

# RUPRI Center for Rural Health Policy Analysis

## *Rural Data Brief*

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## **COVID-19 Cases and Vaccination Rates**

*Fred Ullrich, BA; and Keith Mueller, PhD*

### **Purpose**

Vaccinations are an important tool for ending the COVID-19 pandemic<sup>i</sup>. COVID-19 vaccines have been approved for use in those aged 16 and older in the United States since December 2020 and those aged 12-15 since May 2021.<sup>ii</sup> As of mid-August 2021, approximately 51.1% of the U.S. population is considered fully vaccinated against COVID-19<sup>iii</sup>. Despite progress in getting the population vaccinated there has been a significant increase in COVID-19 incidence and mortality in late summer 2021<sup>iv</sup>. This data brief examines the relationship between vaccination rates, COVID-19 one-week incidence and metropolitan/nonmetropolitan location.

### **Key Findings**

- Overall, the COVID-19 vaccination rate (percent of the population 12 years and older that received at least one vaccination dose) was lower in nonmetropolitan counties than in metropolitan counties.
- The rate of new confirmed cases was lower in both nonmetropolitan and metropolitan counties where the vaccination rate was higher than the national county median.
- There was substantial variation in case and vaccination rates across Census regions. Median county case rates overall and by metropolitan/nonmetropolitan status are lowest in the Northeast states and highest in South states. Median county vaccination rates overall and by metropolitan/nonmetropolitan status are highest in the Northeast states and lowest in South states.

### **Methods**

Data on confirmed COVID-19 cases for the week of August 29, 2021 – September 4, 2021, were obtained from the Johns Hopkins University COVID-19 Data Repository<sup>v</sup>. Vaccination data as of August 15, 2021 (two weeks prior to the start of the case data period) were obtained from the Centers for Disease Control and Prevention web site<sup>vi</sup>. For the purposes of this report, county vaccination rates are based on the percentage of the total population aged 12 years and older that have received at least one vaccination



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**RURAL POLICY RESEARCH INSTITUTE**

Department of Health Management and Policy,  
145 Riverside Dr., Iowa City, IA 52242-2007, (319) 384-3830  
<http://www.public-health.uiowa.edu/rupri>  
E-mail: [cph-rupri-inquiries@uiowa.edu](mailto:cph-rupri-inquiries@uiowa.edu)

RUPRI Center for Rural  
Health Policy Analysis,  
University of Iowa  
College of Public Health,

dose (regardless of manufacturer). Total population counts (for calculation of incidence rates) are based on data obtained from American Community Survey 5-year estimates<sup>vii</sup>. Counties were classified as metropolitan or nonmetropolitan based on Urban Influence Codes<sup>viii</sup>.

The available county-level case and vaccination data are not complete. Nebraska does not currently provide county case data. Hawaii, Idaho, New Mexico, Rhode Island, South Dakota, and Texas do not provide current county vaccination data (or the data provided is available for less than 75 percent of their counties). These states are excluded from this analysis. In addition, 70 counties indicating that no vaccinations had been administered were also excluded (based on the assumption that they were not actually providing vaccination data rather than no residents of the county having been vaccinated).

## Results

Table 1a. shows that the median county case rate was higher, and the median county vaccination proportion was lower in nonmetropolitan counties than in metropolitan counties. Table 1b. shows that the majority (57.9 percent) of nonmetropolitan counties had a vaccination rate below the national county median. Fewer than half of metropolitan counties (38.4 percent) had a vaccination rate below the national county median. Overall, the rate of new confirmed cases was lower in counties where the vaccination rate was higher than the national county median (298.94 vs 498.15 cases/100,000 population). This same pattern held for both metropolitan and nonmetropolitan counties.

**Table 1. U.S. County Confirmed COVID-19 Cases Rates and Vaccination Percentages: 8/29/2021 – 9/4/2021**

### a. Overall

	Overall		
	Counties	Case Rate <sup>3</sup>	Vac. Pct <sup>1</sup>
Overall	2,572	394.92	50.3%
Metro. <sup>4</sup>	1,022	370.07	55.7%
Nonmet. <sup>4</sup>	1,550	413.52	47.9%

### b. By Vaccination Percentage<sup>1</sup>

	High Vac. Pct <sup>2</sup>		Low Vac. Pct <sup>2</sup>	
	Counties n / (pct)	Case Rate <sup>3</sup>	Counties n / (pct)	Case Rate <sup>3</sup>
Overall	1,283 (49.9%)	298.94	1,289 (50.1%)	498.15
Metro. <sup>4</sup>	630 (61.6%)	284.06	392 (38.4%)	491.72
Nonmet. <sup>4</sup>	653 (42.1%)	306.93	897 (57.9%)	505.66

1. County median percentage of the population 12 years and older that have received at least one vaccination dose.

2. County vaccination rate compared to national county median (50.3 percent)

3. County median rate (cases/100,000 population) of new confirmed COVID-19 cases.

4. County classifications based on Urban Influence Codes.

Table 2a shows that median nonmetropolitan vaccination percentages are lower than metropolitan percentages in all four census regions. Median nonmetropolitan case rates are higher in all four census regions (however, the Midwest median nonmetropolitan and metropolitan case rates are not substantially different). Further, median county case rates overall and by metropolitan/nonmetropolitan status are lowest in states in the Northeast region and highest in states in the South region. Median county vaccination rates overall and by metropolitan/nonmetropolitan status are highest in the states in the Northeast region and lowest in states in the South region.

Table 2b shows differences in cases and vaccination rates across census regions, and within them between nonmetropolitan and metropolitan counties. Across all four census regions case rates are lower where vaccination rates are high (regardless of metropolitan/nonmetropolitan status).

**Table 2. County Confirmed COVID-19 Cases Rates and Vaccination Percentages by Census Region: 8/29/2021 – 9/4/2021**

**a. Overall**

	Overall		
	Counties	Case Rate <sup>3</sup>	Vac. Pct <sup>1</sup>
<b>West States</b>			
Overall	349	343.57	57.1%
Metro. <sup>4</sup>	120	314.05	65.1%
Nonmet. <sup>4</sup>	229	353.27	51.3%
<b>Midwest States</b>			
Overall	867	278.02	52.4%
Metro. <sup>4</sup>	276	277.23	57.5%
Nonmet. <sup>4</sup>	591	278.02	50.6%
<b>South States</b>			
Overall	1,146	580.95	44.8%
Metro. <sup>4</sup>	501	530.66	48.0%
Nonmet. <sup>4</sup>	645	634.81	43.0%
<b>Northeast States</b>			
Overall	210	181.41	67.2%
Metro. <sup>4</sup>	125	175.36	70.1%
Nonmet. <sup>4</sup>	85	194.88	60.9%

**b. By Vaccination Percentage<sup>1</sup>**

	High Vac. Pct <sup>2</sup>		Low Vac. Pct <sup>2</sup>	
	Counties n / (pct)	Case Rate <sup>3</sup>	Counties n / (pct)	Case Rate <sup>3</sup>
<b>West States</b>				
Overall	174 (49.9%)	313.22	175 (50.1%)	370.16
Metro. <sup>4</sup>	83 (69.2%)	264.90	37 (30.8%)	405.16
Nonmet. <sup>4</sup>	91 (39.7%)	331.45	138 (60.3%)	363.70
<b>Midwest States</b>				
Overall	430 (49.6%)	255.06	437 (50.4%)	331.13
Metro. <sup>4</sup>	184 (66.7%)	261.94	92 (33.3%)	326.44
Nonmet. <sup>4</sup>	246 (41.6%)	250.37	345 (58.4%)	332.31
<b>South States</b>				
Overall	571 (49.8%)	555.51	575 (50.2%)	608.24
Metro. <sup>4</sup>	286 (57.1%)	526.69	215 (42.9%)	542.31
Nonmet. <sup>4</sup>	285 (44.2%)	596.20	360 (55.8%)	652.39
<b>Northeast States</b>				
Overall	103 (49.0%)	159.09	107 (51.0%)	202.10
Metro. <sup>4</sup>	79 (63.2%)	159.09	46 (36.8%)	188.16
Nonmet. <sup>4</sup>	24 (28.2%)	156.96	61 (71.8%)	205.71

1. County median percentage of the population 12 years and older that have received at least one vaccination dose.

2. County vaccination rate compared to regional county median (West: 57.1%, Midwest: 52.4%, South: 44.8%, Northeast 67.2%)

3. County median rate (cases/100,000 population) of new confirmed COVID-19 cases.

4. County classifications based on Urban Influence Codes.

State case rate and vaccination percent data (grouped by census region) are presented in Table 3. Quartiles are used to identify states with very high and very low state case rates and vaccine percentages (i.e., those in the highest quartile – top 25% of states, and lowest quartile – bottom 25% of states). Cells in the “Overall, Case Rate” column highlighted in green (n = 13) have a median county case rate lower than the national county lowest quartile rate (229.50/100,000). Those highlighted in red (n = 9) have a median county case rate higher than the national county highest quartile rate (625.73/100,000). Cells in the “Overall, Vac. Pct.” column highlighted in green (n = 14) have a median county vaccination percentage higher than the national county highest quartile percentage (60.2 percent). Those highlighted in red (n = 3) have a median county case vaccination percentage lower than the national county lowest quartile percentage (41.1 percent).

In nonmetropolitan counties, the median case rate was lower in high-vaccination counties than in low-vaccination counties in 26 states. In metropolitan counties, the median case rate was lower in high-vaccination counties than in low-vaccination counties in 18 states.

**Table 3. State County Confirmed COVID-19 Cases Rates 8/29/2021 – 9/4/2021, Overall, and Metropolitan/Nonmetropolitan by Vaccination Percentage<sup>1</sup>**

Census Region	State	Overall		Nonmetropolitan <sup>2</sup>				Metropolitan <sup>2</sup>			
		Case Rate <sup>4</sup>	Vac. Pct <sup>1</sup>	High Vac. Pct <sup>3</sup>		Low Vac. Pct <sup>3</sup>		High Vac. Pct <sup>3</sup>		Low Vac. Pct <sup>3</sup>	
				Counties n / (pct)	Case Rate <sup>4</sup>	Counties n / (pct)	Case Rate <sup>4</sup>	Counties n / (pct)	Case Rate <sup>4</sup>	Counties n / (pct)	Case Rate <sup>4</sup>
Midwest	Illinois	398.81	57.2%	35 (56.5%)	380.6	27 (43.5%)	650.4	38 (95.0%)	286.4	2 (5.0%)	522.3
	Indiana	528.74	49.1%	11 (22.9%)	585.1	37 (77.1%)	582.2	27 (62.8%)	494.3	16 (37.2%)	484.7
	Iowa	247.61	56.2%	64 (82.1%)	262.5	14 (17.9%)	227.2	21 (100.0%)	245.4	- 0 -	---
	Kansas	332.54	49.9%	34 (39.5%)	341.0	52 (60.5%)	302.7	10 (52.6%)	478.9	9 (47.4%)	425.4
	Michigan	167.12	53.6%	33 (64.7%)	171.8	18 (35.3%)	167.7	15 (62.5%)	159.2	9 (37.5%)	178.4
	Minnesota	209.63	58.6%	51 (86.4%)	209.6	8 (13.6%)	207.5	20 (74.1%)	205.8	7 (25.9%)	224.1
	Missouri	265.70	41.4%	6 (7.4%)	387.7	75 (92.6%)	261.6	13 (38.2%)	225.2	21 (61.8%)	300.9
	North Dakota	249.41	49.0%	22 (46.8%)	221.6	25 (53.2%)	267.1	4 (66.7%)	289.9	2 (33.3%)	263.9
	Ohio	416.98	46.8%	3 (9.1%)	354.1	30 (90.9%)	484.7	24 (66.7%)	313.2	12 (33.3%)	443.5
	Wisconsin	232.45	58.9%	40 (87.0%)	224.7	6 (13.0%)	224.4	24 (92.3%)	242.9	2 (7.7%)	182.8
Northeast	Connecticut	127.59	79.7%	1 (100.0%)	125.6	- 0 -	---	7 (100.0%)	129.5	- 0 -	---
	Maine	153.62	70.8%	11 (100.0%)	193.3	- 0 -	---	5 (100.0%)	143.7	- 0 -	---
	Massachusetts	153.15	70.3%	1 (33.3%)	081.7	2 (66.7%)	000.0	10 (90.9%)	158.8	1 (9.1%)	176.8
	New Hampshire	163.37	67.9%	7 (100.0%)	163.2	- 0 -	---	3 (100.0%)	163.4	- 0 -	---
	New Jersey	161.63	75.2%	- 0 -	---	- 0 -	---	21 (100.0%)	161.6	- 0 -	---
	New York	181.79	65.4%	23 (95.8%)	212.7	1 (4.2%)	153.1	38 (100.0%)	178.1	- 0 -	---
	Pennsylvania	215.67	62.2%	19 (67.9%)	217.4	9 (32.1%)	203.4	36 (97.3%)	208.1	1 (2.7%)	271.4
	Vermont	147.99	58.5%	7 (63.6%)	138.9	4 (36.4%)	156.6	2 (66.7%)	182.8	1 (33.3%)	157.0
South	Alabama	631.44	46.0%	10 (26.3%)	460.5	28 (73.7%)	677.6	10 (34.5%)	528.5	19 (65.5%)	643.1
	Arkansas	475.69	48.4%	21 (38.2%)	523.5	34 (61.8%)	473.6	9 (45.0%)	388.0	11 (55.0%)	616.1
	Delaware	367.13	70.7%	- 0 -	---	- 0 -	---	3 (100.0%)	367.1	- 0 -	---
	Dist. of Col.	198.98	73.0%	- 0 -	---	- 0 -	---	1 (100.0%)	198.9	- 0 -	---
	Florida	741.14	58.2%	2 (8.7%)	934.2	21 (91.3%)	993.2	41 (93.2%)	676.4	3 (6.8%)	913.9
	Georgia	665.75	19.5%	- 0 -	---	77 (100.0%)	665.7	2 (2.9%)	950.1	66 (97.1%)	663.0
	Kentucky	747.78	49.8%	35 (41.2%)	776.4	50 (58.8%)	791.3	20 (58.8%)	564.5	14 (41.2%)	743.4
	Louisiana	460.17	44.2%	1 (3.4%)	514.3	28 (96.6%)	603.9	17 (48.6%)	273.5	18 (51.4%)	410.3
	Maryland	143.97	69.9%	5 (100.0%)	167.3	- 0 -	---	19 (100.0%)	143.8	- 0 -	---
	Mississippi	636.92	48.2%	27 (41.5%)	549.8	38 (58.5%)	744.5	9 (52.9%)	512.8	8 (47.1%)	664.4
	North Carolina	481.00	52.4%	24 (44.4%)	492.7	30 (55.6%)	510.0	30 (65.2%)	417.8	16 (34.8%)	506.1
	Oklahoma	470.86	47.6%	17 (28.8%)	422.1	42 (71.2%)	484.9	7 (38.9%)	483.4	11 (61.1%)	530.7
	South Carolina	697.00	49.5%	8 (40.0%)	824.4	12 (60.0%)	647.5	12 (46.2%)	685.0	14 (53.8%)	766.4
	Tennessee	799.55	43.0%	5 (9.4%)	785.8	48 (90.6%)	845.8	18 (42.9%)	681.3	24 (57.1%)	846.9
	Virginia	354.62	22.0%	5 (10.4%)	275.9	43 (89.6%)	378.6	11 (14.1%)	269.1	67 (85.9%)	348.5
West Virginia	644.71	30.5%	1 (2.9%)	570.3	33 (97.1%)	705.3	- 0 -	---	21 (100.0%)	520.7	
West	Alaska	468.49	67.9%	22 (88.0%)	452.1	3 (12.0%)	723.1	2 (66.7%)	438.2	1 (33.3%)	473.5
	Arizona	323.66	64.3%	5 (71.4%)	413.8	2 (28.6%)	367.0	7 (87.5%)	226.0	1 (12.5%)	354.7
	California	335.38	66.4%	10 (76.9%)	375.2	3 (23.1%)	440.2	36 (97.3%)	255.0	1 (2.7%)	467.0
	Colorado	197.47	56.1%	19 (48.7%)	197.7	20 (51.3%)	157.0	14 (82.4%)	203.2	3 (17.6%)	302.0
	Montana	284.97	45.0%	17 (34.0%)	284.9	33 (66.0%)	244.7	3 (60.0%)	481.5	2 (40.0%)	154.4
	Nevada	336.83	44.9%	4 (30.8%)	689.9	9 (69.2%)	320.3	3 (75.0%)	455.7	1 (25.0%)	076.1
	Oregon	481.72	59.2%	17 (73.9%)	516.2	6 (26.1%)	559.1	12 (92.3%)	363.8	1 (7.7%)	835.2
	Utah	362.26	55.1%	10 (52.6%)	455.2	9 (47.4%)	494.7	9 (90.0%)	294.1	1 (10.0%)	575.4
	Washington	431.24	63.2%	16 (88.9%)	405.9	2 (11.1%)	393.4	16 (76.2%)	392.5	5 (23.8%)	552.2
	Wyoming	708.65	43.3%	4 (19.0%)	561.4	17 (81.0%)	739.8	1 (50.0%)	401.2	1 (50.0%)	784.0

Legend (national measures)		
	Case rate <sup>4</sup>	Vac. pct. <sup>1</sup>
First quartile	229.50	41.1%
Median	394.92	50.3%
Third quartile	625.73	60.2%

1. County median percentage of the population aged 12 years and older that have received at least one vaccination dose. States with median county vaccination rate higher than the national third quartile are highlighted in green. States with rates lower than the national first quartile are highlighted in red.
2. County classifications based on Urban Influence Codes. Note that Delaware, District of Columbia, and New Jersey have no nonmetropolitan counties.
3. County vaccination rate compared to national county median.
4. County median rate (cases/100,000 population) of new confirmed COVID-19 cases. States with median county case rates higher than the third quartile are highlighted in red. States with rates lower than the national first quartile are highlighted in green.

## Suggested Citation

Ullrich F, Mueller K. **COVID-19 Case and Vaccination Brief**, RUPRI Center for Rural Health Policy Analysis, September 30, 2021-8.

## References

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