) and the number of reported COVID-19 deaths per million (Figure 19) than the other HRRs in this category. In addition, the Youngstown, Ohio DPM curve has been increasing steeply, like the other four HRRs.

Both Slidell, Louisiana and Flint, Michigan appear as though their rates of CPM and DPM increase may be leveling off. for But for Buffalo, New York, and Lancaster, Pennsylvania, both CPM and DPM curves appear to be continuing to increase steeply. The Youngstown, Ohio DPM curve also appears to be continuing to increase steeply.

Figure 18

CONFIRMED COVID-19 CPM SINCE MARCH 22, 2020, IN HRRS WITH HIGHER CFR AND HIGHER CPM
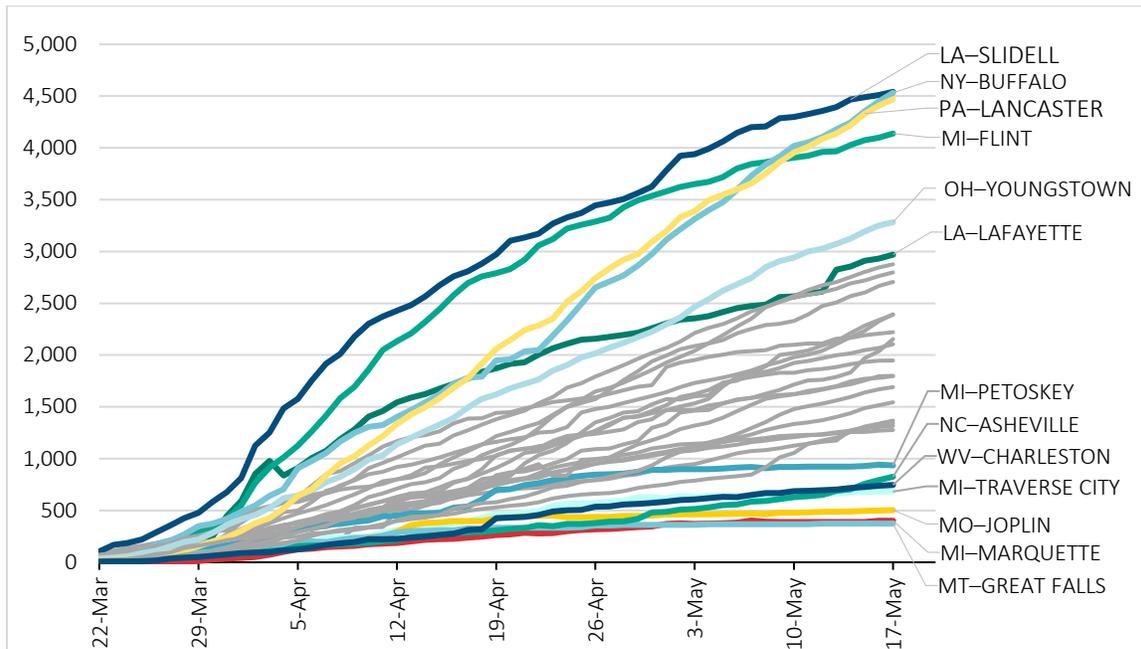
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations. Note: Johns Hopkins University data show what appears to be anomalies in the Lafayette County, LA cumulative number of cases on April 2 and 3, 2020.

Figure 19

HRCONFIRMED COVID-19 DPM SINCE MARCH 22, 2020, IN HRRS WITH HIGHER CFR AND HIGHER CPM
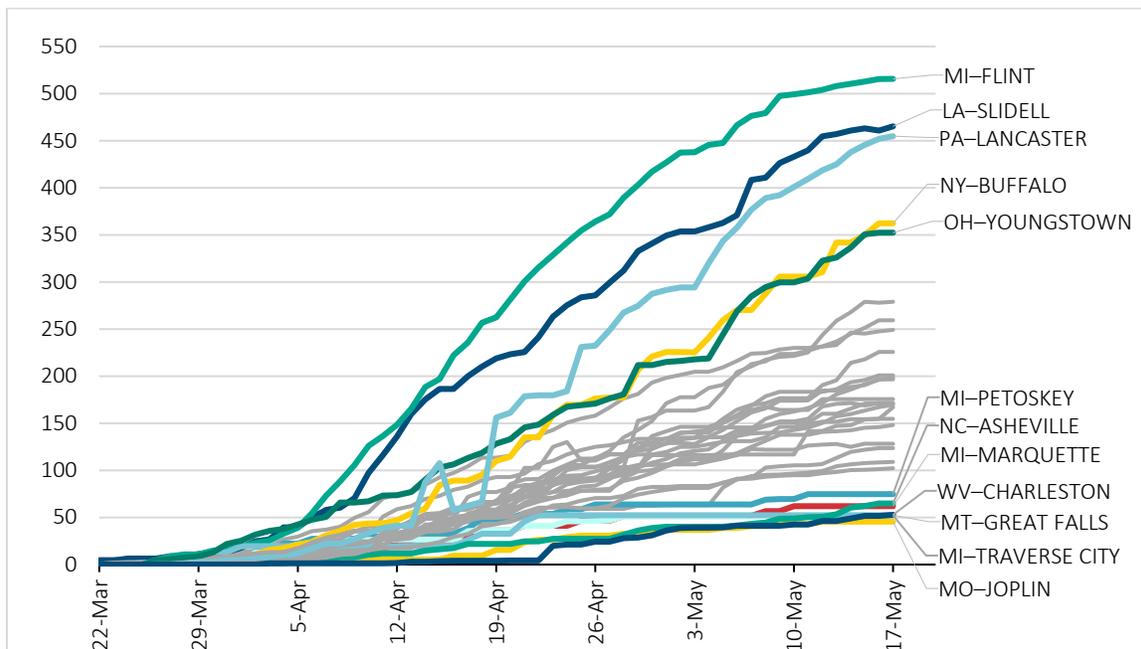
Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations. Note: Johns Hopkins University data show what appears to be anomalies in the Lancaster County, PA cumulative number of deaths on April 14 and 15, 2020.

By definition, the HRRs in this category have higher case fatality rates, ranging from 7.1% to 15.5%. The average CFR for this group is 9.4%, while the population-weighted average is somewhat lower, 8.5%. The total CFR for these HRRs is 8.4%

Figure 20

COVID-19 CASE FATALITY RATES, MAY 17, 2020, IN HRRS WITH HIGHER CFR AND HIGHER CPM
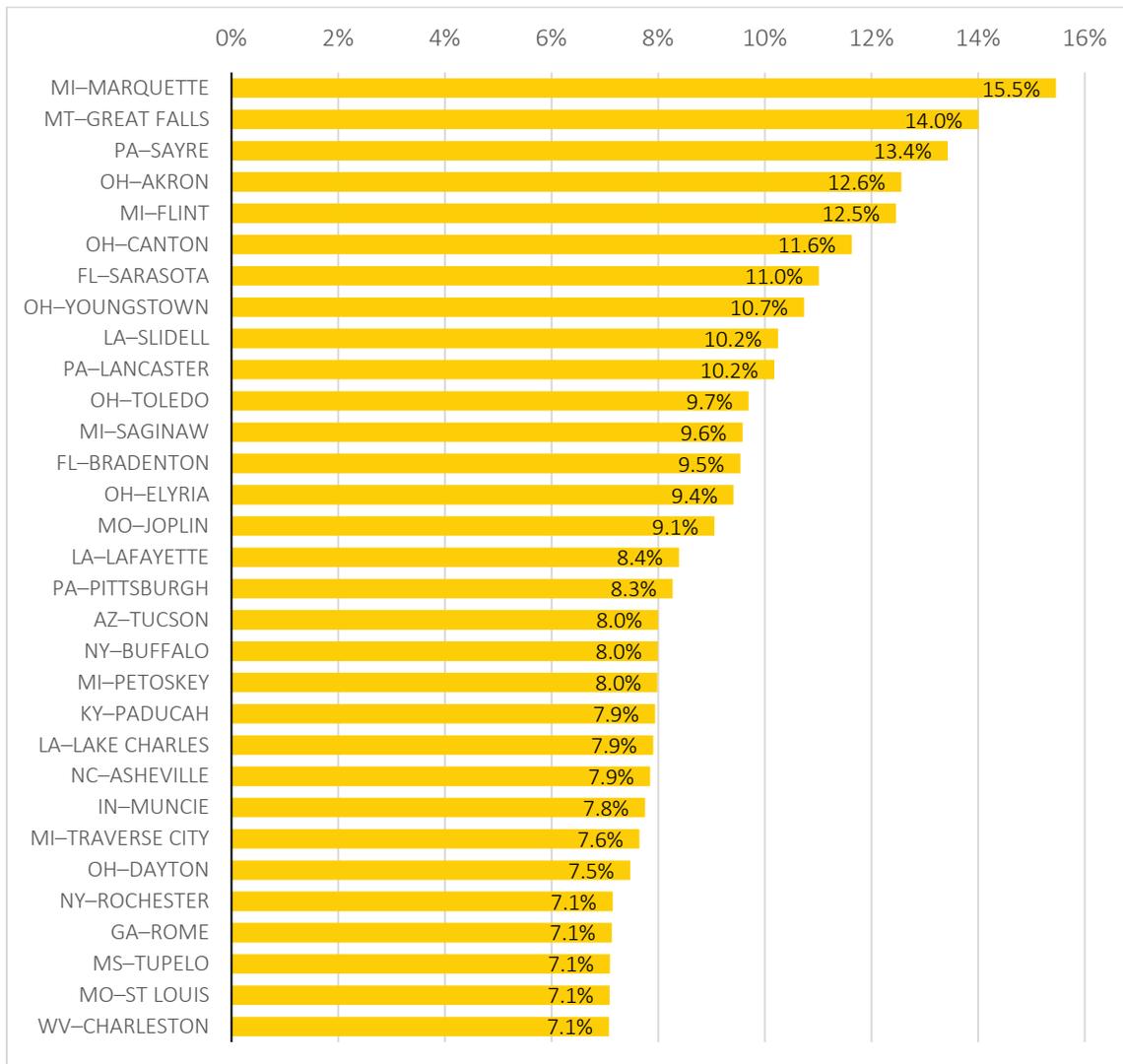
HRR	CFR
MI–MARQUETTE	15.5%
MT–GREAT FALLS	14.0%
PA–SAYRE	13.4%
OH–AKRON	12.6%
MI–FLINT	12.5%
OH–CANTON	11.6%
FL–SARASOTA	11.0%
OH–YOUNGSTOWN	10.7%
LA–SLIDELL	10.2%
PA–LANCASTER	10.2%
OH–TOLEDO	9.7%
MI–SAGINAW	9.6%
FL–BRADENTON	9.5%
OH–ELYRIA	9.4%
MO–JOPLIN	9.1%
LA–LAFAYETTE	8.4%
PA–PITTSBURGH	8.3%
AZ–TUCSON	8.0%
NY–BUFFALO	8.0%
MI–PETOSKEY	8.0%
KY–PADUCAH	7.9%
LA–LAKE CHARLES	7.9%
NC–ASHEVILLE	7.9%
IN–MUNCIE	7.8%
MI–TRAVERSE CITY	7.6%
OH–DAYTON	7.5%
NY–ROCHESTER	7.1%
GA–ROME	7.1%
MS–TUPELO	7.1%
MO–ST LOUIS	7.1%
WV–CHARLESTON	7.1%

Data source: Johns Hopkins University, Dartmouth Atlas Data, author's tabulations.

Hospital Referral Regions and Key Data

Table 7 shows the names of the HRRs in each category presented in this report.

Table 7
HRRS BY CATEGORY

Highest DPM, Highest CPM	Higher DPM, Higher CPM	Lower DPM, Higher CPM	Higher CFR, Higher CPM
CT–BRIDGEPORT	CT–HARTFORD	CO–GREELEY	AZ–TUCSON
G– ALBANY	CT–NEW HAVEN	DC–WASHINGTON	FL–BRADENTON
LA–NEW ORLEANS	IL–BLUE ISLAND	DE–WILMINGTON	FL–SARASOTA
NJ–HACKENSACK	IL–CHICAGO	FL–MIAMI	GA–ROME
NJ–NEW BRUNSWICK	IL–EVANSTON	IA–IOWA CITY	IN–MUNCIE
NJ–NEWARK	IL–MELROSE PARK	IA–SIOUX CITY	KY–PADUCAH
NJ–PATERSON	LA–BATON ROUGE	IA–WATERLOO	LA–LAFAYETTE
NJ–RIDGEWOOD	LA–HOUMA	IL–AURORA	LA–LAKE CHARLES
NY–NEW YORK	LA–METAIRIE	IL–ELGIN	LA–SLIDELL
NY–WHITE PLAINS	LA–SHREVEPORT	IL–HINSDALE	MI–FLINT
	MD–TAKOMA PARK	IL–JOLIET	MI–MARQUETTE
	MA–BOSTON	IN–INDIANAPOLIS	MI–PETOSKEY
	MA–SPRINGFIELD	IN–MUNSTER	MI–SAGINAW
	MA–WORCESTER	LA–MONROE	MI–TRAVERSE CITY
	MI–ANN ARBOR	MD–BALTIMORE	MO–JOPLIN
	MI–DEARBORN	MD–SALISBURY	MO–ST LOUIS
	MI–DETROIT	MN–ST CLOUD	MS–TUPELO
	MI–PONTIAC	MS–JACKSON	MT–GREAT FALLS
	MI–ROYAL OAK	NY–ALBANY	NC–ASHEVILLE
	MS–MERIDIAN	PA–WILKES-BARRE	NY–BUFFALO
	NJ–CAMDEN	RI–PROVIDENCE	NY–ROCHESTER
	NJ–MORRISTOWN	SD–SIOUX FALLS	OH–AKRON
	NY–EAST LONG ISLAND	TX–AMARILLO	OH–CANTON
	PA–ALLENTOWN	VA–ARLINGTON	OH–DAYTON
	PA–PHILADELPHIA	WA–YAKIMA	OH–ELYRIA
	PA–READING		OH–TOLEDO
	PA–SCRANTON		OH–YOUNGSTOWN
			PA–LANCASTER
			PA–PITTSBURGH
			PA–SAYRE
			WV–CHARLESTON

All 306 HRRs with key data as of May 17, 2020, are shown in Table 8 in alphabetical order by two-letter state abbreviation.

Table 8
ALASKA (AK) THROUGH CALIFORNIA (CA)

HRR Name	HRR Number	Population	%Percent of Population > 65 With 2+ Underlying Conditions	Confirmed COVID-19 Cases per Million	Reported COVID-19 Deaths per Million	COVID-19 Case Fatality Rate
AK–ANCHORAGE	10	723,231	0.8%	535	14	2.6%
AL–BIRMINGHAM	1	2,299,021	6.4%	2,329	110	4.7%
AL–DOTHAN	2	372,374	1.2%	2,573	110	4.3%
AL–HUNTSVILLE	5	682,258	1.7%	1,154	15	1.3%
AL–MOBILE	6	863,831	2.2%	2,827	155	5.5%
AL–MONTGOMERY	7	468,222	1.2%	3,815	124	3.2%
AL–TUSCALOOSA	9	276,699	0.7%	2,210	60	2.7%
AR–FORT SMITH	16	374,492	1.1%	219	13	6.2%
AR–JONESBORO	18	249,522	0.6%	1,256	29	2.3%
AR–LITTLE ROCK	19	1,572,426	4.0%	2,029	47	2.3%
AR–SPRINGDALE	21	630,923	1.1%	567	15	2.7%
AR–TEXARKANA	22	259,558	0.8%	992	25	2.6%
AZ–MESA	11	1,635,649	3.2%	1,598	71	4.4%
AZ–PHOENIX	12	3,885,966	7.2%	2,041	91	4.4%
AZ–SUN CITY	14	351,254	1.7%	1,606	70	4.4%
AZ–TUCSON	15	1,288,454	2.9%	1,544	124	8.0%
CA–ALAMEDA CO.	65	1,701,321	3.1%	1,423	49	3.5%
CA–BAKERSFIELD	25	1,237,811	2.3%	2,165	68	3.1%
CA–CHICO	31	301,375	0.7%	110	3	2.8%
CA–CONTRA COSTA CO.	33	1,142,748	2.1%	976	30	3.1%
CA–FRESNO	43	1,319,887	2.6%	1,332	19	1.4%
CA–LOS ANGELES	56	10,092,705	23.8%	3,764	180	4.8%
CA–MODESTO	58	962,803	2.0%	863	34	3.9%
CA–NAPA	62	273,925	0.6%	377	9	2.5%
CA–ORANGE CO.	23	3,505,728	7.1%	1,463	34	2.3%
CA–PALM SPR/RANCHO MIR.	69	382,941	1.4%	2,146	93	4.3%
CA–REDDING	73	343,504	0.8%	318	12	3.7%
CA–SACRAMENTO	77	2,826,127	5.6%	670	33	5.0%
CA–SALINAS	78	414,962	0.7%	786	18	2.3%
CA–SAN BERNARDINO	79	3,405,541	6.4%	1,866	81	4.3%
CA–SAN DIEGO	80	4,030,264	6.8%	1,933	68	3.5%
CA–SAN FRANCISCO	81	1,555,713	2.9%	1,801	40	2.2%
CA–SAN JOSE	82	1,909,813	3.3%	1,261	69	5.4%
CA–SAN LUIS OBISPO	83	263,595	0.5%	858	4	0.4%
CA–SAN MATEO CO.	85	851,398	1.5%	2,008	84	4.2%
CA–SANTA BARBARA	86	466,883	0.8%	3,195	24	0.7%
CA–SANTA CRUZ	87	287,465	0.4%	597	8	1.4%
CA–SANTA ROSA	89	500,225	1.0%	751	8	1.1%
CA–STOCKTON	91	659,772	1.3%	867	39	4.6%
CA–VENTURA	96	882,778	1.9%	1,034	36	3.5%

Table 2 (continued)
COLORADO (CO) THROUGH IDAHO (ID)

HRR Name	HRR Number	Population	Percent of Population > 65 With 2+ Underlying Conditions	Confirmed COVID-19 Cases per Million	Reported COVID-19 Deaths per Million	COVID-19 Case Fatality Rate
CO–BOULDER	101	346,243	0.4%	2,979	200	6.7%
CO–COLORADO SPRINGS	102	934,005	1.5%	1,718	114	6.6%
CO–DENVER	103	3,289,833	4.6%	4,514	258	5.7%
CO–FORT COLLINS	104	383,843	0.5%	1,374	37	2.7%
CO–GRAND JUNCTION	105	355,345	0.5%	2,462	72	2.9%
CO–GREELEY	106	429,829	0.7%	6,835	309	4.5%
CO–PUEBLO	107	183,505	0.4%	1,175	72	6.1%
CT–BRIDGEPORT	109	701,839	1.4%	15,104	1,215	8.0%
CT–HARTFORD	110	1,493,486	3.8%	7,708	875	11.4%
CT–NEW HAVEN	111	1,470,514	3.8%	11,242	890	7.9%
DC–WASHINGTON	113	2,856,530	5.8%	7,493	387	5.2%
DE–WILMINGTON	112	830,288	1.9%	5,127	234	4.6%
FL–BRADENTON	115	370,590	1.3%	2,105	201	9.5%
FL–CLEARWATER	116	538,198	2.3%	1,048	69	6.6%
FL–FORT LAUDERDALE	118	3,115,066	11.1%	2,901	153	5.3%
FL–FORT MYERS	119	1,433,714	6.0%	2,104	119	5.7%
FL–GAINESVILLE	120	600,508	1.7%	1,498	57	3.8%
FL–HUDSON	122	475,019	2.4%	567	20	3.5%
FL–JACKSONVILLE	123	1,854,128	4.3%	1,429	57	4.0%
FL–LAKELAND	124	464,069	1.4%	1,035	53	5.1%
FL–MIAMI	127	3,498,074	11.0%	5,151	190	3.7%
FL–OCALA	129	594,236	3.5%	808	44	5.5%
FL–ORLANDO	130	4,303,581	13.2%	1,031	37	3.6%
FL–ORMOND BEACH	131	437,092	1.8%	1,148	49	4.3%
FL–PANAMA CITY	133	221,509	0.7%	457	18	4.0%
FL–PENSACOLA	134	866,208	2.2%	1,415	46	3.3%
FL–SARASOTA	137	467,598	2.3%	1,345	148	11.0%
FL–ST PETERSBURG	139	436,798	1.5%	1,048	69	6.6%
FL–TALLAHASSEE	140	857,094	2.0%	2,928	132	4.5%
FL–TAMPA	141	1,656,612	4.0%	1,010	33	3.2%
GA–ALBANY	142	207,215	0.5%	15,865	1,319	8.3%
GA–ATLANTA	144	7,065,140	12.0%	3,138	121	3.9%
GA–AUGUSTA	145	711,253	1.6%	1,902	70	3.7%
GA–COLUMBUS	146	365,755	0.9%	2,677	125	4.7%
GA–MACON	147	737,866	2.1%	3,520	183	5.2%
GA–ROME	148	297,266	0.8%	1,800	128	7.1%
GA–SAVANNAH	149	947,526	2.0%	1,193	54	4.6%
HI–HONOLULU	150	1,415,872	3.3%	445	12	2.7%
IA–CEDAR RAPIDS	190	316,439	0.7%	3,316	231	7.0%
IA–DAVENPORT	191	486,631	1.3%	2,551	66	2.6%
IA–DES MOINES	192	1,179,991	2.2%	4,678	116	2.5%
IA–DUBUQUE	193	159,699	0.3%	2,094	102	4.9%
IA–IOWA CITY	194	362,562	0.7%	5,268	144	2.7%
IA–MASON CITY	195	126,472	0.4%	498	3	0.5%
IA–SIOUX CITY	196	262,198	0.6%	15,434	72	0.5%
IA–WATERLOO	197	213,259	0.5%	8,522	188	2.2%
ID–BOISE	151	1,032,823	1.6%	2,082	51	2.5%
ID–IDAHO FALLS	152	261,991	0.4%	302	0	0.0%

Table 2 (continued)
ILLINOIS (IL) THROUGH MAINE (ME)

HRR Name	HRR Number	Population	Percent of Population > 65 With 2+ Underlying Conditions	Confirmed COVID-19 Cases per Million	Reported COVID-19 Deaths per Million	COVID-19 Case Fatality Rate
IL–AURORA	154	361,567	0.5%	6,376	191	3.0%
IL–BLOOMINGTON	175	204,195	0.4%	934	33	3.6%
IL–BLUE ISLAND	155	844,190	2.2%	11,804	541	4.6%
IL–CHICAGO	156	2,564,816	5.0%	12,081	551	4.6%
IL–ELGIN	158	804,881	1.5%	7,888	312	4.0%
IL–EVANSTON	161	903,758	2.1%	11,695	517	4.4%
IL–HINSDALE	163	480,159	0.9%	6,445	333	5.2%
IL–JOLIET	164	720,877	1.5%	6,047	312	5.2%
IL–MELROSE PARK	166	1,336,311	2.6%	9,569	432	4.5%
IL–PEORIA	170	589,442	1.5%	977	28	2.9%
IL–ROCKFORD	171	708,968	1.7%	3,867	108	2.8%
IL–SPRINGFIELD	172	794,679	2.3%	1,194	77	6.5%
IL–URBANA	173	443,838	1.1%	1,534	42	2.8%
IL–HINSDALE	163	480,159	0.9%	6,445	333	5.2%
IN–EVANSVILLE	179	676,139	1.7%	1,177	72	6.2%
IN–FORT WAYNE	180	892,466	2.0%	1,739	102	5.9%
IN–GARY	181	528,073	1.4%	4,084	185	4.5%
IN–INDIANAPOLIS	183	3,037,837	6.6%	5,801	351	6.1%
IN–LAFAYETTE	184	264,778	0.5%	1,964	39	2.0%
IN–MUNCIE	185	162,420	0.5%	2,155	167	7.8%
IN–MUNSTER	186	308,834	0.8%	7,413	354	4.8%
IN–SOUTH BEND	187	706,847	1.6%	3,020	105	3.5%
IN–TERRE HAUTE	188	179,989	0.5%	1,077	45	4.2%
KS–TOPEKA	200	456,124	1.0%	1,602	39	2.5%
KS–WICHITA	201	1,262,728	2.9%	3,500	34	1.0%
KY–COVINGTON	203	442,363	0.9%	2,107	115	5.5%
KY–LEXINGTON	204	1,548,572	4.0%	743	23	3.1%
KY–LOUISVILLE	205	1,835,775	4.4%	2,094	140	6.7%
KY–OWENSBORO	207	149,923	0.5%	2,865	36	1.3%
KY–PADUCAH	208	364,656	1.2%	1,948	155	7.9%
LA–ALEXANDRIA	209	278,648	0.8%	3,049	132	4.3%
LA–BATON ROUGE	210	989,565	2.1%	6,353	453	7.1%
LA–HOUMA	212	266,625	0.7%	6,813	538	7.9%
LA–LAFAYETTE	213	632,650	1.5%	2,969	249	8.4%
LA–LAKE CHARLES	214	293,600	0.7%	2,221	176	7.9%
LA–METAIRIE	216	468,605	1.3%	12,301	892	7.3%
LA–MONROE	217	263,938	0.7%	6,390	209	3.3%
LA–NEW ORLEANS	218	715,467	1.5%	16,138	1,090	6.8%
LA–SHREVEPORT	219	680,543	1.9%	5,178	441	8.5%
LA–SLIDELL	220	207,660	0.6%	4,541	465	10.2%
MA–BOSTON	227	5,135,042	11.4%	13,219	863	6.5%
MA–SPRINGFIELD	230	746,371	1.7%	8,715	860	9.9%
MA–WORCESTER	231	842,295	1.8%	11,120	703	6.3%
MD–BALTIMORE	223	2,587,466	6.1%	5,041	268	5.3%
MD–SALISBURY	225	487,252	1.6%	10,854	315	2.9%
MD–TAKOMA PARK	226	1,026,910	1.9%	9,855	440	4.5%
ME–BANGOR	221	391,704	1.1%	430	30	6.9%
ME–PORTLAND	222	1,103,747	2.4%	1,608	63	3.9%

Table 2 (continued)
MICHIGAN (MI) THROUGH MONTANA (MT)

HRR Name	HRR Number	Population	Percent of Population > 65 With 2+ Underlying Conditions	Confirmed COVID-19 Cases per Million	Reported COVID-19 Deaths per Million	COVID-19 Case Fatality Rate
MI–ANN ARBOR	232	1,418,066	3.2%	5,830	598	10.3%
MI–DEARBORN	233	496,776	1.5%	10,842	1,257	11.6%
MI–DETROIT	234	1,731,609	5.1%	8,380	966	11.5%
MI–FLINT	235	548,948	1.7%	4,139	516	12.5%
MI–GRAND RAPIDS	236	1,272,989	2.6%	2,858	66	2.3%
MI–KALAMAZOO	238	682,099	1.6%	2,224	128	5.7%
MI–LANSING	239	723,958	1.6%	1,830	101	5.5%
MI–MARQUETTE	240	193,642	0.5%	401	62	15.5%
MI–MUSKEGON	242	277,017	0.7%	2,340	108	4.6%
MI–PETOSKEY	243	173,336	0.5%	936	75	8.0%
MI–PONTIAC	244	492,066	1.2%	6,393	725	11.3%
MI–ROYAL OAK	245	710,882	2.0%	6,506	741	11.4%
MI–SAGINAW	246	601,878	2.1%	2,706	259	9.6%
MI–ST JOSEPH	248	139,602	0.4%	2,957	159	5.4%
MI–TRAVERSE CITY	249	240,019	0.7%	683	52	7.6%
MI–ANN ARBOR	232	1,418,066	3.2%	5,830	598	10.3%
MI–DEARBORN	233	496,776	1.5%	10,842	1,257	11.6%
MI–DETROIT	234	1,731,609	5.1%	8,380	966	11.5%
MI–FLINT	235	548,948	1.7%	4,139	516	12.5%
MI–GRAND RAPIDS	236	1,272,989	2.6%	2,858	66	2.3%
MI–KALAMAZOO	238	682,099	1.6%	2,224	128	5.7%
MI–LANSING	239	723,958	1.6%	1,830	101	5.5%
MI–MARQUETTE	240	193,642	0.5%	401	62	15.5%
MI–MUSKEGON	242	277,017	0.7%	2,340	108	4.6%
MI–PETOSKEY	243	173,336	0.5%	936	75	8.0%
MI–PONTIAC	244	492,066	1.2%	6,393	725	11.3%
MI–ROYAL OAK	245	710,882	2.0%	6,506	741	11.4%
MI–SAGINAW	246	601,878	2.1%	2,706	259	9.6%
MI–ST JOSEPH	248	139,602	0.4%	2,957	159	5.4%
MI–TRAVERSE CITY	249	240,019	0.7%	683	52	7.6%
MN–DULUTH	250	336,626	0.8%	606	41	6.8%
MN–MINNEAPOLIS	251	3,462,286	6.1%	2,489	159	6.4%
MN–ROCHESTER	253	430,215	0.9%	1,899	30	1.6%
MN–ST CLOUD	254	276,576	0.5%	7,009	46	0.7%
MN–ST PAUL	256	1,166,373	1.9%	1,890	82	4.3%
MO–CAPE GIRARDEAU	263	256,196	0.7%	2,184	68	3.1%
MO–COLUMBIA	264	724,283	1.6%	986	8	0.8%
MO–JOPLIN	267	376,021	1.1%	503	46	9.1%
MO–KANSAS CITY	268	2,634,727	5.3%	1,642	62	3.8%
MO–SPRINGFIELD	270	900,552	2.4%	242	11	4.6%
MO–ST LOUIS	273	3,428,227	8.7%	2,799	198	7.1%
MS–GULFPORT	257	223,036	0.5%	1,090	36	3.3%
MS–HATTIESBURG	258	311,294	0.8%	4,236	169	4.0%
MS–JACKSON	259	1,050,859	2.4%	5,058	186	3.7%
MS–MERIDIAN	260	184,939	0.5%	9,280	545	5.9%
MS–OXFORD	261	152,096	0.4%	2,873	125	4.4%
MS–TUPELO	262	398,818	1.0%	2,389	170	7.1%
MT–BILLINGS	274	636,290	1.0%	573	6	1.0%
MT–GREAT FALLS	275	152,812	0.3%	374	52	14.0%
MT–MISSOULA	276	413,976	0.7%	277	11	3.9%

Table 2 (continued)
NORTH CAROLINA (NC) THROUGH OHIO (OH)

HRR Name	HRR Number	Population	Percent of Population > 65 With 2+ Underlying Conditions	Confirmed COVID-19 Cases per Million	Reported COVID-19 Deaths per Million	COVID-19 Case Fatality Rate
NC–ASHEVILLE	309	705,595	1.8%	826	65	7.9%
NC–CHARLOTTE	311	2,839,301	5.2%	1,805	60	3.3%
NC–DURHAM	312	1,463,062	3.5%	2,523	110	4.4%
NC–GREENSBORO	313	667,235	1.7%	1,896	80	4.2%
NC–GREENVILLE	314	872,435	2.3%	1,523	53	3.5%
NC–HICKORY	315	303,815	0.8%	867	28	3.2%
NC–RALEIGH	318	2,321,195	4.5%	1,778	60	3.4%
NC–WILMINGTON	319	519,819	1.4%	1,109	49	4.4%
NC–WINSTON-SALEM	320	1,192,474	3.2%	1,889	32	1.7%
ND–BISMARCK	321	243,873	0.5%	1,085	21	1.9%
ND–FARGO MOORHEAD - MN	322	576,086	1.2%	2,826	88	3.1%
ND–GRAND FORKS	323	164,434	0.4%	2,382	28	1.2%
ND–MINOT	324	151,038	0.3%	722	20	2.7%
NE–LINCOLN	277	608,357	1.3%	4,258	29	0.7%
NE–OMAHA	278	1,383,617	2.6%	4,784	38	0.8%
NH–LEBANON	281	389,452	0.8%	709	23	3.3%
NH–MANCHESTER	282	928,559	1.8%	3,191	114	3.6%
NJ–CAMDEN	283	2,814,096	8.7%	10,437	675	6.5%
NJ–HACKENSACK	284	1,323,111	3.5%	24,726	1,616	6.5%
NJ–MORRISTOWN	285	1,027,445	2.4%	14,835	1,217	8.2%
NJ–NEW BRUNSWICK	288	1,061,869	2.7%	16,559	1,089	6.6%
NJ–NEWARK	289	1,585,413	3.8%	23,378	1,764	7.5%
NJ–PATERSON	291	393,773	1.0%	27,564	1,601	5.8%
NJ–RIDGEWOOD	292	478,922	1.0%	26,971	1,521	5.6%
NM–ALBUQUERQUE	293	1,757,680	3.3%	3,644	161	4.4%
NV–LAS VEGAS	279	2,386,404	5.3%	2,309	128	5.5%
NV–RENO	280	812,979	1.5%	1,932	67	3.5%
NY–ALBANY	295	1,823,494	4.7%	5,516	234	4.2%
NY–BINGHAMTON	296	344,560	1.0%	2,185	149	6.8%
NY–BRONX	297	1,431,932	3.3%	2,430	97	4.0%
NY–BUFFALO	299	1,358,192	4.1%	4,532	362	8.0%
NY–EAST LONG ISLAND	301	4,749,878	13.9%	15,959	782	4.9%
NY–ELMIRA	300	317,719	0.9%	2,346	81	3.5%
NY–NEW YORK	303	11,799,715	13.7%	16,445	1,762	10.7%
NY–ROCHESTER	304	1,288,656	3.2%	2,394	171	7.1%
NY–SYRACUSE	307	1,039,240	2.6%	2,299	109	4.7%
NY–WHITE PLAINS	308	1,157,681	2.8%	30,658	1,231	4.0%
OH–AKRON	325	705,337	1.7%	1,797	226	12.6%
OH–CANTON	326	635,505	1.7%	1,691	197	11.6%
OH–CINCINNATI	327	1,720,064	3.6%	1,888	98	5.2%
OH–CLEVELAND	328	2,023,438	5.3%	2,211	133	6.0%
OH–COLUMBUS	329	3,216,268	7.2%	3,352	81	2.4%
OH–DAYTON	330	1,069,424	2.9%	1,368	102	7.5%
OH–ELYRIA	331	260,186	0.7%	1,902	179	9.4%
OH–KETTERING	332	446,481	1.2%	1,022	36	3.5%
OH–TOLEDO	334	985,979	2.4%	2,877	279	9.7%
OH–YOUNGSTOWN	335	608,760	2.0%	3,282	352	10.7%

Table 2 (continued)
OKLAHOMA (OK) THROUGH TEXAS (TX)–HOUSTON

HRR Name	HRR Number	Population	Percent of Population > 65 With 2+ Underlying Conditions	Confirmed COVID-19 Cases per Million	Reported COVID-19 Deaths per Million	COVID-19 Case Fatality Rate
OK–LAWTON	336	196,684	0.5%	1,712	61	3.5%
OK–OKLAHOMA CITY	339	2,030,202	4.8%	1,113	61	5.5%
OK–TULSA	340	1,427,085	3.4%	1,255	87	6.9%
OR–BEND	341	267,576	0.5%	468	0	0.0%
OR–EUGENE	342	787,946	1.7%	378	20	5.2%
OR–MEDFORD	343	457,580	1.1%	282	2	0.8%
OR–PORTLAND	344	2,987,652	4.9%	938	40	4.3%
OR–SALEM	345	355,247	0.6%	2,068	75	3.6%
PA–ALLENTOWN	346	1,259,906	3.3%	8,205	522	6.4%
PA–ALTOONA	347	292,201	0.9%	1,062	5	0.5%
PA–DANVILLE	350	577,869	1.5%	1,795	95	5.3%
PA–ERIE	351	684,973	2.0%	458	19	4.2%
PA–HARRISBURG	352	1,071,932	2.8%	3,230	122	3.8%
PA–JOHNSTOWN	354	203,157	0.7%	472	15	3.1%
PA–LANCASTER	355	712,597	1.6%	4,469	455	10.2%
PA–PHILADELPHIA	356	4,293,960	9.9%	9,709	690	7.1%
PA–PITTSBURGH	357	2,834,298	8.0%	1,317	109	8.3%
PA–READING	358	604,055	1.5%	7,376	442	6.0%
PA–SAYRE	359	189,411	0.5%	1,277	172	13.4%
PA–SCRANTON	360	309,256	1.0%	5,564	558	10.0%
PA–WILKES-BARRE	362	246,241	0.8%	7,739	393	5.1%
PA–YORK	363	453,502	1.1%	1,889	38	2.0%
RI–PROVIDENCE	364	1,241,206	2.9%	10,238	98	1.0%
SC–CHARLESTON	365	1,253,877	2.7%	989	42	4.3%
SC–COLUMBIA	366	1,298,795	2.9%	2,616	131	5.0%
SC–FLORENCE	367	378,164	1.1%	3,308	145	4.4%
SC–GREENVILLE	368	1,010,981	2.2%	1,488	60	4.0%
SC–SPARTANBURG	369	409,130	0.9%	1,143	40	3.5%
SD–RAPID CITY	370	222,022	0.4%	321	5	1.4%
SD–SIOUX FALLS	371	817,789	1.7%	6,740	55	0.8%
TN–CHATTANOOGA	373	748,963	2.0%	1,688	25	1.5%
TN–JACKSON	374	329,471	1.0%	1,272	16	1.2%
TN–JOHNSON CITY	375	286,296	0.8%	396	4	1.0%
TN–KINGSPORT	376	459,028	1.6%	463	22	4.8%
TN–KNOXVILLE	377	1,449,429	4.0%	622	20	3.2%
TN–MEMPHIS	379	1,803,593	4.1%	3,634	77	2.1%
TN–NASHVILLE	380	3,158,790	6.7%	3,550	54	1.5%
TX–ABILENE	382	299,787	0.8%	1,355	50	3.7%
TX–AMARILLO	383	448,877	0.9%	9,581	127	1.3%
TX–AUSTIN	385	2,235,980	2.8%	1,462	44	3.0%
TX–BEAUMONT	386	468,929	1.4%	1,456	71	4.9%
TX–BRYAN	388	311,284	0.5%	1,304	60	4.6%
TX–CORPUS CHRISTI	390	587,340	1.6%	514	7	1.3%
TX–DALLAS	391	5,721,503	9.3%	1,863	48	2.6%
TX–EL PASO	393	1,162,863	2.3%	1,751	43	2.5%
TX–FORT WORTH	394	2,553,249	4.6%	1,775	51	2.9%
TX–HARLINGEN	396	626,949	1.7%	1,152	48	4.2%
TX–HOUSTON	397	7,625,692	12.8%	1,950	51	2.6%

Table 2 (continued)
TEXAS (TX)–LONGVIEW THROUGH WYOMING (WY)

HRR Name	HRR Number	Population	Percent of Population > 65 With 2+ Underlying Conditions	Confirmed COVID-19 Cases per Million	Reported COVID-19 Deaths per Million	COVID-19 Case Fatality Rate
TX–LONGVIEW	399	218,322	0.5%	1,392	37	2.6%
TX–LUBBOCK	400	748,812	1.5%	1,268	81	6.4%
TX–MCALLEN	402	750,912	1.6%	470	11	2.2%
TX–ODESSA	406	425,093	0.7%	630	40	6.3%
TX–SAN ANGELO	411	165,929	0.5%	574	6	1.1%
TX–SAN ANTONIO	412	3,164,981	6.1%	1,009	30	3.0%
TX–TEMPLE	413	578,882	0.9%	981	15	1.5%
TX–TYLER	416	595,837	1.6%	932	11	1.1%
TX–VICTORIA	417	154,744	0.4%	1,343	64	4.8%
TX–WACO	418	364,151	0.8%	437	16	3.7%
TX–WICHITA FALLS	420	200,917	0.6%	487	16	3.3%
UT–OGDEN	421	553,942	0.7%	426	2	0.5%
UT–PROVO	422	735,139	0.7%	2,311	16	0.7%
UT–SALT LAKE CITY	423	2,285,152	3.1%	2,146	28	1.3%
VA–ARLINGTON	426	2,597,407	3.4%	6,510	204	3.1%
VA–CHARLOTTESVILLE	427	620,746	1.3%	3,554	79	2.2%
VA–LYNCHBURG	428	263,276	0.7%	725	12	1.6%
VA–NEWPORT NEWS	429	574,234	1.3%	1,362	66	4.8%
VA–NORFOLK	430	1,334,987	2.8%	2,084	71	3.4%
VA–RICHMOND	431	1,882,832	4.0%	3,021	128	4.2%
VA–ROANOKE	432	718,099	2.0%	666	24	3.6%
VA–WINCHESTER	435	471,138	1.1%	2,496	79	3.1%
VT–BURLINGTON	424	643,186	1.4%	1,531	83	5.5%
WA–EVERETT	437	762,198	1.2%	3,158	137	4.3%
WA–OLYMPIA	438	435,765	0.9%	421	11	2.7%
WA–SEATTLE	439	3,232,405	4.9%	2,797	188	6.7%
WA–SPOKANE	440	1,681,418	3.1%	1,389	80	5.8%
WA–TACOMA	441	913,983	1.4%	1,850	69	3.7%
WA–YAKIMA	442	315,594	0.5%	7,462	251	3.4%
WI–APPLETON	446	337,718	0.7%	705	17	2.4%
WI–GREEN BAY	447	522,002	1.3%	4,307	59	1.4%
WI–LA CROSSE	448	358,650	0.8%	925	57	6.1%
WI–MADISON	449	1,157,042	2.0%	1,242	50	4.0%
WI–MARSHFIELD	450	379,210	1.0%	286	14	5.1%
WI–MILWAUKEE	451	2,732,748	5.5%	4,498	177	3.9%
WI–NEENAH	452	244,054	0.6%	725	9	1.3%
WI–WAUSAU	456	188,738	0.5%	256	5	1.8%
WV–CHARLESTON	443	786,434	2.9%	746	53	7.1%
WV–HUNTINGTON	444	339,067	1.2%	742	35	4.7%
WV–MORGANTOWN	445	406,475	1.2%	685	25	3.6%
WY–CASPER	457	194,654	0.3%	1,775	5	0.3%

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