

Changes in Hospitalizations and In-Hospital Deaths for Patients From Rural Areas in the Initial Period of the COVID-19 Pandemic (April–December 2020), 29 States

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Introduction

Annually, there are approximately 5.6 million hospitalizations for rural residents in the United States, including for medical conditions (51 percent), surgeries (21 percent), maternal conditions (9 percent), neonatal conditions (9 percent), mental health and substance use conditions (5 percent), and injuries^a (5 percent).¹ With the COVID-19 pandemic beginning in early 2020, hospital utilization changed considerably, as areas of the country saw spikes in COVID-19 cases and subsequent hospitalizations. Hospitalizations related to COVID-19 varied by State and across time.² The Centers for Disease Control and Prevention (CDC) reported higher rates of COVID-19 cases in rural areas compared with urban areas starting in September 2020,³ but little is known about the impact of the initial period of the pandemic on hospitalizations and in-hospital deaths overall for rural residents.

As a complement to the Healthcare Cost and Utilization Project (HCUP) Statistical Brief on hospitalizations for patients from urban areas, this brief presents data from 29 States on hospitalizations for patients from rural areas across time periods with a focus on the initial impact of the COVID-19 pandemic. The number of hospitalizations and in-hospital deaths for patients from rural areas is presented overall and by patient characteristics from April to December 2020 compared with State-level averages from April to December in 2016–2019. The percentages of all hospitalizations and in-hospital deaths related to COVID-19 for patients from rural areas during the April–December 2020 timeframe are also provided. Because of the large sample size of the HCUP data, small differences can be statistically significant but not meaningful. Thus, only differences greater than or equal to 10 percent are discussed in the text.

This analysis is limited to discharges for patients from rural areas^b treated in community, non-rehabilitation hospitals in 29 States (Arizona, California, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland,

^a Each hospitalization was assigned to a single hospitalization type hierarchically, based on the following order of hospital stay principal diagnoses: maternal, neonatal, mental health/substance use, injury, surgical, and medical.

^b For this Statistical Brief, rural areas represent micropolitan and noncore counties as defined by the urban-rural classification scheme developed by the National Center for Health Statistics (NCHS) and the Office of Management and Budget (OMB). Please see the Definitions section for more information.

Highlights

- Across 29 States, the average number of hospitalizations for patients from rural areas decreased 19 percent in April–June while the average number of in-hospital deaths increased 71 percent to about 1,200 in October–December 2020 compared with the same months in previous years.
- In April–December 2020, the percentages of hospitalizations and in-hospital deaths related to COVID-19 for patients from rural areas were 7 and 28 percent, respectively, corresponding to 161,500 hospitalizations and 21,300 in-hospital deaths related to COVID-19 across 29 States.
- Nearly one in three in-hospital deaths (31 percent) for patients aged 65 years or more from rural areas were COVID-19 related compared with 22 percent for patients aged 18–64 years from rural areas in April–December 2020 across 29 States.
- Across 29 States, the number of in-hospital deaths for non-Hispanic other patients from rural areas nearly doubled in April–December 2020 compared with the same months in previous years; about 4 in 10 in-hospital deaths among these patients were COVID-19 related.
- Across expected payers, Medicare hospitalizations for patients from rural areas decreased the most (15 percent) while those with an expected payer of Medicaid had the largest increase in in-hospital deaths (35 percent) in April–December 2020 compared with the same months in previous years in 29 States.

Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Washington, and Wisconsin) for which HCUP data were available for April–December 2016–2019 (State Inpatient Databases [SID]) and April–December 2020 (quarterly inpatient data). These States accounted for 65.8 percent of the resident U.S. rural population in 2019.^{4,5} Information contained in this Statistical Brief was primarily obtained from the [HCUP Summary Trend Tables](#).⁶ The Summary Trend Tables, accessed as downloadable tables, provide State-specific monthly trends in hospital utilization for the most recent HCUP data available. These tables were also used to create the [HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions](#)⁷ and will be updated as more quarterly data become available.

Findings

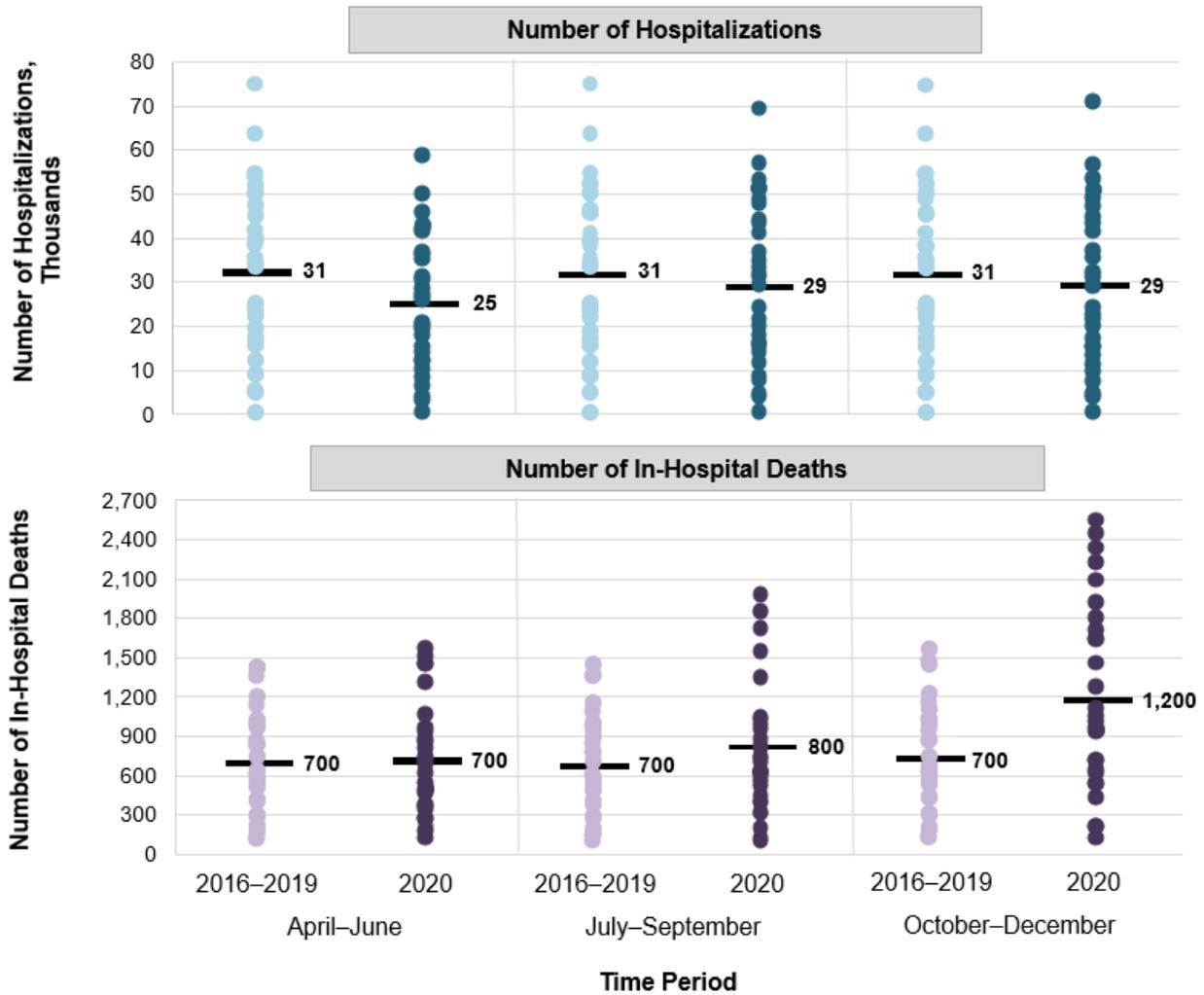
State-level hospitalizations and in-hospital deaths for patients from rural areas, 2016–2019 and 2020

Figure 1 displays the number of hospitalizations and in-hospital deaths for patients from rural areas for each of the 29 States in April–December 2016–2019^c and 2020. Each dot in the figure represents the State-specific number of hospitalizations or in-hospital deaths. The average number of hospitalizations and in-hospital deaths across these 29 States is also presented.

- On average, the *number of all hospitalizations for patients from rural areas* in the 29 States examined decreased 19.4 percent in the second quarter of 2020 (April–June) compared with the same quarter in 2016–2019 (from about 31,000 to 25,000 hospitalizations).
- On average, the *number of all-cause in-hospital deaths among patients from rural areas* in the 29 States examined increased in the third and fourth quarters of 2020 compared with the same quarters in previous years. In-hospital deaths increased 14.3 percent and 71.4 percent in the third (July–September; from about 700 to 800 deaths) and fourth (October–December; from about 700 to 1,200 deaths) quarters of 2020 compared with the same quarters in 2016–2019, respectively.

^c Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Figure 1. Number of hospitalizations (in thousands) and in-hospital deaths among patients from rural areas by quarter, in April–December 2020 compared with the average of April–December 2016–2019, 29 States



Notes: Number of in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years. Data values are suppressed for counts <11. Each dot in the figure represents the State-specific number of hospitalizations or in-hospital deaths.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 29 States (AZ, CA, CT, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, ND, NJ, NY, OH, OR, PA, SC, SD, TN, VA, VT, WA, and WI) (available as of October 2021)

Figure 2 presents the number of hospitalizations and in-hospital deaths for patients from rural areas by region, comparing April–December 2020 with the average from April–December 2016–2019.^d The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–December 2020 is also presented. Similar State-level data are provided in the Appendix.

- The *number of all hospitalizations for patients from rural areas* decreased in April–December 2020 compared with the average in April–December 2016–2019 for all regions based on the 29 States examined. Examined States in the Northeast had an 18.1 percent decrease in hospitalizations (from 341,800 to 280,000 hospitalizations), while examined States in the West had a decrease of 10.9 percent (from 199,700 to 177,900 hospitalizations). The number of hospitalizations in New Jersey for patients from rural areas had the largest decrease (42.9 percent) among examined States, from about 700 to 400 hospitalizations (see Appendix).

Across regions, 6.8 percent of all hospitalizations for patients from rural areas were related to COVID-19 in April–December 2020, ranging from 3.5 percent among examined States in the Northeast to 8.0 percent among examined States in the South. The percentage of COVID-19-related hospitalizations for patients from rural areas in the 29 examined States ranged from 0.9 percent in Vermont to 13.7 percent in Arizona (see Appendix).

- The *number of all-cause in-hospital deaths among patients from rural areas* in April–December 2020 versus the average in April–December 2016–2019 increased for all regions. In-hospital deaths for patients from rural areas among examined States in the South increased 41.5 percent (from 21,200 to 30,000 deaths). All-cause in-hospital deaths in Arizona for patients from rural areas more than doubled (140.0 percent), from 500 to 1,200 deaths (see Appendix).

Across regions, 27.7 percent of in-hospital deaths among patients from rural areas were related to COVID-19 in April–December 2020. Among examined States in the South, 30.3 percent of in-hospital deaths for patients from rural areas were related to COVID-19; rates ranged from 6.3 percent in Maine to 51.8 percent in Arizona (see Appendix).

^d Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Figure 2. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 among patients from rural areas in April–December 2020 compared with the average of all hospitalizations in April–December 2016–2019, 29 States

Region	Time period	Number of hospitalizations	Apr–Dec, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Dec, 2020 percent related to COVID-19
29 States (29 out of 50 States + DC; 66% of the population*)	Apr–Dec, 2016–2019	// 2,725,500		// 59,000	
	Apr–Dec, 2020	// 2,374,700	6.8%	// 77,000	27.7%
Northeast (6 out of 9 States; 87% of the population*)	Apr–Dec, 2016–2019	341,800		7,900	
	Apr–Dec, 2020	280,000	3.5%	8,500	16.9%
Midwest (11 out of 12 States; 96% of the population*)	Apr–Dec, 2016–2019	1,271,200		25,000	
	Apr–Dec, 2020	1,114,400	7.1%	32,600	29.7%
South (8 out of 16 States + DC; 48% of the population*)	Apr–Dec, 2016–2019	912,900		21,200	
	Apr–Dec, 2020	802,400	8.0%	30,000	30.3%
West (4 out of 13 States; 39% of the population*)	Apr–Dec, 2016–2019	199,700		4,900	
	Apr–Dec, 2020	177,900	4.4%	5,900	19.4%

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years. // indicates a break in the axis.

* Percentage of the resident U.S. rural population in the specified region in 2019.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 29 States (AZ, CA, CT, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, ND, NJ, NY, OH, OR, PA, SC, SD, TN, VA, VT, WA, and WI) (available as of October 2021)

Patient characteristics associated with hospitalizations and in-hospital deaths for patients from rural areas, 2016–2019 and 2020

Figure 3 presents the number of hospitalizations and in-hospital deaths for patients from rural areas in 29 States combined, by patient age group, comparing April–December 2020 with the average from April–December 2016–2019.^e The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–December 2020 is also presented.

- The number of all hospitalizations for patients from rural areas decreased 13.6 percent, 13.0 percent, and 12.5 percent in April–December 2020 compared with the average in April–December 2016–2019 for pediatric patients aged less than 18 years (from 342,700 to 296,100 hospitalizations), adult patients aged 18–64 years (from 1.2 to 1.1 million hospitalizations), and older adult patients aged 65 or more years (from 1.2 to 1.0 million hospitalizations), respectively.

At the beginning of the pandemic, across the 29 States with available data, the percentage of hospitalizations related to COVID-19 among patients from rural areas was highest for older adult patients aged 65 or more years (9.7 percent) compared with patients in other age groups.

- The number of all-cause in-hospital deaths among patients from rural areas increased 29.3 and 32.1 percent for adult patients aged 18–64 years (from 15,700 to 20,300 deaths) and older adult patients (from 42,000 to 55,500 deaths), respectively, in April–December 2020 versus the average in April–December 2016–2019.

Nearly one in three in-hospital deaths for older adult patients aged 65 years or more from rural areas (30.6 percent) were COVID-19 related in April–December 2020; one in five (21.6 percent) in-hospital deaths for adult patients aged 18–64 years from rural areas were COVID-19 related in April–December 2020.

Figure 3. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 among patients from rural areas by patient age group in April–December 2020 compared with the average of all hospitalizations in April–December 2016–2019, 29 States

Age group	Time period	Number of hospitalizations	Apr–Dec, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Dec, 2020 percent related to COVID-19
Pediatric <18	Apr–Dec, 2016–2019	342,700		1,300	
	Apr–Dec, 2020	296,100	0.4%	1,200	1.0%
Adult 18–64	Apr–Dec, 2016–2019	1,230,700		15,700	
	Apr–Dec, 2020	1,070,400	5.8%	20,300	21.6%
Older adult 65+	Apr–Dec, 2016–2019	1,152,100		42,000	
	Apr–Dec, 2020	1,008,100	9.7%	55,500	30.6%

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 29 States (AZ, CA, CT, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, ND, NJ, NY, OH, OR, PA, SC, SD, TN, VA, VT, WA, and WI) (available as of October 2021)

^e Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Figure 4 presents the number of hospitalizations and in-hospital deaths for patients from rural areas in 29 States combined, by patient race/ethnicity, comparing April–December 2020 with the average from April–December 2016–2019.^f The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–December 2020 is also presented.

- The *number of all hospitalizations for patients from rural areas* decreased by 12.9 percent in April–December 2020 versus the average in April–December 2016–2019 for non-Hispanic White patients (from 2.2 to 2.0 million hospitalizations), who represent 82 percent of hospitalizations for patients from rural areas in the 29 examined States in both time periods.

In April–December 2020, the percentage of COVID-19-related hospitalizations for patients from rural areas ranged from 6.2 percent for non-Hispanic White patients to 10.7 percent for non-Hispanic Black patients.

- The *number of all-cause in-hospital deaths among patients from rural areas* increased in April–December 2020 versus the average in April–December 2016–2019 for all race/ethnicity groups. The increase in the number of in-hospital deaths for patients from rural areas was largest among patients with other non-Hispanic race/ethnicity (92.3 percent; from 1,300 to 2,500 deaths) followed by Hispanic patients (75.0 percent; from 800 to 1,400 deaths), non-Hispanic Black patients (70.5 percent; from 4,400 to 7,500 deaths), and non-Hispanic White patients (26.3 percent; from 49,500 to 62,500 deaths).

Overall, about 1 in 4 all-cause in-hospital deaths among non-Hispanic White (25.7 percent) patients from rural areas were COVID-19 related in April–December 2020, but about 4 in 10 in-hospital deaths for non-Hispanic Black (37.7 percent), Hispanic (38.6 percent), and other non-Hispanic race/ethnicity (41.0 percent) patients from rural areas were related to COVID-19.

Figure 4. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 among patients from rural areas by patient race/ethnicity in April–December 2020 compared with the average of all hospitalizations in April–December 2016–2019, 29 States

Patient race/ethnicity	Time period	Number of hospitalizations	Apr–Dec, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Dec, 2020 percent related to COVID-19
White NH	Apr–Dec, 2016–2019	2,248,000		49,500	
	Apr–Dec, 2020	1,957,100	6.2%	62,500	25.7%
Black NH	Apr–Dec, 2016–2019	213,100		4,400	
	Apr–Dec, 2020	197,300	10.7%	7,500	37.7%
Hispanic	Apr–Dec, 2016–2019	67,700		800	
	Apr–Dec, 2020	67,200	9.5%	1,400	38.6%
Other NH	Apr–Dec, 2016–2019	72,000		1,300	
	Apr–Dec, 2020	71,200	8.9%	2,500	41.0%

Abbreviation: NH, non-Hispanic

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 29 States (AZ, CA, CT, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, ND, NJ, NY, OH, OR, PA, SC, SD, TN, VA, VT, WA, and WI) (available as of October 2021)

^f Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Figure 5 presents the number of hospitalizations and in-hospital deaths for patients from rural areas in 29 States combined, by primary expected payer, comparing April–December 2020 with the average from April–December 2016–2019.⁹ The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–December 2020 is also presented.

- The *number of all hospitalizations for patients from rural areas* decreased in April–December 2020 versus the average in April–December 2016–2019 for all expected payers, with the largest decrease among hospitalizations with an expected payer of Medicare (14.9 percent; from 1.3 to 1.1 million hospitalizations).

In April–December 2020, the percentage of hospitalizations related to COVID-19 among patients from rural areas was highest for hospitalizations with Medicare as an expected payer (9.0 percent) and lowest for hospitalizations with Medicaid as an expected payer (2.7 percent).

- The *number of all-cause in-hospital deaths among patients from rural areas* increased in April–December 2020 versus the average in April–December 2016–2019 for all expected payers, ranging from a 22.2 percent increase for stays with an expected payer of self-pay/no charge (from 1,800 to 2,200 deaths) to a 35.3 percent increase for those with an expected payer of Medicaid (from 5,100 to 6,900 deaths).

The percentage of adult in-hospital deaths related to COVID-19 among patients from rural areas in April–December 2020 ranged from 16.3 percent of in-hospital deaths with Medicaid as an expected payer to 30.2 percent of in-hospital deaths with Medicare as an expected payer.

Figure 5. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 among patients from rural areas by primary expected payer in April–December 2020 compared with the average of all hospitalizations in April–December 2016–2019, 29 States

Primary expected payer	Time period	Number of hospitalizations	Apr–Dec, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Dec, 2020 percent related to COVID-19
Private insurance	Apr–Dec, 2016–2019	677,300		8,300	
	Apr–Dec, 2020	581,900	6.3%	10,300	25.5%
Medicare	Apr–Dec, 2016–2019	1,308,300		41,200	
	Apr–Dec, 2020	1,113,900	9.0%	53,600	30.2%
Medicaid	Apr–Dec, 2016–2019	552,700		5,100	
	Apr–Dec, 2020	505,400	2.7%	6,900	16.3%
Self-pay/No charge*	Apr–Dec, 2016–2019	99,800		1,800	
	Apr–Dec, 2020	89,600	4.4%	2,200	16.7%

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

* Self-pay/No charge: includes self-pay, no charge, charity, and no expected payment.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 29 States (AZ, CA, CT, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, ND, NJ, NY, OH, OR, PA, SC, SD, TN, VA, VT, WA, and WI) (available as of October 2021)

⁹ Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Figure 6 presents the number of hospitalizations and in-hospital deaths for patients from rural areas in 29 States combined by community-level income, comparing April–December 2020 with the average from April–December 2016–2019.^h The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–December 2020 is also presented.

- The *number of all hospitalizations for patients from rural areas* decreased more than three times as much for patients residing in the highest income areas (35.2 percent decrease; from 29,300 to 19,000 hospitalizations) compared with rural resident patients from the lowest income areas (11.1 percent decrease; from 1.3 to 1.2 million hospitalizations) in April–December 2020 versus the average in April–December 2016–2019.

In April–December 2020, the percentage of hospitalizations related to COVID-19 for patients from rural areas was highest among hospitalizations for patients residing in the lowest income quartile (7.3 percent).

- The *number of all-cause in-hospital deaths among patients from rural areas* increased in April–December 2020 versus the average in April–December 2016–2019 for hospitalizations for patients from all but the highest income quartile. The increase was highest for patients residing in the lowest income quartile (38.3 percent increase; from 30,300 to 41,900 deaths).

Across the 29 States, the percentage of in-hospital deaths related to COVID-19 among patients from rural areas in April–December 2020 was highest for patients residing in the lowest income quartile (29.2 percent) and lowest for patients residing in the highest income quartile (19.9 percent).

Figure 6. Number of all hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 among patients from rural areas by community-level income in April–December 2020 compared with the average of all hospitalizations in April–December 2016–2019, 29 States

Community-level income	Time period	Number of hospitalizations	Apr–Dec, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Dec, 2020 percent related to COVID-19
Lowest (Q1)	Apr–Dec, 2016–2019	1,335,100		30,300	
	Apr–Dec, 2020	1,186,400	7.3%	41,900	29.2%
Middle (Q2–Q3)	Apr–Dec, 2016–2019	1,317,100		27,000	
	Apr–Dec, 2020	1,134,700	6.2%	33,300	25.9%
Highest (Q4)	Apr–Dec, 2016–2019	29,300		600	
	Apr–Dec, 2020	19,000	4.8%	500	19.9%

Abbreviation: Q, quartile

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years. Quartile is based on the national distribution of community-level income.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 29 States (AZ, CA, CT, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, ND, NJ, NY, OH, OR, PA, SC, SD, TN, VA, VT, WA, and WI) (available as of October 2021)

^h Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Appendix. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 among patients from rural areas in April–December 2020 compared with the average of all hospitalizations in April–December 2016–2019, 29 States

State of hospitalization	Number of hospitalizations		Apr–Dec, 2020 percent related to COVID-19	Number of in-hospital deaths		Apr–Dec, 2020 percent related to COVID-19
	Apr–Dec, 2016–2019*	Apr–Dec, 2020		Apr–Dec, 2016–2019*	Apr–Dec, 2020	
All regions (29 States)	2,725,500	2,374,700	6.8	59,000	77,000	27.7
Northeast	341,800	280,000	3.5	7,900	8,500	16.9
CT	13,800	12,600	5.0	400	500	17.3
ME	46,200	38,800	1.3	1,200	1,100	6.3
NJ	700	400	4.3	<50	<50	–
NY	116,500	90,400	2.4	2,800	2,600	11.1
PA	138,800	117,100	5.5	2,900	3,700	26.2
VT	25,700	20,700	0.9	600	500	–
Midwest	1,271,200	1,114,400	7.1	25,000	32,600	29.7
IA	102,100	90,400	9.1	1,900	2,600	35.2
IL	123,300	103,800	7.3	2,400	3,200	30.3
IN	135,200	123,600	8.2	2,600	3,400	32.6
KS	74,800	68,200	8.7	1,600	2,100	30.6
MI	147,600	123,100	4.7	3,000	3,700	23.9
MN	105,800	88,100	5.8	1,800	2,000	23.8
MO	163,100	144,500	7.1	3,600	4,600	29.2
ND	35,400	32,200	7.3	900	1,200	36.5
OH	223,800	197,900	6.5	4,200	5,500	28.8
SD	46,400	42,300	9.3	800	1,400	38.7
WI	113,700	100,400	7.3	2,200	2,900	27.0
South	912,900	802,400	8.0	21,200	30,000	30.3
GA	162,800	151,500	10.0	3,400	5,500	34.9
KY	189,700	162,200	5.6	4,400	5,600	23.4
LA	70,100	61,800	9.4	1,600	2,400	36.5
MD	14,500	10,400	5.5	300	300	22.6
MS	155,700	136,500	10.4	3,100	5,300	39.7
SC	70,300	57,900	8.3	1,800	2,400	30.5
TN	150,200	138,700	7.0	4,200	5,500	25.6
VA	99,500	83,400	5.7	2,500	3,000	22.6
West	199,700	177,900	4.4	4,900	5,900	19.4
AZ	26,200	26,500	13.7	500	1,200	51.8
CA	65,800	56,900	3.0	1,600	1,700	12.3
OR	50,700	45,200	2.3	1,200	1,300	9.1
WA	56,900	49,300	3.0	1,500	1,700	11.0

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Data values and calculations are suppressed for counts <11 and denoted with a hyphen '-'.

* Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–December across these 4 years.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 29 States (AZ, CA, CT, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, ND, NJ, NY, OH, OR, PA, SC, SD, TN, VA, VT, WA, and WI) (available as of October 2021)

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- ⁷ Agency for Healthcare Research and Quality. HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions. Healthcare Cost and Utilization Project (HCUP). June 2021. www.hcup-us.ahrq.gov/datavisualizations/covid-19-inpatient-trends.jsp. Accessed July 26, 2021.

About Statistical Briefs

Healthcare Cost and Utilization Project (HCUP) Statistical Briefs provide basic descriptive statistics on a variety of topics using HCUP administrative healthcare data. Topics include hospital inpatient, ambulatory surgery, and emergency department use and costs, quality of care, access to care, medical conditions, procedures, and patient populations, among other topics. The reports are intended to generate hypotheses that can be further explored in other research; the reports are not designed to answer in-depth research questions using multivariate methods.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2016–2019 State Inpatient Databases (SID) and 2020 quarterly inpatient data. Information based on quarterly data should be considered preliminary, as additional quarterly data may become available over time. This analysis is limited to patients from rural areas treated in community, nonrehabilitation hospitals in 29 States (Arizona, California, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Washington, and Wisconsin) for which HCUP data were available for April–December 2016–2019 and April–December 2020. These States account for the following percentages of the resident U.S. rural population: 65.8 percent of the total population, 69.1 percent of the non-Hispanic White population, 68.2 percent of the non-Hispanic Black population, 59.0 percent of the Hispanic population, and 71.5 percent of the other non-Hispanic race/ethnicity population, including but not limited to American Indian, Alaska Native, Asian, Native Hawaiian, and other Pacific Islander.^{4,5} All of the information for 2020 contained in this Statistical Brief can be found in the HCUP Summary Trend Tables at www.hcup-us.ahrq.gov/reports/trendtables/summarytrendtables.jsp.

The HCUP inpatient data contain the universe of the inpatient discharge abstracts in the participating HCUP States, translated into a uniform format to facilitate multistate comparisons and analyses. The inpatient data encompass more than 95 percent of all U.S. community hospital discharges. The inpatient data can be used to investigate questions unique to one State, to compare data from two or more States, to conduct market-area variation analyses, and to identify State-specific trends in inpatient care utilization, access, charges, and outcomes.

Types of hospitals included in HCUP State Inpatient Databases (and quarterly inpatient data)

This analysis used SID and quarterly inpatient data limited to information from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). Community hospitals include obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical center hospitals. Excluded for this analysis are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. However, if a patient received long-term care, rehabilitation, or treatment for a psychiatric or chemical dependency condition in a community hospital, the discharge record for that stay was included in the analysis.

Definitions

Diagnoses and ICD-10-CM

The *principal diagnosis* is that condition established after study to be chiefly responsible for the patient's admission to the hospital. *Secondary diagnoses* are conditions that coexist at the time of admission that require or affect patient care treatment received or management, or that develop during the inpatient stay. *All-listed diagnoses* include the principal diagnosis plus the secondary conditions.

ICD-10-CM is the International Classification of Diseases, Tenth Revision, Clinical Modification. There are over 70,000 ICD-10-CM diagnosis codes.

Case definition

COVID-19-related hospitalizations and in-hospital deaths, defined by the discharge disposition, are identified by any-listed ICD-10-CM code of U07.1 (2019 novel coronavirus disease) on the discharge record. Per coding guidelines,¹ the use of U07.1 is based on documentation by the provider or documentation of a positive COVID-19 test result. The ICD-10-CM code for COVID-19 was implemented beginning April 1, 2020. As such, there may be some measurement error in the identification of cases.

Unit of analysis

The unit of analysis is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in 1 year will be counted each time as a separate discharge from the hospital.

Location of patients' residence

Place of residence is based on the urban-rural classification scheme for U.S. counties developed by the National Center for Health Statistics (NCHS) and based on the Office of Management and Budget (OMB) definition of a metropolitan service area as including a city and a population of at least 50,000 residents. For this Statistical Brief, we collapsed the NCHS codes into the following three categories:

Large metropolitan (metro) area:

- Large Central Metropolitan: Counties in a metropolitan area with 1 million or more residents that satisfy at least one of the following criteria: (1) containing the entire population of the largest principal city of the metropolitan statistical area (MSA), (2) having their entire population contained within the largest principal city of the MSA, or (3) containing at least 250,000 residents of any principal city in the MSA
- Large Fringe Metropolitan: Counties in a metropolitan area with 1 million or more residents that do not qualify as large central metropolitan counties

¹ Centers for Disease Control and Prevention, National Center for Health Statistics. ICD-10-CM Official Guidelines for Coding and Reporting, FY 2021 (October 1, 2020 - September 30, 2021). www.cdc.gov/nchs/data/icd/10cmguidelines-FY2021.pdf. Accessed March 18, 2021.

Medium/small metro area:

- Medium Metropolitan: Counties in a metropolitan area of 250,000–999,999 residents
- Small Metropolitan: Counties in a metropolitan area of 50,000–249,999 residents

Rural area:

- Micropolitan: Counties in a nonmetropolitan area of 10,000–49,999 residents
- Noncore: Counties in a nonmetropolitan and nonmicropolitan area

Reporting of race and ethnicity

Data on Hispanic ethnicity are collected differently among the States and also can differ from the census methodology of collecting information on race (White, Black, Asian/Pacific Islander, American Indian/Alaska Native, Other [including mixed race]) separately from ethnicity (Hispanic, non-Hispanic). State data organizations often collect Hispanic ethnicity as one of several categories that include race. Therefore, for multistate analyses, HCUP creates the combined categorization of race and ethnicity for data from States that report ethnicity separately. When a State data organization collects Hispanic ethnicity separately from race, HCUP uses Hispanic ethnicity to override any other race category to create a Hispanic category for the uniformly coded race/ethnicity data element, while also retaining the original race and ethnicity data. This Statistical Brief reports race/ethnicity for the following categories: Hispanic, non-Hispanic White, non-Hispanic Black, and other non-Hispanic race/ethnicities (Asian/Pacific Islander, American Indian/Alaska Native, other).

Expected payer

To make coding uniform across all HCUP data sources, the primary expected payer for the hospital stay combines detailed categories into general groups:

- Medicare: includes fee-for-service and managed care Medicare
- Medicaid: includes fee-for-service and managed care Medicaid
- Private insurance: includes commercial nongovernmental payers, regardless of the type of plan (e.g., private health maintenance organizations [HMOs], preferred provider organizations [PPOs])
- Self-pay/No charge: includes self-pay, no charge, charity, and no expected payment
- Other payers: includes other Federal and local government programs (e.g., TRICARE, CHAMPVA, Indian Health Service, Black Lung, Title V) and Workers' Compensation

Due to variability in coding in “other” payer by State (from 1.6 to 7.4 percent) and difficulty with interpretation, estimates of “other” expected payers were excluded from the Statistical Brief. Less than 0.01 percent of discharges were missing information on expected payer.

Prior to 2017, hospital stays that were expected to be billed to the State Children’s Health Insurance Program (SCHIP) may be classified as Medicaid or Other, depending on the structure of the State program. Because most State data do not identify SCHIP as a separate expected payer, it is not possible to present this information separately. Beginning with 2017 data, hospital stays that were expected to be billed to SCHIP are included under Medicaid.

For this Statistical Brief, when more than one payer is listed for a hospital discharge, the first-listed payer is used.

Community-level income

Community-level income is based on the median household income of the patient’s ZIP Code of residence. Quartiles are defined so that the total U.S. population is evenly distributed. Cut-offs for the quartiles are determined annually using ZIP Code demographic data obtained from Claritas, a vendor that produces population estimates and projections based on data from the U.S. Census Bureau.¹ The value ranges for the income quartiles vary by year. Patients in the first quartile are assigned to the *lowest*

¹ Claritas. Claritas Demographic Profile by ZIP Code. www.claritas360.claritas.com/mybestsegments/. Accessed June 27, 2021.

income category, patients in the middle two quartiles are assigned to the *middle* income category, and patients in the highest quartile are assigned to the *highest* income category. The income quartile is missing for patients who are homeless or foreign.

About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of healthcare databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, and private data organizations (HCUP Partners) and the Federal government to create a national information resource of encounter-level healthcare data. HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to healthcare programs, and outcomes of treatments at the national, State, and local market levels.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska Department of Health and Social Services	Nevada Department of Health and Human Services
Alaska State Hospital and Nursing Home Association	New Hampshire Department of Health & Human Services
Arizona Department of Health Services	New Jersey Department of Health
Arkansas Department of Health	New Mexico Department of Health
California Office of Statewide Health Planning and Development	New York State Department of Health
Colorado Hospital Association	North Carolina Department of Health and Human Services
Connecticut Hospital Association	North Dakota (data provided by the Minnesota Hospital Association)
Delaware Division of Public Health	Ohio Hospital Association
District of Columbia Hospital Association	Oklahoma State Department of Health
Florida Agency for Health Care Administration	Oregon Association of Hospitals and Health Systems
Georgia Hospital Association	Oregon Office of Health Analytics
Hawaii Lauima Data Alliance	Pennsylvania Health Care Cost Containment Council
Hawaii University of Hawai'i at Hilo	Rhode Island Department of Health
Illinois Department of Public Health	South Carolina Revenue and Fiscal Affairs Office
Indiana Hospital Association	South Dakota Association of Healthcare Organizations
Iowa Hospital Association	Tennessee Hospital Association
Kansas Hospital Association	Texas Department of State Health Services
Kentucky Cabinet for Health and Family Services	Utah Department of Health
Louisiana Department of Health	Vermont Association of Hospitals and Health Systems
Maine Health Data Organization	Virginia Health Information
Maryland Health Services Cost Review Commission	Washington State Department of Health
Massachusetts Center for Health Information and Analysis	West Virginia Department of Health and Human Resources, West Virginia Health Care Authority
Michigan Health & Hospital Association	Wisconsin Department of Health Services
Minnesota Hospital Association	Wyoming Hospital Association
Mississippi State Department of Health	
Missouri Hospital Industry Data Institute	
Montana Hospital Association	
Nebraska Hospital Association	

For More Information

For information on COVID-19 resources at AHRQ, refer to the AHRQ COVID-19 Resources page: www.ahrq.gov/coronavirus/index.html. For other information on COVID-19 healthcare utilization, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_covid.jsp.

For additional HCUP statistics, visit:

- HCUP Fast Stats at www.hcup-us.ahrq.gov/faststats/landing.jsp for easy access to the latest HCUP-based statistics for healthcare information topics
- HCUPnet, HCUP's interactive query system, at www.hcupnet.ahrq.gov/
- HCUP Summary Trend Tables at www.hcup-us.ahrq.gov/reports/trendtables/summarytrendtables.jsp for monthly information on hospital utilization
- HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions at www.hcup-us.ahrq.gov/datavisualizations/covid-19-inpatient-trends.jsp

For more information about HCUP, visit www.hcup-us.ahrq.gov/.

For a detailed description of HCUP and more information on the design of the State Inpatient Databases (SID), please refer to the following database documentation:

Agency for Healthcare Research and Quality. Overview of the State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated October 2020. www.hcup-us.ahrq.gov/sidoverview.jsp. Accessed January 22, 2021.

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of healthcare in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please email us at hcup@ahrq.gov or send a letter to the address below:

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