H·CUP HEALTHCARE COST AND UTILIZATION PROJECT

AHRQ Agency for Healthcare Research and Quality

STATISTICAL BRIEF #245

November 2018

# Geographic Variation in Substance-Related Inpatient Stays Across States and Counties in the United States, 2013–2015

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## Introduction

Substance use disorders contribute to the burden of disease at a higher rate in the United States than in other developed countries.[1] Individuals with a substance use disorder are at greater risk of major medical conditions and adverse outcomes such as cardiovascular disease and cancer, mortality, and mental health problems, including suicidal thoughts and behaviors.[2,3] On a societal level, substance use disorders are associated with greater health care utilization and costs, crime, and lost work productivity.[4] Reducing the prevalence of these disorders is critical for fostering the physical and mental health, safety, and well-being of individuals, families, and communities across the United States.[5]

Alcohol is the most common type of substance abused, which may be in part because it is easier to access than other substances.[6] In 2013, 17.3 million Americans were dependent on or had problems related to their use of alcohol, down from 18.1 million in 2002.[7] Marijuana was the next most common type of substance involving abuse or dependence (4.2 million individuals), followed by prescription pain relievers (1.8 million individuals), cocaine (855,000 individuals), heroin (517,000 individuals), and

[1] Kamal R. What Are the Current Costs and Outcomes Related to Mental Health and Substance Abuse Disorders? Peterson-Kaiser Health System Tracker. Updated July 31, 2017. www.healthsystemtracker.org/chart-collection/current-costs-outcomes-related-mental-health-substance-abuse-disorders/?_sf_s=mental#item-start. Accessed July 30, 2017.
[2] Ibid.
[3] Bahorik AL, Satre DD, Kline-Simon AH, Weisner CM, Campbell CI. Alcohol, cannabis, and opioid use disorders, and disease burden in an integrated health care system. Journal of Addiction Medicine. 2017;11(1):3–9.
[4] Lipari RN, Van Horn SL. Trends in Substance Use Disorders Among Adults Aged 18 or Older. The CBHSQ Report. Substance Abuse and Mental Health Services Administration. June 29, 2017. www.samhsa.gov/data/sites/default/files/report_2790/ShortReport-2790.html. Accessed June 15, 2018.
[5] Ibid.
[6] Green M. 8 Most Commonly Abused Drugs in the U.S. [Infographic]. Absolute Advocacy. July 1, 2014. www.absoluteadvocacy.org/most-commonly-abused-drugs/. Accessed June 15, 2018.
[7] National Institute on Drug Abuse. Drug Facts: Nationwide Trends. Revised June 2015. www.drugabuse.gov/publications/drugfacts/nationwide-trends. Accessed June 15, 2018.

### Highlights

- From 2013 to 2015, there was an average of 1 substance-related inpatient stay annually for every 100 people in the United States. Alcohol, opioids, cannabis, and stimulants were the most common substances.
- Of counties in the 31 States in this Statistical Brief, Baltimore City, Maryland had the highest rates of opioid (1,592 per 100,000 population), cannabis (843), and stimulant (931) stays and the third highest rate of alcohol-related stays (1,955).
- Counties in Texas had the lowest rates of opioid (Starr, 15 per 100,000) and cannabis (Val Verde, 19) stays, and the second lowest rate of alcohol-related stays (Kendall, 139).
- High rates (i.e., those in the top quintile) of substance-related stays contributed to costs:
  - *Alcohol-related stays* in Rhode Island and Massachusetts (80 and 71 percent of counties in the top quintile) cost an average of $98 and $95 per resident annually, respectively.
  - *Opioid-related stays* in West Virginia and Massachusetts (66 and 64 percent of counties in the top quintile) cost $33 and $39 per resident annually, respectively.
  - *Cannabis-related stays* in North Carolina, Maryland, and Rhode Island (45, 40, and 40 percent of counties in the top quintile) cost $16, $24, and $22 per resident annually, respectively.
  - *Stimulant-related stays* in California and North Carolina (63 and 56 percent of counties in the top quintile) cost $32 and $15 per resident annually, respectively.

stimulants other than cocaine (469,000 individuals).[8] Use of multiple types of substances also is common and increases risk of hospitalization, overdose, and death.[9] One in nine people with a substance use disorder have both alcohol and drug dependence.[10]

The proportion of the U.S. population with alcohol dependence decreased by 14 percent between 2002 and 2013 (from 7.7 percent to 6.6 percent of the population).[11] However, other data show that the rate of alcohol-related inpatient stays increased by 33 percent between 2013 and 2014 alone (from 81.4 to 108.0 stays per 100,000 population).[12] The opioid crisis—which has resulted from the abuse of both prescription and illegal drugs, including heroin—also has grown. Prescriptions for pain relievers did in fact decrease from 2012 through 2016, from 81.3 to 66.5 prescriptions per 100 persons—the lowest rate in over 10 years.[13] Nevertheless, opioid-related emergency department visits have continued to rise (by 99 percent between 2005 and 2014), as have opioid-related hospitalizations (by 64 percent between 2005 and 2014), and deaths (by 180 percent between 2002 and 2015).[14,15]

An estimated 22.7 million Americans need treatment for a problem related to alcohol or drugs, but only a small fraction (<1 percent) receive it.[16] Furthermore, access to treatment varies widely across the United States.[17,18] Although substance use can be addressed effectively in ambulatory care and other community settings, hospitalization remains a key component of the continuum of care for individuals with a substance use disorder. A better understanding of geographic variation in types of substance-related hospitalizations across the country may inform State and local efforts to increase access to substance use disorder treatment.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief examines State- and county-level variation in substance-related inpatient stays in 31 States that, at the time this Statistical Brief was written, released data through the Community-Level Statistics path of HCUPnet, an online query tool for county- and substate region-level statistics.[19] Aggregate data from 2013 through the third quarter of 2015 are presented. The fourth quarter of 2015 is excluded because of the transition of the International Classification of Diseases coding system from the 9th to the 10th revision.[20]

First, State-level rates of inpatient stays involving common types of substances are shown. Second, county-level rates of stays involving the four most common types of substances (alcohol, opioids,

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[8] National Institute on Drug Abuse. Drug Facts: Nationwide Trends. Revised June 2015. www.drugabuse.gov/publications/drugfacts/nationwide-trends. Accessed June 15, 2018.
[9] Substance Abuse and Mental Health Services Administration, Center for the Application of Prevention Technologies. Now What? The Role of Prevention Following a Nonfatal Opioid Overdose. January 26, 2018. www.samhsa.gov/capt/sites/default/files/resources/role_of_prevention_following_and_overdose-v02.pdf. Accessed June 15, 2018.
[10] Lipari RN, Van Horn SL. Trends in Substance Use Disorders Among Adults Aged 18 or Older. The CBHSQ Report. Substance Abuse and Mental Health Services Administration. June 29, 2017.
[11] National Institutes of Health, National Institute on Drug Abuse. Drug Facts: Nationwide Trends. Revised June 2015. www.drugabuse.gov/publications/drugfacts/nationwide-trends. Accessed June 15, 2018.
[12] Agency for Healthcare Research and Quality. HCUPnet: Hospital Inpatient National Statistics. https://hcupnet.ahrq.gov/#query/eyJEQVRBU0VUX1NPVVJDRSI6WyJEU19OSVMiXSwiQU5BTFlTSVNfVFlQRSI6WyJBVF9UIl0sIkNBVEVHT1JJWkFUSU9OX1RZUEUiOlsiQ1RfQ0NTRCJdLCJDVF9DQ1NEIjpbIjU3NjciXX0=. Accessed August 10, 2018.
[13] Centers for Disease Control and Prevention. U.S. Prescribing Rate Maps. July 31, 2017. www.cdc.gov/drugoverdose/maps/rxrate-maps.html. Accessed June 15, 2018.
[14] Weiss AJ, Elixhauser A, Barrett ML, Steiner CA, Bailey MK, O'Malley L. Opioid-Related Inpatient Stays and Emergency Department Visits by State, 2009–2014. HCUP Statistical Brief #219. December 2016. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb219-Opioid-Hospital-Stays-ED-Visits-by-State.pdf. Accessed July 30, 2018.
[15] National Institute on Drug Abuse. Overdose Death Rates. September 2017. www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates. Accessed July 30, 2018.
[16] National Institutes of Health, National Institute on Drug Abuse. Drug Facts: Nationwide Trends. June 2015. www.drugabuse.gov/publications/drugfacts/nationwide-trends. Accessed June 15, 2018.
[17] Vestal C. Waiting Lists Grow for Medicine to Fight Opioid Addiction. Pew Charitable Trusts. February 11, 2016. www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2016/02/11/waiting-lists-grow-for-medicine-to-fight-opioid-addiction. Accessed June 15, 2018.
[18] amfAR. Opioid and Health Indicators Database: Percent Needing but Not Receiving Addiction Treatment. http://opioid.amfar.org/indicator/pctunmetneed. Accessed June 15, 2018.
[19] Agency for Healthcare Research and Quality. HCUPnet Web site. www.hcupnet.ahrq.gov/. Accessed October 31, 2018.
[20] Barrett ML, Heslin KC, Yoon F, Moore BJ. Case Study: National Healthcare Quality and Disparities Report (QDR) Sensitivity Analysis on Developing AHRQ Quality Indicator Estimates for 2015 Using Only ICD-9-CM Data. April 7, 2017. Agency for Healthcare Research and Quality. www.hcup-us.ahrq.gov/datainnovations/CaseStudy_QDRanalysis04072017.pdf. Accessed April 24, 2018.

cannabis, and stimulants) are examined. Finally, the cost of substance-related stays overall and for these four substances is presented for each State. If an inpatient stay involved multiple substances, the stay was counted in each substance type. Data are suppressed for counties if they are based on a small number of inpatient stays or hospitals, if they are statistically unstable, or if there was incomplete reporting. Thus, in this Statistical Brief, the highest and lowest rates of substance-related stays are described only among counties with unsuppressed data. All differences noted in the text are 10 percent or greater.

Readers should note that the substance definitions used in this Statistical Brief were developed for the Community-Level Statistics path of HCUPnet.[21] The definitions may differ from those in other Statistical Briefs. In particular, the opioid definition used here includes opioid dependence/abuse in remission and neonatal abstinence syndrome and does not include opioid substances causing adverse effects in therapeutic use. As a result, rates of substance-related inpatient stays may differ somewhat from similar rates reported elsewhere (e.g., opioid statistics available in HCUP Fast Stats, statistics based on the Clinical Classification Software category for substance-related disorders).

## Findings

*State-level rates of inpatient stays involving common types of substances, 2013–2015*
Table 1 presents the leading types of substances involved in inpatient stays within 31 States and the nation overall. The State-level rate of stays per 100,000 population is presented for all substances combined, including the most common types of substances shown, as well as other types of substances that are not shown, such as sedatives. For each of the three most common types of substances, the State-level rate and share of stays, as a percentage of total stays for all substance types, are shown. Data are sorted in descending order by the rate of total stays for all types of substances combined. An inpatient stay may be counted under multiple categories if it involved more than one type of substance.

[21] Agency for Healthcare Research and Quality. HCUPnet Web site. www.hcupnet.ahrq.gov/. Accessed October 31, 2018.

**Table 1. State-level rates of common types of substance-related inpatient stays, 2013–2015**

| State | Rate[a] of stays for all substances | Most common substance type | | | Second most common substance type | | | Third most common substance type | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Type | Rate[a] | % | Type | Rate[a] | % | Type | Rate[a] | % |
| United States | 1,064 | Alcohol | 588 | 55.3 | Opioid | 217 | 20.4 | Cannabis | 193 | 18.1 |
| Rhode Island | 1,503 | Alcohol | 894 | 59.5 | Opioid | 336 | 22.3 | Cannabis | 250 | 16.6 |
| Massachusetts | 1,387 | Alcohol | 839 | 60.5 | Opioid | 373 | 26.9 | Cannabis | 190 | 13.7 |
| West Virginia | 1,344 | Alcohol | 677 | 50.4 | Opioid | 401 | 29.9 | Other[b] | 250 | 18.6 |
| Maryland | 1,329 | Alcohol | 723 | 54.4 | Opioid | 411 | 30.9 | Cannabis | 269 | 20.3 |
| Florida | 1,289 | Alcohol | 715 | 55.5 | Opioid | 218 | 16.9 | Cannabis | 217 | 16.9 |
| Michigan | 1,217 | Alcohol | 677 | 55.6 | Cannabis | 298 | 24.5 | Opioid | 236 | 19.4 |
| Tennessee | 1,204 | Alcohol | 574 | 47.7 | Opioid | 341 | 28.3 | Other[b] | 222 | 18.4 |
| Minnesota | 1,188 | Alcohol | 734 | 61.8 | Cannabis | 230 | 19.3 | Opioid | 214 | 18.0 |
| Kentucky | 1,173 | Alcohol | 559 | 47.6 | Opioid | 312 | 26.6 | Other[b] | 239 | 20.3 |
| Illinois | 1,162 | Alcohol | 640 | 55.1 | Opioid | 267 | 23.0 | Cannabis | 234 | 20.2 |
| New Mexico | 1,139 | Alcohol | 674 | 59.2 | Opioid | 223 | 19.6 | Cannabis | 182 | 16.0 |
| Pennsylvania | 1,129 | Alcohol | 617 | 54.6 | Opioid | 280 | 24.7 | Cannabis | 163 | 14.5 |
| Oregon | 1,106 | Alcohol | 573 | 51.8 | Opioid | 270 | 24.4 | Stimulant | 201 | 18.1 |
| Arizona | 1,098 | Alcohol | 564 | 51.3 | Opioid | 223 | 20.3 | Stimulant | 184 | 16.7 |
| North Carolina | 1,087 | Alcohol | 574 | 52.8 | Cannabis | 227 | 20.9 | Opioid | 203 | 18.7 |
| New Jersey | 1,077 | Alcohol | 583 | 54.1 | Opioid | 294 | 27.3 | Cannabis | 173 | 16.1 |
| Wisconsin | 1,033 | Alcohol | 665 | 64.4 | Opioid | 173 | 16.7 | Cannabis | 153 | 14.8 |
| Washington | 1,021 | Alcohol | 495 | 48.5 | Opioid | 300 | 29.4 | Cannabis | 185 | 18.1 |
| Indiana | 976 | Alcohol | 536 | 55.0 | Opioid | 192 | 19.6 | Cannabis | 179 | 18.4 |
| Oklahoma | 970 | Alcohol | 482 | 49.7 | Other[b] | 185 | 19.1 | Cannabis | 150 | 15.5 |
| California | 945 | Alcohol | 503 | 53.2 | Stimulant | 221 | 23.4 | Cannabis | 169 | 17.9 |
| North Dakota | 945 | Alcohol | 634 | 67.2 | Cannabis | 166 | 17.6 | Opioid | 147 | 15.6 |
| South Carolina | 931 | Alcohol | 553 | 59.4 | Cannabis | 172 | 18.4 | Stimulant | 144 | 15.5 |
| Nevada | 923 | Alcohol | 501 | 54.2 | Opioid | 168 | 18.2 | Stimulant | 153 | 16.5 |
| Wyoming | 912 | Alcohol | 629 | 69.0 | Cannabis | 132 | 14.5 | Opioid | 101 | 11.0 |
| Arkansas | 881 | Alcohol | 432 | 49.0 | Cannabis | 161 | 18.3 | Stimulant | 147 | 16.6 |
| Louisiana | 867 | Alcohol | 425 | 49.0 | Cannabis | 167 | 19.2 | Opioid | 151 | 17.5 |
| Hawaii | 863 | Alcohol | 401 | 46.5 | Stimulant | 280 | 32.5 | Cannabis | 196 | 22.7 |
| Texas | 690 | Alcohol | 396 | 57.4 | Stimulant | 124 | 18.0 | Cannabis | 119 | 17.3 |
| Utah | 624 | Alcohol | 282 | 45.1 | Opioid | 187 | 29.9 | Stimulant | 119 | 19.1 |
| Iowa | 624 | Alcohol | 418 | 67.0 | Cannabis | 74 | 11.8 | Other[b] | 63 | 10.1 |

[a] The rate of inpatient stays per 100,000 population was calculated annually and then averaged across the 3 years (2013–2015), weighted by the population total in each year. State-level rates are based on data from all counties, including those with suppressed county-level data in subsequent figures.

[b] Other drug abuse includes such things as combinations of or unspecified drug dependence, drug dependence complicating pregnancy, antidepressant abuse, and poisoning by common cold medicines. A full definition is provided in Table 3 starting on page 23.

Note: Inpatient stays may involve more than one type of substance. Thus, substance-specific rates may sum to more than the rate for all substances combined.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 National Inpatient Sample (NIS) and 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics path on HCUPnet, an online query tool.

- **For every 100 people in the U.S. population, there was 1 substance-related inpatient stay per year. Rates of substance-related inpatient stays varied over two-fold across States.**

  Using national data from 2013–2015, the average annual rate of inpatient stays involving all substances combined was 1,064 per 100,000 population (or 1 per 100). The three highest rates of substance-related stays in any of the 31 States included in this Brief were in the following States:

  - Rhode Island: 1,503 per 100,000 population—over twice the lowest rate in any State (624 in Utah and Iowa)
  - Massachusetts: 1,387 per 100,000 population
  - West Virginia: 1,344 per 100,000 population

  After Utah and Iowa (624 per 100,000 population), Texas and Hawaii had the next lowest State-level rates of substance-related stays (690 and 863 per 100,000 population, respectively).

- **In each State, alcohol was the most common type of substance among inpatient stays.**

  Alcohol was the most common type of substance among inpatient stays overall and in each of the 31 States. At the national level, there were 588 alcohol-related stays per 100,000 population and alcohol was involved in 55.3 percent of all substance-related stays. At the State level, the rate of alcohol-related stays ranged from 282 per 100,000 population in Utah to 894 per 100,000 population in Rhode Island.

- **Nationally and in most States, opioids were the second most common type of substance among inpatient stays.**

  Nationally, there were 217 opioid-related stays per 100,000 population, and opioids were involved in 1 in 5 substance-related stays (20.4 percent). State-level rates of opioid-related stays were highest in the following States:

  - Maryland: 411 per 100,000 population
  - West Virginia: 401 per 100,000 population
  - Massachusetts: 373 per 100,000 population

  Opioids did not rank among the three most common types of substances in Oklahoma, California, South Carolina, Arkansas, Hawaii, Texas, and Iowa. Notably, these States also had some of the lowest overall rates of stays for all substances combined (ranging from 624 per 100,000 population in Iowa to 970 per 100,000 population in Oklahoma).

- **Nationally, cannabis was the third most common type of substance among inpatient stays.**

  Nationally, there were 193 cannabis-related stays per 100,000 population, and cannabis was involved in 18.1 percent of substance-related stays. State-level rates of cannabis-related stays were highest in the following States:

  - Michigan: 298 per 100,000 population (here, cannabis ranked as the second most common type of substance)
  - Maryland: 269 per 100,000 population
  - Rhode Island: 250 per 100,000 population

- **Stimulants ranked as the second most common type of substance among inpatient stays in California, Hawaii, and Texas.**

  Nationally, stimulants were the fourth most common type of substance, involved in 15.8 percent of all substance-related stays (data not shown). The rate of stimulant-related stays was 168 per 100,000 population (data not shown). State-level rates of stimulant-related stays were highest in the following States, where stimulants ranked as the second or third most common type of substance among inpatient stays:

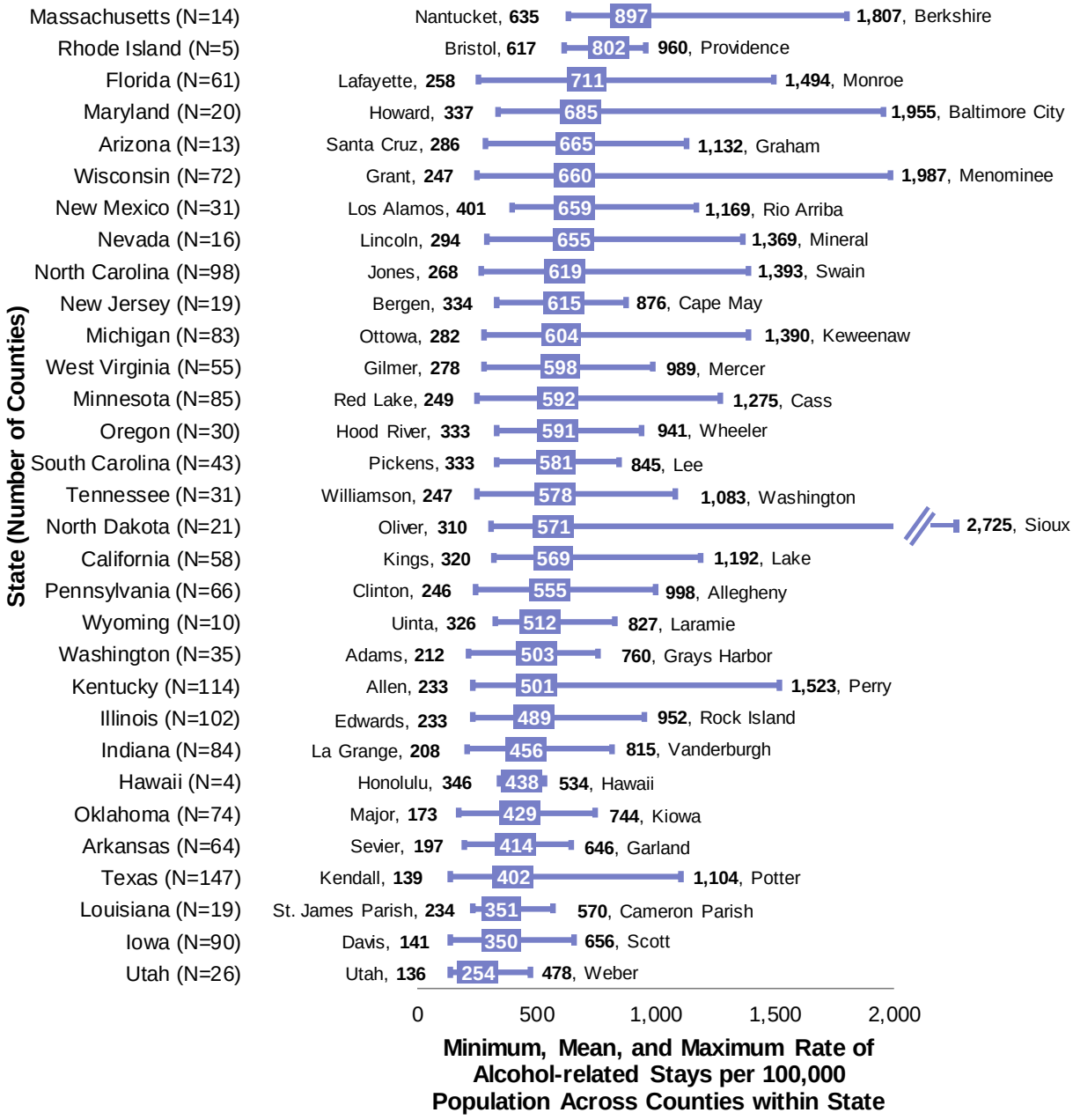
  - Hawaii: 280 per 100,000 population
  - California: 221 per 100,000 population
  - Oregon: 201 per 100,000 population

  Stimulants were involved in 32.5 percent of substance related stays in Hawaii, 23.4 percent of substance-related stays in California, and 18.1 percent of substance-related stays in Oregon.

*Variation in county-level rates of inpatient stays involving common types of substances, 2013–2015*
Figures 1 through 4 present characteristics of the distributions of county-level rates of inpatient stays involving the four most common types of substances: alcohol, opioids, cannabis, and stimulants. The figures display the minimum, mean, and maximum rate (per 100,000 population) across counties within the 31 States included in this Brief. The county name is listed alongside the minimum and maximum values. The States are ordered according to the mean county-level rate. Note that the means of county-level rates in Figures 1–4 (averaged across all counties in each State)[22] may differ from the State-level rates presented in Table 1.

[22] The formula used to calculate county averages is provided on page 22.

**Figure 1. County-level variation in rates of alcohol-related inpatient stays, by State, 2013–2015**




Abbreviation: N, number of counties in the State with unsuppressed data

Notes: The middle box represents the mean rate across all counties in the State. The lower and upper ends of the lines indicate the minimum and maximum values, respectively. Statistics are suppressed for counties if the reporting cell draws from fewer than two hospitals, contains fewer than 11 discharges, or has a relative standard error (standard error / weighted estimate) greater than 0.30 or equal to 0, or because the county is missing 2 percent or more of total discharges in the HCUP State Inpatient Database (SID) when compared with the Medicare Hospital Service Area File.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics path on HCUPnet, an online query tool.

- **The counties with the three highest rates of alcohol-related stays were in North Dakota, Wisconsin, and Maryland; whereas the three lowest county rates were in Utah, Texas, and Iowa.**

  The following counties had the three highest rates of alcohol-related stays:

  - Sioux County, North Dakota: 2,725 per 100,000 population
  - Menominee County, Wisconsin: 1,987 per 100,000 population
  - Baltimore City, Maryland: 1,955 per 100,000 population

  Among the counties in these 31 States, the following counties had the lowest rates of alcohol-related stays:

  - Utah County, Utah: 136 per 100,000 population
  - Kendall County, Texas: 139 per 100,000 population
  - Davis County, Iowa: 141 per 100,000 population

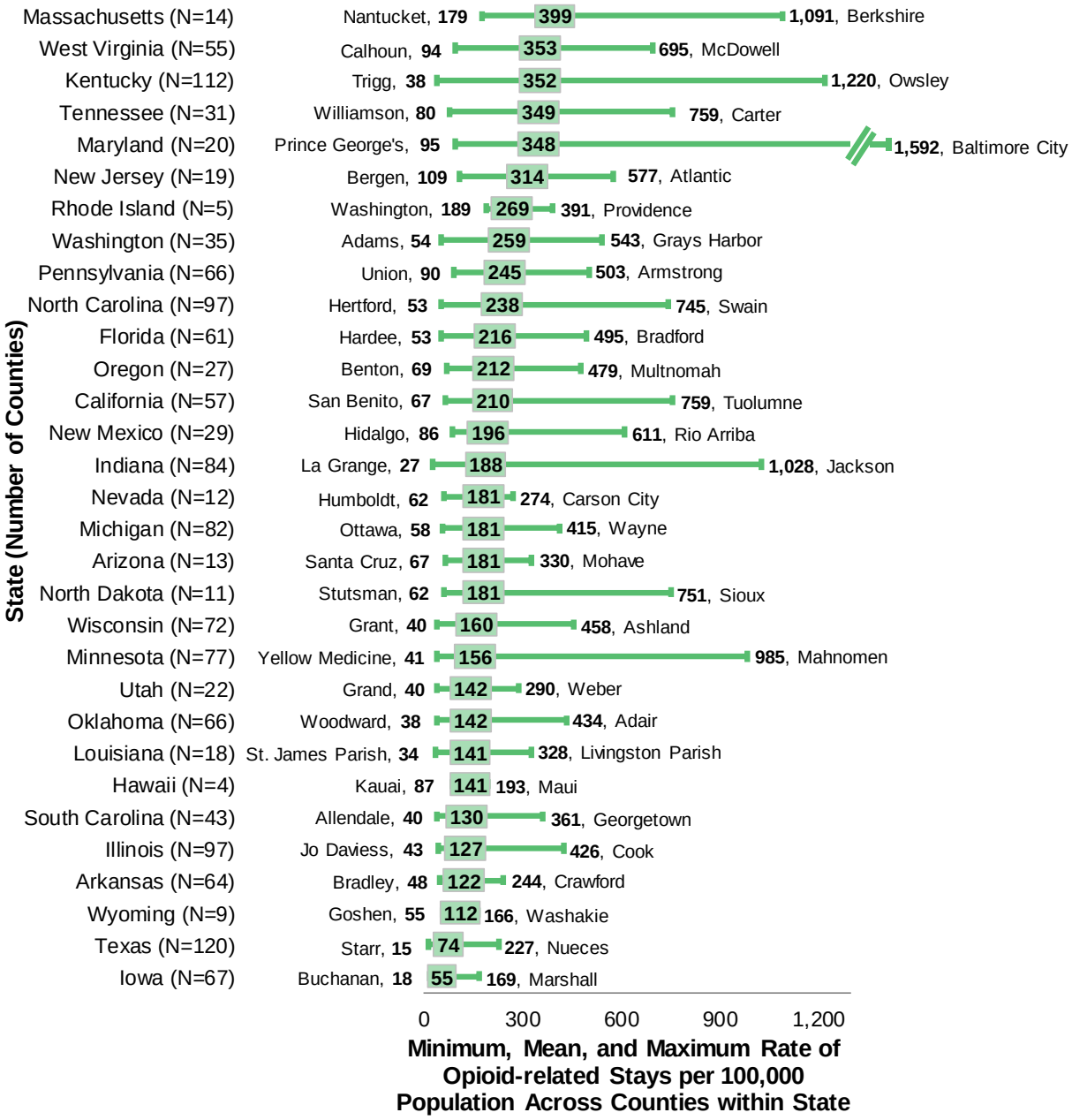
- **County-level rates of alcohol-related stays varied widely in North Dakota, Wisconsin, and Texas, where the highest county rate was 8–9 times greater than the lowest county rate within each of the three States.**

  - In North Dakota, the rate of alcohol-related stays was 9 times higher in Sioux County (2,725 per 100,000 population) than in Oliver County (310 per 100,000 population).

  - In Wisconsin, the rate of alcohol-related stays was 8 times higher in Menominee County (1,987 per 100,000 population) than in Grant County (247 per 100,000 population).

  - In Texas, the rate of alcohol-related stays was 8 times higher in Potter County (1,104 per 100,000 population) than in Kendall County (139 per 100,000 population).

**Figure 2. County-level variation in rates of opioid-related inpatient stays, by State, 2013–2015**




Abbreviation: N, number of counties in the State with unsuppressed data

Notes: The middle box represents the mean rate across all counties in the State. The lower and upper ends of the lines indicate the minimum and maximum values, respectively. Statistics are suppressed for counties if the reporting cell draws from fewer than two hospitals, contains fewer than 11 discharges, or has a relative standard error (standard error / weighted estimate) greater than 0.30 or equal to 0, or because the county is missing 2 percent or more of total discharges in the HCUP State Inpatient Database (SID) when compared with the Medicare Hospital Service Area File.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 State Inpatient Databases (SID) for 31 States, which at the time this Statistical Brief was written released data through the Community-Level Statistics path on HCUPnet, an online query tool

- **Two of the three counties with the highest rates of opioid-related stays were in Kentucky. The counties with the three lowest rates of opioid-related stays were all in Texas.**

  The following counties had the three highest rates of opioid-related stays:

  - Baltimore City, Maryland: 1,592 per 100,000 population
  - Owsley County, Kentucky: 1,220 per 100,000 population
  - Harlan County, Kentucky: 1,214 per 100,000 population (data not shown)

  The following three counties had the lowest rates of opioid-related stays:

  - Starr County, Texas: 15 per 100,000 population
  - Uvalde County, Texas: 17 per 100,000 population (data not shown)
  - Val Verde County, Texas: 18 per 100,000 population (data not shown)

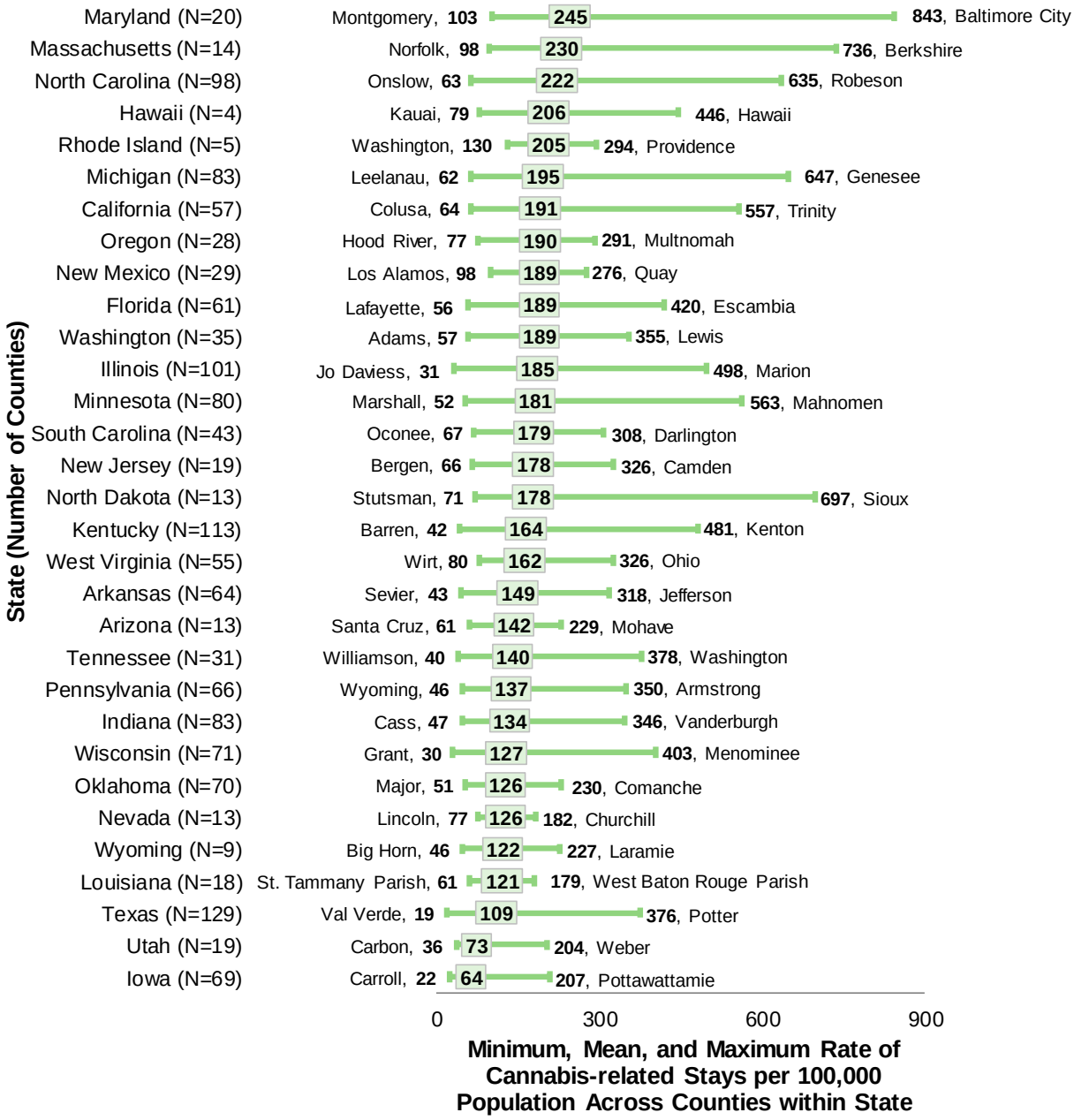
- **County-level rates of opioid-related stays varied widely in Indiana, Kentucky, and Minnesota, where the highest county rate was over 24 times greater than the lowest county rate in each State.**

  - In Indiana, the rate of opioid-related stays was 38 times higher in Jackson County (1,028 per 100,000 population) than in La Grange County (27 per 100,000 population).

  - In Kentucky, the rate of opioid-related stays was 32 times higher in Owsley County (1,220 per 100,000 population) than in Trigg County (38 per 100,000 population).

  - In Minnesota, the rate of opioid-related stays was 24 times higher in Mahnomen County (985 per 100,000 population) than in Yellow Medicine County (41 per 100,000 population).

**Figure 3. County-level variation of rates of cannabis-related inpatient stays, by State, 2013–2015**




Abbreviation: N, number of counties in the State with unsuppressed data

Notes: The middle box represents the mean rate across all counties in the State. The lower and upper ends of the lines indicate the minimum and maximum values, respectively. Statistics are suppressed for counties if the reporting cell draws from fewer than two hospitals, contains fewer than 11 discharges, or has a relative standard error (standard error / weighted estimate) greater than 0.30 or equal to 0, or because the county is missing 2 percent or more of total discharges in the HCUP State Inpatient Database (SID) when compared with the Medicare Hospital Service Area File.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics path on HCUPnet, an online query tool

- **Counties with the three highest rates of cannabis-related stays were in Maryland, Massachusetts, and North Dakota. The three counties with the lowest rates of cannabis-related stays were in Texas and Iowa.**

  The following counties had the highest county-level rates of cannabis-related stays:

  - Baltimore City, Maryland: 843 per 100,000 population
  - Berkshire County, Massachusetts: 736 per 100,000 population
  - Sioux County, North Dakota: 697 per 100,000 population

  The following counties had the lowest county-level rates of cannabis-related stays:

  - Val Verde County, Texas: 19 per 100,000 population
  - Carroll County, Iowa: 22 per 100,000 population
  - Clayton County, Iowa: 25 per 100,000 population (data not shown)

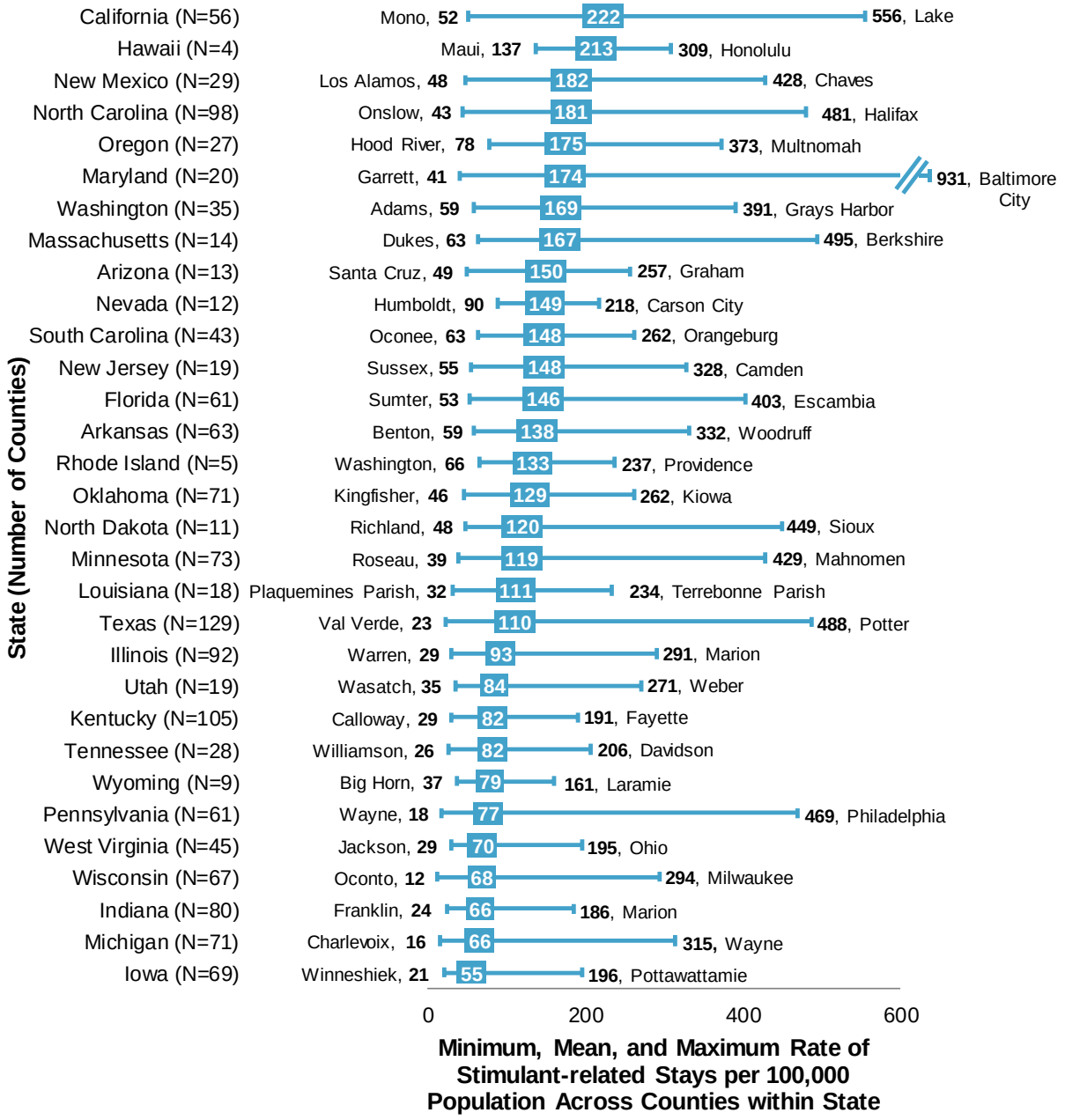
- **County-level rates of cannabis-related stays varied widely in Texas, Illinois, and Wisconsin, where the highest county rate was over 13 times greater than the lowest county rate in each State.**

  - In Texas, the rate of cannabis-related stays was 20 times higher in Potter County (376 per 100,000 population) than in Val Verde County (19 per 100,000 population).

  - In Illinois, the rate of cannabis-related stays was 16 times higher in Marion County (498 per 100,000 population) than in Jo Daviess County (31 per 100,000 population).

  - In Wisconsin, the rate was 13 times higher in Menominee County (403 per 100,000 population) than in Grant County (30 per 100,000 population).

**Figure 4. County-level variation in rates of stimulant-related inpatient stays, by State, 2013–2015**

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Notes: The middle box represents the mean rate across all counties in the State. The lower and upper ends of the lines indicate the minimum and maximum values, respectively. Statistics are suppressed for counties if the reporting cell draws from fewer than two hospitals, contains fewer than 11 discharges, or has a relative standard error (standard error / weighted estimate) greater than 0.30 or equal to 0, or because the county is missing 2 percent or more of total discharges in the HCUP State Inpatient Database (SID) when compared with the Medicare Hospital Service Area File.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics path on HCUPnet, an online query tool

- **Counties with the three highest rates of stimulant-related stays were in Maryland, California, and Massachusetts. The three counties with the lowest rates of stimulant-related stays were in Wisconsin and Michigan.**

  The following counties had the highest rates of stimulant-related stays:

  - Baltimore City, Maryland: 931 per 100,000 population
  - Lake County, California: 556 per 100,000 population
  - Berkshire County, Massachusetts: 495 per 100,000 population

  The following counties had the lowest rates of stimulant-related stays:

  - Oconto County, Wisconsin: 12 per 100,000 population
  - Charlevoix County, Michigan: 16 per 100,000 population
  - Emmet County, Michigan: 17 per 100,000 population (data not shown)

- **County-level rates of stimulant-related stays varied widely in Pennsylvania, Wisconsin, and Maryland, where the highest county rate was 23–26 times greater than the lowest county rate in each State.**

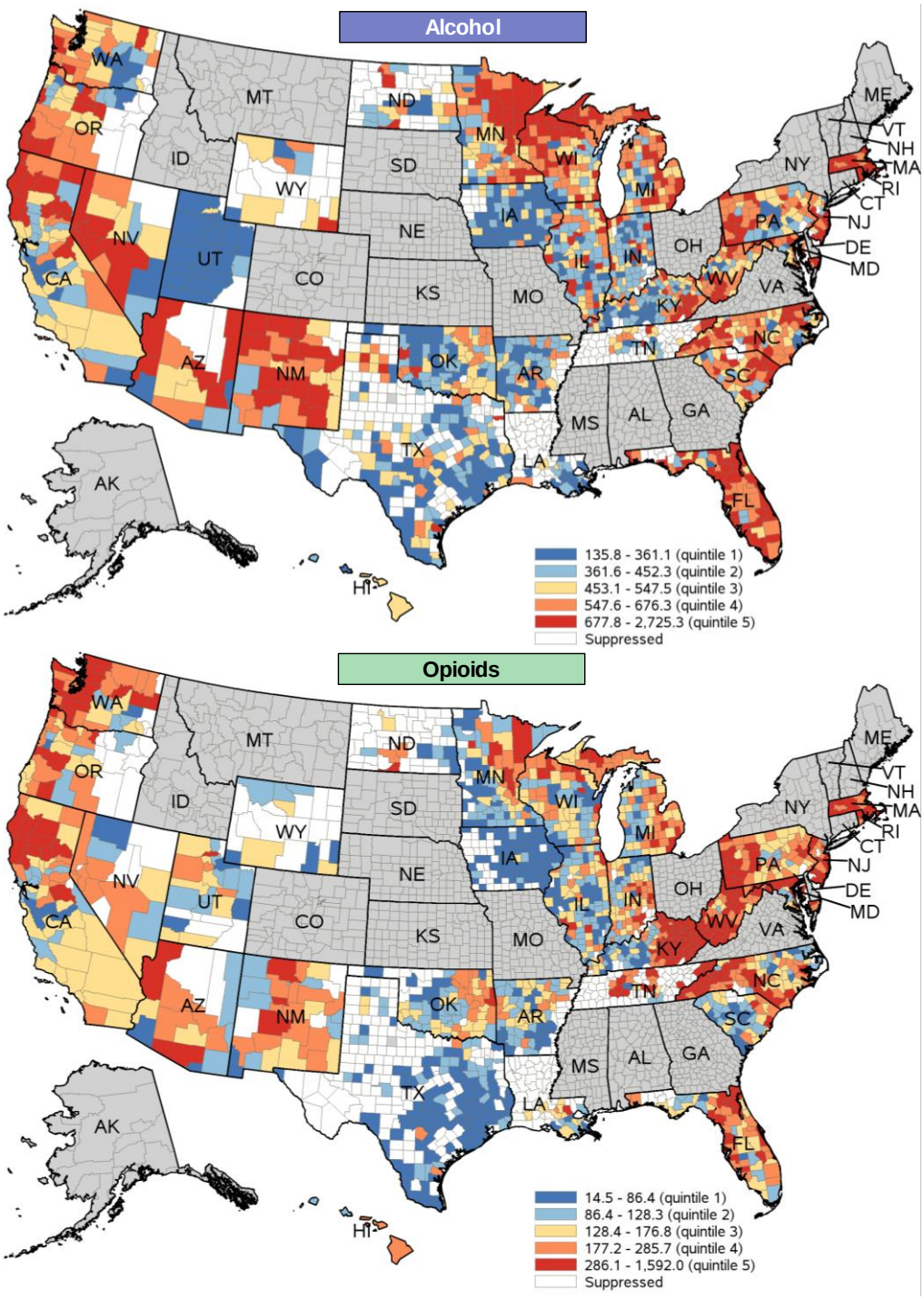
  - In Pennsylvania, the rate of stimulant-related stays was 26 times higher in Philadelphia County (469 per 100,000 population) than in Wayne County (18 per 100,000 population).

  - In Wisconsin, the rate of stimulant-related stays was 25 times higher in Milwaukee County (294 per 100,000 population) than in Oconto County (12 per 100,000 population).

  - In Maryland, the rate was 23 times higher in the county of Baltimore City (931 per 100,000 population) than in Garrett County (41 per 100,000 population).

*Hot spots of county-level rates of inpatient stays involving common types of substances, 2013–2015*
Figures 5 and 6 display maps of county-level rates of alcohol-, opioid-, cannabis-, and stimulant-related inpatient stays in 2013–2015 for the 31 States included in this Brief. Rates were categorized into quintiles after ranking all counties in the 31 States with data that were not suppressed. Counties with rates in the highest quintile (top 20 percent) were considered hot spots.

**Figure 5. County-level rates of alcohol- and opioid-related inpatient stays per 100,000 population, 2013–2015**

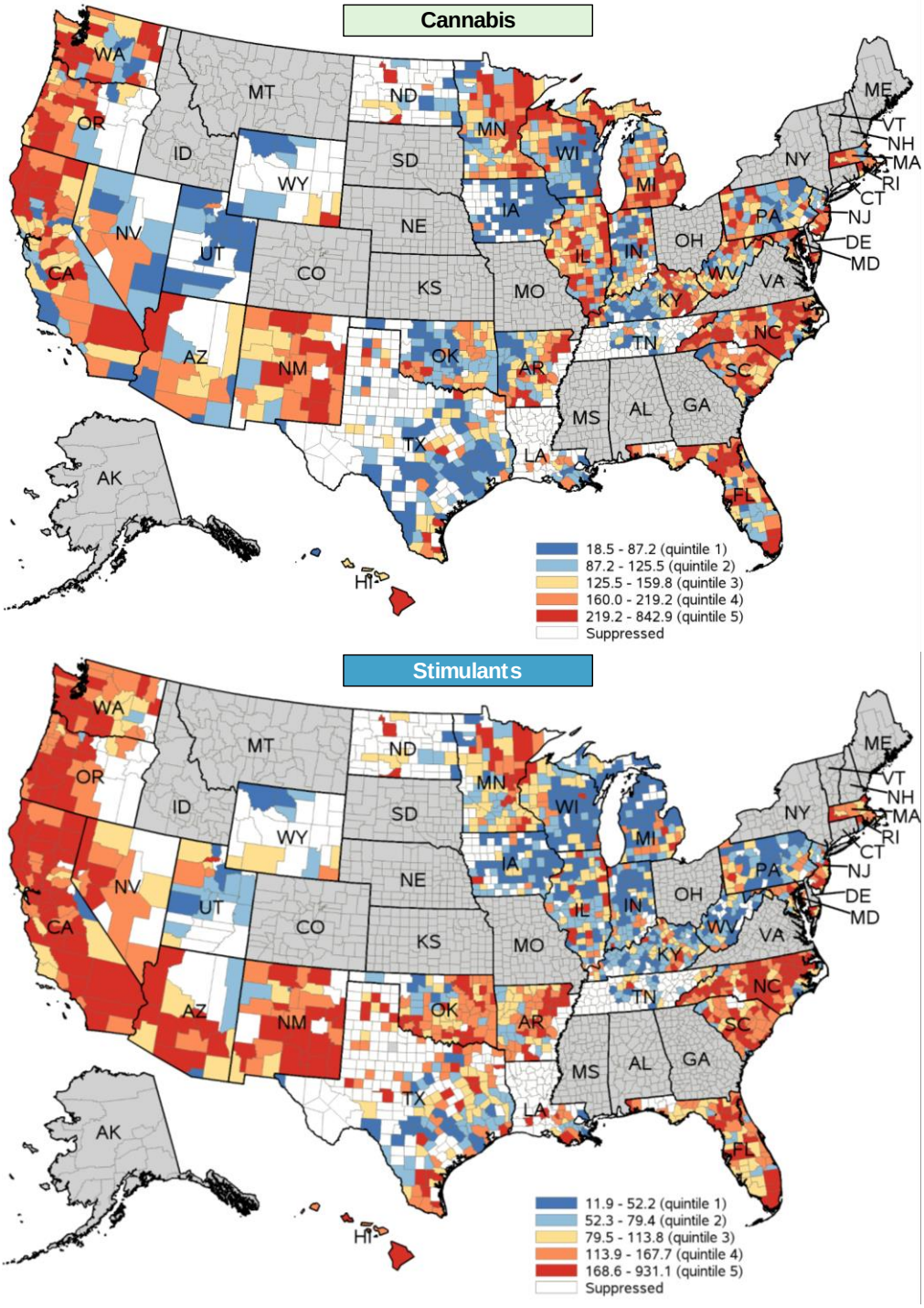



Notes: County-level data are unavailable for States in grey. Data are suppressed if the reporting cell draws from fewer than two hospitals, contains fewer than 11 discharges, or has a relative standard error (standard error/weighted estimate) greater than 0.30 or equal to 0, or because the county is missing 2 percent or more of total discharges in the HCUP State Inpatient Database (SID) when compared with the Medicare Hospital Service Area File.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics path on HCUPnet, an online query tool

- Hot spots of **alcohol-related stays** (i.e., counties with rates in the highest quintile) were particularly concentrated in Rhode Island and Massachusetts, where 80 and 71 percent of counties in the State, respectively, had a rate in the highest quintile.
- Hot spots of **opioid-related stays** were particularly concentrated in West Virginia, as well as in Massachusetts. In these States, 66 and 64 percent of counties, respectively, had a rate in the highest quintile.
- The following are examples of pockets of hot spots in some States with otherwise low rates:
  - In Oklahoma, most counties (81 percent) had an **alcohol-related stay** rate in the three *lowest* quintiles, yet two counties (Kiowa and Roger Mills) had an alcohol-related stay rate in the *highest* quintile.
  - In Utah, 82 percent of counties had an **opioid-related stay** rate in the three *lowest* quintiles, yet one county (Weber) had a rate in the *highest* quintile.
  - In South Carolina, 84 percent of counties had an **opioid-related stay** rate in the three *lowest* quintiles, yet two counties (Darlington and Georgetown) had a rate in the *highest* quintile.

**Figure 6. County-level rates of cannabis- and stimulant-related inpatient stays per 100,000 population, 2013–2015**



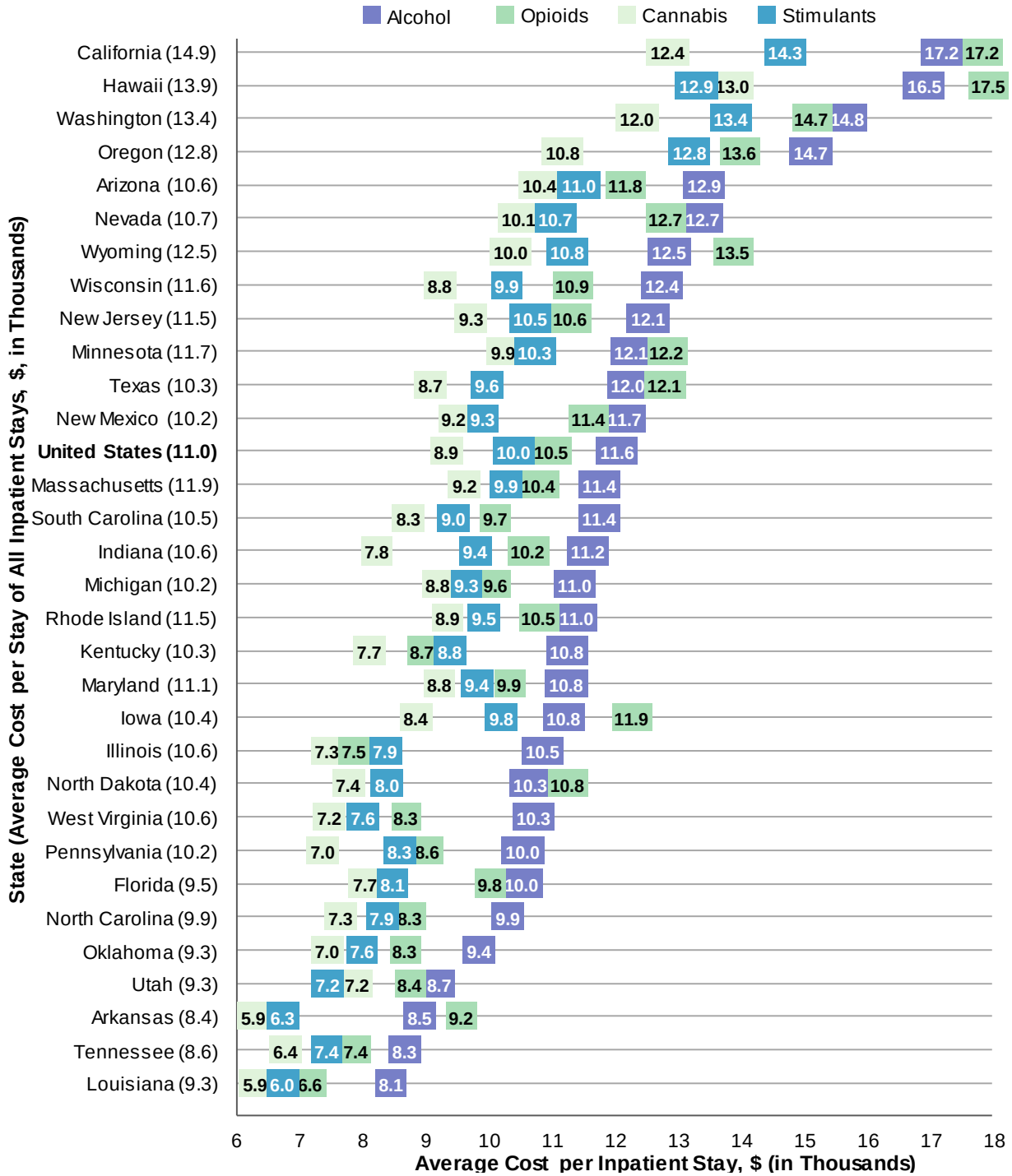

Notes: County-level data are unavailable for States in grey. Data are suppressed if the reporting cell draws from fewer than two hospitals, contains fewer than 11 discharges, or has a relative standard error (standard error/weighted estimate) greater than 0.30 or equal to 0, or because the county is missing 2 percent or more of total discharges in the HCUP State Inpatient Database (SID) when compared with the Medicare Hospital Service Area File.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics path on HCUPnet, an online query tool

- The percentage of counties with a **cannabis-related stay** rate in the highest quintile reached 45 percent in North Carolina and 40 percent in Maryland and Rhode Island.
- Hot spots of **stimulant-related stays** tended to be most concentrated in California and North Carolina. In these States, the percentage of hot-spot counties was 63 and 56 percent, respectively.
- The following are examples of pockets of cannabis- and stimulant-related hot spots in some States with otherwise low rates:
  - In Oklahoma, most counties (73 percent) had a **cannabis-related stay** rate in the three *lowest* quintiles, yet two counties (Comanche and Greer) had a rate in the *highest* quintile.
  - Similarly, in Iowa (94 percent), Wisconsin (85 percent), and Pennsylvania (82 percent) the vast majority of counties had rates of **stimulant-related stays** in the three *lowest* quintiles, yet a small number of counties in these States had a rate in the *highest* quintile: Pottawattamie (Iowa); Burnett, Menominee, Douglas, and Milwaukee (Wisconsin); and Allegheny and Philadelphia (Pennsylvania).

*Variation in average costs of common types of substance-related inpatient stays by State, 2013–2015*
Figure 7 displays the average cost per type of substance-related inpatient stay by State in 2013–2015. States are ordered by the average cost per alcohol-related stay. The average cost of all inpatient stays (substance and nonsubstance-related) within each State is listed on the y-axis next to the State names.

**Figure 7. Average cost per type of substance-related inpatient stay, by State, 2013–2015**




Note: Average cost per stay was calculated annually and then averaged across the 3 years (2013–2015), weighted by the population total.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–2015 National Inpatient Sample (NIS) and 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics pathway on HCUPnet, an online query tool

- **Nationally, of the four most common types of substance-related stays, those involving alcohol cost the most on average, followed by opioid-, stimulant-, and cannabis-related stays.**

  Of the four most common types of substances involved in inpatient stays, alcohol-related stays had the highest average cost, followed by opioid-, stimulant, and cannabis-related stays.

  - Alcohol: $11,600 per stay
  - Opioids: $10,500 per stay
  - Stimulants: $10,000 per stay
  - Cannabis: $8,900 per stay

  The average cost per stay for some types of substances was higher than that of inpatient care in general. For instance, in California both alcohol- and opioid-related stays ($17,200 per stay) were on average costlier than all inpatient stays ($14,900 per stay).

- **Among the 31 States, the average cost per alcohol-, opioid-, cannabis-, and stimulant-related stay was highest in California, Hawaii, and Washington, where the average cost of inpatient stays overall also was highest.**

  - Alcohol: The highest average cost per alcohol-related stay was $17,200 in California, followed by $16,500 in Hawaii, and $14,800 in Washington.

  - Opioids and cannabis: Hawaii had the highest average cost of opioid- and cannabis-related stays ($17,500 and $13,000, respectively), followed by California ($17,200 and $12,400) and Washington ($14,700 and $12,000).

  - Stimulants: The highest average cost per stimulant-related stay was $14,300 in California, followed by $13,400 in Washington and $12,900 in Hawaii.

  - Inpatient stays overall: California, Hawaii, and Washington also had a higher average cost of all inpatient stays (including substance-related and non-substance-related stays) compared with other states ($14,900, $13,900, and $13,400, respectively).

  Average costs of the four most common substance-related stays were lowest in Louisiana ($8,100 per alcohol-related stay, $6,600 per opioid-related stay, $6,000 per stimulant-related stay, and $5,900 per cannabis-related stay).

Table 2 presents the per capita cost of inpatient stays involving any substance type and of stays involving the four most common types of substances. The State-level statistics are sorted by the per capita cost of inpatient stays involving all types of substances combined. Per capita costs are presented alongside the percentage of counties in each State with a substance-related stay rate in the highest quintile (quintile 5), which were considered hot spots.

**Table 2. Per capita costs of inpatient stays involving substance use and the prevalence of hot spots for substance-related stays, by State, 2013–2015**

| State | Per capita cost, $[a] | | | | | Counties in the State that were hot spots[b] for types of substance-related stays, % | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All substances | Alcohol | Opioids | Cannabis | Stimulants | Alcohol | Opioids | Cannabis | Stimulants |
| **United States** | **119** | **68** | **23** | **17** | **17** | —[c] | —[c] | —[c] | —[c] |
| Rhode Island | 165 | 98 | 35 | 22 | 18 | 80.0 | 40.0 | 40.0 | 20.0 |
| Massachusetts | 157 | 95 | 39 | 18 | 16 | 71.4 | 64.3 | 28.6 | 28.6 |
| California | 156 | 86 | 27 | 21 | 32 | 22.4 | 19.3 | 26.3 | 62.5 |
| Oregon | 155 | 84 | 37 | 21 | 26 | 33.3 | 18.5 | 35.7 | 44.4 |
| Washington | 150 | 73 | 44 | 22 | 24 | 8.6 | 42.9 | 37.1 | 42.9 |
| Minnesota | 143 | 89 | 26 | 23 | 16 | 27.1 | 11.7 | 21.3 | 17.8 |
| Maryland | 143 | 78 | 41 | 24 | 20 | 35.0 | 50.0 | 40.0 | 25.0 |
| Hawaii | 136 | 66 | 23 | 26 | 36 | 0.0 | 0.0 | 25.0 | 50.0 |
| Arizona | 135 | 73 | 26 | 17 | 20 | 38.5 | 15.4 | 7.7 | 46.2 |
| West Virginia | 130 | 70 | 33 | 14 | 6 | 25.5 | 65.5 | 20.0 | 2.2 |
| New Mexico | 129 | 79 | 26 | 17 | 16 | 41.9 | 10.3 | 27.6 | 44.8 |
| Michigan | 127 | 74 | 23 | 26 | 13 | 28.9 | 11.0 | 25.3 | 2.8 |
| New Jersey | 125 | 71 | 31 | 16 | 16 | 42.1 | 63.2 | 31.6 | 31.6 |
| Wisconsin | 123 | 82 | 19 | 13 | 10 | 34.7 | 9.7 | 14.1 | 6.0 |
| Florida | 123 | 71 | 21 | 17 | 16 | 59.0 | 27.9 | 37.7 | 27.9 |
| Kentucky | 117 | 61 | 27 | 14 | 9 | 17.5 | 51.8 | 24.8 | 5.7 |
| Wyoming | 114 | 79 | 14 | 13 | 10 | 10.0 | 0.0 | 11.1 | 0.0 |
| Nevada | 113 | 63 | 21 | 13 | 16 | 50.0 | 0.0 | 0.0 | 33.3 |
| Illinois | 111 | 67 | 20 | 17 | 14 | 12.7 | 4.1 | 24.8 | 12.0 |
| Pennsylvania | 107 | 61 | 24 | 11 | 12 | 22.7 | 31.8 | 13.6 | 3.3 |
| North Carolina | 103 | 57 | 17 | 16 | 15 | 29.6 | 35.1 | 44.9 | 56.1 |
| Indiana | 102 | 60 | 20 | 14 | 9 | 10.7 | 9.5 | 10.8 | 3.8 |
| South Carolina | 101 | 63 | 13 | 14 | 13 | 27.9 | 4.7 | 23.3 | 30.2 |
| North Dakota | 99 | 65 | 16 | 12 | 9 | 9.5 | 9.1 | 15.4 | 18.2 |
| Tennessee | 96 | 47 | 25 | 12 | 9 | 25.8 | 61.3 | 12.9 | 3.6 |
| Oklahoma | 86 | 46 | 12 | 11 | 11 | 2.7 | 3.0 | 2.9 | 21.1 |
| Texas | 81 | 47 | 10 | 10 | 12 | 2.7 | 0.0 | 4.7 | 16.3 |
| Arkansas | 73 | 37 | 11 | 9 | 9 | 0.0 | 0.0 | 18.8 | 22.2 |
| Iowa | 68 | 45 | 7 | 6 | 6 | 0.0 | 0.0 | 0.0 | 1.4 |
| Louisiana | 65 | 34 | 10 | 10 | 9 | 0.0 | 5.6 | 0.0 | 22.2 |
| Utah | 55 | 25 | 16 | 7 | 9 | 0.0 | 4.5 | 0.0 | 5.3 |

[a] The cost per capita (cost per 1 individual in the population) was calculated annually for each State and then averaged across the 3 years, weighted by the population total.

[b] Hot spots were defined as counties with a substance-related inpatient stay rate in the highest quintile (top 20 percent).

[c] Not calculated because not all States provide county-level data for Community-Level Statistics

Note: Inpatient stays may involve more than one type of substance. Thus, substance-specific costs may sum to more than the cost for all substances combined.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013–-2015 National Inpatient Sample (NIS) and 2013–2015 State Inpatient Databases (SID) for 31 States, which, at the time this Statistical Brief was written, released data through the Community-Level Statistics pathway on HCUPnet, an online query tool

- **On average, $119 was spent annually per U.S. resident on substance-related inpatient stays from 2013 through 2015.**

  Nationally, the average annual per capita cost of inpatient stays involving all substances combined was $119 from January 2013 through September 2015. Alcohol-related stays constituted the greatest percentage of per capita costs, followed by opioids, cannabis, and stimulants.

  - Alcohol: 57.1 percent ($68 of $119 per capita)
  - Opioids: 19.3 percent ($23 of $119 per capita)
  - Cannabis: 14.3 percent ($17 of $119 per capita)
  - Stimulants: 14.3 percent ($17 of $119 per capita)

- **Rhode Island, Massachusetts, and California had the highest per capita costs of substance-related stays.**

  Rhode Island and Massachusetts had the highest per capita costs for substance-related stays ($165 and $157, respectively). These States also ranked among those with the highest rates of substance-related stays (as shown in Table 1).

  Notably, California had the third highest per capita cost of substance-related stays ($156), even though the rate of substance-related stays in California (945 per 100,000 population) fell below the national average (1,064 stays per 100,000 population, Table 1).

- **Hot spots of substance stays were associated with substantial health care costs within States.**

  Regarding alcohol-related stays:

  - Rhode Island and Massachusetts had the highest percentages of counties identified as hot spots of alcohol-related stays, where 80.0 and 71.4 percent of counties, respectively, had an alcohol-related stay rate in the highest quintile nationally.
    - In these States, alcohol-related stays cost nearly $100 per capita (compared with $68 nationally).
  - The per capita cost of alcohol-related stays was highest in Rhode Island ($98), Massachusetts ($95), and Minnesota ($89); and lowest in Utah ($25), Louisiana ($34), and Arkansas ($37).

  Regarding opioid-related stays:

  - West Virginia and Massachusetts had the highest percentages of counties identified as hot spots of opioid-related stays, where 65.5 and 64.3 percent of counties, respectively, had an opioid-related stay rate in the highest quintile nationally.
    - The per capita cost of opioid-related stays in these States was $33 and $39, respectively (compared with $23 nationally).
  - The per capita cost of opioid-related stays was highest in Washington ($44), Maryland ($41), and Massachusetts ($39); and lowest in Iowa ($7), Louisiana ($10), and Texas ($10).

Regarding cannabis-related stays:

- North Carolina (44.9 percent) and Maryland and Rhode Island (40.0 percent) had the highest percentages of counties identified as hot spots of cannabis-related stays.
    - In these States, the per capita cost of cannabis-related stays was $16, $24, and $22, respectively (compared with $17 nationally).
- The per capita cost of cannabis-related stays was highest in Michigan ($26), Hawaii ($26), and Maryland ($24); and lowest in Iowa, Utah, and Arkansas (under $10).

Finally, regarding stimulant-related stays:

- California (62.5 percent) and North Carolina (56.1 percent) had the highest percentages of counties identified as hot spots of stimulant-related stays.
    - The per capita cost of stimulant-related stays was $32 and $15 in these States, respectively (compared with $17 nationally).
- The per capita cost of stimulant-related stays was highest in Hawaii ($36), California ($32), and Oregon ($26); and lowest in Iowa and West Virginia ($6).

## About Statistical Briefs

Healthcare Cost and Utilization Project (HCUP) Statistical Briefs provide basic descriptive statistics on a variety of topics using HCUP administrative health care 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 on data from the HCUP National Inpatient Sample (NIS) and State Inpatient Databases (SID), 2013 through the third quarter of 2015. The statistics were generated from the Community-Level Statistics path of HCUPnet, a free, online query system that provides users with *immediate access* to the largest set of publicly available, all-payer national, regional, State- and county-level hospital care databases from HCUP.[23] Supplemental sources included population denominator data for use with HCUP databases, derived from Claritas, a vendor that compiles and adds value to data from the U.S. Census Bureau.[24] Because 2015 was based on three quarters of data, population estimates in this year were multiplied by three-fourths (i.e. 0.75) to obtain the denominator used to calculate population-based rates. State and county rates are based on the location of the patient's residence.

Data were suppressed if the reporting cell drew from fewer than two hospitals, contained fewer than 11 discharges, had a relative standard error (standard error divided by weighted estimate) greater than 0.30 or equal to 0, or because the county was missing 2 percent or more of total discharges in the HCUP SID when compared with the Medicare Hospital Service Area File.[25] The Medicare Hospital Service Area file contains the number of Medicare inpatient hospital fee-for-service claims annually. This number was compared with the number of discharges in HCUP with an expected payer of Medicare to evaluate whether data for a given county should be suppressed. These rules were designed to protect patient and hospital identities, to reduce the influence of small counties with unstable rates on the results, and to ensure that HCUP data include most hospitalizations in an area. One limitation of these rules is that counties with substance-related inpatient stay rates of 0 or with low rates, which may reflect successful public health efforts to manage substance use, are suppressed.

For the national and State-level information presented in Tables 1 and 2 and Figure 7, the inpatient stay rate, average cost, and cost per capita were calculated annually at the national level and for each State. Then, to obtain the aggregate 3-year estimate, they were averaged across the 3 years, weighted by the population total in each year. These State-level data include information from all counties, including those with suppressed county-level data in the other figures.

$$\text{Rate or cost}_{2013–2015} = \text{Rate or cost}_{2013} * (\text{population estimate}_{2013}/\text{population estimate}_{2013–2015}) + \text{rate or cost}_{2014} * (\text{population estimate}_{2014}/\text{population estimate}_{2013–2015}) + \text{rate or cost}_{2015} * (\text{population estimate}_{2015}/\text{population estimate}_{2013–2015})$$

Figures 2 through 6 are derived from county-level inpatient stay rates. The 3-year county-level estimates were calculated as follows:

$$\text{Rate}_{2013–2015} = (\text{Number of stays}_{2013} + \text{number of stays}_{2014} + \text{number of stays}_{2015})/(\text{population estimate}_{2013} + \text{population estimate}_{2014} + \text{population estimate}_{2015}) * 100{,}000$$

For more information on methods used by Community-Level Statistics, please see https://hcupnet.ahrq.gov/downloadables/Methods-Community-Statistics-04-02-18.pdf

[23] Agency for Healthcare Research and Quality. HCUPnet Web site. www.hcupnet.ahrq.gov/. Accessed January 31, 2017.
[24] Claritas. Claritas Demographic Profile. www.claritas.com. Accessed June 23, 2017.
[25] Centers for Medicare & Medicaid Services. Hospital Service Area File. July 26, 2018. www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Hospital-Service-Area-File/index.html. Accessed July 30, 2018.

## Definitions

*Diagnoses and ICD-9-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 concomitant conditions that coexist at the time of admission or develop during the stay. *All-listed diagnoses* include the principal diagnosis plus these additional secondary conditions.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are approximately 14,000 ICD-9-CM diagnosis codes.

*Case definition*
Substance-related ICD-9-CM codes were included in this Statistical Brief if they involved alcohol or illicit drug use, including any use of illegal drugs, or misuse of prescription drugs or other substances. With the exception of heroin (an illicit drug) causing adverse effects in therapeutic use (E935.0), ICD-9-CM codes for adverse effects of medications in therapeutic use were excluded from the definition of "substance-related" because these adverse effects were likely caused inadvertently by medical treatment, not by the illicit use of a substance. If it could not be determined from a given ICD-9-CM code whether the diagnosis reflected illicit use of a substance or an adverse effect of a medication, the code was included in the definition of a "substance-related" only if it referred to a substance that is likely to be abused, specifically barbiturates, benzodiazepines, sedatives, prescription opioids, dextromethorphan, pseudoephedrine, amphetamines, and methylphenidate. A full list of ICD-9-CM codes that were included is shown in Table 3. Identification of substance-related inpatient stays was based on all-listed diagnoses.

Note that the definition used in this Statistical Brief may differ from that in other Briefs. As a result, rates of substance-related inpatient stays may differ somewhat from similar rates reported elsewhere. In particular, the opioid definition used here includes opioid dependence/abuse in remission and neonatal abstinence syndrome and does not include opioid substances causing adverse effects in therapeutic use. The codes included in this Brief also differ from those in the Clinical Classification Software category for substance-related disorders available for query in other parts of HCUPnet.

**Table 3. Definition of substance use**

| ICD-9-CM description | ICD-9-CM code | Type of substance or substance-related condition |
|---|---|---|
| **Chapter 5: Mental disorders (290–319)** | | |
| **Alcohol-induced mental disorders (291)** | | |
| Alcohol withdrawal delirium | 291.0 | Alcohol |
| Alcohol-induced persisting amnestic disorder | 291.1 | Alcohol |
| Alcohol-induced persisting dementia | 291.2 | Alcohol |
| Alcohol-induced psychotic disorder with hallucinations | 291.3 | Alcohol |
| Idiosyncratic alcohol intoxication | 291.4 | Alcohol |
| Alcohol-induced psychotic disorder with delusions | 291.5 | Alcohol |
| Other specified alcohol-induced mental disorders | | |
| Alcohol withdrawal | 291.81 | Alcohol |
| Alcohol-induced sleep disorders | 291.82 | Alcohol |
| Other alcohol-induced mental disorders | 291.89 | Alcohol |
| Unspecified alcohol-induced mental disorder | 291.9 | Alcohol |
| **Drug-induced mental disorders (292)** | | |
| Drug withdrawal | 292.0 | Drug-induced mental disorders |
| Drug-induced psychotic disorders with delusions | 292.11 | Drug-induced mental disorders |
| Drug-induced psychotic disorders with hallucinations | 292.12 | Drug-induced mental disorders |
| Pathological drug intoxication | 292.2 | Drug-induced mental disorders |
| Drug-induced delirium | 292.81 | Drug-induced mental disorders |
| Drug-induced persisting dementia | 292.82 | Drug-induced mental disorders |

| ICD-9-CM description | ICD-9-CM code | Type of substance or substance-related condition |
|---|---|---|
| Drug-induced amnestic disorder | 292.83 | Drug-induced mental disorders |
| Drug-induced mood disorder | 292.84 | Drug-induced mental disorders |
| Drug-induced sleep disorders | 292.85 | Drug-induced mental disorders |
| Other specified drug-induced mental disorders | 292.89 | Drug-induced mental disorders |
| Unspecified drug-induced mental disorder | 292.9 | Drug-induced mental disorders |
| **Alcohol and drug dependence (303, 304)** | | |
| Acute alcohol intoxication | 303.0x | Alcohol |
| Other and unspecified alcohol dependence | 303.9x | Alcohol |
| Opioid type dependence | 304.0x | Opioids |
| Sedative, hypnotic or anxiolytic dependence | 304.1x | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Cocaine dependence | 304.2x | Stimulants |
| Cannabis dependence | 304.3x | Cannabis |
| Amphetamine and other psychostimulant dependence | 304.4x | Stimulants |
| Hallucinogen dependence | 304.5x | Hallucinogens |
| Other specified drug dependence (absinthe, glue, inhalant, phencyclidine) | 304.6x | Other |
| Combinations of opioid type drug with any other drug dependence | 304.7x | Opioids |
| Combinations of drug dependence excluding opioid type drug | 304.8x | Other |
| Unspecified drug dependence | 304.9x | Other |
| **Nondependent abuse of drugs (305)** | | |
| Nondependent alcohol abuse | 305.0x | Alcohol |
| Nondependent cannabis abuse | 305.2x | Cannabis |
| Nondependent hallucinogen abuse | 305.3x | Hallucinogens |
| Nondependent sedative, hypnotic or anxiolytic abuse | 305.4x | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Nondependent opioid abuse | 305.5x | Opioids |
| Nondependent cocaine abuse | 305.6x | Stimulants |
| Nondependent amphetamine or related acting sympathomimetic abuse | 305.7x | Stimulants |
| Nondependent anti-depressant abuse | 305.8x | Other |
| Nondependent other mixed or unspecified drug abuse | 305.9x | Other |
| **Chapters 6, 7, and 9: Diseases of the nervous system and sense organs (320–389), Diseases of the circulatory system (390–459), and Diseases of the digestive system (520–579)** | | |
| Alcoholic polyneuropathy | 357.5 | Alcohol |
| Alcoholic cardiomyopathy | 425.5 | Alcohol |
| Alcoholic gastritis, without mention of hemorrhage | 535.30 | Alcohol |
| Alcoholic gastritis, with hemorrhage | 535.31 | Alcohol |
| Fatty liver | 571.0 | Alcohol |
| Acute alcoholic hepatitis | 571.1 | Alcohol |
| Alcoholic cirrhosis of liver | 571.2 | Alcohol |
| Alcoholic liver damage unspecified | 571.3 | Alcohol |
| **Chapter 11: Complications of pregnancy, childbirth and the puerperium (630–679)** | | |
| Drug dependence complicating pregnancy | 648.3x | Other |

| ICD-9-CM description | ICD-9-CM code | Type of substance or substance-related condition |
|---|---|---|
| **Chapter 15: Newborn (perinatal) (760–779)** | | |
| **Noxious influences affecting fetus or newborn via placenta or breastmilk (760)** | | |
| Fetal alcohol syndrome | 760.71 | Alcohol |
| Narcotics affecting newborn | 760.72 | Opioids |
| Hallucinogens affecting newborn | 760.73 | Hallucinogens |
| Cocaine affecting newborn | 760.75 | Stimulants |
| **Other and ill-defined conditions originating in the perinatal period (779)** | | |
| Drug withdrawal syndrome in newborn | 779.5 | Opioids |
| **Chapter 17: Injury and poisoning (800–999)** | | |
| **Poisoning by drugs, medicinal substances, and biologicals (960–979)** | | |
| Opium (alkaloids) | 965.00 | Opioids |
| Heroin | 965.01 | Opioids |
| Methadone | 965.02 | Opioids |
| Other opiates and related narcotics | 965.09 | Opioids |
| Barbiturates | 967.0 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Chloral hydrate group | 967.1 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Paraldehyde | 967.2 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Bromine compounds | 967.3 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Methaqualone compounds | 967.4 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Glutethimide group | 967.5 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Mixed sedatives, not elsewhere classified | 967.6 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Other sedatives and hypnotics | 967.8 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Unspecified sedative or hypnotic (sleeping pills) | 967.9 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Surface [topical] and infiltration anesthetics | 968.5 | Stimulants |
| Benzodiazepine-based tranquilizers | 969.4 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Other tranquilizer | 969.5 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Hallucinogens | 969.6 | Hallucinogens |
| Psychostimulant NOS (Begin 2009) | 969.70 | Stimulants |
| Amphetamine (Begin 2009) | 969.72 | Stimulants |
| Methylphendate (Begin 2009) | 969.73 | Stimulants |
| Psychostimulant NEC (Begin 2009) | 969.79 | Stimulants |
| Opiate antagonist | 970.1 | Opioids |
| CNS stimulant NEC (only 2006–2010) | 970.8 | Stimulants |
| Cocaine (Begin 2010) | 970.81 | Stimulants |
| CNS stimulant NEC (Begin 2010) | 970.89 | Stimulants |
| CNS stimulant NOS | 970.9 | Stimulants |
| Antitussives | 975.4 | Other |

| ICD-9-CM description | ICD-9-CM code | Type of substance or substance-related condition |
|---|---|---|
| Anti-common cold drugs | 975.6 | Other |
| Ethyl alcohol | 980.0 | Alcohol |
| Other specified alcohols | 980.8 | Alcohol |
| Unspecified alcohol | 980.9 | Alcohol |
| **Supplemental classification of external causes of injury and poisoning (E-Codes)** | | |
| **Accidental poisoning by drugs, medicinal substances, and biologicals (E850–E858)** | | |
| Accidental poisoning by heroin | E850.0 | Opioids |
| Accidental poisoning by methadone | E850.1 | Opioids |
| Accidental poisoning by other opiates and related narcotics | E850.2 | Opioids |
| Accidental poisoning by barbiturates | E851 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Chlorl hydrate | E852.0 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Paraldehyde | E852.1 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Bromine compound | E852.2 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Methaqualone compounds | E852.3 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Glutethimide group | E852.4 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Mixed sedatives NEC | E852.5 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Other specified sedatives and hypnotics | E852.8 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Unspecified sedative or hypnotic | E852.9 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Benzodiazepine-based tranquilizers | E853.2 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Tranquilizer NEC | E853.8 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Tranquilizer NOS | E853.9 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Accidental poisoning by hallucinogens | E854.1 | Hallucinogens |
| Accidental poisoning by psychostimulants | E854.2 | Stimulants |
| Accidental poisoning by central nervous system stimulants (analeptics, opiate antagonists) | E854.3 | Stimulants |
| **Accidental poisoning by other solid and liquid substances, gases, and vapors (E860–E869)** | | |
| Alcohol beverage | E860.0 | Alcohol |
| Ethyl alcohol | E860.1 | Alcohol |
| Alcohol NEC | E860.8 | Alcohol |
| Alcohol NOS | E860.9 | Alcohol |
| **Drugs, medicinal substances, and biologicals causing adverse effects in therapeutic use (E930–E949)** | | |
| Heroin causing adverse effects in therapeutic use | E935.0 | Opioids |
| **Suicide and self-inflicted poisoning by solid or liquid substances (E950)** | | |

| ICD-9-CM description | ICD-9-CM code | Type of substance or substance-related condition |
|---|---|---|
| Suicide and self-inflicted poisoning by barbiturates | E950.1 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Suicide and self-inflicted poisoning by other sedatives/hypnotics | E950.2 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Suicide and self-inflicted poisoning by tranquilizers and other psychotropic agents | E950.3 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| **Poisoning by solid or liquid substances, undetermined whether accidentally or purposely inflicted (E980–E989)** | | |
| Undetermined poisoning by barbiturates | E980.1 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Undetermined poisoning by other sedatives and hypnotics | E980.2 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| Undetermined poisoning by tranquilizers and other psychotropic agents | E980.3 | Sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates |
| **Classification of factors influencing health status and contact with health services (V-Codes)** | | |
| Counseling, substance use | V65.42 | Other |

Abbreviations: ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; NEC, not elsewhere classifiable; NOS, not otherwise specified

*Types of hospitals included in HCUP State Inpatient Databases*
This analysis used State Inpatient Databases (SID) limited to data 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 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.

Additionally, discharges from long-term acute care facilities are excluded from data made available through the Community-Level Statistics path on HCUPnet.

*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.

*Costs and charges*
Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare & Medicaid Services.[26] *Costs* reflect the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility costs; *charges* represent the amount a hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used. Hospital charges reflect the amount the hospital billed for the entire hospital stay and do not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundred.

## About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of health care databases and related software tools and products developed through a Federal-State-Industry

[26] Agency for Healthcare Research and Quality. HCUP Cost-to-Charge Ratio (CCR) Files. Healthcare Cost and Utilization Project (HCUP). 2001–2014. Rockville, MD: Agency for Healthcare Research and Quality. Updated November 2016. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed January 31, 2017.

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 health care 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 health care 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** Health Information Corporation
**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

## About the NIS

The HCUP National (Nationwide) Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, nonrehabilitation hospitals). The NIS includes all payers. It is drawn from a sampling frame that contains hospitals comprising more than 95 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use. Over time, the sampling frame for the NIS has changed; thus, the number of States contributing to the NIS varies from year to year. The NIS is intended for national estimates only; no State-level estimates can be produced.

The 2012 NIS was redesigned to optimize national estimates. The redesign incorporates two critical changes:

- Revisions to the sample design—starting with 2012, the NIS is now a *sample of discharge records from all HCUP-participating hospitals*, rather than a sample of hospitals from which all discharges were retained (as is the case for NIS years before 2012).

- Revisions to how hospitals are defined—the NIS now uses the *definition of hospitals and discharges supplied by the statewide data organizations* that contribute to HCUP, rather than the definitions used by the American Hospital Association (AHA) Annual Survey of Hospitals.

The new sampling strategy is expected to result in more precise estimates than those that resulted from the previous NIS design by reducing sampling error: for many estimates, confidence intervals under the new design are about half the length of confidence intervals under the previous design. The change in sample design for 2012 necessitates recomputation of prior years' NIS data to enable analyses of trends that use the same definitions of discharges and hospitals.

## About the SID

The HCUP State Inpatient Databases (SID) are hospital inpatient databases from data organizations participating in HCUP. The SID contain the universe of the inpatient discharge abstracts in the participating HCUP States, translated into a uniform format to facilitate multistate comparisons and analyses. Together, the SID encompass more than 95 percent of all U.S. community hospital discharges. The SID 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.

## About HCUPnet

HCUPnet (www.hcupnet.ahrq.gov/) is an online query system that offers instant access to the largest set of all-payer health care databases that are publicly available. HCUPnet has an easy step-by-step query system that creates tables and graphs of national and regional statistics as well as data trends for community hospitals in the United States. HCUPnet generates statistics using data from HCUP's National (Nationwide) Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the Nationwide Emergency Department Sample (NEDS), the Nationwide Readmissions Database (NRD), the State Inpatient Databases (SID), and the State Emergency Department Databases (SEDD).

## For More Information

For other information on substance use, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_mhsa.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 health care information topics
- HCUPnet, HCUP's interactive query system, at www.hcupnet.ahrq.gov/

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 National Inpatient Sample (NIS) and the State Inpatient Databases (SID), please refer to the following database documentation:

Agency for Healthcare Research and Quality. Overview of the National (Nationwide) Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated February 2018. www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed February 12, 2018.

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 April 2017. www.hcup-us.ahrq.gov/sidoverview.jsp. Accessed January 18, 2018.

## Suggested Citation

Fingar KR (IBM Watson Health), Skinner H (IBM Watson Health), Johann J (IBM Watson Health), Coenen N (IBM Watson Health), Freeman WJ (AHRQ), Heslin KC (AHRQ). Geographic Variation in Substance-Related Inpatient Stays Across States and Counties in the United States, 2013–2015. HCUP Statistical Brief #245. November 2018. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb245-Substance-Inpatient-Stays-Across-US-Counties.pdf.

## Acknowledgments

The authors would like to acknowledge the contributions of Minya Sheng, Veronica Hernandez, and Sylvia Hall of IBM Watson Health, and Anne Elixhauser formerly of the Agency for Healthcare Research and Quality (AHRQ).

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care 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 e-mail us at hcup@ahrq.gov or send a letter to the address below:

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This Statistical Brief was posted online on November 13, 2018.