

Urban and Rural Hospitalizations in Mississippi: Overview and Trend Analyses, 2014-2018



MISSISSIPPI STATE DEPARTMENT OF HEALTH

The Mississippi Rural Health Surveillance System

Epidemiological Report, 10/31/2019

KEY MESSAGES

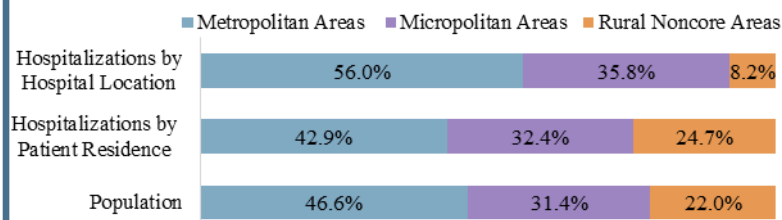
- From 2014 to 2018, the number of hospitalizations among Mississippi's rural residents decreased and increased among urban residents. Despite the decrease in the rural population hospitalizations, the per capita rate remained higher than that of their urban counterparts.
- During the same time, a parallel shift in inpatient care to large medical centers occurred.
- In 2018, 79.0% of all hospital stays for residents in small rural areas occurred outside of their home county.
- From 2014 to 2018, the number of hospital stays covered by private insurance and Medicare *increased*. At the same time, the number of Medicaid-covered and self-paying hospitalizations *decreased* for the state as a whole. This percent decrease varied by hospital, however. The percent decrease in Medicaid-covered hospital stays was greatest for hospitals located in the state's most rural areas. Self-paying hospitalizations declined for hospitals in metropolitan and micropolitan areas, but increased for hospitals in the most rural areas.

Background: Recent research indicates that Mississippi's infrastructure of rural health care is rapidly deteriorating. According to a 2019 analysis of their financial sustainability almost half of Mississippi's rural hospitals (48.4%) are experiencing severe financial difficulties.¹ The same report estimates that Mississippi has the nation's second highest percentage of rural hospitals at substantial financial risk for closure. To address this imminent public health crisis, the Mississippi State Department of Health (MSDH) has established a statewide rural health surveillance system. The goal of this surveillance is to monitor and report on the health status of rural residents and the capacity of the local health care systems serving this population.

Objectives and Data: Our first objective was to compare hospitalizations rates and trends in both urban and rural areas. Secondly, we calculated the percentage of hospitalizations that occurred in rural hospitals and identified those counties that lack sufficient hospital-level care. Lastly, we assessed hospital charges, length of stay, and expected payers for urban and rural hospitals. To achieve these goals, we analyzed 2014-2018 hospital discharge data.² These data contain information on patient's demographics, expected payers, length of stay, charges, clinical diagnoses, and procedures performed. This report summarizes data for state residents treated in Mississippi's general acute care hospitals. The unit of analysis is a hospitalization not an individual patient.

Geographical Analysis: To examine the variation in the geographical distribution of hospitalizations, we applied the urban-rural classification system developed by the National Center for Health Statistics (NCHS).³ Based on this scheme, we categorized all Mississippi counties into three geographical units: metropolitan areas (an urbanized cluster with a population of at least 50,000 and its adjacent counties), micropolitan areas (an urbanized cluster of 2,500–49,000 population and its adjacent counties), and noncore areas (non-metro and non-micropolitan counties). Both micropolitan and noncore counties are considered to be rural; however, noncore counties are geographical units located in the state's most rural areas.

Figure 1. Population and Inpatient Care in Rural and Urban Areas in MS, 2018



In-hospital Care in Rural Areas: During 2018, 22.0% of the Mississippi population lived in rural noncore areas. At the same time, 24.6% of all hospitalizations occurred among such residents. Yet, only 8.2% of all hospital stays were in hospitals located in rural noncore areas (Figure 1). These findings suggest that rural residents in Mississippi do not have adequate access to hospital-level care in their communities or may bypass rural hospitals.

Hospitals Types: In 2018, 105 hospitals reported data to the Mississippi Inpatient Outpatient Data System; of these institutions, 99 were general acute care hospitals and six were mental health facilities. Only acute care inpatient stays are included in this report. Based on their location, we categorized all hospitals into three groups: metropolitan, micropolitan, and rural noncore (Map 1). In addition, we divided all facilities according to the number of their licensed beds into four groups described below. It is important to note, however, that licensed beds are the maximum number of beds approved by MSDH and hospitals may not operate all of those beds.⁴

Hospital Size: The majority (63) of Mississippi's hospitals are small facilities with less than 100 beds. During 2018, 27 facilities had ≤ 25 beds (very small hospitals) and 36 facilities had between 26 and 100 beds (small hospitals). The number of medium-size hospitals (101-300 beds) was 24 and the number of large facilities (≥ 301 beds) was 12 (Figure 2). During 2018 in Mississippi, only 2.8% of all hospitalizations occurred in very small hospitals, and about one-tenth (10.5%) of all hospitalizations were in small hospitals. At the same time medium-size hospitals were responsible for 31.0% of all hospital stays. The twelve large hospitals accounted for 12.1% of all facilities in the state, but for 55.7% of all hospitalizations in the state during 2018 (Figure 3).

Hospital Location: In general, hospitals located in rural Mississippi are small. During 2018, rural noncore areas had 37 hospitals: 18 were very small, 16 were small, and three were medium-size facilities (Figure 4). By contrast, large facilities are located predominantly in metro areas. In fact, four out of the state's twelve large hospitals in 2018 were within the Jackson metro area (Hinds County). In that same year, these four large facilities were responsible for nearly one quarter (23.0%) of all hospitalizations in Mississippi.

Figure 2. Number and Percent of Hospitals by Bed Size in MS, 2018

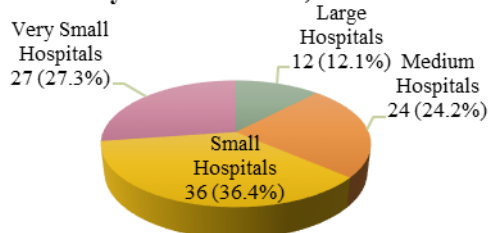


Figure 3. Number and Percent of Hospitalizations by Hospital Size in MS, 2018

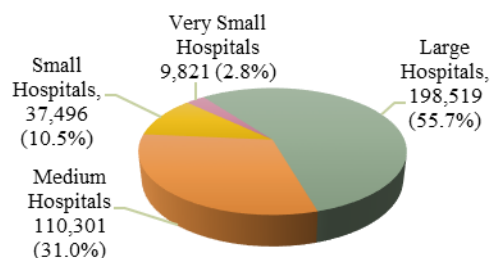
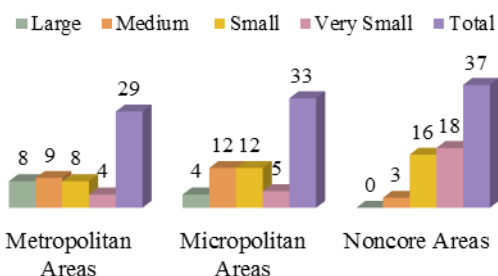
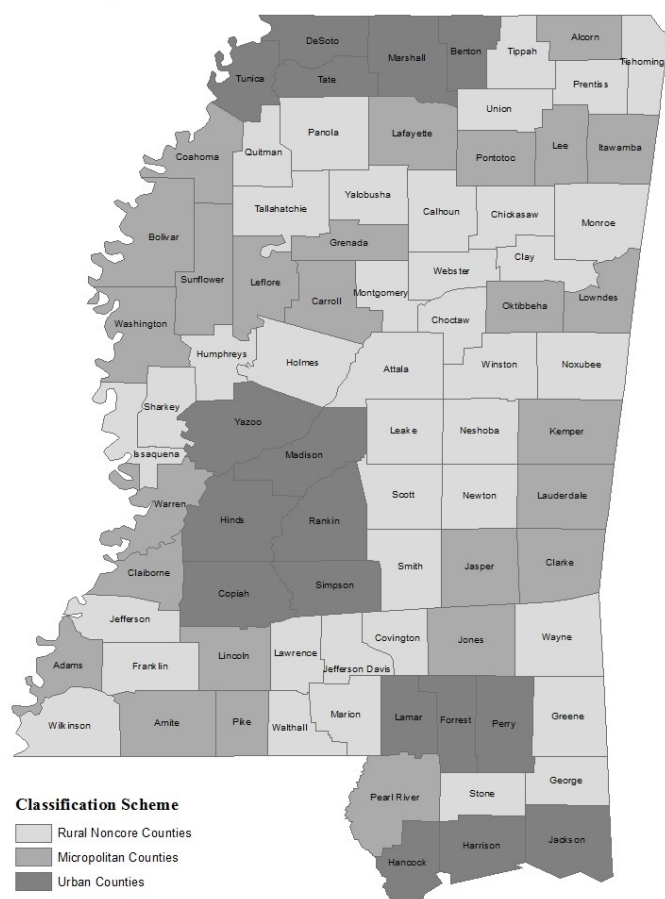


Figure 4. Number of Hospitals According to Size and Location in MS, 2018



Map 1. Urban-Rural Classification for MS Counties



Metropolitan statistical areas have a large population nucleus (i.e., towns of 50,000 people or more). By definition, these areas contain surrounding counties that have small population sizes but are economically and socially integrated with the metropolitan nucleus (e.g., Perry County). In other words, the population in these small counties uses the social infrastructure of the nearby metropolitan nucleus, including commuting to work or receiving medical care.

Patient Characteristics and Resource Utilizations According to Hospital Location: The average age of patients discharged from rural noncore hospitals in 2018 was 55.4 years — five years higher than the average age of patients discharged from micropolitan or metropolitan hospitals (Table 1). During that same year, hospital stays in rural noncore hospitals were a day longer than stays in metropolitan or micropolitan facilities. Between 2014 and 2018, the average length of stay remained the same (around 5 days) for metropolitan and micropolitan facilities. The length of stay decreased, however, for rural noncore hospitals, from 7.9 days in 2014 to 6.0 days in 2018.

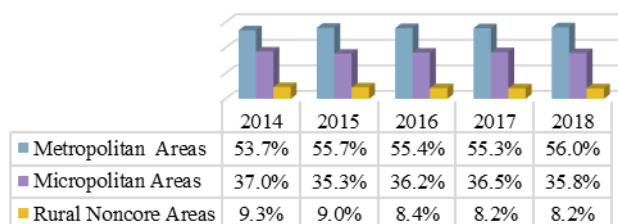
During the five-year period, the average hospital charges were three times higher in metropolitan hospitals compared to rural noncore facilities; such charges were also nearly two times higher in micropolitan hospitals than in rural noncore facilities. It is important to note that hospital charges do not represent the actual amount of money collected or the actual cost of treatment and services. In addition, our findings regarding hospital charges do not account for important determinants of medical care cost such as the severity of treated illnesses, the availability of technology, or the complexity of procedures performed.

Table 1. Average Age, Length of Stay, and Average Charges per Hospital Location in MS, 2014 and 2018

	Mean Age (Years)		Mean Length of Stay (Days)		Mean Charges	
	2014	2018	2014	2018	2014	2018
Metropolitan Areas	48.0	49.8	5.1	5.0	\$43,153	\$51,378
Micropolitan Areas	49.1	50.6	5.3	5.1	\$26,930	\$32,063
Rural Noncore Areas	55.3	55.4	7.9	6.0	\$14,346	\$17,671
All	49.1	50.6	5.4	5.1	\$34,473	\$41,705

Trends According to Hospital Location: Between 2014 and 2018, the overall number of general hospital discharges in Mississippi increased by 0.9%; however, this trend varied according to hospital location. The greatest percent increase in hospital stays was recorded for metropolitan hospitals (5.3%) (Table 2, Figure 5). At the same time, the number of discharges from hospitals located in micropolitan areas decreased by 2.2%, while the number of discharges from rural noncore areas decreased by 11.4%, an average annual decline of 3.0%.

Figure 5. Percent Hospitalizations by Hospital Location in MS, 2018



Trends According to Hospital Size: Trends also fluctuated according to hospital size (Figure 6). Between 2014-2018, the number of hospitalizations decreased by 2.3% for very small hospitals, by 3.0% for small facilities, and by 5.1% for medium-size facilities. By contrast, the number of hospitalizations increased by 5.7% for large hospitals, an average annual increase of 1.4%. In conclusion, small rural hospitals in Mississippi experienced a decline in hospital discharges from 2014 to 2018, while large metropolitan hospitals continued to exhibit a significant growth in their hospital utilization.

Figure 6. Percent Hospitalizations by Hospital Size in MS, 2018

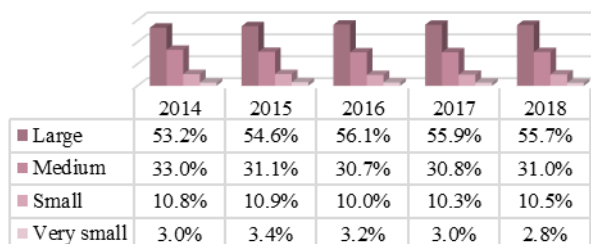


Table 2. Number of Hospital Discharges By Location and Size of Hospitals in MS: Trends, 2014-2018

	2014	2015	2016	2017	2018	Change 2014-2018	Average Annual Change
Hospital Location							
Metropolitan Areas	189,518	198,230	196,262	200,591	199,472	5.3%	1.3%
Micropolitan Areas	130,409	125,367	128,223	132,494	127,549	-2.2%	-0.6%
Rural Noncore Areas	32,859	32,107	29,643	29,807	29,116	-11.4%	-3.0%
Hospital Size							
Large (≥ 301 size)	187,815	194,184	198,744	202,892	198,519	5.7%	1.4%
Medium (101-300 beds)	116,277	110,743	108,608	111,738	110,301	-5.1%	-1.3%
Small (26-100 beds)	38,638	39,215	36,115	37,474	37,496	-3.0%	-0.7%
Very Small (7-25 beds)	10,056	11,562	10,661	10,788	9,821	-2.3%	-0.6%

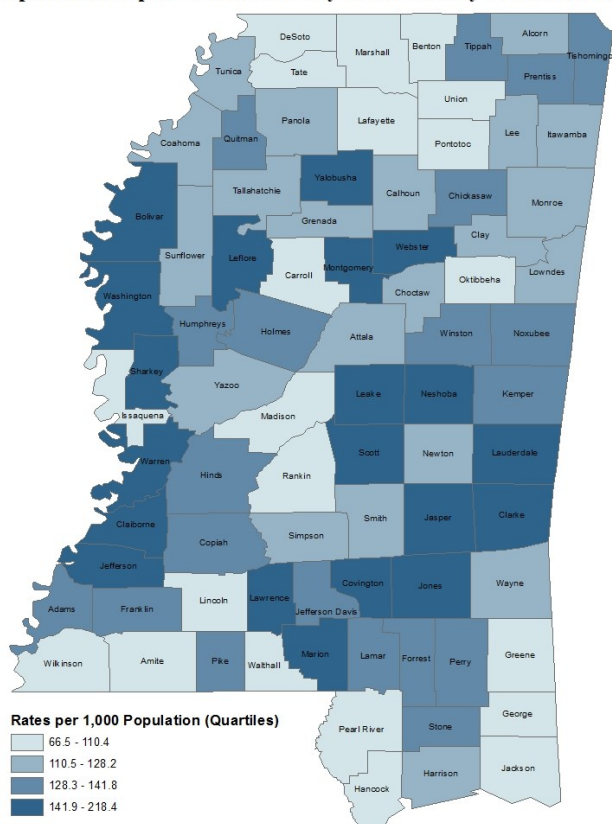
Hospitalization Rates and Trends According to Home County of Patient: In 2018, there were 356,137 hospital stays in general acute care facilities among state residents in Mississippi; this represents a statewide hospitalization rate of 119.2 stays per 1,000 residents. In 2018, hospitalization rates by county of residence ranged widely, from 66.5 per 1,000 residents in Hancock to 218.4 per 1,000 residents in Yalobusha. In general, rural populations were hospitalized at higher rates compared to their urban counterparts. During 2018, the hospitalization rate was 133.9 stays per 1,000 residents in rural noncore areas, 123.0 stays per 1,000 residents in micropolitan counties, and 109.8 stays per 1,000 residents in metro counties (Table 3). Geographically, there were two distinct clusters of high-hospitalization rates predominantly affecting rural counties along the Mississippi River and in the South Central part of the state (Map 2). The overall hospitalization rates remained relatively stable during 2014-2018—the cumulative change was 1.2%. Trends in hospitalization rates differed, however, according to residence. Between 2014 and 2018, the hospitalization rates increased by 3.1% for residents in metro areas, but decreased by 1.1% for residents in micropolitan areas and by 1.0% for residents in rural noncore areas.

Hospitalization Rates According to County of Hospital: Hospitalization rates by hospital location, however, exhibited a different pattern (Map 3). As expected, such rates were highest in heavily populated areas of the state with dense concentrations of medical facilities. In fact, half of all of all hospitalizations (52.2%) in Mississippi during 2018 occurred in hospitals located in the following five counties: Hinds, Forrest, Harrison, Lee, and Lauderdale.

Table 3. Hospitalization Numbers and Rates per 1,000 Population According to Patient Residence in MS, 2014-2018

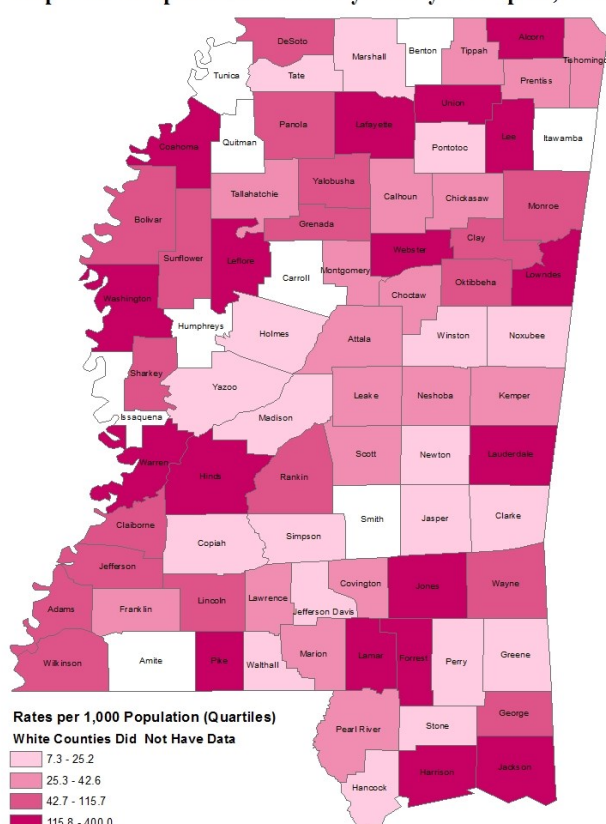
Year	Metropolitan Areas		Micropolitan Areas		Rural Noncore Areas		All Areas (Overall)	
	Discharges	Rate	Discharges	Rate	Discharges	Rate	Discharges	Rate
2014	145,585	106.5	116,880	121.7	90,321	135.3	352,786	117.8
2015	151,944	110.7	113,202	118.5	90,558	136.4	355,704	118.9
2016	149,143	108.3	114,808	120.8	90,177	136.5	354,128	118.5
2017	151,935	109.9	118,720	125.9	92,237	140.2	362,892	121.6
2018	152,739	109.8	115,552	123.0	87,846	133.9	356,137	119.2
Change 2014-2018	4.9%	3.1%	-1.1%	1.1%	-2.7%	-1.0%	0.9%	1.2%

Map 2. MS Hospitalization Rates by Home County of Patient, 2018



Source: Mississippi State Department of Health

Map 3. MS Hospitalization Rates by County of Hospital, 2018



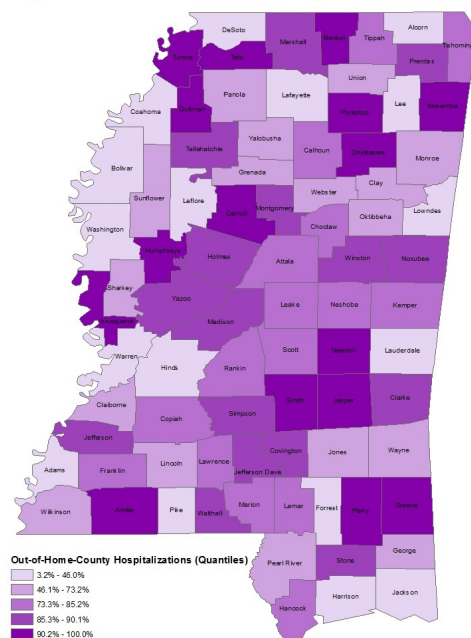
Source: Mississippi State Department of Health

Out-of-Home-County Hospitalizations (Crossover Hospitalizations): We defined the phenomenon of crossover hospitalizations or out-of-home-county hospitalizations (OHCH) as hospital stays occurring outside of the county of residence. For example, hospital stays for residents of Lamar County that were not within hospitals located in their home county are considered to be OHCH. Our analysis does not consider the distance to the hospital facility from the home address. Instead, our goal was to pinpoint counties that exhibit high rates of OHCH. Further analyses are needed, however, to determine the causes for crossover hospitalizations. Research suggests that the causality of such crossover is complex and multifactorial.⁵

During 2018 in Mississippi, half all hospitalizations were outside of patients' home counties (179,312 or 50.3%). Residents in rural noncore areas accounted for 38.7% (69,373) of all OHCH. Compared to all other residents, rural noncore residents had a higher crossover rate: 105.7 per 1,000 population versus 51.1 per 1,000 population in micropolitan areas and 44.5 per 1,000 population in metropolitan areas. In other words, 79.0 % of all hospitalizations among residents in rural noncore counties were outside of their home counties, while this percent was 41.5% for micropolitan residents and 40.6% for metropolitan residents. In fact, the crossover rate for nine counties was 100.0%. Some counties had a high crossover rate because they lack a facility providing in-patient care. Other counties (e.g., Madison) had high crossover rates because these are suburban areas in close proximity to a county with major medical centers (Map 4).

Presented in Table 4 are the percentages of OHCH for each county in Mississippi. Counties were stratified into five quantiles (equal groups) ranked from the highest to the lowest percent of OHCH. In 2018, 58.5% (48) of all counties or 37.7% of the state population exhibited a high-level of crossover ($\geq 75\%$). Three-quarters (29 out of 39 or 74.4%) of all rural noncore counties and 70.5% (12 out of 17) of all metropolitan counties were in this group. Compared to residents in rural noncore and metropolitan counties, residents in micropolitan areas made more use of in-patient care provided in their communities: only 7 out of the 26 micropolitan counties had a $\geq 75\%$ crossover.

Map 4. Percent of Out-of-Home-County Hospitalizations in MS, 2018



Source: Mississippi State Department of Health

Table 4. Percent of Out-of-Home-County Hospitalizations By County in MS, 2018

GROUP ONE		GROUP TWO		GROUP THREE		GROUP FOUR		GROUP FIVE	
County	OHCH	County	OHCH	County	OHCH	County	OHCH	County	OHCH
Amite (MI)*	100.0%	Madison (ME)	90.1%	Copiah (ME)	85.2%	Yalobusha (RN)	73.2%	Bolivar (MI)	46.0%
Benton (ME)	100.0%	Jefferson (RN)	89.5%	Leake (RN)	84.7%	Sharkey (RN)	72.2%	Pike (MI)	39.7%
Carroll (MI)	100.0%	Clarke (MI)	89.2%	Attala (RN)	84.0%	Panola (RN)	72.0%	Adams (MI)	32.9%
Humphreys (RN)	100.0%	Holmes (RN)	89.0%	Kemper (MI)	83.8%	Claiborne (MI)	71.7%	Leflore (MI)	30.6%
Issaquena (RN)	100.0%	Covington (RN)	88.8%	Marion (RN)	83.8%	Wilkinson (RN)	69.3%	Warren (MI)	30.6%
Itawamba (MI)	100.0%	Stone (RN)	88.8%	Scott (RN)	83.5%	Sunflower (MI)	65.9%	Coahoma (MI)	29.7%
Quitman (RN)	100.0%	Jefferson Davis (RN)	88.7%	Lawrence (RN)	83.1%	Grenada (MI)	59.1%	Washington (MI)	26.7%
Smith (RN)**	100.0%	Marshall (ME)	88.1%	Franklin (RN)	81.6%	Oktibbeha (MI)	58.5%	Lowndes (MI)	26.5%
Tunica (ME)	100.0%	Simpson (ME)	88.1%	Tippah (RN)	81.4%	Pearl River (MI)	58.3%	Forrest (ME)	25.4%
Jasper (MI)	97.1%	Tallahatchie (RN)	87.8%	Neshoba (RN)	81.3%	George (RN)	57.7%	Alcorn (MI)	21.2%
Perry (ME)	93.9%	Noxubee (RN)	86.9%	Calhoun (RN)	81.0%	Lincoln (MI)	56.0%	Lafayette (MI)	21.1%
Tate (ME)	93.4%	Walthall (RN)	86.2%	Choctaw (RN)	78.2%	Clay (RN)	55.3%	Harrison (ME)	16.7%
Pontotoc (MI)	93.2%	Montgomery (RN)	86.1%	Lamar (ME)	77.8%	Webster (RN)	55.2%	Jackson (ME)	13.2%
Newton (RN)	93.1%	Prentiss (RN)	85.8%	Rankin (ME)	77.7%	Monroe (RN)	54.7%	Lee (MI)	13.1%
Chickasaw (RN)	93.0%	Yazoo (ME)	85.6%	Hancock (ME)	76.2%	Union (RN)	53.4%	Lauderdale (MI)	10.6%
Greene (RN)	91.7%	Winston (RN)	85.4%	Tishomingo (RN)	75.6%	Wayne (RN)	51.1%	Hinds (ME)	10.4%
						Jones (MI)	48.1%	DeSoto (ME)	3.2%
8.0% of MS population		12.6% of MS population		17.1% of MS population		15.4% of MS population		46.9% MS population	

Calculations: To obtain the number of OHCH, we subtracted the number of hospitalizations that occurred in hospitals within the home county from the number of hospitalizations for all residents of this county. Then, we divided the difference obtained by the number of hospitalizations for all residents in this county.

Legend: ME (metropolitan counties); MI (micropolitan counties); RN (rural noncore)

*Amite and Wilkinson counties are served by the same hospital located on the line between the two counties, but registered in Wilkinson County.

**The facility in Smith County did not report discharges during the study period.

Total Length of Stay, Charges, and Payers: From 2014 to 2018, total hospital days decreased statewide, but increased for hospitals in metropolitan areas (Figure 7). In five years, total hospital charges increased by 22.1% or nearly 2.7 billion dollars, from 12.2 billion dollars in 2014 to 14.9 billion dollars in 2018 (Figure 8). This uptrend was most pronounced for hospitals in urban areas—the hospital charges for such hospitals increased by 25.3%. The public shared the biggest burden of hospital charges. Publicly funded payers, Medicare and Medicaid, accounted for 66.2% of all hospitalizations in Mississippi during 2018. Medicare was the primary expected payer for 55.6% of all discharges from rural noncore hospitals, but for 47.6% of all charges from micropolitan hospitals, and 42.2% of all charges from metropolitan hospitals (Figure 9)

Figure 7. Total Patient Days per Hospital Location and Statewide in MS, 2014-2018

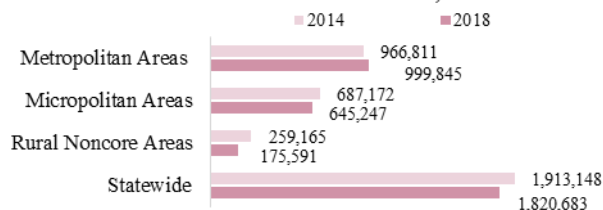
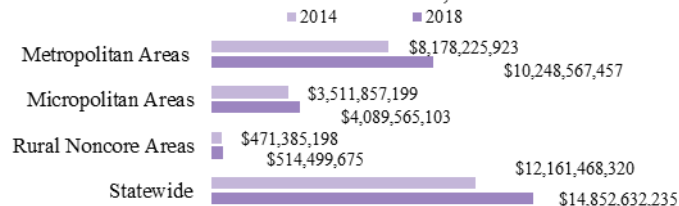


Figure 8. Total Hospital Charges per Hospital Location and Statewide in MS, 2014-2018



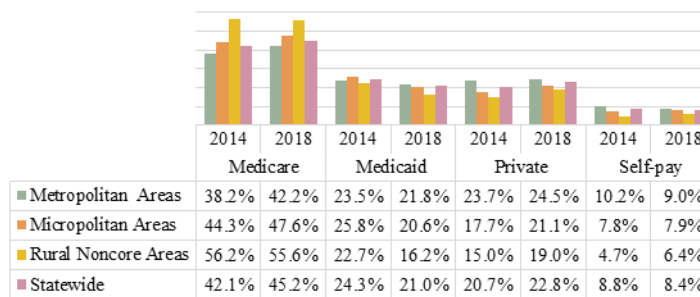
Although the overall trend in the number of hospitalizations remained stable between 2014 and 2018, these trends varied by payer. The number of hospitalizations covered by Medicare and private insurance increased by 8.4% and 11.3%, respectively (Table 5). The number of Medicaid covered hospitalizations, however, decreased by 12.9% statewide. The decline in Medicaid covered hospitalizations were especially pronounced for hospitals located in rural noncore areas (by 36.7%) and hospitals located in micropolitan areas (by 21.6%).

Table 5. Hospital Discharges By Primary Expected Payer According to Hospital Location in MS, Cumulative Change, 2014 and 2018

	Metropolitan Hospitals			Micropolitan Hospitals			Rural Noncore Hospitals			Statewide		
	2014	2018	Change	2014	2018	Change	2014	2018	Change	2014	2018	Change
Medicare	72,399	84,211	16.3%	57,811	60,751	5.1%	18,461	16,185	-12.3%	148,671	161,147	8.4%
Medicaid	44,601	43,576	-2.3%	33,592	26,333	-21.6%	7,446	4,715	-36.7%	85,639	74,624	-12.9%
Private	44,969	48,835	8.6%	23,126	26,935	16.5%	4,928	5,530	12.2%	73,023	81,300	11.3%
Self-pay	19,240	18,042	-6.2%	10,236	10,064	-1.7%	1,546	1,876	21.3%	31,022	29,982	-3.4%
Other	8,309	4,808	-42.1%	5,644	3,466	-38.6%	478	810	69.5%	14,431	9,084	-37.1%
Statewide	189,518	199,472	5.3%	130,409	127,549	-2.2%	32,859	29,116	-11.4%	352,786	356,137	0.9%

In 2018, hospitalized self-paying patients without health insurances or with inadequate insurance accounted for 8.4% of all hospitalizations in Mississippi. Trend analysis revealed a statewide downtrend in the number of self-paying hospitalizations, but this trend also differed by hospital location. Between 2014 and 2018, the number of self-paying hospitalizations decreased by 6.2% for metropolitan hospitals and 1.7% for micropolitan hospitals. Hospitals in rural noncore areas, however, exhibited a 21.3% increase in the number of self-paying stays. Despite the overall decline in the number of self-paying hospitalizations, the total amount of self-pay charges continued to climb. Such charges increased by 13.4%, from 958 million dollars in 2014 to 1.1 billion dollars in 2018. This finding is important because Mississippi had the seventh highest rate of uninsured residents in the nation during 2017.⁶ Compared to the estimated national average of 8.4%, an estimated 12.0% of Mississippi's population was uninsured. The escalating cost of in-hospital care, coupled with the high level of uninsured patients and poor insurance policies, imposed a significant financial burden on the state of Mississippi, its citizens, and hospitals.

Figure 9. Primary Expected Payers, MS, 2014 and 2018: Percent of Total Charges per Hospital Location



This report was prepared by Manuela Staneva, MPH, Mississippi State Department of Health

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