THE MISSISSIPPI OPIOID EPIDEMIC PROJECT

EPIDEMIOLOGICAL
REPORT
9/24/2018

MISSISSIPPI STATE DEPARTMENT OF HEALTH

OPIOID-RELATED HOSPITALIZATIONS AND EMERGENCY DEPARTMENT VISITS

MISSISSIPPI, 2014-2017

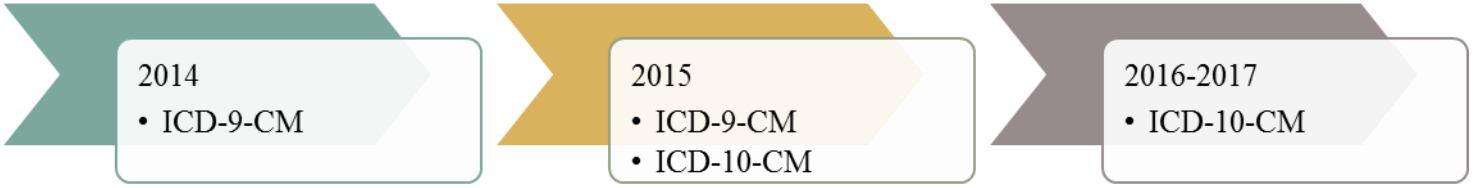
INTRODUCTION

- Health care data are one of richest and most valuable sources of health-related information. These data present an invaluable opportunity to study a vast number of diseases and health conditions including substance use disorders and overdoses. This report summarizes opioid data from two distinct health care sources: hospital inpatient discharge data and emergency department (ED) data. Presented are summary statistics on numbers, rates, payers, and demographics of patients with an opioid-related diagnosis. To capture all conditions, we grouped opioid use disorders, opioid overdoses, and other opioid associated adverse effects into one category, opioid-related diagnoses. The analysis included primary and secondary opioid-related diagnoses.

- It is important to note that patients may have multiple inpatient admissions or ED visits during a single year. For this report, the unit of analysis for hospital discharge data is a hospital discharge (hospitalization) not a patient. Likewise, the unit of analysis for ED data is an ED visit not a patient. In addition, ED visits resulting in hospital admissions are counted in both data sources, ED data and hospital discharge data.

- The findings in this report are based on inpatient discharge data and outpatient data from all reporting hospitals in Mississippi (over 100 facilities). Reporting hospitals are short-term general hospitals, specialty hospitals, and long-term healthcare facilities such as psychiatric hospitals and chemical dependency treatment facilities. Federal health care facilities (e.g., Veteran Affairs or prison-based health care facilities) are excluded from reporting requirements and their data are not included in this report. The emergency department (ED) data were abstracted from the hospital outpatient data system.

- During the study period, there was a change in the classification system used to code clinical diagnoses and medical procedures. Between 2014 and the first three quarters of 2015, diagnoses and procedures in health care data were coded using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). The International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) was introduced in the fourth quarter of 2015, replacing the previous classification system, ICD-9-CM. Accordingly, data for the last quarter of 2015 and all quarters of 2016 were coded with the ICD-10-CM. Since the two classification systems, ICD-9-CM and ICD-10-CM, differ significantly in their coding schemes, hospitalization and ED data before and after 2015 should be compared with this change in mind.



Data at a Glance
During 2017 in Mississippi

There were 8,022 opioid-related hospital stays: Every day 22 people on average were discharged from a hospital with an opioid-related diagnosis.

⇧ 26.2% since 2014

There were 4,036 opioid-related ED visits: Every day 11 people on average were treated in emergency rooms with an opioid-related diagnosis.

⇧ 50.7% since 2014

Total charges for opioid-related hospitalizations were $322,408,631

⇧ 72.7% since 2014

Total charges for opioid-related ED visits were $23,425,614

⇧ 75.3% since 2014

Medicare and Medicaid were responsible for 64.7% ($208,432,752) of all charges for opioid-related hospital stays:

$571,049 a day.

Medicare and Medicaid were responsible for 50.5% ($11,830,200) of all charges for opioid-related ED related visits:

$32,412 a day.

Caucasians accounted for 78.0% of all opioid-related hospitalizations.

Caucasians accounted for 72.9% of all opioid-related ED visits.

NUMBERS AND RATES OF OPIOID-RELATED HOSPITALIZATIONS AND ED VISITS

Number of Opioid-Related Hospitalizations in MS, 2014-2017

- Between 2014 and 2017, the number of opioid-related hospitalizations increased by 26.2%, from 6,355 to 8,022 (Figure 1). This was an increase of 1,667 hospitalizations.
- The hospitalization rate increased by 25.5%, from 199.0 in 2014 to 249.7 per 100,000 population in 2017 (Table 1).

Number of Opioid-Related ED Visits in MS, 2014-2017

- Between 2014 and 2017, the number of opioid-related ED visits increased by 50.7%, from 2,678 to 4,036 (Figure 1). This was an increase of 1,358 ED visits.
- The ED rate increased by 44.7%, from 87.2 in 2014 to 126.2 per 100,000 population in 2017 (Table 2).

- Note: The number of opioid-related hospitalizations decreased slightly by 2.6% between 2014 and 2015; this decline, however, was temporary as such hospitalizations increased by 16.0% between 2015 and 2016. The reasons for the decline in opioid hospitalizations between 2014 and 2015 are not clear. It is possible, for instance, that this temporary decrease was due to underreporting as a result of the transition from ICD-9-CM to ICD-10-CM during the same year. This interpretation is supported by the fact that ED visits, unlike inpatient admissions, demonstrated a steady increase throughout the entire period climbing by 18.0%, from 2014 to 2015, and by 18.9%, from 2015 to 2016.

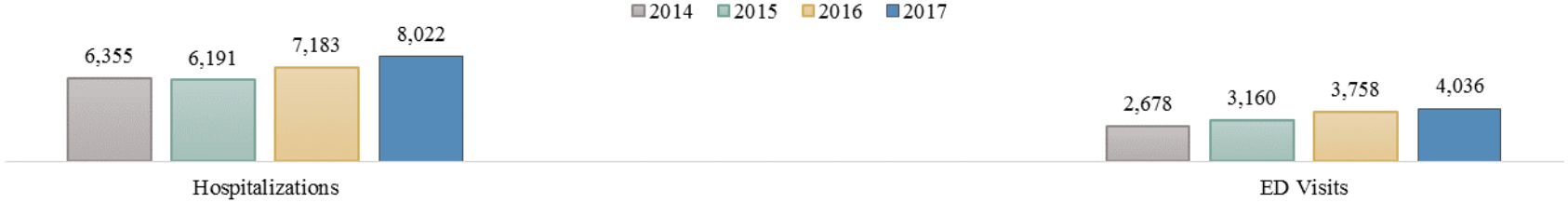
Table 1. Opioid-Related Hospitalizations: Totals, Number and Percentage of MS Residents, and Age-Adjusted Rates

	Total	MS Residents (%)	Age-adjusted rate
2014	6,355	5,921 (93.2%)	199.0
2015	6,191	5,758 (93.0%)	191.5
2016	7,183	6,715 (93.5%)	224.7
2017	8,022	7,452 (92.9%)	249.7

Table 2. Opioid-Related ED Visits: Totals, Number and Percentage of MS Residents, and Age-Adjusted Rates

	Total	MS Residents (%)	Age-adjusted rate
2014	2,678	2,544 (95.0%)	87.2
2015	3,160	2,986 (94.5%)	102.1
2016	3,758	3,499 (93.1%)	117.1
2017	4,036	3,767 (93.3%)	126.2

Figure 1. Numbers of Opioid-Related Hospitalizations and ED Visits in MS, 2014-2017



TYPES OF OPIOID-RELATED HOSPITALIZATIONS AND ED VISITS

◊ Opioid-related conditions can be separated into two broad categories: opioid use disorders (abuse and dependence) and opioid-related adverse effects (poisoning and other adverse effects associated with the therapeutic use of opioids). Although dependence was still the predominant diagnosis for patient admissions, the number of hospitalizations and ED visits for abuse and dependence decreased during the study period. This decrease can be explained by the introduction in 2015 of a new category, "unspecified opioid use," in the ICD-10-CM. Consequently, as the use of this new catchall category to classify inpatient admissions and ED visits began, the number of diagnoses for abuse and dependence decreased correspondingly. This shift in data trends suggests that statistics on opioid-related conditions and diagnoses are highly sensitive to changes in the classification scheme used to label them.

Opioid-Related Hospitalizations in MS, 2014-2017

◊ Hospital admissions for opioid poisoning increased by 23.3%. At the same time, the admissions associated with adverse effects increased drastically by 119.3%.

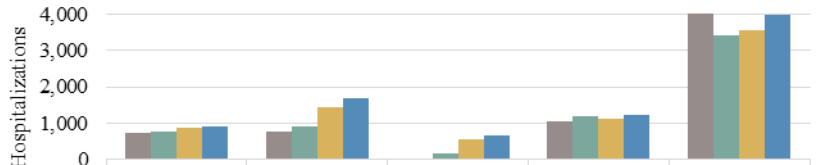
◊ Between 2014 and 2016, there was a temporary decrease in admissions for abuse and dependence. Such admissions declined, however, at the expense of an increasing number of diagnoses for unspecified use. Between 2016 and 2017, diagnoses for abuse and dependence increased, again, by 10.3% and 12.0%, respectively (Figure 2).

Opioid-Related ED Visits in MS, 2014-2017

◊ Opioid overdoses recorded in ED data jumped by 75.5% during the study period and ED visits for adverse effects nearly doubled with an increase of 88.5%.

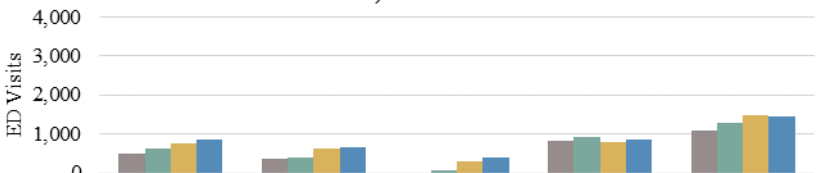
◊ Between 2015 and 2016, ED diagnoses for abuse decreased slightly, but went up again during the last two years of the study period. From 2016 through 2017, diagnoses for dependence declined marginally. The lower number of diagnoses for abuse and dependence was due to an increase in unspecified codes for opioid use (Figure 3).

Figure 2. Type of Opioid-Related Hospitalizations in MS, 2014-2017



	Poisoning	Adverse effects	Unspecified use	Abuse	Dependence
2014	722	766	0	1,059	4,013
2015	751	892	157	1,180	3,413
2016	885	1,438	559	1,102	3,543
2017	890	1,680	652	1,216	3,969

Figure 3. Type of Opioid-Related ED Visits in MS, 2014-2017



	Poisoning	Adverse effects	Unspecified use	Abuse	Dependence
2014	493	347	0	822	1,075
2015	628	387	56	914	1,279
2016	758	629	297	778	1,468
2017	865	654	386	866	1,458

CHARGES FOR HOSPITAL STAYS AND ED VISITS

Opioid-Related Hospitalizations in MS, 2014-2017

- In 2017, the average charge for an opioid-related hospital stay was $40,191 - an increase of 36.8% ($10,808) compared to the average charge in 2014 (Figure 4).
- In 2017, the total amount of charges submitted for opioid-related hospitalizations was $322,408,631, an average annual increase of 72.7% compared to 2014 (Table 3).

Opioid-Related ED Visits in MS, 2014-2017

- In 2017, the average charge for an opioid-related ED visit was $5,804 - an increase of 16.3% ($815) compared to the average charge in 2014 (Figure 5).
- In 2017, the total amount of charges submitted for opioid-related ED visit was $23,425,614, which was an average annual increase of 75.3% compared to 2014 (Table 4).

Figure 4. Average Hospital Charges for Opioid-Related and Non-Opioid-Related Hospitalizations in MS, 2014-2017

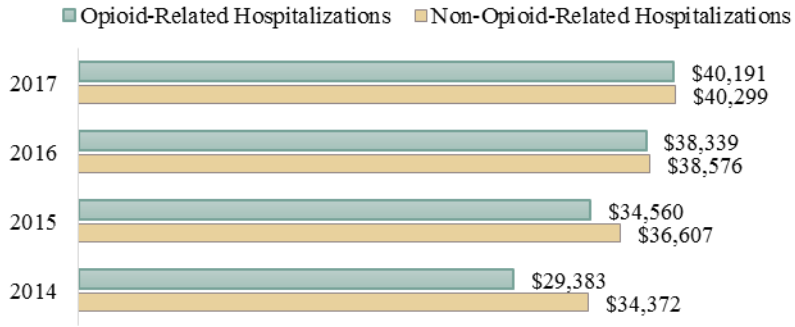


Figure 5. Average Hospital Charges for Opioid-Related and Non-Opioid-Related ED Visits in MS, 2014-2017

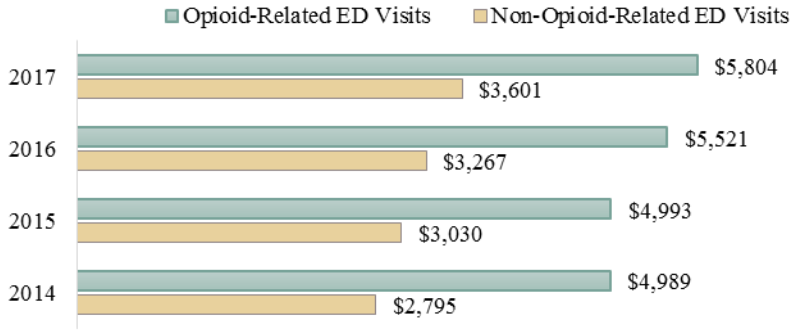


Table 3. Opioid-Related Hospitalizations: Hospital Charges in MS, 2014-2017

	2014	2015	2016	2017
Other	$186,727,420	$213,962,265	$275,390,417	$322,408,631
Annual Change	Baseline	+14.6%	+28.7%	+17.1%

Table 4. Opioid-Related Hospitalizations: Charges for ED Visits in MS, 2014-2017

	2014	2015	2016	2017
Other	$13,360,710	$15,778,746	$20,746,777	$23,425,614
Annual Change	Baseline	+18.1%	+31.5%	+12.9%

Note: Charges in this report are calculated for primary and secondary diagnoses of opioid-related conditions. These charges reflect the amount that a hospital built for the entire stay or visit . This is not the amount that the hospital collected and charges may not represent the actual cost of service.

CHARGES FOR HOSPITAL STAYS AND ED VISITS BY PAYER

Opioid-Related Hospitalizations in MS, 2014-2017

- The publically funded payers, Medicare and Medicaid, were responsible for nearly two-thirds of the total charges: 43.9% and 20.8%, respectively (Figure 6).
- Between 2014 and 2017, private insurances exhibited the greatest increase of 119.6% in charges for hospital stays - charges for such insurers more than doubled. Charges for Medicare patient also increased substantially (Table 5).

Opioid-Related ED Visits in MS, 2014-2017

- The publically funded payers, Medicare and Medicaid, were responsible for over half of the total charges: 32.6% and 17.9%, respectively (Figure 7).
- Between 2014 and 2017, all main payers experienced an increase of 90.7% or more in ED charges. Charges for opioid-related ED visits for private payers showed the highest increase of 80.1% from 2016 to 2017 (Table 6).

Figure 6. Percent of Total Charges for Opioid-Related Hospitalizations by Payer in MS, 2017

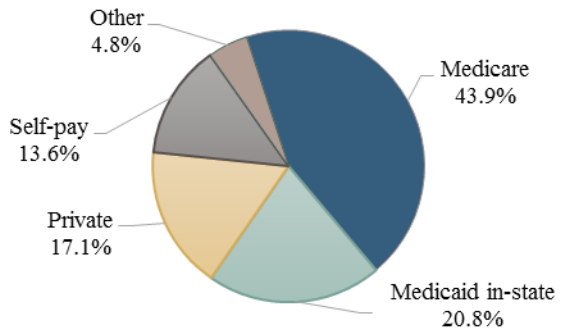


Figure 7. Percent of Total Charges for Opioid-Related ED Visit by Payer in MS, 2017

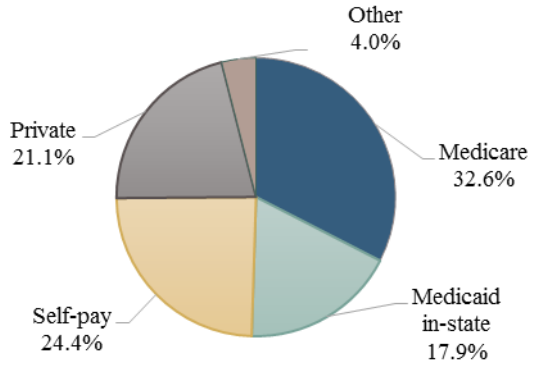


Table 5. Opioid-Related Hospitalizations: Charges by Payer in MS, 2014 and 2017

	2014	2017	Change 2014-2017
Medicare	$70,314,683	$141,429,661	+101.1%
Medicaid in-state	$46,150,550	$67,010,091	+45.2%
Self-pay	$32,878,410	$43,739,400	+33.0%
Private	$24,934,299	$54,761,415	+119.6%
Other	$12,449,479	$15,468,065	+24.2%
Total	$186,727,420	$322,408,631	+72.7%

Table 6. Opioid-Related Hospitalizations: ED Charges by Payer in MS, 2014 and 2017

	2014	2017	Change 2014-2017
Medicare	$4,235,395	$7,627,533	+80.1%
Medicaid in-state	$2,472,310	$4,202,667	+70.0%
Self-pay	$3,307,041	$5,709,973	+72.7%
Private	$2,596,932	$4,952,896	+90.7%
Other	$749,031	$932,545	+24.5%
Total	$13,360,710	$23,425,614	+75.3%

RACIAL DISTRIBUTION

Opioid-Related Hospitalizations in MS, 2014-2017

- Compared to all other racial groups, Caucasian patients were disproportionately hospitalized with an opioid-related condition. Such patients accounted for 78.0% of all opioid-related hospital stays during 2017 (Figure 8).
- The percentage of African Americans hospitalized with an opioid-related diagnosis, however, increased from 16.2% in 2014 to 20.5% in 2017 (Figure 8). Consequently, the hospitalization rate for African Americans showed the steepest increase of 62.6% among all of the studied racial groups. From 2014 to 2017, the increase in the rate for among Caucasians was 21.1% (Table 7).

Opioid-Related ED Visits in MS, 2014-2017

- Like inpatient hospital admissions, Caucasians accounted for the vast majority (72.9%) of all opioid-related ED visits in 2017 (Figure 9).
- Compared to opioid-related hospital stays, however, the racial differences in ED visits were slightly less pronounced. The proportion of African Americans treated in ED was higher than the proportion of African Americans treated in hospitals. In 2017, African Americans accounted for 20.5% of hospital admissions, but for 25.4% of all ED visits. African Americans also experienced the greatest increase in the rate of ED visits (Table 8).

Figure 8. Racial Distribution of Opioid-Related Hospitalizations in MS, 2014-2017

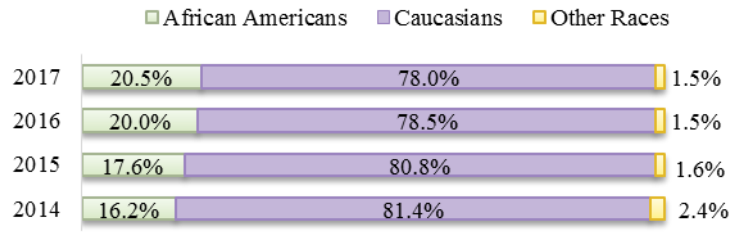


Figure 9. Racial Distribution of Opioid-Related ED Visits in MS, 2014-2017

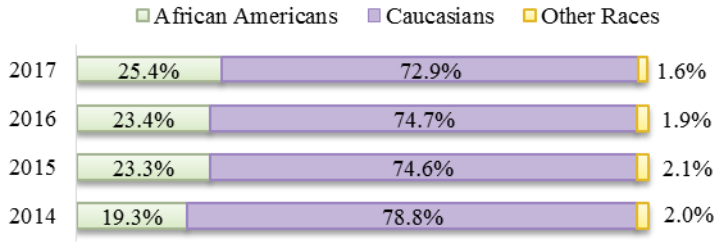


Table 7. Opioid-Related Hospitalizations: Rate by Race per 100,000 Population in MS, 2014-2017

	2014	2015	2016	2017	Change 2014-2017
African Americans	84.8	90.9	119.2	137.9	+62.6%
Caucasian	270.5	261.1	297.2	327.5	+21.1%
Other Race	161.0	100.4	115.1	123.5	-23.3%

Table 8. Opioid-Related ED Visits: Rate by Race per 100,000 Population in MS, 2014-2017

	2014	2015	2016	2017	Change 2014-2017
African Americans	44.4	63.0	72.8	86.7	+95.3%
Caucasian	111.8	124.5	147.4	154.7	+38.4%
Other Race	56.4	70.7	72.2	62.9	+11.5%

AGE DISTRIBUTION

Opioid-Related Hospitalizations in MS, 2014-2017

The 25-34 age group had the highest hospitalization rate in 2014. By 2017, however, the hospitalization rates were roughly similar between the age groups in the 25-64 range (Figure 10). This convergence resulted from two trends occurring simultaneously: a slight decrease in the rate of hospitalization for the 0-24 age group and marked increases in the same rate for the 55-64 age group of 40.1% and for the ≥ 65 age group of 81.4% (Table 9).

Opioid-Related ED Visits in MS, 2014-2017

The 25-34 age group had consistently the highest rate of ED visits during the study period. Compared to 2014, all age groups experienced an upward trend in ED visits (Figure 11). This upward dynamic was most pronounced, however, among patients 55 years of age or older. From 2014 to 2017, for example, the rates of ED visits spiked by 65.5% for the 55-64 age group and by 79.2% for the age group of 65 years and older (Table 10).

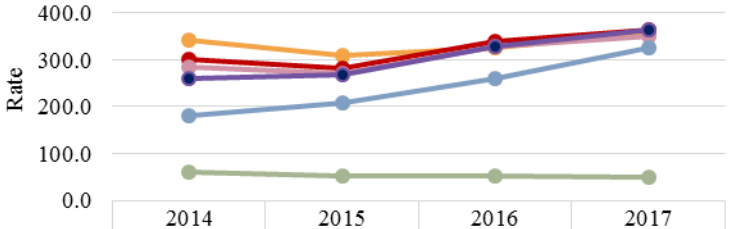
Table 9. Opioid-Related Hospitalizations by Age Group in MS: Number and % of Total Hospitalizations in 2017 and Change in Rate from 2014 to 2017

Age Group	0-24 years	25-34 years	35-44 years	45-54 years	55-64 years	≥ 65 years
Number (% of total) 2017	544 (6.8%)	1,558 (19.4%)	1,440 (18.0%)	1,410 (17.6%)	1,480 (18.5%)	1,590 (19.7%)
Change in Rate From 2014 to 2017	-16.4%	+4.3%	+21.2%	+22.9%	+40.1%	+81.4%

Table 10. Opioid-Related ED Visits by Age Group: in MS: Numbers and % of Total ED Visits in 2017 and Change in Rate from 2014to 2017

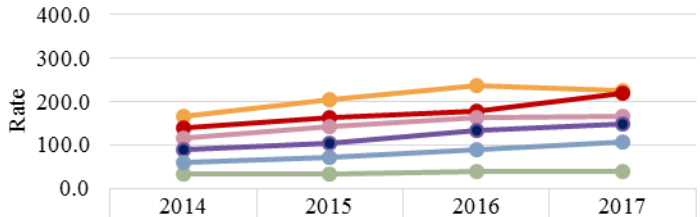
Age Group	0-24 years	25-34 years	35-44 years	45-54 years	55-64 years	≥ 65 years
Number (% of total) 2017	435 (10.8%)	975 (24.2%)	841 (20.8%)	667 (16.5%)	605 (15.0%)	513 (12.7%)
Change in Rate From 2014to 2017	+19.6%	+37.0%	+56.1%	+45.0%	+65.5%	+79.2%

Figure 10. Opioid-Related Hospitalizations: Age Group Rates per 100,000 Population in MS, 2014-2017



	2014	2015	2016	2017
0-24 years	59.2	51.4	50.8	49.5
25-34 years	342.8	309.7	326.2	357.7
35-44 years	300.1	282.7	339.2	363.6
45-54 years	285.3	271.2	329.0	350.5
55-64 years	259.8	268.5	327.4	364.0
≥ 65 years	180.4	208.3	260.6	327.2

Figure 11. Opioid-Related ED Visits: Age Group Rates per 100,000 Population in MS, 2014-2017



	2014	2015	2016	2017
0-24 years	33.6	32.4	38.3	40.2
25-34 years	164.9	205.4	236.1	225.9
35-44 years	139.3	162.0	178.6	217.5
45-54 years	114.4	140.7	162.9	165.9
55-64 years	88.7	103.5	133.4	146.8
≥ 65 years	60.0	72.3	88.3	107.5

GENDER DISTRIBUTION

Opioid-Related Hospitalizations in MS, 2014-2017

- Women were hospitalized more frequently with an opioid-related condition than men.
- The percentage of women hospitalized with an opioid-related diagnosis was consistent from 2014 to 2017 (Figure 12).
- The hospitalization rate for women increased by 25.6%, while the hospitalization rate for men increased by 27.1% (Table 11).

Opioid-Related ED Visits in MS, 2014-2017

- Like inpatient admissions, women had higher numbers and rates of opioid-related ED visits than men.
- The proportion of female ED opioid-related visits, however, declined slightly, from 57.8% in 2014 to 54.5% in 2017 (Figure 13).
- In addition, unlike inpatient admissions, men experienced a greater increase in ED visits compared to females: 58.9% versus 41.0% (Table 12).

Figure 12. Gender Distribution of Opioid-Related Hospitalizations in MS, 2014-2017

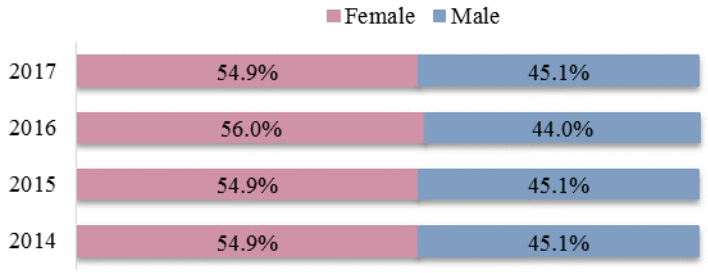


Figure 13. Gender Distribution of Opioid-Related ED Visits in MS, 2014-2017

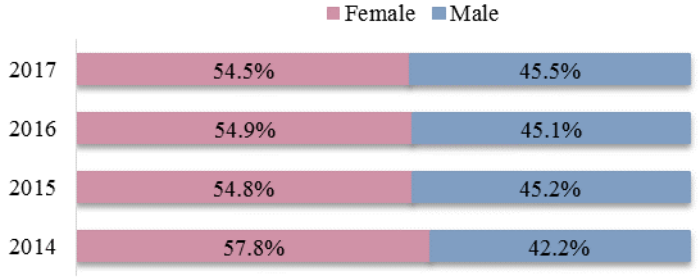


Table 11. Opioid-Related Hospitalizations : Rate by Gender per 100,000 Population in MS, 2014-2017

	2014	2015	2016	2017	Change 2014-2017
Female	214.2	206.4	246.2	269.1	+25.6%
Male	180.3	177.6	201.8	229.1	+27.1%

Table 12. Opioid-Related ED Visits: Rate by Gender per 100,000 Population in MS, 2014-2017

	2014	2015	2016	2017	Change 2014-2017
Female	96.0	106.8	126.2	135.4	+41.0%
Male	73.3	92.3	107.3	116.5	+58.9%

RESIDENTIAL PATTERNS

Opioid-Related Hospitalizations in MS, 2014-2017

- The average four-year rates for opioid-related hospital stays were almost identical for non-metro and metro counties, 216.6 and 215.2 per 100,000 population, respectively (Table 13).
- Among the urban centers, Jackson metro area had the highest number of opioid-related discharges, while Hattiesburg metro area had the highest hospitalization rate of 314.7 per 100,000 population (Figure 14 and Table 13).

Opioid-Related ED Visits in MS, 2014-2017

- The four-year average opioid-related ED rate for metro counties was 118.0 per 100,000 population. Non-metro counties had lower rate of 97.6 per 100,000 population (Table 13).
- Gulfport-Biloxi area had the highest number of ED visits. Although Hattiesburg had the highest rate of opioid-related ED visits (192.3), Gulfport-Biloxi followed closely with178.5 ED visits per 100,000 population (Figure15).

Figure 14. Number of Opioid-Related Hospitalizations by County in MS, Four-Year Averages, 2014-2017

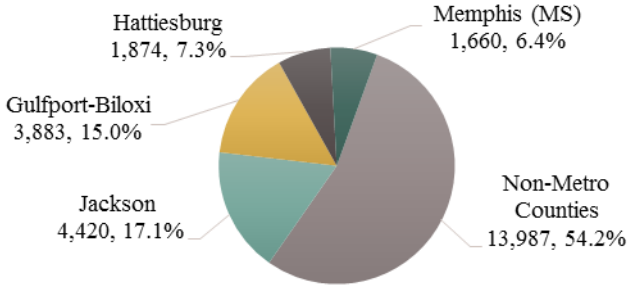


Figure 15. Number of Opioid-Related ED Visits by County in MS, Four-Year Averages, 2014-2017

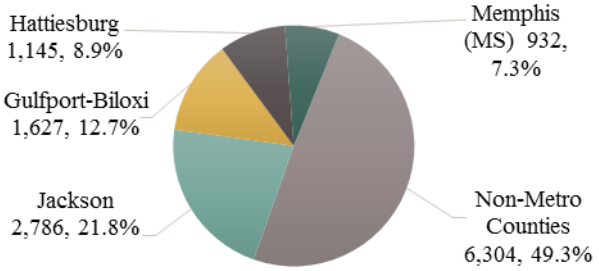


Table 13. Opioid-Related Hospitalizations and ED Visits: Rate by Type of Residence in MS, Four-Year Period, 2014-2017

Metropolitan and non-metropolitan counties	Three-Year Rate of Opioid-Related Hospitalizations per 100, 000 Population	Three-Year Rate of Opioid-Related ED Visits per 100, 000 Population
Non-metropolitan counties	216.6	97.6
Metropolitan counties	215.2	118.0
Metropolitan areas		
Jackson (Hinds, Rankin, Madison, Simpson, Yazoo, Copiah)	191.0	70.3
Memphis (MS Counties: DeSoto, Marshall, Tunica, Tate, Benton)	161.2	90.5
Gulfport-Biloxi-Pascagoula (Harrison, Hancock, Jackson)	248.8	178.5
Hattiesburg (Forrest, Lamar, Perry)	314.7	192.3

COUNTY-LEVEL RATES FOR OPIOID-RELATED HOSPITALIZATIONS: 2014-2017 AVERAGE RATES

Table 14. Opioid-Related Hospitalizations in MS, 2014-2017: Counties Ranked by Rate

Rank	County	Rate	Rank	County	Rate
1	Franklin	408.1	42	Tate	190.0
2	Lauderdale	380.9	43	Copiah	189.4
3	Clarke	370.2	44	Attala	189.1
4	Greene	362.6	45	Hinds	188.8
5	Neshoba	353.4	46	Leake	188.4
6	Forrest	348.0	47	Monroe	186.7
7	Marion	343.0	48	Winston	181.7
8	Warren	335.8	49	DeSoto	177.5
9	Pike	334.3	50	Alcorn	174.8
10	Jones	326.4	51	Panola	168.2
11	Stone	323.3	52	Jefferson Davis	164.6
12	Lamar	315.2	53	Carroll	159.0
13	Lawrence	267.2	54	Humphreys	157.6
14	Coahoma	263.5	55	Tippah	155.1
15	Jackson	262.7	56	Yalobusha	152.9
16	Harrison	261.9	57	Washington	152.7
17	Covington	260.2	58	Adams	152.5
18	Jasper	254.8	59	Amite	151.7
19	Walthall	247.5	60	Montgomery	151.5
20	Lee	246.4	61	Hancock	149.3
21	Newton	244.4	62	Scott	136.7
22	Leflore	240.3	63	Grenada	135.5
23	Prentiss	237.7	64	Holmes	126.8
24	Yazoo	237.4	65	Bolivar	126.7
25	Itawamba	233.6	66	Noxubee	125.2
26	Lowndes	233.0	67	Madison	124.1
27	Tishomingo	232.0	68	Benton	115.0
28	Rankin	231.1	69	Clay	114.1
29	Webster	220.8	70	Wilkinson	110.6
30	Sharkey	219.6	71	Quitman	107.4
31	Lincoln	215.5	72	Perry	104.5
32	Pearl River	214.5	73	Tallahatchie	103.7
33	Chickasaw	214.4	74	Calhoun	100.7
34	George	212.8	75	Choctaw	99.7
35	Wayne	208.6	76	Marshall	91.9
36	Union	202.8	77	Claiborne	88.1
37	Simpson	199.9	78	Sunflower	87.9
38	Pontotoc	199.1	79	Tunica	85.0
39	Jefferson	198.9	80	Oktibbeha	84.0
40	Smith	193.0	81	Lafayette	69.1
41	Kemper	192.9	82	Issaquena	-

Rates for counties with less than 20 counts are unreliable and were not calculated.

Opioid-Related Hospitalizations in MS, 2014-2017

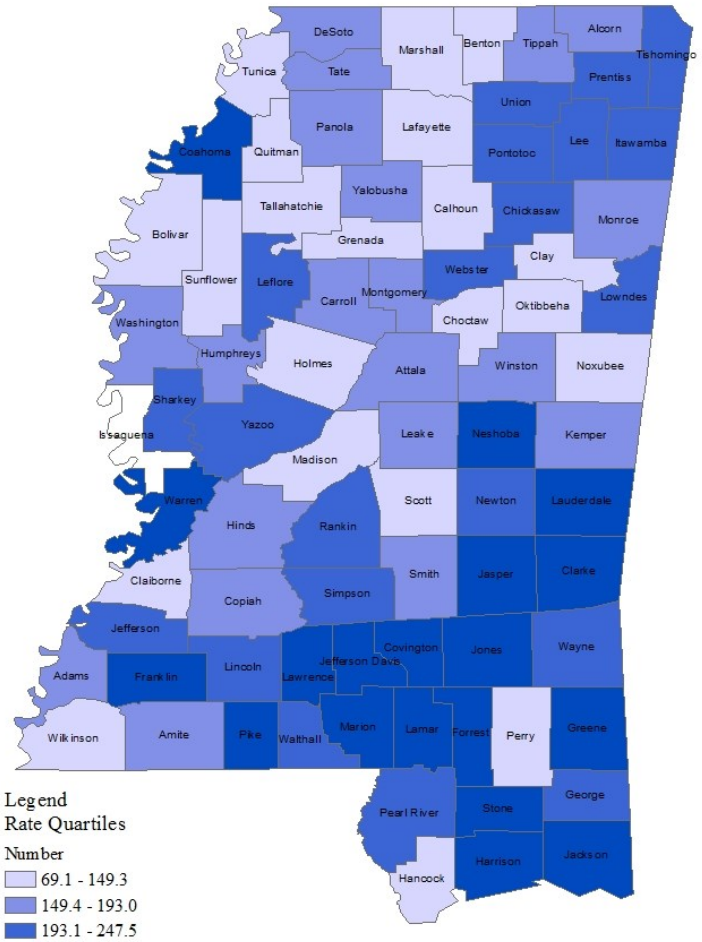
- Harrison County, located on the Mississippi Gulf Cost, accounted for about 6.8% of the state population, but this county reported the highest number of opioid-related hospitalizations in the state - 2,118 or 8.2% (Table 15).
- The four-year average rate for the state was 215.9 per 100,000 population. The opioid-related hospitalization rates varied widely among different counties with a cluster of high hospitalization rates in the south region of the state (Table 14). The top 10 counties by numbers and rate are listed in Table 15.
- County rates for non-opioid-related hospitalizations did not show any particular pattern or clusters in the state. The following counties were among the top ten counties for opioid and non-opioid-related hospitalization rates: Neshoba, Green, Franklin, and Clarke. Comparative maps of opioid and non-opioid hospitalizations are presented on page 13.

Table 15. Number and Rates of Opioid-Related Hospitalizations: Top 10 Counties in MS, 2014-2017

Number of Hospitalizations (% of Total)		Rate per 100,000 Population	
Harrison	2,118 (8.2%)	Franklin	408.1
Hinds	1,826 (7.1%)	Lauderdale	380.9
Jackson	1,487 (5.8%)	Clarke	370.2
Rankin	1,385 (5.4%)	Greene	362.6
De Soto	1,240 (4.8%)	Neshoba	353.4
Lauderdale	1,189 (4.6%)	Forrest	348.0
Forrest	1,057 (4.1%)	Marion	343.0
Jones	889 (3.4%)	Warren	335.8
Lee	840 (3.3%)	Pike	334.3
Lamar	766 (3.0%)	Jones	326.4

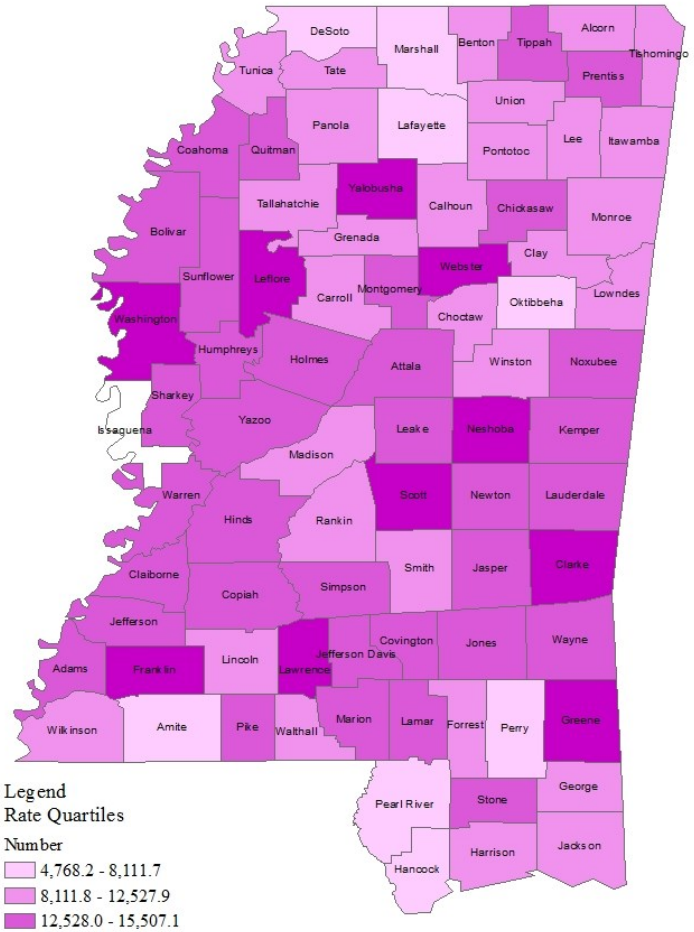
COUNTY RATES FOR OPIOID-RELATED AND NON-OPIOID-RELATED HOSPITALIZATIONS: MAPS

Opioid-Related Hospitalizations in MS, 2014-2017
County Rates per 100,000 Population



The rate for Issaquena County is not reported (<20 cases).

Non-Opioid-Related Hospitalizations in MS, 2014-2017
County Rates per 100,000 Population



The rate for Issaquena County is not reported (<20 counts).

COUNTY-LEVEL RATES FOR OPIOID-RELATED ED VISITS: 2014-2017 AVERAGE RATES

Table 15. Opioid-Related Hospitalizations in MS, 2014-2017: Counties Ranked by Rate

Rank	County	Rate	Rank	County	Rate
1	Forrest	236.7	42	Scott	87.3
2	Franklin	212.1	43	Grenada	81.8
3	Marion	203.4	44	Jasper	81.4
4	Pike	196.7	45	Rankin	81.2
5	Harrison	186.2	46	Smith	81.0
6	Jackson	181.1	47	Tate	75.1
7	Stone	179.0	48	Union	75.0
8	Lawrence	176.2	49	Simpson	74.6
9	Clarke	170.3	50	Choctaw	72.5
10	Greene	168.5	51	Hinds	71.0
11	Lamar	168.3	52	Wayne	70.7
12	Walthall	162.1	53	Leflore	69.1
13	Pearl River	150.7	54	Amite	67.9
14	Warren	144.2	55	Newton	67.2
15	George	144.0	56	Leake	66.8
16	Lauderdale	141.6	57	Washington	66.7
17	Jones	138.4	58	Monroe	66.2
18	Hancock	136.9	59	Marshall	64.8
19	Covington	136.5	60	Benton	63.5
20	Attala	134.9	61	Webster	63.4
21	Neshoba	132.5	62	Clay	62.7
22	Tishomingo	132.0	63	Chickasaw	62.3
23	Tallahatchie	114.1	64	Lafayette	60.7
24	Alcorn	113.2	65	Holmes	57.9
25	Copiah	110.0	66	Adams	55.1
26	Carroll	105.2	67	Calhoun	54.6
27	Lowndes	104.9	68	Lee	54.3
28	Yalobusha	104.6	69	Pontotoc	48.8
29	DeSoto	102.6	70	Itawamba	47.8
30	Montgomery	100.2	71	Sunflower	44.9
31	Panola	98.7	72	Tunica	38.8
32	Prentiss	98.6	73	Bolivar	38.7
33	Kemper	97.7	74	Madison	35.4
34	Lincoln	97.6	75	Perry	34.8
35	Wilkinson	96.8	76	Oktibbeha	28.2
36	Jefferson Davis	95.3	77	Jefferson	-
37	Noxubee	93.3	78	Sharkey	-
38	Winston	92.9	79	Claiborne	-
39	Tippah	90.6	80	Humphreys	-
40	Yazoo	90.4	81	Issaquena	-
41	Coahoma	90.3	82	Quitman	-

Rates for counties with less than 20 counts are unreliable and were not calculated.

Opioid-Related ED Visits in MS, 2014-2017

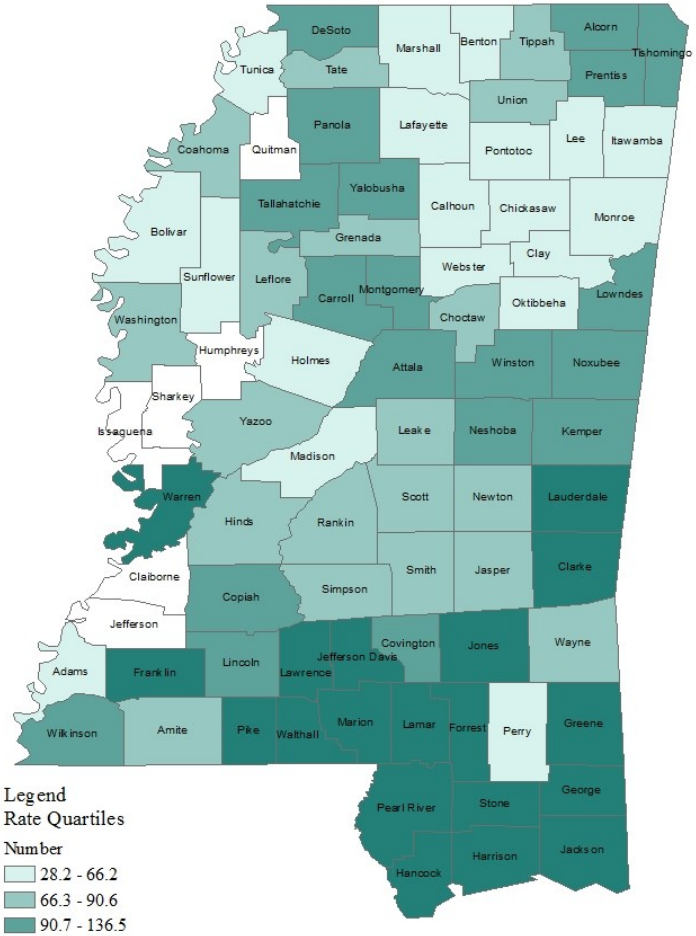
- Harrison and Jackson Counties on the Mississippi Gulf Coast accounted for 11.5% of the state population, but these two counties reported one fifth of all ED visits during the study period: 1,506 (11.6%) and 1,025 (7.9%) (Table 13).
- The four-year average rate for the state was 107.0 per 100,000 population. Like opioid-related hospitalization, rates of opioid -related ED visits were higher for counties in the south region of the state, in particular, the counties within the Mississippi's Gulf Costs and Pine Belt (Table 17). The top 10 counties by rate are listed in Table 17.
- There were several clusters of high county rates for non-opioid-related hospitalization rates, mainly, in the northern part of the state. The patterns of opioid and non-opioid-related ED visits were clearly distinct. Comparative maps of opioid and non-opioid hospitalizations are presented on page 15.

Table 17. Number and Rates of Opioid-Related ED Visits: Top 10 Counties in MS, 2014-2017

Number of Hospitalizations (% of Total)		Rate per 100,000 Population	
Harrison	1,506 (11.6%)	Forrest	236.7
Jackson	1,025 (7.9%)	Franklin	212.1
Forrest	719 (5.5%)	Marion	203.4
De Soto	717 (5.5%)	Pike	196.7
Hinds	687 (5.3%)	Harrison	186.2
Rankin	487(3.8%)	Jackson	181.1
Lauderdale	442 (3.4%)	Stone	179.0
Lamar	409 (3.2%)	Lawrence	176.2
Jones	377 (2.9%)	Clarke	170.3
Pearl River	333 (2.6%)	Greene	168.5

COUNTY RATES OF OPIOID-RELATED AND NON-OPIOID-RELATED ED VISITS

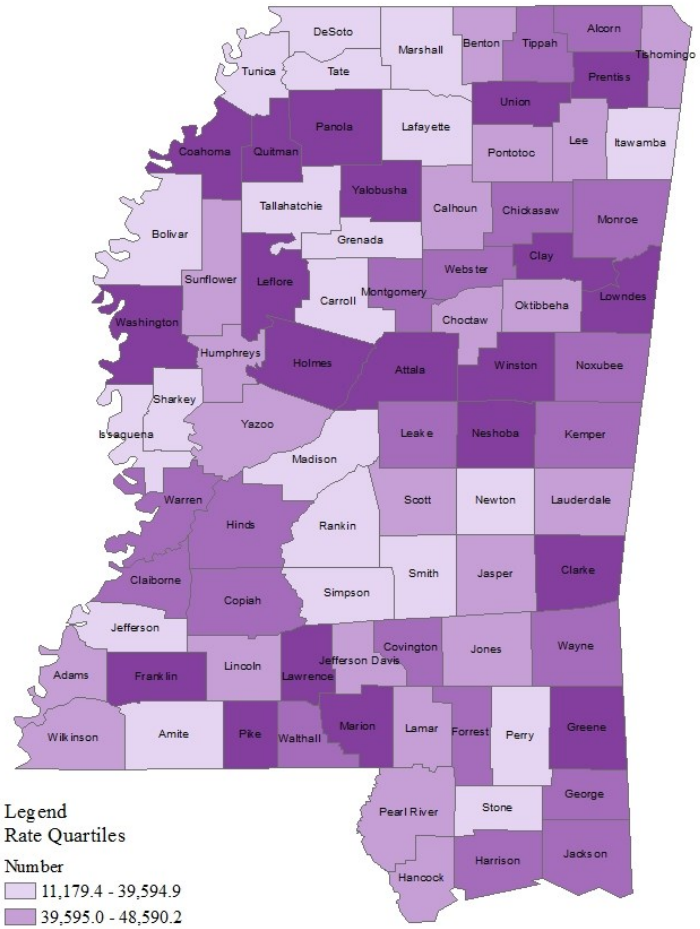
Opioid-Related ED Visits in MS, 2014-2017
County Rates per 100,000 Population



Legend
Rate Quartiles
Number
- 28.2 - 66.2
- 66.3 - 90.6
- 90.7 - 136.5
- 136.6 - 236.7

The rates for the counties in white are not reported (<20 cases).

Non-Opioid-Related ED Viists in MS, 2014-2017
County Rates per 100,000 Population



Legend
Rate Quartiles
Number
- 11,179.4 - 39,594.9
- 39,595.0 - 48,590.2
- 48,590.3 - 60,728.6
- 60,728.7 - 83,622.0

DISCUSSION: MAIN POINTS FOR CONSIDERARION AND PREVENTION

- From 2014 to 2017, the numbers opioid-related hospital stays and ED visits increased by 26.2% and 50.7%, respectively. This trend varied, however, by type of opioid-related diagnosis: The highest increase was recorded for diagnoses indicating adverse effects related to opioid treatments. Such diagnoses increased by 119.3% for hospitalization and by 88.5% for ED visits. This finding underscores the importance of judicious opioid prescribing practices since opioid treatments are associated with substantial risks. In addition to opioid-related side effects, overdoses demonstrated a substantial uptrend signifying that the opioid epidemic is intensifying in Mississippi. From 2014 to 2017, hospitalizations for opioid overdoses increased by 23.3%, while ED visits for opioid overdoses jumped by 75.5%.

- The highest increase in rates for opioid-related hospital stays and ED visits were manifested among the elderly population. From 2014 to 2017, hospital admissions and ED visits for the ≥ 65 age group climbed by 81.4% and 79.2%, respectively. Mississippi health care providers should be aware of this finding and carefully select the most appropriate chronic pain treatment options for elderly patients.

- Caucasians were disproportionately affected by opioid-related hospitalizations: In 2017, 78.0% of all opioid-related hospitalizations and 72.9% of all ED visits were among this racial group. From 2014 to 2017, rates for opioid-related hospitalizations and ED visits, however, increased more among African Americans than Caucasians. National-level research on fatal overdoses has noted a similar narrowing in the racial gap with African Americans being increasingly affected by the opioid epidemic.[1]

- Women had a higher prevalence of opioid-related diagnoses, accounting for over half of all hospital admissions and ED visits during the four-year period. This finding has important implications for prevention of opioid misuse among women. Research has shown, for example, that women are more likely to experience chronic pain and take prescription opioids at higher doses and for longer periods of time than men.[2]

- The opioid epidemic in Mississippi is associated with substantial economic costs. This highlights the importance of investing in public health prevention. In 2017, the total amount of charges for opioid-related hospitalizations in Mississippi exceeded 300 million, a 72.7% increase compared to 2014. The total charges for ED visits spiked even more by 75.3% reaching $23,425,614.

- Although, the hospitalization rates varied widely among different counties, there was a cluster of high hospitalization rates in the south of the state. This geographic “opioid hot spot” included populated areas on Mississippi’s Gulf Coast as well as populated areas along highways 59 and 55. Although further investigation is needed to determine the causes of this variation in the geographic distribution of opioid-related disorders, these areas should be a primary target for prevention.

TECHNICAL NOTES AND ACKNOWLEDGEMENTS

Data analyses: The diagnostic codes used for the analyses are listed in Table 18. Age-adjusted death rates were calculated using the direct method and adjusted to the 2000 standard population. Crude rates for the period 2014-2017 were calculated using the sum of the 2014-2017 population data sets. Population data sets were obtained from the U. S. Census Bureau. County-level poverty data was obtained from the 2011-2015 American Community Survey 5-Year Estimates. Patient residence was determined according to categories of 2013 National Center for Health Statistics Urban-Rural Classification.[3]

Table 18. Diagnostic Codes Used for Data Analysis

ICD-9-CM	Description	ICD-10-CM
304.0	Opioid type dependence	F112
304.7	Combinations of opioid type drug with any other drug dependence	
	Opioid use unspecified	F119
305.5	Opioid abuse	F111
965.0	Poisoning by opiates and related narcotics	
E 850.0	Poisoning by heroin	T401X1-4
E850.1	Poisoning by methadone	T403X1-4
E850.2	Poisoning by other opiates and related narcotics	T400X1-4,T402X1-4,T404X1-4,T40601-4, T40691-4
E935.0	Heroin causing adverse effects In therapeutic Use	
E935.1	Methadone causing adverse effects in therapeutic use	T403X5
E935.2	Other opiates and related narcotics causing adverse effects in therapeutic use	T400X5, T402X5, T404X5,T40605,T40695

The Mississippi Opioid Epidemic Project is a collaborative effort between the Public Health Pharmacy, Office of Epidemiology, and Office of Preventive Health at the Mississippi State Department of Health. The project's mission is to use evidence-based research methods to evaluate the scope of the opioid epidemic in Mississippi and maintain statewide surveillance systems utilizing different data sources, including hospital discharge data, prescription monitoring program data, vital records data and emergency medical services data. For additional information on opioid drug abuse statistics as well as state and national initiatives tar-geting this epidemic, please visit the Mississippi State Department of Health's website at: http://msdh.ms.gov and search Prescription Drug Abuse.

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This epidemiological report was prepared by: Manuela Staneva, MPH; Thomas Dobbs, MD, MPH; Meg Pearson, PharmD, MS; and Paul Byers, MD

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