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

STATISTICAL BRIEF #294
April 2022

Lan Liang, Ph.D., and Lawrence D. Reid, Ph.D.

Introduction

Annually, there are approximately 29.7 million hospitalizations for urban residents in the United States, including for medical conditions (48 percent), surgeries (20 percent), maternal conditions (11 percent), neonatal conditions (11 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 among urban residents for most of 2020.[3] Rates of COVID-19 cases in rural areas surpassed those in urban areas beginning in mid-September of 2020.[3] Little is known about the impact of the initial period of the pandemic on hospitalizations and in-hospital deaths overall for urban residents.

As a complement to the Healthcare Cost and Utilization Project (HCUP) Statistical Brief on hospitalizations for patients from <u>rural areas</u>, this brief presents data from 29 States on hospitalizations for patients from urban areas across various 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 urban 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 residents of urban 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 residents of urban areas[b] treated in community, nonrehabilitation hospitals in 29 States (Arizona, California, Connecticut, Georgia, Illinois,

Highlights

- Across 29 States, the average number of hospitalizations for patients from urban areas decreased 20 percent to about 138,000 while the average number of in-hospital deaths increased 47 percent to about 4,700 in April–June 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 urban areas were 7 and 32 percent, respectively, corresponding to 902,700 adult hospitalizations and 122,700 in-hospital deaths related to COVID-19 across 29 States.

- About 1 in 10 hospitalizations and one-third of in-hospital deaths for older adult patients aged 65 or more years from urban areas were COVID-19 related in April–December 2020 across 29 States.

- Across 29 States, the number of in-hospital deaths for Hispanic patients from urban areas more than doubled in April–December 2020 compared with the same months in previous years; more than half of these deaths were COVID-19 related.

- In-hospital deaths for patients from urban areas increased nearly twice as much for patients from the lowest income areas (50 percent increase) compared with patients from the highest income areas (27 percent increase) in April–December 2020 versus the same months in previous years in 29 States.

---

[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, urban areas represent large, medium, and small metro 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.

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 (State Inpatient Databases [SID]) and April–December 2020 (quarterly inpatient data). These States accounted for 67.7 percent of the resident U.S. urban 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 and includes additional information on other conditions, length of stay and in-hospital mortality. 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 urban areas, 2016–2019 and 2020
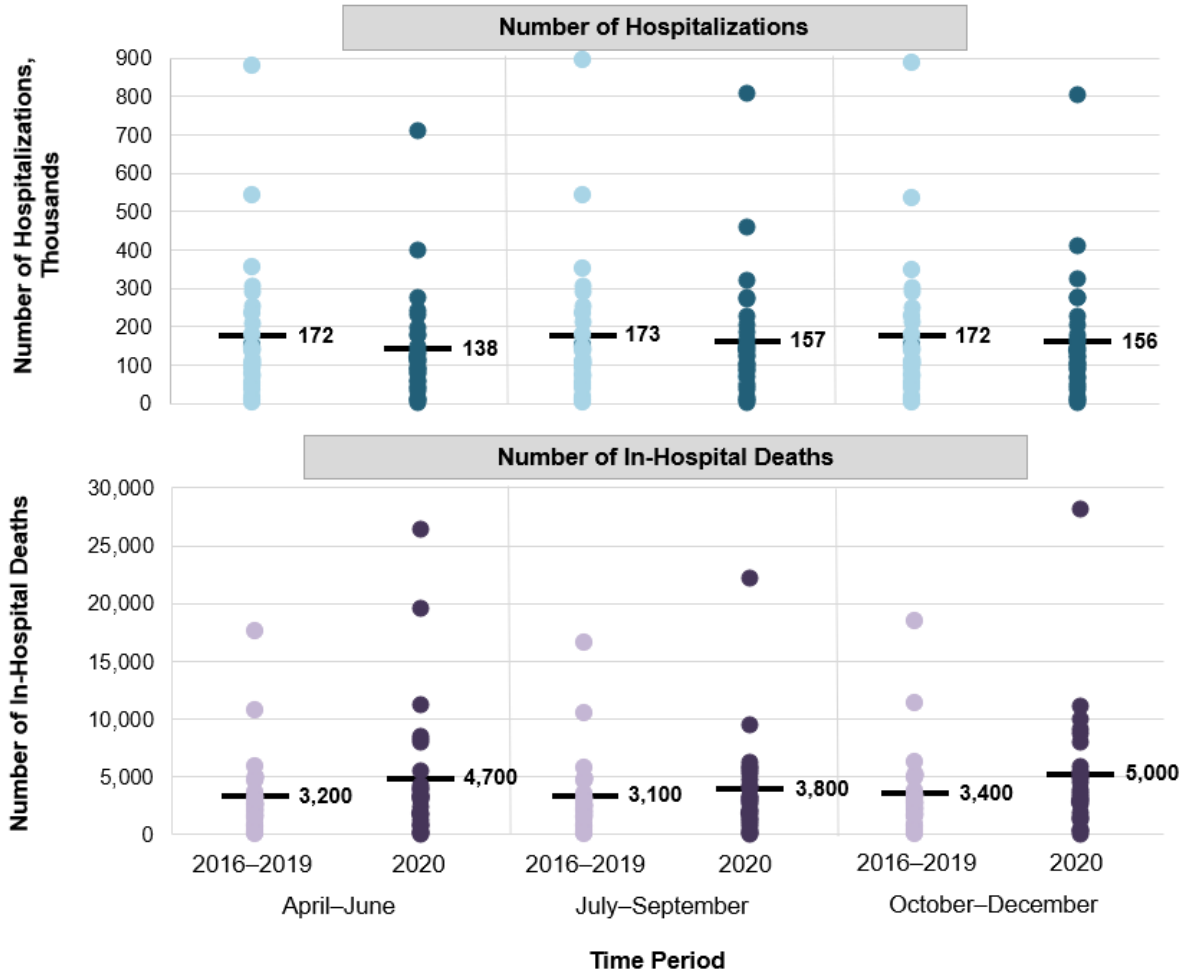Figure 1 displays the number of hospitalizations and in-hospital deaths for patients from urban areas for each of the 29 States in April–December 2016–2019[c] and 2020. Each dot in the figure represents the State-specific number of hospitalizations or in-hospital deaths. The average number of hospitalizations and in-hospital deaths across these 29 States is also presented.

■   On average, the *number of all hospitalizations for patients from urban areas* in the 29 States examined decreased 19.8 percent in the second quarter of 2020 (April–June) compared with the same quarter in 2016–2019 (from about 172,000 to 138,000 hospitalizations).

■   On average, the *number of all-cause in-hospital deaths for patients from urban areas* in the 29 States examined increased 46.9, 22.6, and 47.1 percent in the second (April–June; from 3,200 to 4,700 deaths), third (July–September; from 3,100 to 3,800 deaths), and fourth (October–December; from 3,400 to 5,000 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 urban areas by quarter, 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. 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 urban 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 urban 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 18.0 percent decrease in hospitalizations (from 3.7 to 3.1 million hospitalizations). The number of hospitalizations in New Jersey for patients from urban areas had the largest decrease among the examined States, with a 21.9 percent reduction (from 698,100 to 545,000 hospitalizations) (see Appendix).

  Across regions, 6.9 percent of all hospitalizations for patients from urban areas were related to COVID-19 in April–December 2020, ranging from 6.5 percent among examined States in the West to 7.2 percent among examined States in the Midwest. The percentage of COVID-19-related hospitalizations for patients from urban areas in the 29 examined States ranged from 1.3 percent in Vermont to 9.8 percent in New Jersey (see Appendix).

- The *number of all-cause in-hospital deaths for patients from urban areas* in April–December 2020 versus the average in April–December 2016–2019 increased for all regions based on the 29 States examined, ranging from a 33.8 percent increase among examined States in the West (from 73,600 to 98,500 deaths) to a 40.4 percent increase among examined States in the Midwest (from 76,900 to 108,000 deaths). The increase was largest in Arizona, where the number of in-hospital deaths among patients from urban areas increased by 78.4 percent (from 7,400 to 13,200 deaths) (see Appendix).

  Across regions, 31.5 percent of in-hospital deaths for patients from urban areas were related to COVID-19 in April–December 2020; rates ranged from 6.3 percent in Vermont to 46.5 percent in New Jersey (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 urban 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; 68% of the population*)	Apr–Dec, 2016–2019	14,988,600		281,900	
	Apr–Dec, 2020	13,082,300	6.9%	389,400	31.5%
Northeast (6 out of 9 States; 83% of the population*)	Apr–Dec, 2016–2019	3,727,100		73,000	
	Apr–Dec, 2020	3,055,400	6.9%	102,400	35.2%
Midwest (11 out of 12 States; 98% of the population*)	Apr–Dec, 2016–2019	4,455,800		76,900	
	Apr–Dec, 2020	3,942,600	7.2%	108,000	31.3%
South (8 out of 16 States + DC; 38% of the population*)	Apr–Dec, 2016–2019	3,024,700		58,500	
	Apr–Dec, 2020	2,748,400	7.0%	80,500	27.8%
West (4 out of 13 States; 78% of the population*)	Apr–Dec, 2016–2019	3,781,000		73,600	
	Apr–Dec, 2020	3,335,900	6.5%	98,500	30.8%

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. urban 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 urban areas, 2016–2019 and 2020

Figure 3 presents the number of hospitalizations and in-hospital deaths for patients from urban 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 urban areas* decreased 16.0 percent, 12.1 percent, and 12.1 percent in April–December 2020 compared with the average in April–December 2016–2019 for pediatric patients aged less than 18 years (2.3 to 1.9 million hospitalizations), adult patients aged 18–64 years (7.3 to 6.4 million hospitalizations), and older adult patients aged 65 or more years (5.4 to 4.7 million hospitalizations), respectively.

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

- The *number of all-cause in-hospital deaths for patients from urban areas* increased 37.2 and 40.7 percent among adult patients (81,000 to 111,100 deaths) and older adult patients (193,100 to 271,600 deaths), respectively, in April–December 2020 versus the average in April–December 2016–2019. The number of all-cause in-hospital deaths for pediatric patients from urban areas decreased 13.9 percent (from 7,900 to 6,800 deaths).

  More than one-third (34.0 percent) of in-hospital deaths among hospitalizations for patients from urban areas for older adult patients aged 65 or more years were COVID-19 related in April–December 2020. More than one in four (27.0 percent) in-hospital deaths for adult urban residents aged 18–64 years 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 urban 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	2,297,800		7,900	
	Apr–Dec, 2020	1,929,100	0.6%	6,800	1.2%
Adult 18–64	Apr–Dec, 2016–2019	7,330,700		81,000	
	Apr–Dec, 2020	6,440,800	6.8%	111,100	27.0%
Older adult 65+	Apr–Dec, 2016–2019	5,360,100		193,100	
	Apr–Dec, 2020	4,712,400	9.7%	271,600	34.0%

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 urban 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 urban areas* decreased by at least 10 percent in April–December 2020 versus the average in April–December 2016–2019 for non-Hispanic White patients (15.4 percent decrease; 9.1 to 7.7 million hospitalizations), non-Hispanic Black patients (10.1 percent decrease; 2.5 to 2.3 million hospitalizations), and patients with other non-Hispanic race/ethnicity (11.6 percent decrease; 1.2 to 1.1 million hospitalizations).

  In April–December 2020, the percentage of hospitalizations related to COVID-19 for patients from urban areas ranged from 5.5 percent for non-Hispanic White patients to 11.3 percent for Hispanic patients.

- The *number of all-cause in-hospital deaths for patients from urban areas* increased in April–December 2020 versus the average in April–December 2016–2019 for all race/ethnicity groups. The smallest increase was for non-Hispanic White patients (23.7 percent; from 188,100 to 232,700 deaths), while in-hospital deaths for Hispanic patients more than doubled (109.5 percent; from 22,000 to 46,100 deaths). The number of in-hospital deaths increased by 54.7 and 53.8 percent for non-Hispanic Black patients (from 43,000 to 66,500 deaths) and those with other non-Hispanic race/ethnicity (from 21,200 to 32,600 deaths), respectively.

  Overall, 26.0 percent of all-cause in-hospital deaths among non-Hispanic White patients from urban areas were COVID-19 related in April–December 2020, but more than half (51.8 percent) of in-hospital deaths for Hispanic patients from urban 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 urban 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	9,055,900		188,100	
White NH	Apr–Dec, 2020	7,662,100	5.5%	232,700	26.0%
Black NH	Apr–Dec, 2016–2019	2,505,600		43,000	
Black NH	Apr–Dec, 2020	2,251,800	8.3%	66,500	34.6%
Hispanic	Apr–Dec, 2016–2019	1,771,900		22,000	
Hispanic	Apr–Dec, 2020	1,672,300	11.3%	46,100	51.8%
Other NH	Apr–Dec, 2016–2019	1,202,500		21,200	
Other NH	Apr–Dec, 2020	1,062,500	7.6%	32,600	36.4%

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 urban areas in 29 States combined by primary expected payer, comparing April–December 2020 with the average from April–December 2016–2019.[g] 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 urban 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 (14.3 percent; 5.9 to 5.0 million hospitalizations).

  In April–December 2020, the percentage of hospitalizations related to COVID-19 for patients from urban areas was highest for hospitalizations with Medicare as an expected payer (8.9 percent).

- The *number of all-cause in-hospital deaths for patients from urban areas* increased in April–December 2020 versus the average in April–December 2016–2019 for all expected payers, ranging from a 29.9 percent increase for stays with an expected payer of private insurance (48,500 to 63,000 deaths) to a 48.0 percent increase for those with an expected payer of Medicaid (32,700 to 48,400 deaths).

  The percentage of all-cause in-hospital deaths related to COVID-19 for patients from urban areas in April–December 2020 ranged from 25.1 percent for stays with self-pay/no charge as an expected payer to 33.6 percent for stays 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 urban 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	4,526,900		48,500	
	Apr–Dec, 2020	3,949,500	5.7%	63,000	28.9%
Medicare	Apr–Dec, 2016–2019	5,889,700		181,400	
	Apr–Dec, 2020	5,049,300	8.9%	249,100	33.6%
Medicaid	Apr–Dec, 2016–2019	3,665,400		32,700	
	Apr–Dec, 2020	3,263,200	5.0%	48,400	27.8%
Self-pay/ No charge*	Apr–Dec, 2016–2019	491,900		7,500	
	Apr–Dec, 2020	441,400	7.0%	10,900	25.1%

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)

---

[g] 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 urban 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 urban areas* decreased more for patients residing in the highest income areas (14.6 percent; 3.8 to 3.2 million hospitalizations) compared with patients from the middle income areas (11.9 percent; 7.5 to 6.6 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 urban areas was highest among hospitalizations for patients residing in the lowest income quartile (7.9 percent).

- The *number of all-cause in-hospital deaths for patients from urban areas* increased in April–December 2020 versus the average in April–December 2016–2019 for hospitalizations for patients from all income quartiles. The increase was nearly twice as large for patients residing in the lowest income quartile (49.5 percent increase; 65,300 to 97,600 deaths) compared with the increase for patients residing in the highest income quartile (27.4 percent increase; 72,300 to 92,100 deaths).

  Across the 29 States, the percentage of in-hospital deaths related to COVID-19 for patients from urban areas in April–December 2020 was highest for patients residing in the lowest income quartile (34.4 percent) and lowest for patients residing in the highest income quartile (28.5 percent).

Figure 6. Number of all hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 among patients from urban 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	3,562,600		65,300	
	Apr–Dec, 2020	3,103,900	7.9%	97,600	34.4%
Middle (Q2–Q3)	Apr–Dec, 2016–2019	7,459,800		141,200	
	Apr–Dec, 2020	6,571,700	7.0%	195,400	31.5%
Highest (Q4)	Apr–Dec, 2016–2019	3,796,500		72,300	
	Apr–Dec, 2020	3,243,100	5.9%	92,100	28.5%

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 urban 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)	**14,988,600**	**13,082,300**	**6.9**	**281,900**	**389,400**	**31.5**
Northeast	**3,727,100**	**3,055,400**	**6.9**	**73,000**	**102,400**	**35.2**
CT	280,800	252,200	7.5	6,500	9,100	30.9
ME	57,000	49,000	2.1	1,200	1,200	10.3
NJ	698,100	545,000	9.8	14,200	20,600	46.5
NY	1,621,800	1,274,300	6.2	32,700	47,000	34.4
PA	1,054,900	922,400	6.4	18,000	24,200	30.4
VT	14,400	12,600	1.3	300	300	6.3
Midwest	**4,455,800**	**3,942,600**	**7.2**	**76,900**	**108,000**	**31.3**
IA	143,200	130,200	7.3	2,100	3,000	34.2
IL	913,300	791,200	9.2	15,000	23,300	36.8
IN	431,400	390,700	7.3	8,000	10,800	31.0
KS	163,800	151,700	5.5	2,400	3,400	28.8
MI	757,600	654,400	7.1	15,100	21,600	31.5
MN	342,400	297,500	6.2	5,100	6,400	27.0
MO	450,400	403,200	6.3	8,200	11,200	29.1
ND	34,100	31,000	7.0	700	800	30.8
OH	878,800	786,800	6.2	15,100	20,200	27.4
SD	33,300	32,400	7.9	400	700	37.5
WI	307,500	273,400	7.1	4,800	6,600	31.1
South	**3,024,700**	**2,748,400**	**7.0**	**58,500**	**80,500**	**27.8**
GA	632,300	590,600	8.0	9,800	15,600	29.4
KY	227,400	201,600	6.1	5,000	6,500	22.9
LA	324,400	303,600	8.4	6,200	9,300	34.9
MD	426,500	356,000	7.6	8,100	10,300	32.9
MS	116,700	105,100	8.1	2,400	3,600	31.5
SC	325,500	289,400	6.6	6,800	8,800	27.6
TN	437,500	419,900	6.3	9,400	12,700	24.8
VA	534,300	482,300	5.3	10,900	13,800	21.7
West	**3,781,000**	**3,335,900**	**6.5**	**73,600**	**98,500**	**30.8**
AZ	474,400	450,300	8.3	7,400	13,200	39.6
CA	2,663,800	2,324,300	7.0	52,700	70,000	32.5
OR	227,600	197,900	2.8	4,500	4,700	12.8
WA	415,200	363,400	3.6	9,100	10,500	16.1

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)

References

[1] Agency for Healthcare Research and Quality. HCUPnet. Healthcare Cost and Utilization Project (HCUP). www.hcupnet.ahrq.gov/. Accessed August 27, 2021.

[2] Healthcare Cost and Utilization Project (HCUP) Statistical Briefs Series on COVID-19-Related Hospitalizations in 13 States (HCUP Statistical Briefs #273–276). June 2021. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp. Accessed August 29, 2021.

[3] Duca LM, Coyle J, McCabe C, McLean CA. COVID-19 stats: COVID-19 incidence, by urban-rural classification — United States, January 22–October 31, 2020. Morbidity and Mortality Weekly Report. 2020;69(46):1753.

[4] U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States: April 1, 2010 to July 1, 2019 (NC-EST2019-SR11H). October 2021. www.census.gov/newsroom/press-kits/2020/population-estimates-detailed.html. Accessed December 1, 2021.

[5] U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for 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: April 1, 2010 to July 1, 2019 (NC-EST2019-SR11H-nn). October 2021. www.census.gov/data/tables/time-series/demo/popest/2010s-state-detail.html. Accessed December 1, 2021.

[6] Agency for Healthcare Research and Quality. HCUP Summary Trend Tables. Healthcare Cost and Utilization Project (HCUP). Updated December 2020. www.hcup-us.ahrq.gov/reports/trendtables/summarytrendtables.jsp. Accessed February 10, 2021.

[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 urban areas (i.e., large, medium, or small metro 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. urban population: 67.7 percent of the total population, 68.9 percent of the non-Hispanic White population, 68.8 percent of the non-Hispanic Black population, 60.9 percent of the Hispanic population, and 73.2 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,[i] 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

---

[i] 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 non-Hispanic other (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.[j] The value ranges for the income quartiles vary by year. Patients in the first quartile are assigned to the *lowest*

---

[j] 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
Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
Delaware Division of Public Health
District of Columbia Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Laulima Data Alliance
Hawaii University of Hawai'i at Hilo
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association
Mississippi State Department of Health
Missouri Hospital Industry Data Institute
Montana Hospital Association
Nebraska Hospital Association

Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Revenue and Fiscal Affairs Office
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Department of Health and Human Resources, West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming 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.

Suggested Citation

Liang L (AHRQ), Reid LD (AHRQ). Changes in Hospitalizations and In-Hospital Deaths for Patients From Urban Areas in the Initial Period of the COVID-19 Pandemic (April–December 2020), 29 States. HCUP Statistical Brief #294. April 2022. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb294-COVID-19-UrbanHosptl.pdf.

Acknowledgments

* * *

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:

Joel W. Cohen, Ph.D., Director
Center for Financing, Access and Cost Trends
Agency for Healthcare Research and Quality
5600 Fishers Lane
Rockville, MD 20857

This Statistical Brief was posted online on April 15, 2022.