

The Opioid Epidemic in Missouri: What's New in Surveillance

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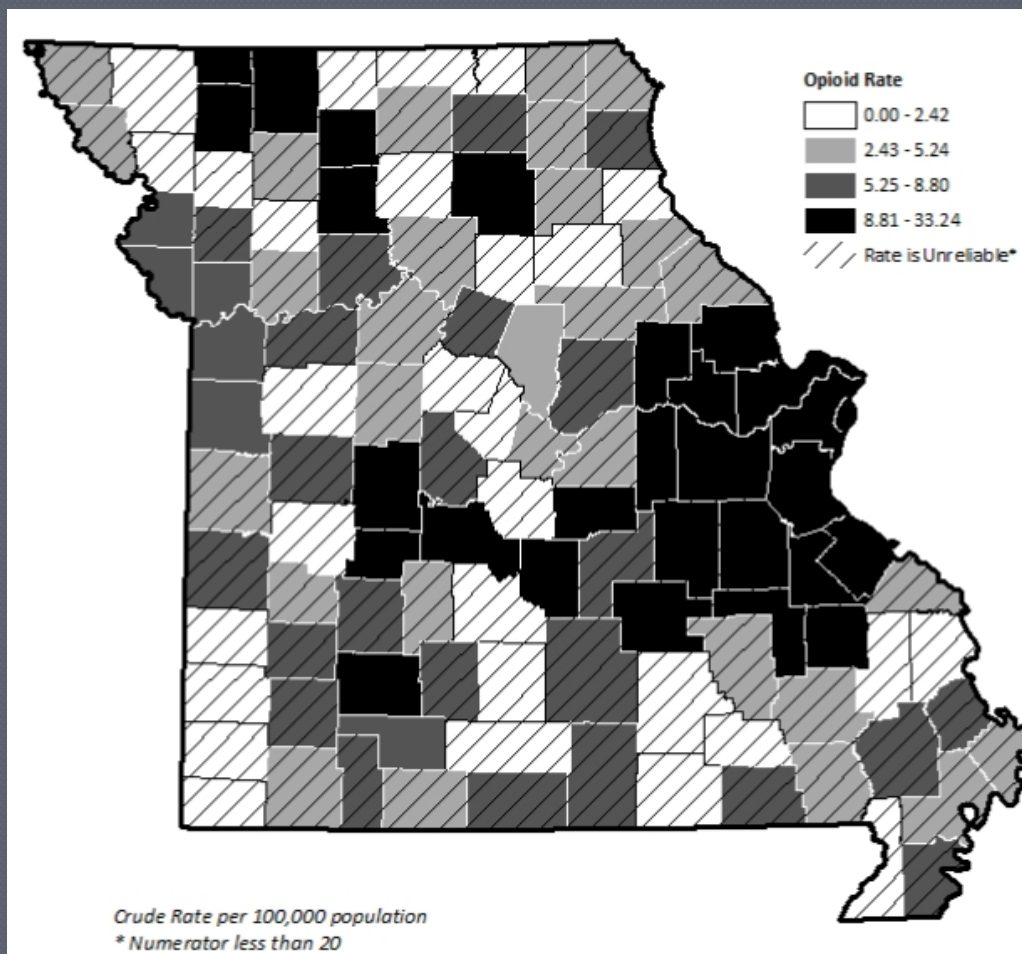
Bureau of Health Care Analysis and
Data Dissemination



Tracking Neonatal Abstinence Syndrome in Missouri:

Trends and the ICD-CM Transition

Missouri Opioid Overdose Mortality, 2012-2016

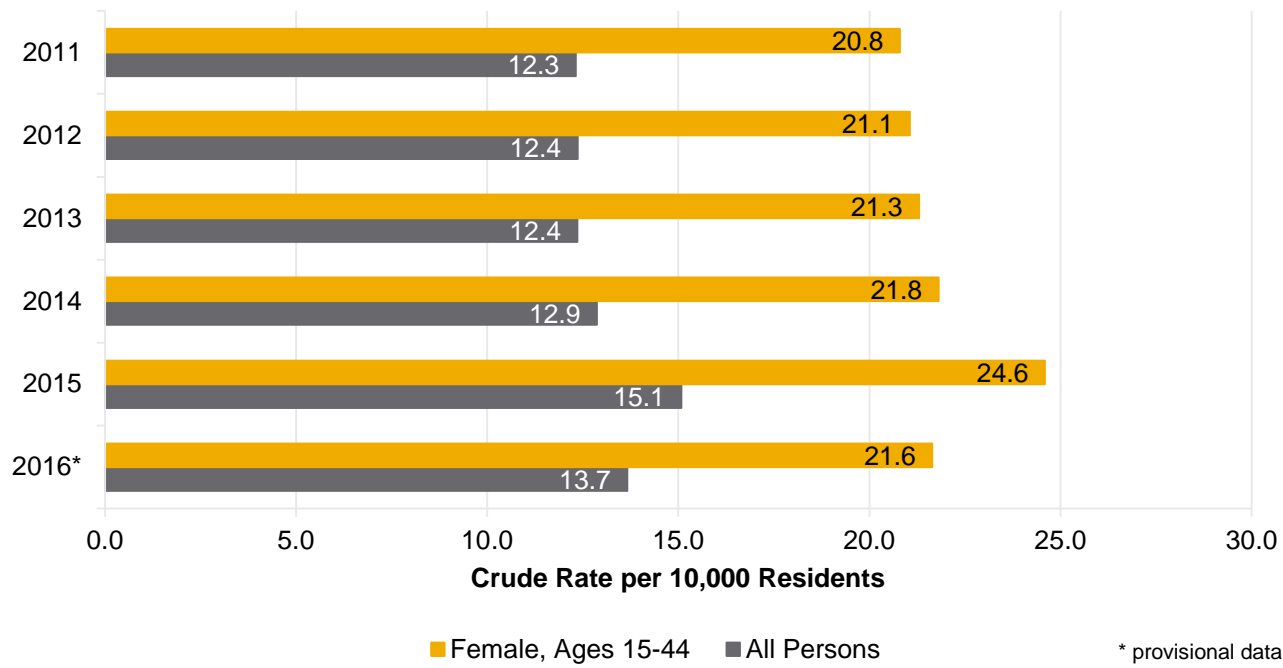


What is Neonatal Abstinence Syndrome (NAS)?

- NAS is a series of withdrawal symptoms and other problems experienced by a newborn after exposure to narcotics via placenta or breastmilk.¹
- NAS can be caused by many drugs, but opiates cause notably high rates of neonatal withdrawal.¹

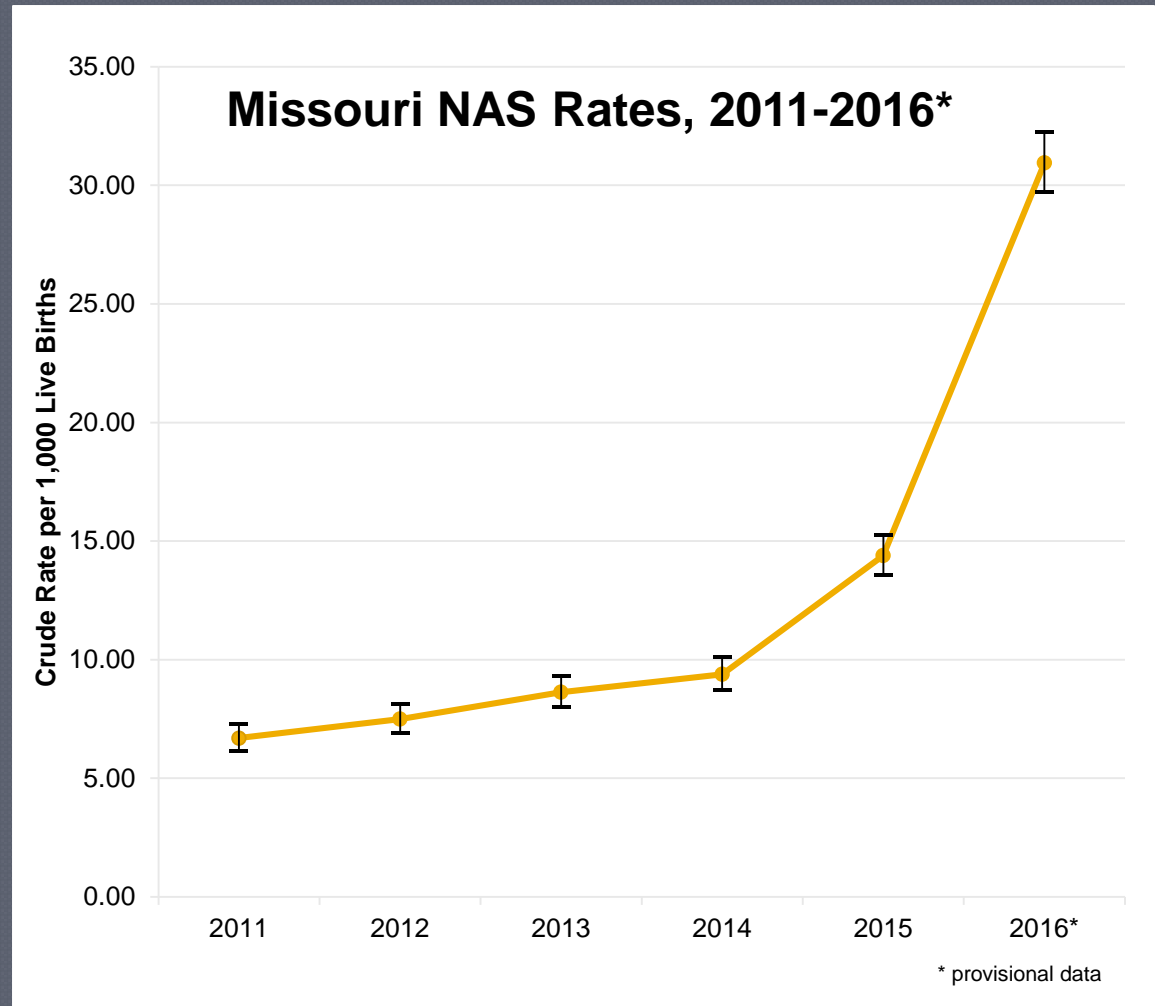
A Troubling Trajectory

Opioid Misuse Emergency Department Discharges, 2011-2016*



NAS Trends in Missouri

Missouri's
NAS rates have
increased
362%
in the past
SIX
years.



Missouri's NAS Surveillance Definition

NAS discharges are identified in Missouri resident children under 1 year of age in the PAS system using ICD-9-CM codes **779.5** and **760.72** for years 2011-2015. For years 2015-current, ICD-10-CM codes **P96.1**, **P96.2**, **P04.4**, and **P04.49** are used. These cases are de-duplicated to provide approximate annual NAS births.

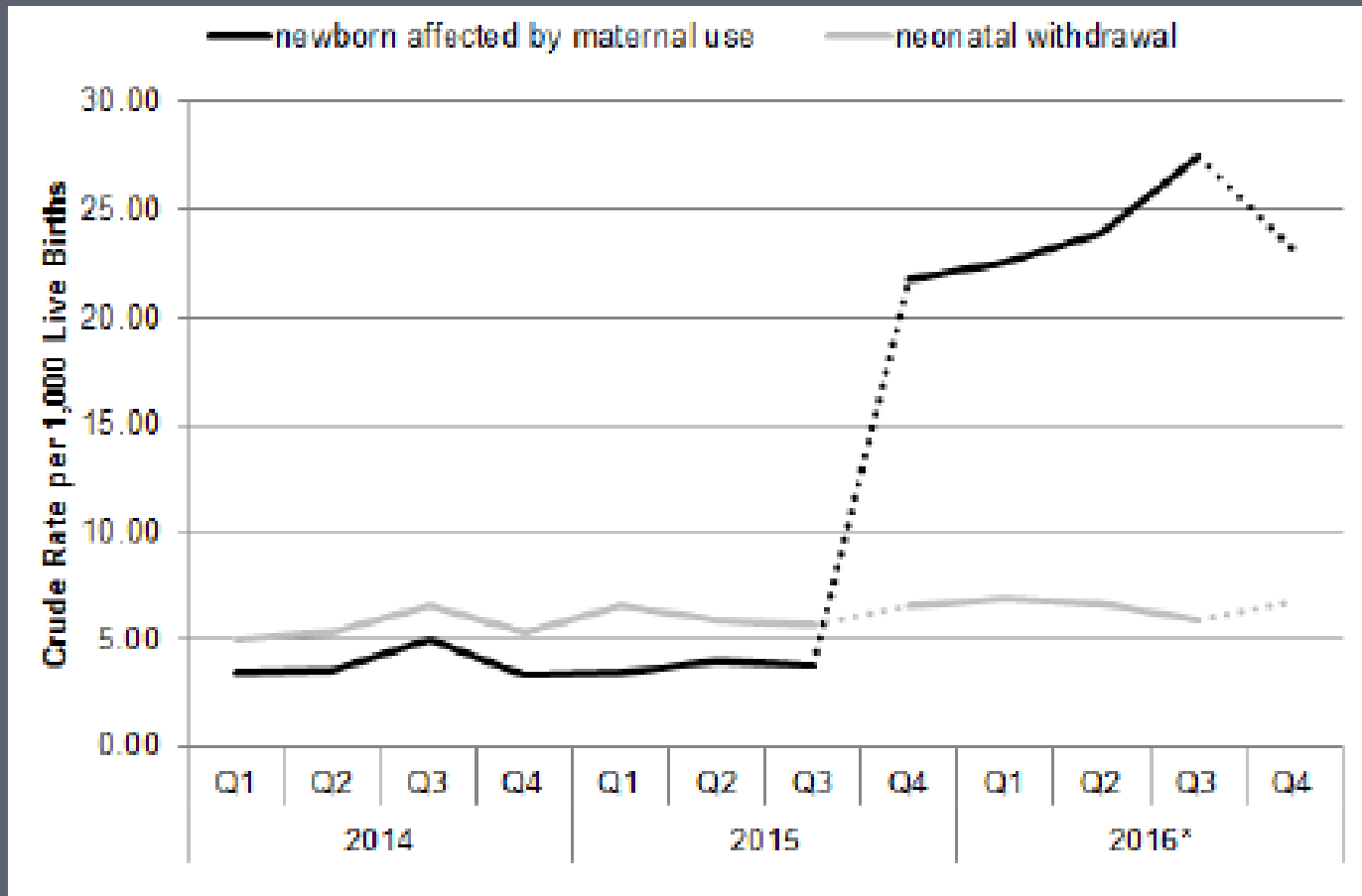
The Patient Abstract System (PAS) is a database maintained by the Department containing inpatient and outpatient records from Missouri's non-federal hospitals and ambulatory surgery centers.

The ICD-CM Transition

	ICD-9-CM (2015)		ICD-10-CM (2016)				ICD-10-CM (2017)			
	2014-Q1 through 2015-Q3		2015-Q4 through 2016-Q3				2016-Q4 through present			
ICD- CM Code	76072	7795	P044	P0449	P961	P962	P044	P0449	P961	P962
Long Description	Narcotics affecting fetus or newborn via placenta or breast milk	Drug with- drawal syndrome in newborn	Newborn (suspect- ed to be) affected by maternal use of drugs of addiction	Newborn (suspect- ed to be) affected by maternal use of other drugs of addiction	Neonatal with- drawal symp- toms from maternal use of drugs of addiction	With- drawal symp- toms from thera- peutic use of drugs in newborn	Newborn affected by maternal use of drugs of addiction	Newborn affected by maternal use of other drugs of addiction	Neonatal with- drawal symp- toms from thera- peutic use of drugs in newborn	With- drawal symp- toms from thera- peutic use of drugs in newborn

The ICD-CM Transition

Missouri Resident NAs Rates by Type, 2014-2016*



An Evolving Surveillance Definition

76072. **Narcotics** affecting fetus or newborn via placenta or breast milk.

P044. Newborn (**suspected-to-be**) affected by maternal use of **drugs of addiction**.

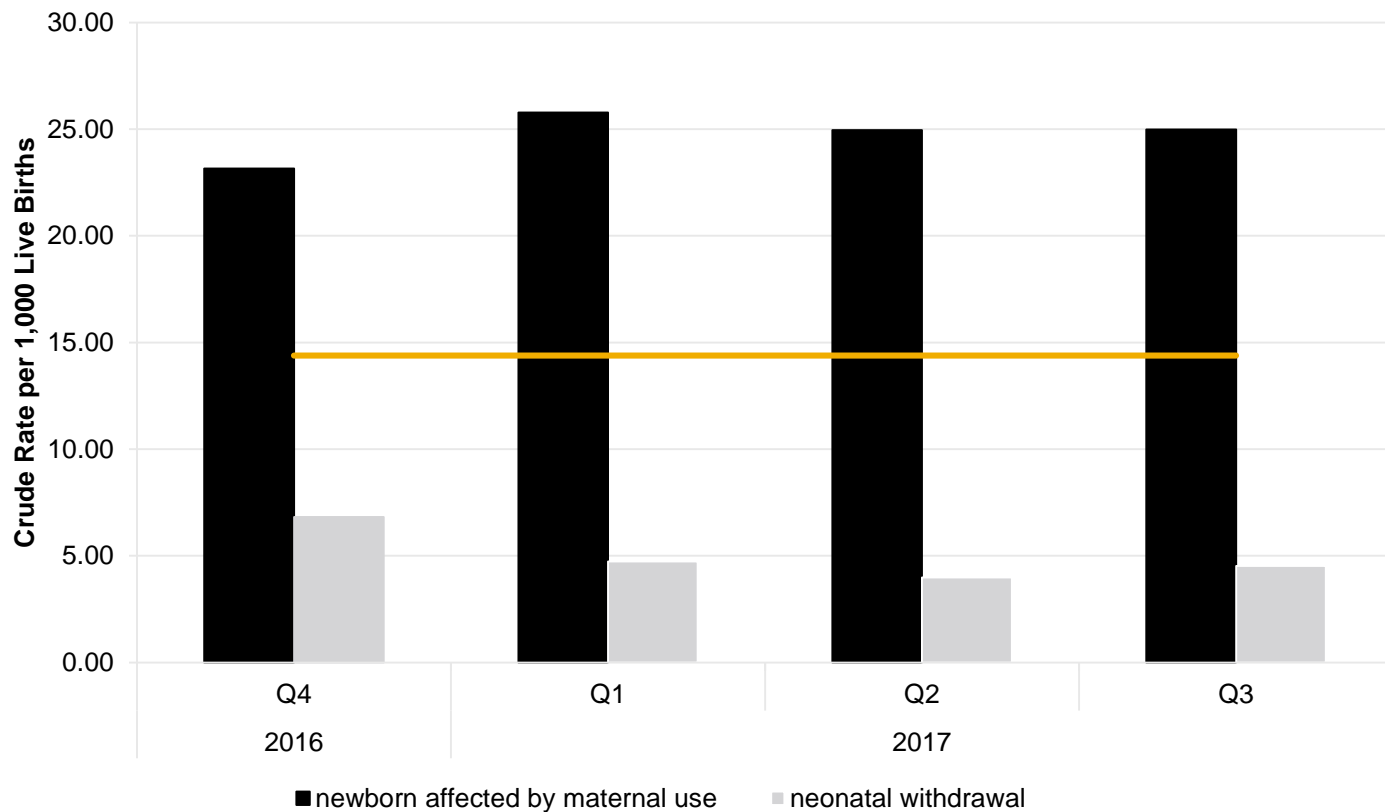
P0449. Newborn (**suspected-to-be**) affected by maternal use of **other drugs of addiction**.

P044. Newborn affected by maternal use of drugs of addiction.

P0449. Newborn affected by maternal use of other drugs of addiction.

An Evolving Surveillance Definition

Provisional Missouri Resident NAS Rates by Type, 2016-2017*



Baseline is the 2015 annual NAS rate.

NAS Data Limitations

- NAS is **not specifically caused by opioids**, though maternal use of this drug type does contribute to the majority of NAS cases.
- NAS cases **may not always be directly attributed to maternal drug use or misuse**- in some cases opiates are used in pain management for newborns which can lead to rare cases of therapeutic withdrawal.
- Definitional changes and evolving surveillance definitions make it **difficult to track true change** over time.
- Neonatal Abstinence Syndrome is a series of symptoms and behaviors and there is not a single standard for diagnosis. Additionally, symptoms may present themselves up to 10 days after birth. This could lead to **under- or over-estimates of NAS prevalence**.
- NAS could be diagnosed in patients outside of a hospital or emergency room setting and **would not be captured** by the PAS system.

Intervention Strategies

- ◉ St. Louis Metro female and family centered treatment options:
 - SSM Health WISH Center at St. Mary's Hospital
 - Queen of Peace Center
 - Chestnut Health Systems (IL residents)
 - Barnes-Jewish Hospital
- ◉ This collaboration is partially funded by Substance Abuse and Mental Health Services Administration (SAMHSA).

Intervention Strategies

- ◉ **CLINICAL GUIDANCE FOR TREATING PREGNANT AND PARENTING WOMEN WITH OPIOID USE DISORDER AND THEIR INFANTS²**
- ◉ Published by SAMHSA in January 2018. Now available online.
 - Detailed clinical guidance and factsheets for stages of pregnancy.
 - Prenatal Care, Infant Care, Maternal Postnatal Care



Sources

- 1. Stanford Children's Health. Neonatal Abstinence Syndrome. <http://www.stanfordchildrens.org/en/topic/default?id=neonatal-abstinence-syndrome-90-P02387>.
- 2. Substance Abuse and Mental Health Services Administration (SAMHSA). Clinical Guidance for Treating Pregnant and Parenting Women With Opioid Use Disorder and Their Infants. <https://store.samhsa.gov/shin/content//SMA18-5054c/SMA18-5054.pdf>.

**I've Got 99 Problems....
And A Centralized Medical
Examiner System Isn't One**

**Partnering with Local Medical
Examiners and Coroners**

ESOOS & NVDRS

- Enhanced State Opioid Overdose Surveillance (ESOOS)
- National Violent Death Reporting System (NVDRS)
- Missouri began participation in both programs in September 2016.
- Both programs require coroner/medical examiner (C/ME) cooperation to provide supplemental information not on the death certificate for fatal events.

Coroner/Medical Examiners

- Toxicology
- Narrative report
 - Victim history
 - Scene evidence
 - Bystanders present?
- Autopsy/Pathology Exam

Sample Toxicology Report

Blood: Heart (cont')

Cannabinoid Quantitation: (cont')

11-NOR-DELTA-9-THC-COOH: _____ 24.0 NANOGRAMS/ML

Methadone Quantitation:

METHADONE: _____ 0.65 MICROGRAMS/ML

METHADONE METABOLITE (EDDP): _____ LESS THAN 0.10 MICROGRAMS/ML

Opiate Quantitation:

Codeine: _____ Negative

MORPHINE (TOTAL): _____ 0.13 MICROGRAMS/ML

6-Monoacetylmorphine: _____ Negative

Hydrocodone: _____ Negative

Hydromorphone: _____ Negative

Oxycodone: _____ Negative

Dihydrocodeine (Hydrocodol): _____ Negative

Oxymorphone: _____ Negative

Morphine (Free): _____ Negative

Urine:

Amphetamine Confirmation:

AMPHETAMINE: _____ POSITIVE

METHAMPHETAMINE: _____ POSITIVE

MDA: _____ Negative

MDMA: _____ Negative

Methadone Confirmation:

METHADONE: _____ POSITIVE

METHADONE METABOLITE (EDDP): _____ POSITIVE

Urine Individual Drug Confirmation:

FENTANYL: _____ POSITIVE

Urine Opiate Confirmation:

CODEINE: _____ POSITIVE

MORPHINE: _____ POSITIVE

6-MONOACETYLMORPHINE: _____ POSITIVE

Narrative

- Personal information scrubbed, only pertinent info related to death recorded
- Example:
 - Victim (V) was 31/Black/Male. Last seen alive at 2230 on 2/1/17. V was found unresponsive at 0900 on 2/2/17 in bed with syringe and spoon on nightstand. EMS arrived at scene at 0910 and pronounced V dead. V had known history of heroin abuse over past 3 years. V had prior drug overdose within last month.

Identifying Opioid Overdose Cases

- ◎ Underlying Cause of Death Codes
 - X40-44.9 (Accidental)
 - Y10-Y14 (Undetermined)
- ◎ Contributing Cause of Death Codes
 - Heroin: T40.1
 - Opioids: T40.0, T40.2, T40.3, T40.4, T40.6
 - T50.9 (Multi-Drug)
- ◎ Search across literal fields in the death certificate.

C/ME System

- In Missouri, the coroner and medical examiner system is decentralized.
 - Coroner vs Medical Examiner
- 114 counties and one independent city
 - Some counties consolidate under one medical examiner (e.g. St. Louis, Kansas City)
- How do we focus our efforts?

Reporting Requirements

- NVDRS - goal is statewide participation starting in 2018
- ESOOS - requires at least 75% of statewide deaths to be reported
- Timeliness
 - Initiation – Upload death certificate data
 - 6 months after reporting period
 - Completion – Abstract C/ME records
 - 8 months after reporting period

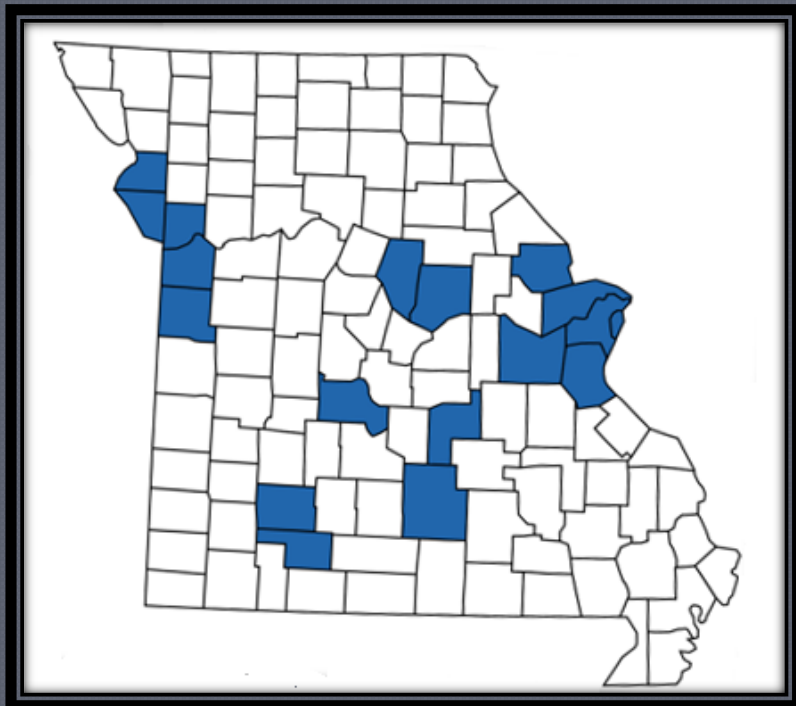
Our Strategy (ESOOS)

- Opioid deaths largely in metro areas. (60% in St. Louis and surrounding area)
- Target metro areas and surrounding counties.

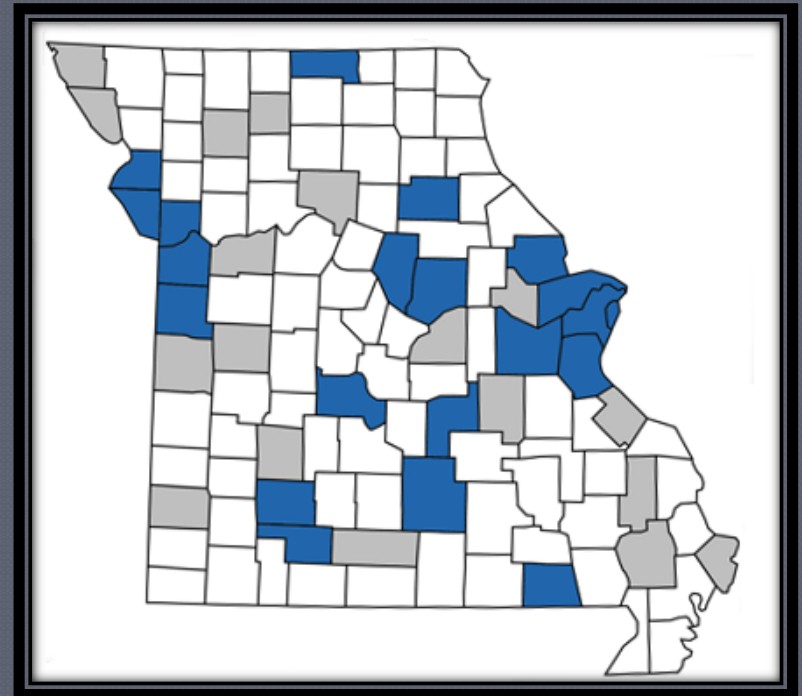


Year 1 vs Year 2 - Participation

Year 1



Year 2

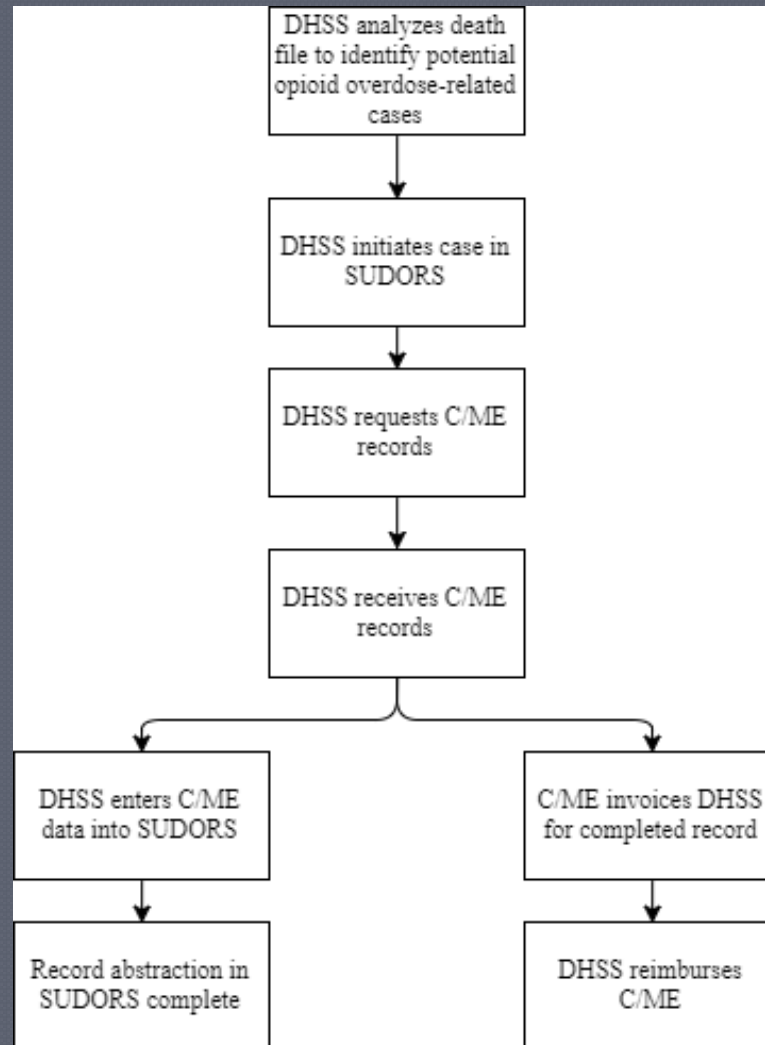


Blue = Participating
Grey = Interested

Recruitment Strategies

- Missouri Coroners' and Medical Examiners' Association (MCMEA)
- Encouragement from C/MEs currently participating
- Other partners
 - Law Enforcement, Local Public Health Agencies (LPHAs), Drug Coalitions, etc.
- Mailer with NVDRS/ESOOS information

Process Flow



Lessons Learned

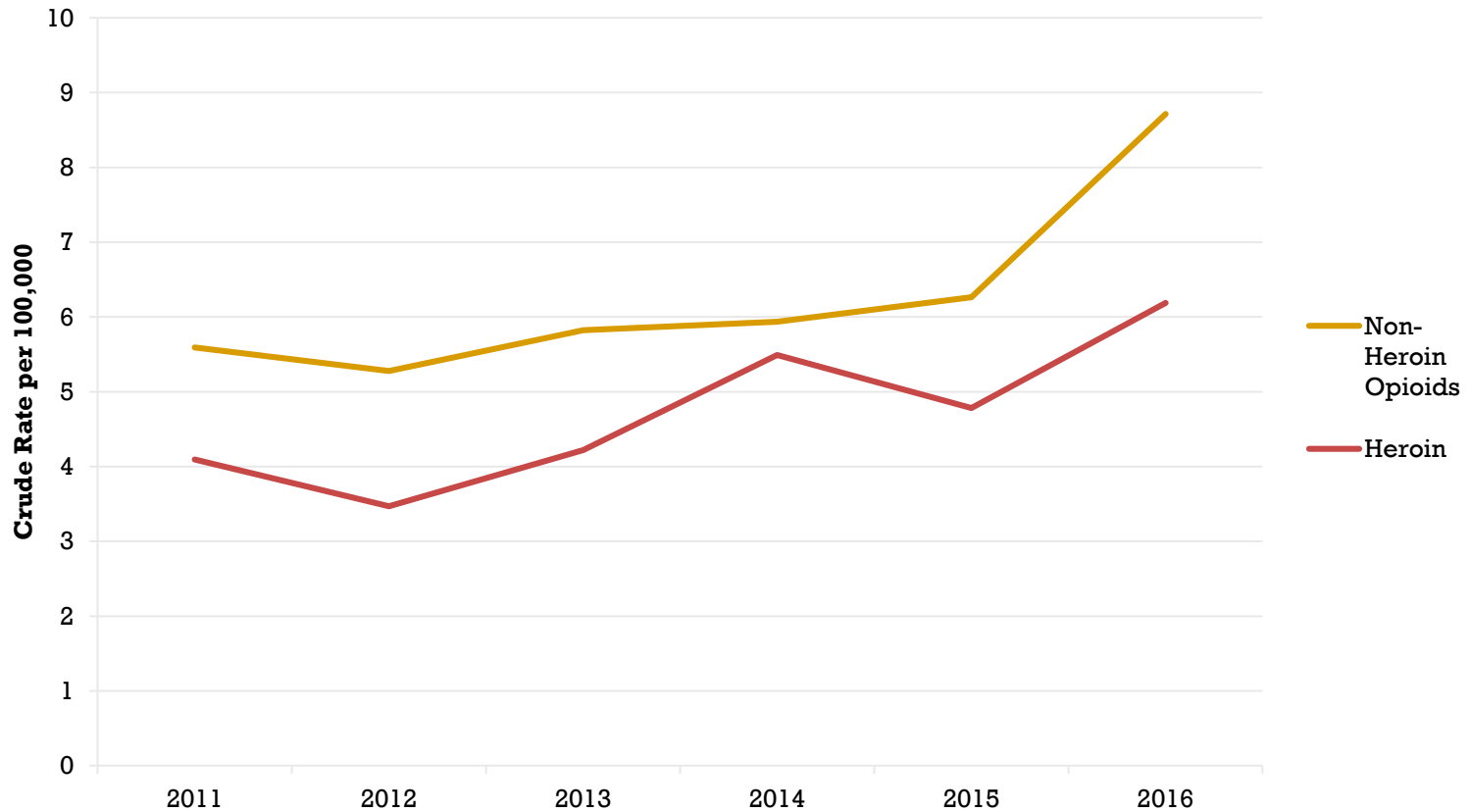
- Varying levels of detail in reports between counties
 - Toxicology Depth
- Contract process
 - Involves multiple county officials
- Providing technical assistance to C/ME

Opioid Overdose in Missouri

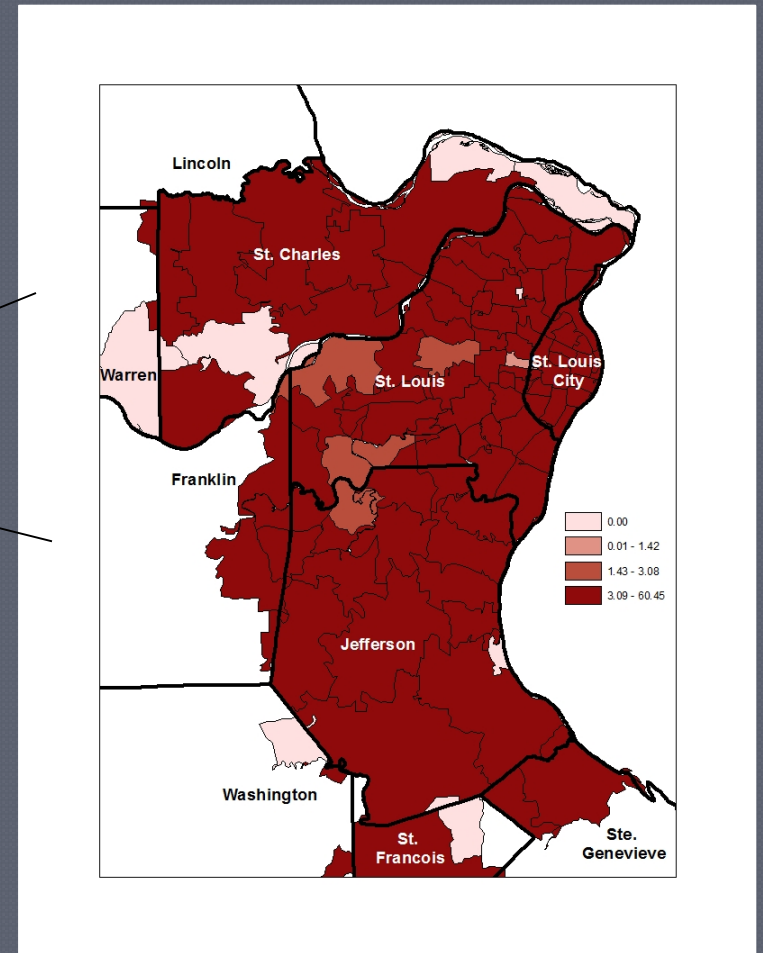
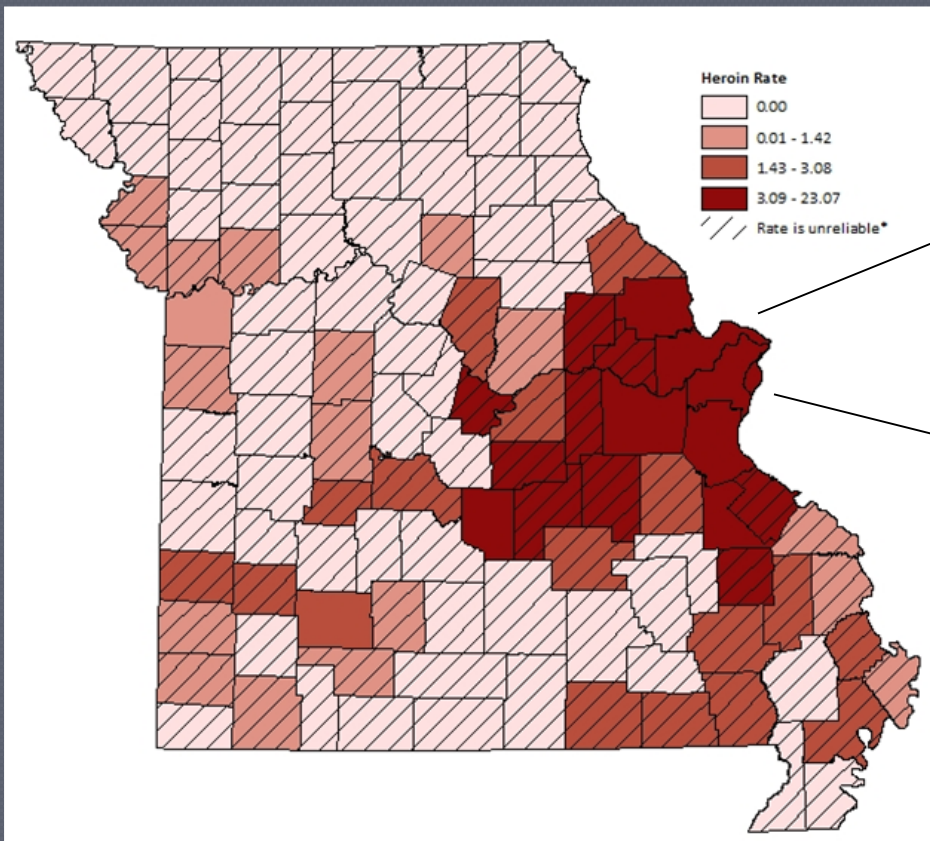
Analyzing Emergency Department Use
in Urban/Rural Areas

Rise in Opioid Overdose in MO

**Resident Opioid Overdose Deaths by Type
Missouri, 2011-2016**



Heroin Death Rates (per 100,000), 2012-2016 MO and St. Louis Area Zip Codes



Research Questions

- How does opioid overdose morbidity compare with mortality?
- How have ED visits due to opioid overdose changed over time?
- Are there differences in rates and changes over time between urban and rural areas?
- Heroin vs. Non-heroin opioids
 - Non-heroin = prescription drugs (fentanyl, oxycodone, OxyContin, etc.) and other illicit opioids

Patient Abstract System (PAS)

- DHSS receives ED, inpatient, and outpatient data from approximately 132 Missouri hospitals
- Records include info on patient demographics, diagnoses, other visit information
- 23 Diagnoses fields
 - Coded in ICD-9-CM and ICD-10-CM
 - First Diagnosis is primary reason for visit

Methodology – Identifying Opioid Overdoses

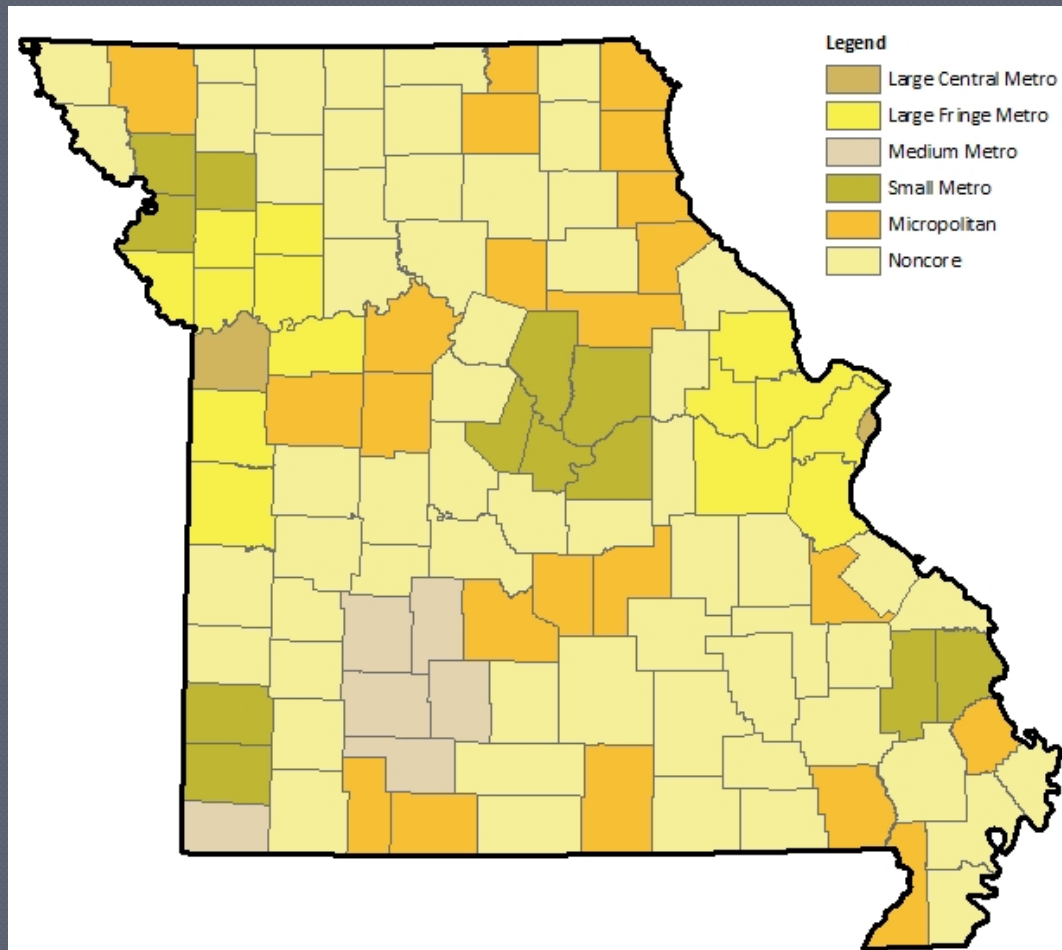
- Enhanced State Opioid Overdose Surveillance (ESOOS)
 - Non-fatal Opioid Overdose Reporting
- ICD-9-CM and ICD-10-CM Definitions
 - ICD-9: 965.XX codes and E850.X E-Codes
 - ICD-10: T40 and F11
 - 6th character: (1,4) Accidental or undetermined
 - 7th character: (A) Initial Encounter
- Array of first 5 of 23 diagnoses fields

Methodology – NCHS County Breakout

- 115 Counties in MO
- 2 Major Urban areas (St. Louis and Kansas City)
- Lesser Urban areas (Springfield, Columbia, Joplin)

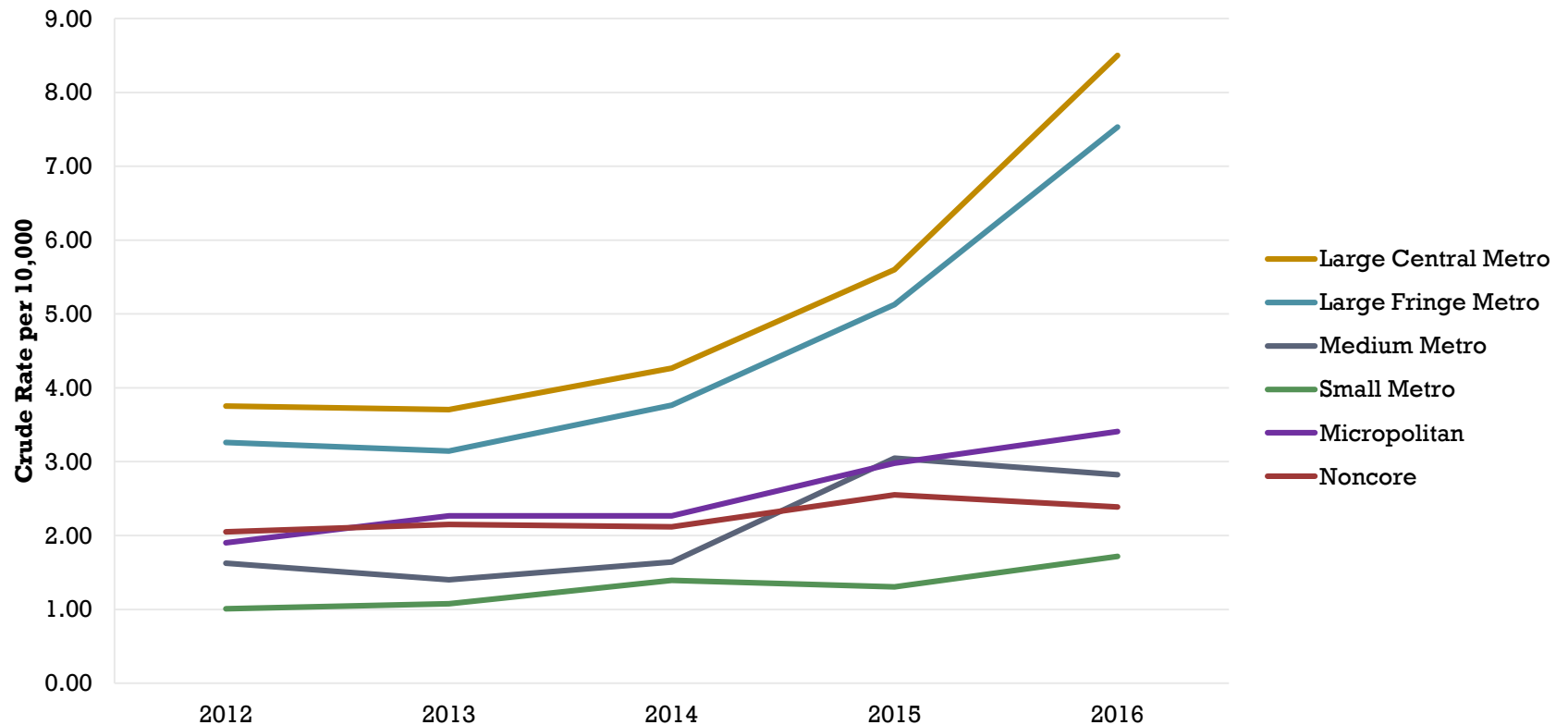
County Classification	Description	Number of Counties
Large Central Metro (Most Urban)	Metropolitan Statistical Area (MSA) of 1 million or more and contain entire population of the principal city in the MSA	2
Large Fringe Metro	MSAs of 1 million or more that are not Large Central Metro	14
Medium Metro	MSA of 250,000 to 999,999	6
Small Metro	MSA of less than 250,000	12
Micropolitan	Counties in Micropolitan Statistical Areas	22
Noncore (Most Rural)	Counties not in Micropolitan Statistical Area	59
Grand Total		115

NCHS Categories for MO Counties



Results

Missouri Resident Opioid ED Visits by NCHS County Classification



Results

MO Resident Heroin Overdose ED Discharge Percent Change					
	2012/2013	2013/2014	2014/2015	2015/2016	2012/2016
Large Central Metro	15%	30%	32%	61%	219%
Large Fringe Metro	-8%	28%	35%	58%	151%
Medium Metro	-21%	223%	178%	-9%	551%
Small Metro	27%	85%	7%	49%	275%
Micropolitan	76%	6%	63%	40%	326%
Noncore	54%	35%	138%	10%	444%
Total	2%	31%	41%	52%	186%

MO Resident Non-Heroin Overdose ED Discharge Percent Change					
	2012/2013	2013/2014	2014/2015	2015/2016	2012/2016
Large Central Metro	-19%	-8%	30%	31%	26%
Large Fringe Metro	7%	2%	40%	19%	82%
Medium Metro	-13%	-11%	39%	-6%	2%
Small Metro	3%	17%	-11%	24%	33%
Micropolitan	4%	-3%	16%	-4%	13%
Noncore	1%	-6%	-1%	-13%	-19%
Total	-3%	-2%	21%	11%	28%

Increase	>100%	50-100%	<50%
Decrease	<50%		

Results

- Urban areas continue to have the highest rates
- Fentanyl vs Heroin
 - ED visits due to heroin overdose have increased drastically in all areas
 - Fentanyl cannot be distinguished from other synthetic narcotics by ICD code alone (T40.4)
 - Fentanyl may not be as prevalent in rural areas
 - It could follow heroin trend and spread

Addressing the Problem

- Participating in ESOOS
 - Collecting more data in a timely manner
- Partnering with stakeholders
 - Law enforcement, C/MEs, LPHAs, Department of Mental Health, local coalitions, other DHSS units
- Prescription Drug Monitoring Programs (PDMPs)
- Naloxone
 - Standing order prescription, Grants for distribution and training
- 911 Good Samaritan Law

Opioid Crisis Response: The Missouri Opioids Dashboard

The Department's Newest
Dissemination Tool

DHSS Opioids Dashboard

- The Division of Community and Public Health has developed a web-based dashboard to communicate data related to opioid abuse.
- Maps, charts, and other graphics tell the story of the opioid epidemic in Missouri.



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Community Health Assessment and Intervention Planning

- Missouri Health Assessment
- Missouri Health Improvement Plan **NEW!**
- Community Data Profiles (State, County and City Profiles)
- MICA (Missouri Information for Community Assessment)
- Priorities MICA
- Health Data Training
- Community Health Improvement Resources (CHIR)
- Intervention MICA
- Opioid Crisis Response **NEW!**
- Life Expectancy Data
- Years of Potential Life Lost (YPLL) Data
- Healthy People 2020 Objectives – Missouri Data Resources
- Age Adjustment Worksheet
- Affordable Care Act Maternal, Infant and Early Childhood Home Visiting Program Needs Assessment
- The Burden of Chronic Diseases in Missouri - Progress and Challenges

Data and Surveillance Systems

Abortions
 Adult Blood Lead Epidemiology and Surveillance (ABLES)
 Bioterrorism Sentinel Surveillance
 Birth Certificate Data
 Birth Defects Registry
 Behavioral Risk Factor Surveillance System (BRFSS)
 Carbon Monoxide Poisoning Surveillance
 Childhood Lead
 Communicable Disease
 County-level Study
 Deaths
 Divorces (Dissolutions of Marriages)
 Emergency Room Visits

Managed Care Data and Consumer Guides
 Marriages
 Missouri Cancer Registry
 Health Care-Associated Infection Reporting (HAI)
 Missouri Child Health Assessment Program Survey (MoCHAPS)
 Missouri Hazardous Material Incident Surveillance (MHMIS)
 Missouri Health Care-Associated Infection Reporting System (MHIRS)
 Missouri Pregnancy Risk Assessment Monitoring System (PRAMS)
 Office of Surveillance
 Diseases/Conditions Annual Reports
 Patient Abstract System

Data & Statistics

- Profiles
- MICA
- Priorities MICA
- Community Health Improvement Resources (CHIR)
- Intervention MICA
- Births
- Deaths
- Patient Abstract System (PAS)
- Behavioral Risk Factor Surveillance System (BRFSS)
- County-Level Study (CLS)
- Healthcare-Associated Infection Reporting (HAI)
- ESSENCE

Related Links

- Cancer Registry
- Communicable Disease Reporting & Surveillance
- Birth Defects Registry
- Environmental Public Health Tracking



Missouri Opioids Information

DHSS Home » Data & Statistics » opioids

Combating the opioids crisis is a top priority for the Missouri Department of Health and Senior Services (DHSS). The department is working with sister state agencies, local health departments, hospitals, law enforcement and other partners to fight this modern plague. We know that every person saved from an overdose or connected with rehabilitation resources is a mother, father, sibling or child to someone else.

DHSS' efforts include a series of nine **Opioids Summits** being held around the state over the next few months. [Click here](#) for a video of the kick-off summit held in Springfield on July 20, 2017. We are also working to track **data** related to opioids misuse so we can see where our efforts are most needed and where we are making progress. Working with the governor's office and the legislature, we have helped enact new measures to save lives and improve the lives of those who struggle with opioid addiction. We've also partnered with the **MO HOPE Project** to help provide education and resources.

Recent News

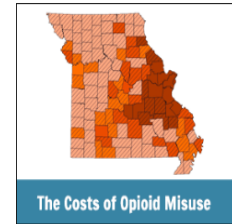
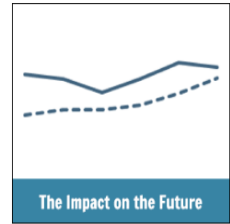
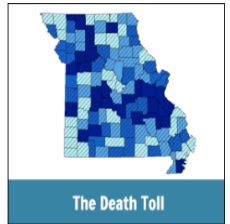
- [Naloxone Standing Order 9/19/17](#)
- [New measures in fight against opioids take effect today \(8/28/2017\)](#)
- [Missouri has new tools in the fight against opioid abuse \(8/1/2017\)](#)
- [Missourians are dying every day from opioid overdoses \(7/17/2017\)](#)



Missouri Opioids Dashboard

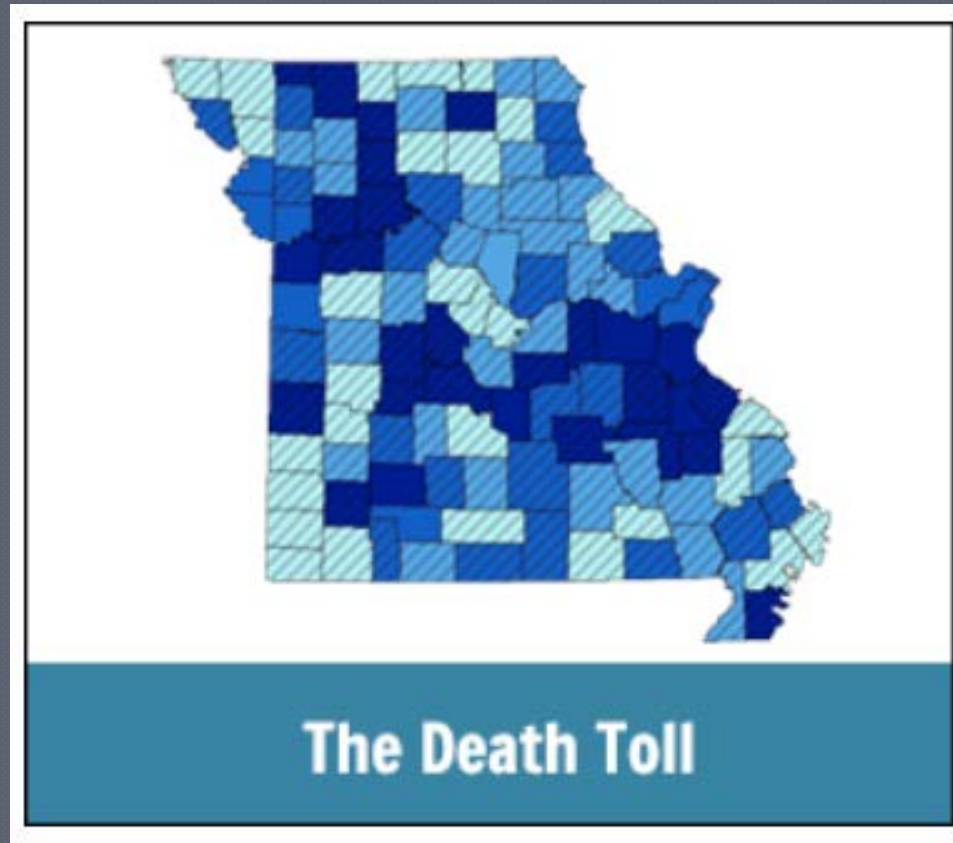
The data presented here are relevant to the opioid misuse epidemic in Missouri. These data tell a troubling story: the opioid epidemic affects all genders, all races, and many age groups in both rural and urban Missouri geographies. The impact is multi-dimensional and multi-generational. Trends indicate that the scourge of misuse in our state, and nationwide, continues to affect people across all demographics.

Clicking the images below will lead to detailed graphics and analysis that feature data from Missouri death certificates and Missouri hospital and emergency room records, among other sources.



Contact us for direct questions or more specific data requests.

Dashboard Section 1





Healthy Living

Senior & Disability Services

Licensing & Regulations

Disaster & Emergency Planning

Data & Statistics

The Death Toll

DHSS Home » Data & Statistics » opioids » death-toll

2016 Heroin and Opioid Overdose Deaths (infographic)

Mapping Overdose Deaths in Missouri

- [Deaths due to Opioid Overdoses 2012-2016 \(county map\)](#)
- [Deaths due to Opioid Overdoses by County of Residence 2012-2016 \(county data table\)](#)
- [Deaths due to Heroin Overdoses 2012-2016 \(county map\)](#)
- [Deaths due to Heroin Overdoses by County of Residence 2012-2016 \(county data table\)](#)
- [Deaths due to Non-Heroin Overdoses 2012-2016 \(county map\)](#)
- [Deaths due to Non-Heroin Overdoses by County of Residence 2012-2016 \(county data table\)](#)

Heroin and Non-Heroin Opioids

- [2016 Missouri Resident Overdose Deaths by Opioid Type \(chart\)](#)
- [2016 Missouri Resident Overdose Deaths by Age Group \(chart\)](#)
- [Quarterly Missouri Resident Heroin and Non-Heroin Opioid Deaths 2013-2017 \(chart\)](#)
- [Monthly Missouri Resident Heroin and Non-Heroin Opioid Deaths 2014-2017 \(chart\)](#)

Heroin Overdose Demographics

- [Missouri Resident Heroin Overdose Deaths by Gender and Race \(infographic\)](#)
- [Missouri Resident Heroin Overdose Deaths by Gender and Race \(chart\)](#)

Opioids

[Opioids Dashboard](#)

[Missouri Opioids Summits](#)

[Data](#)

[Recent News](#)

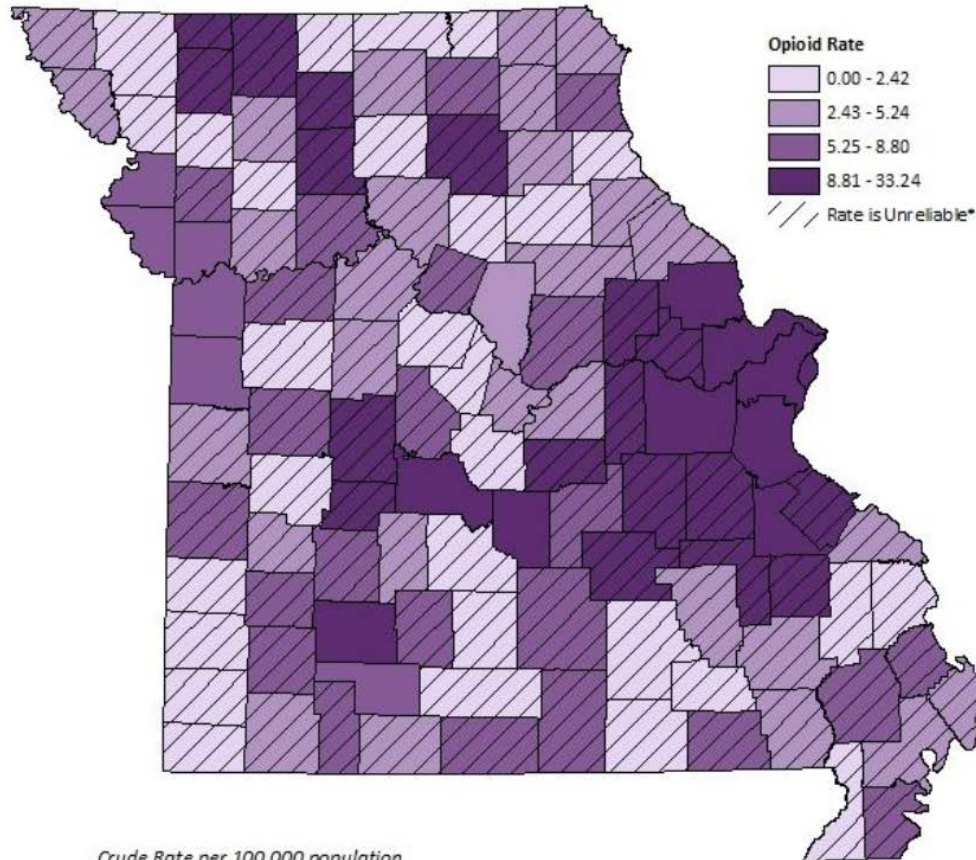
Contact Information

The Director's Office
Missouri Department of Health and Senior Services
PO Box 570
Jefferson City, MO 65102-0570

Telephone: 573-751-6002
Email: info@health.mo.gov

The Death Toll

Deaths Due to Opioid Overdoses 2012-2016



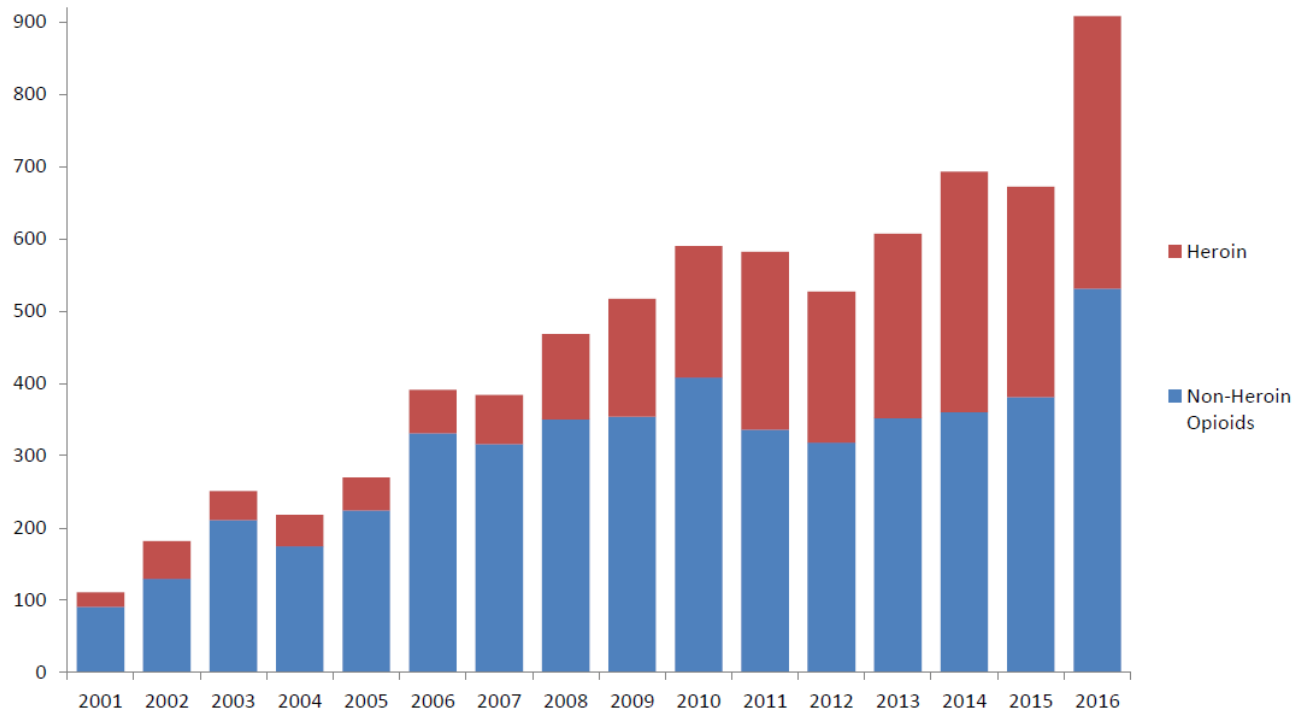
The majority of counties with high opioid-involved mortality rates are clustered in and to the south of the St. Louis metropolitan region, though some additional counties with high opioid-involved death rates can be found across the state. Missouri's metropolitan areas have consistently high rates of opioid-involved overdose mortality. It should be noted that many counties' death rates are based on fewer than 20 deaths and should be interpreted cautiously as mortality rates based on low counts can be unstable. Opioid-involved emergency room discharge rates follow a similar statewide distribution with the greatest rates in the St. Louis area; however, there is an additional cluster of high rates in the southwest region of the state.

Crude Rate per 100,000 population
* Numerator less than 20

Source: Bureau of Vital Statistics,
Missouri Department of Health and Senior Services

The Death Toll

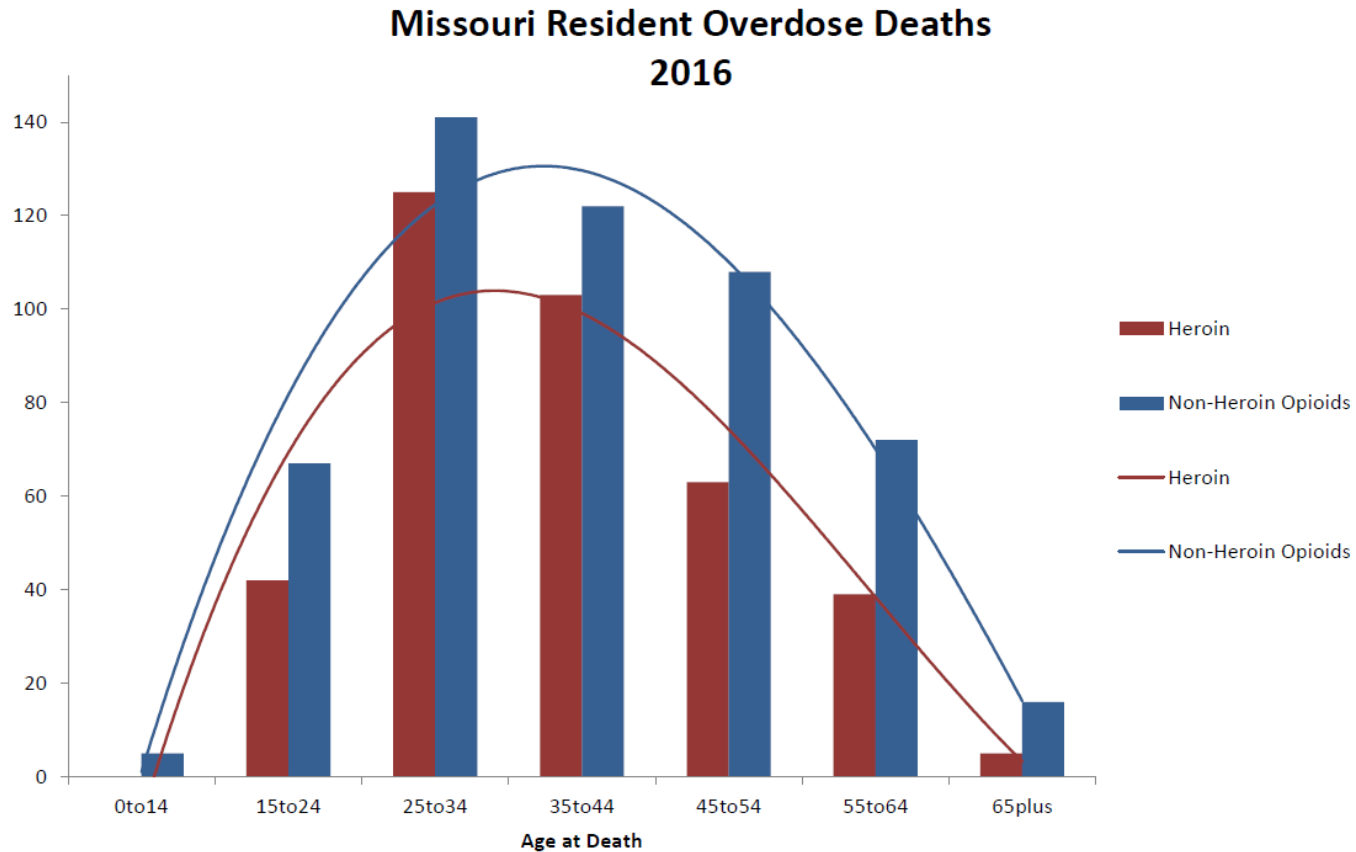
Missouri Resident Overdose Deaths



Source: Bureau of Vital Statistics, Missouri Department of Health and Senior Services

Opioid-involved overdose deaths in Missouri have been steadily climbing over the last 15 years. While overdose deaths due to non-heroin opioids remained relatively stable between 2006 and 2015, a large increase was observed in 2016. The number of heroin deaths has continued to increase rapidly.

The Death Toll

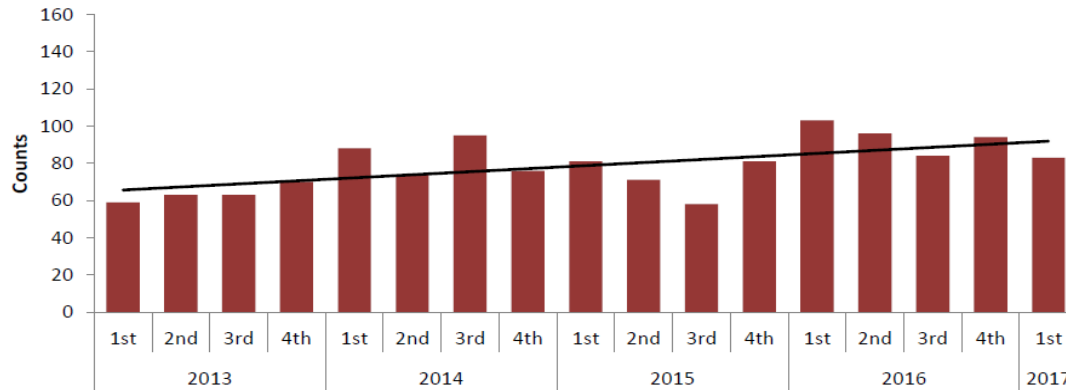


Source: Bureau of Vital Statistics, Missouri Department of Health and Senior Services

In contrast to previous years, Missouri opioid-involved overdose deaths show similar patterns for heroin and non-heroin opioids when comparing age groups. In 2016, the peak for both heroin- and non-heroin opioid- involved overdose deaths is in the 25 to 34 age group. From 2011-2015, the peak age group for non-heroin opioid-involved overdose deaths was 45 to 54. This drastic change indicates an increased popularity in taking strong prescription opioids among young adults.

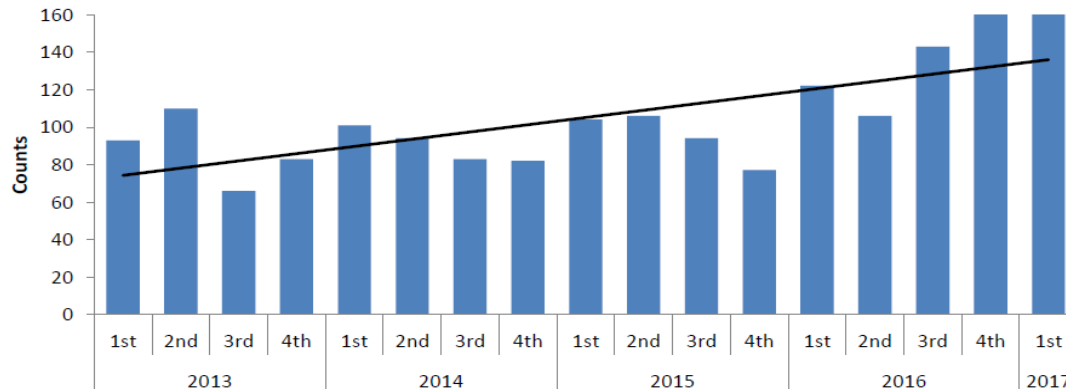
The Death Toll

Quarterly Missouri Resident Heroin Deaths



These charts track heroin- and non-heroin opioid-involved deaths by quarter. While there is a lot of fluctuation from quarter-to-quarter, the overall trend (represented by the black line) is increasing.

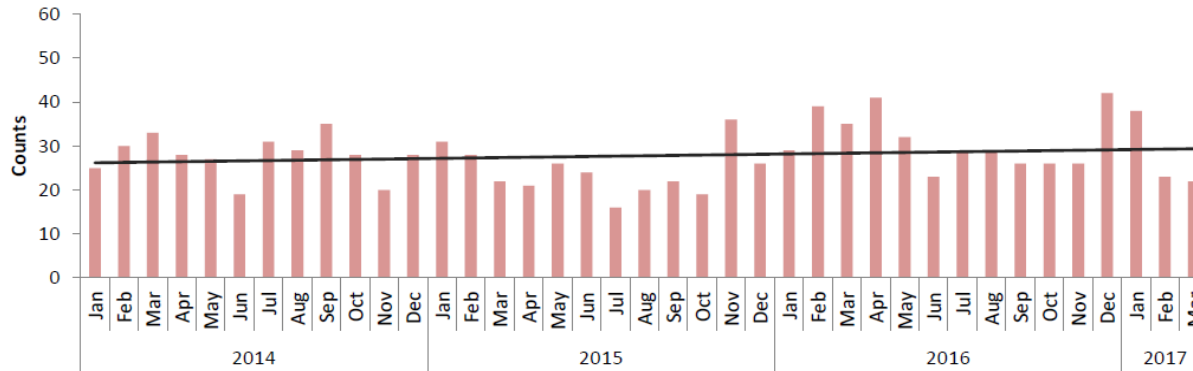
Quarterly Missouri Resident Non-Heroin Opioid Deaths



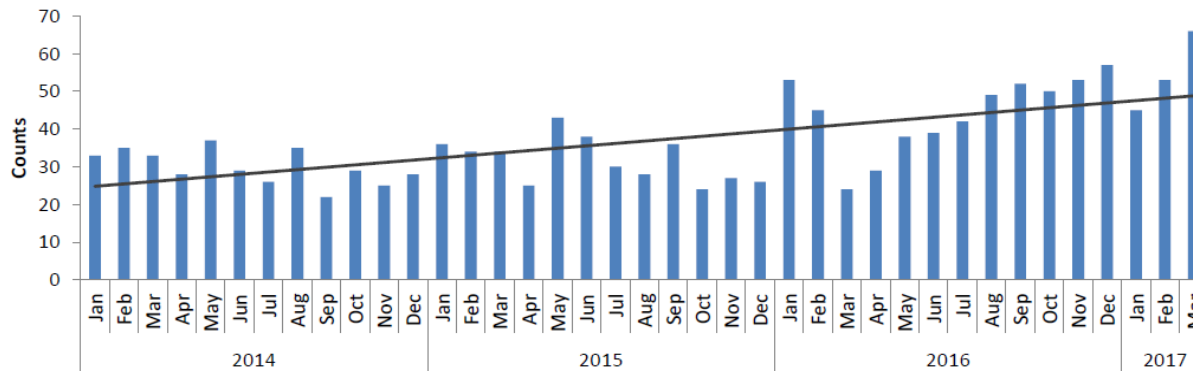
** 2017 data is provisional.*

The Death Toll

Monthly Missouri Resident Heroin Deaths



Monthly Missouri Resident Non-Heroin Opioid Deaths



These charts display the number of heroin- and non-heroin opioid-involved overdose deaths by month. There does not appear to be a pattern of seasonality; instead there is a steady rise over time punctuated by highs and lows. One example of a high is the spike in overdose deaths due to non-heroin opioids in January and February of 2016. The latter part of 2016 continued to increase with the provisional count of March 2017 reaching a new high. DHSS will continue to investigate through more discrete statistical analysis and continued collection of data to determine whether any consistent seasonal trends exist.

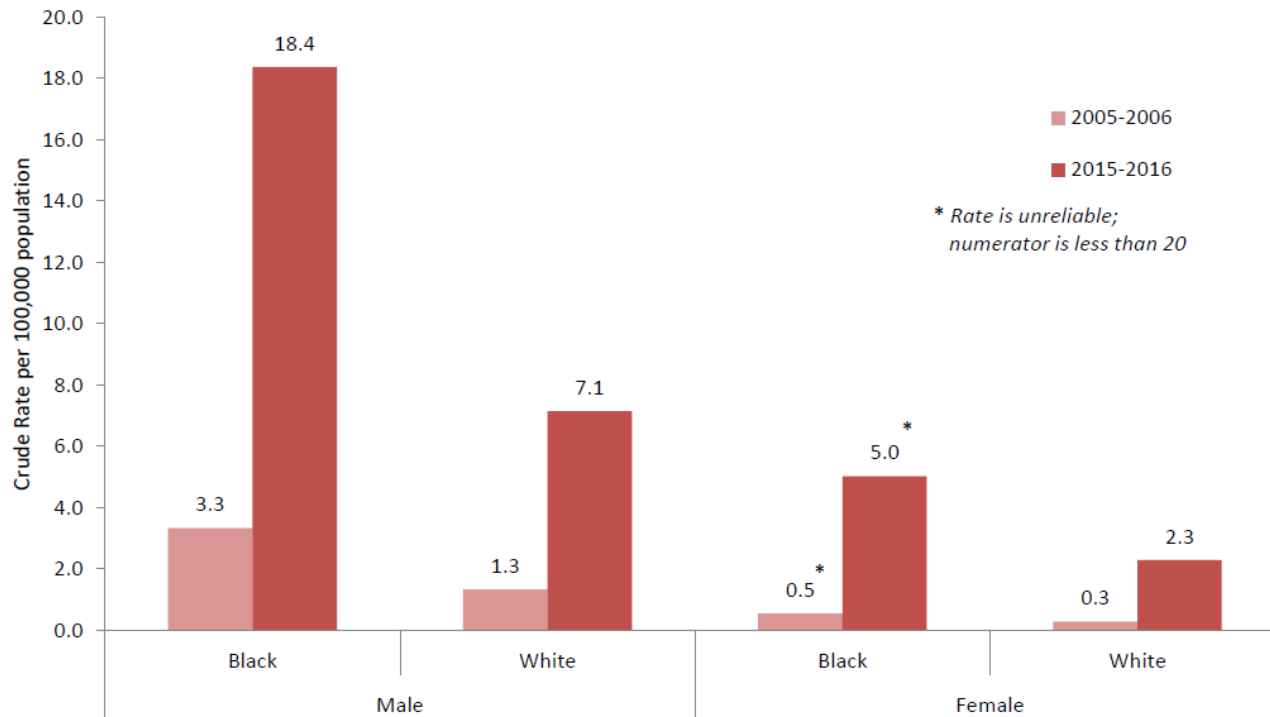
** 2017 data is provisional.*

Dashboard Section 2



An Epidemic Affecting Everyone

Missouri Resident Heroin Overdose Deaths by Gender and Race

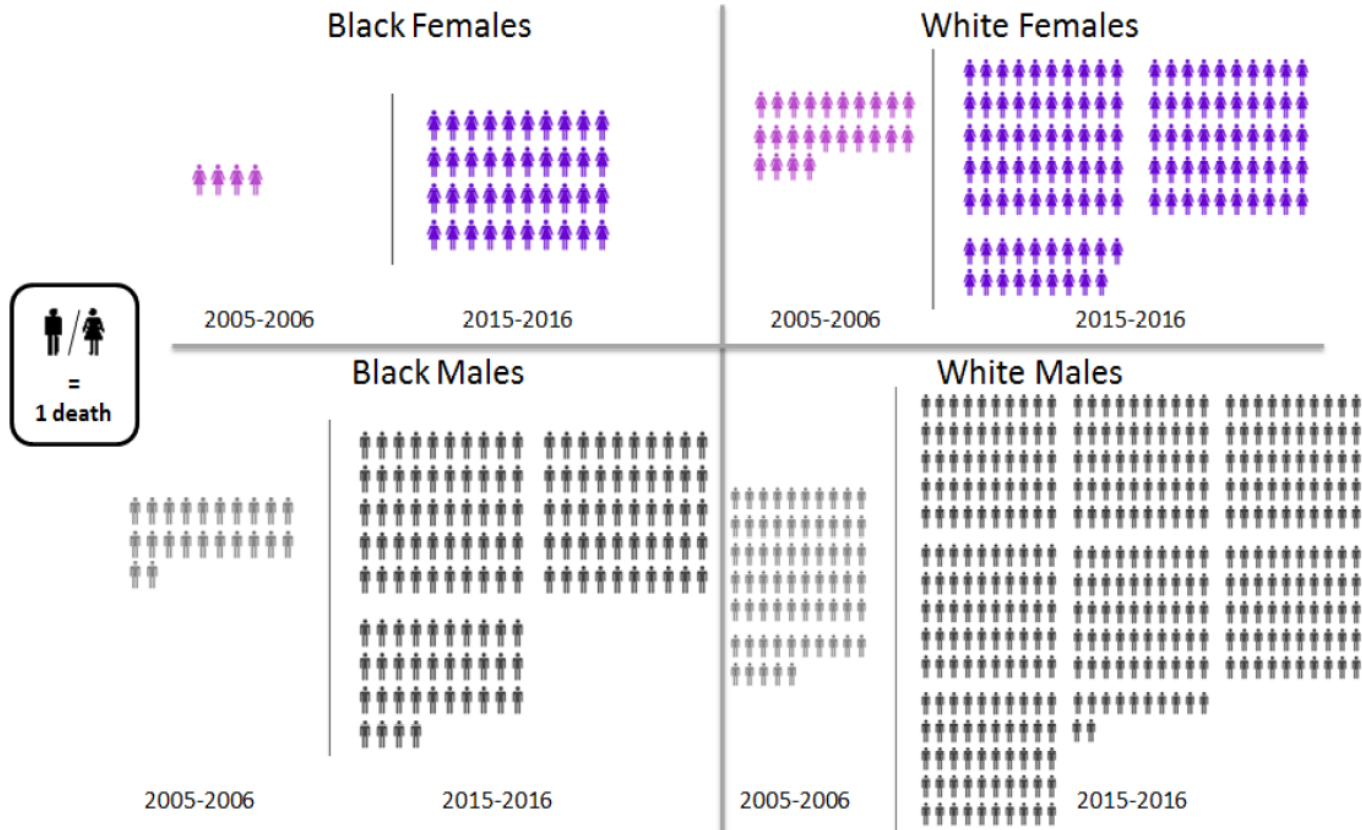


Source: Bureau of Vital Statistics, Missouri Department of Health and Senior Services

Statewide, male rates for heroin-involved overdose deaths are considerably higher than female rates. The rate for Black males is more than twice that of White males, almost four times that of Black females, and over eight times higher than White females for 2015-2016. While females experienced a larger percent change increase between 2005-2006 and 2015-2016, the male rates of heroin-involved overdoses are still much higher overall.

An Epidemic Affecting Everyone

Heroin Overdose Deaths

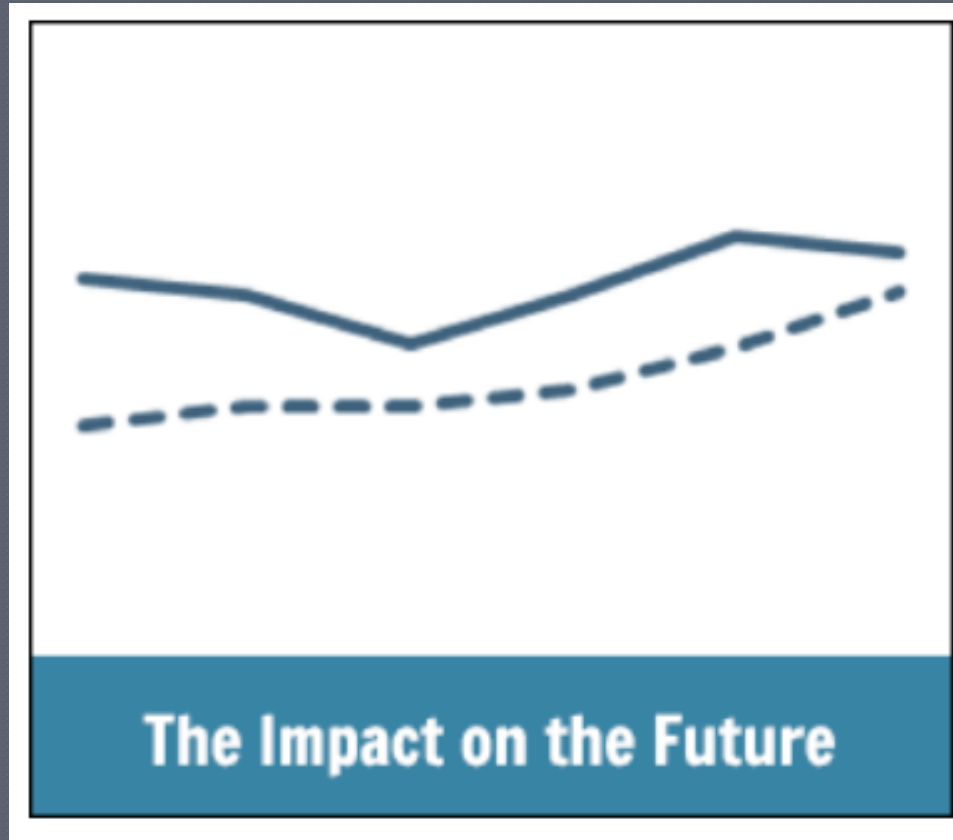


Source: Bureau of Vital Statistics, Missouri Department of Health and Senior Services

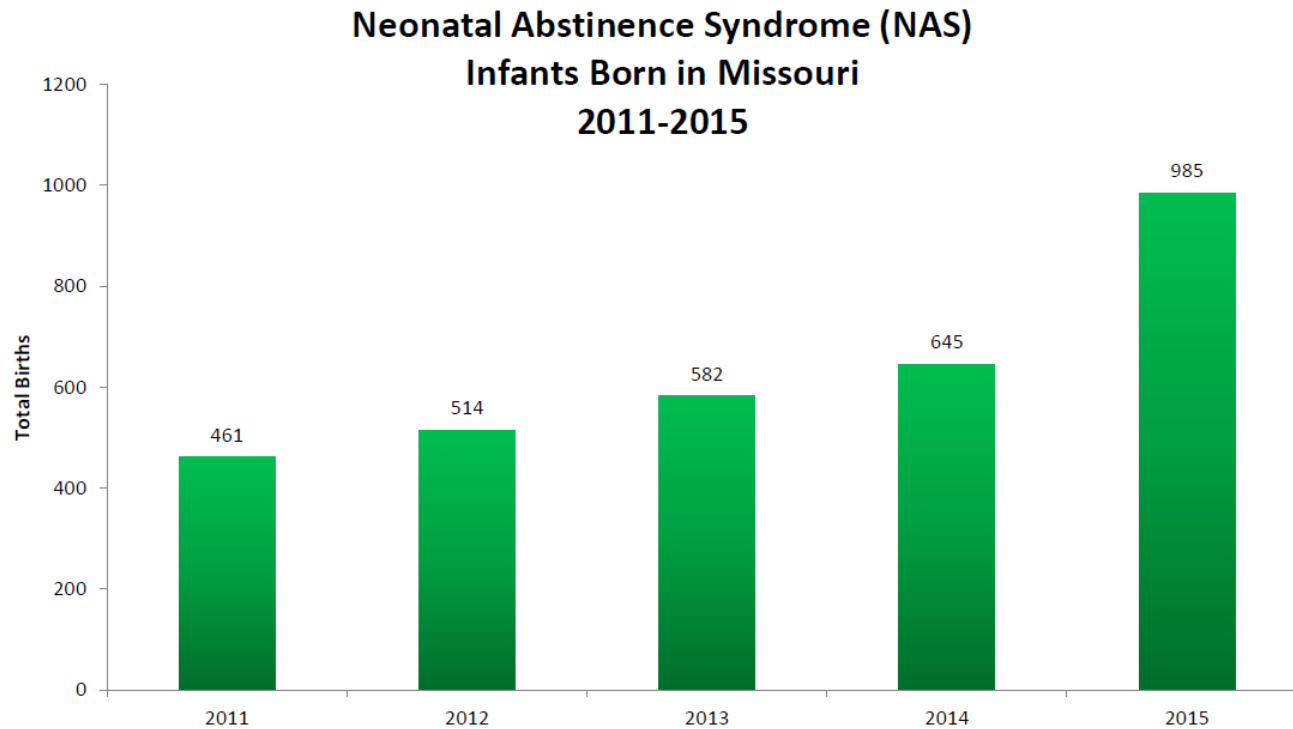
This infographic shows the number of heroin-involved overdose deaths in 2005-2006 compared to 2015-2016 (one figure equals one death) by race and sex. All demographic groups experienced large increases in mortality. Females, regardless of race, experienced a larger percent increase compared to males, with Black females showing the most severe increase.

Note: Due to small numbers and confidentiality, all other races have been excluded from the counts.

Dashboard Section 3



The Impact on the Future



Source: Bureau of Health Care Analysis and Data Dissemination, Missouri Department of Health and Senior Services

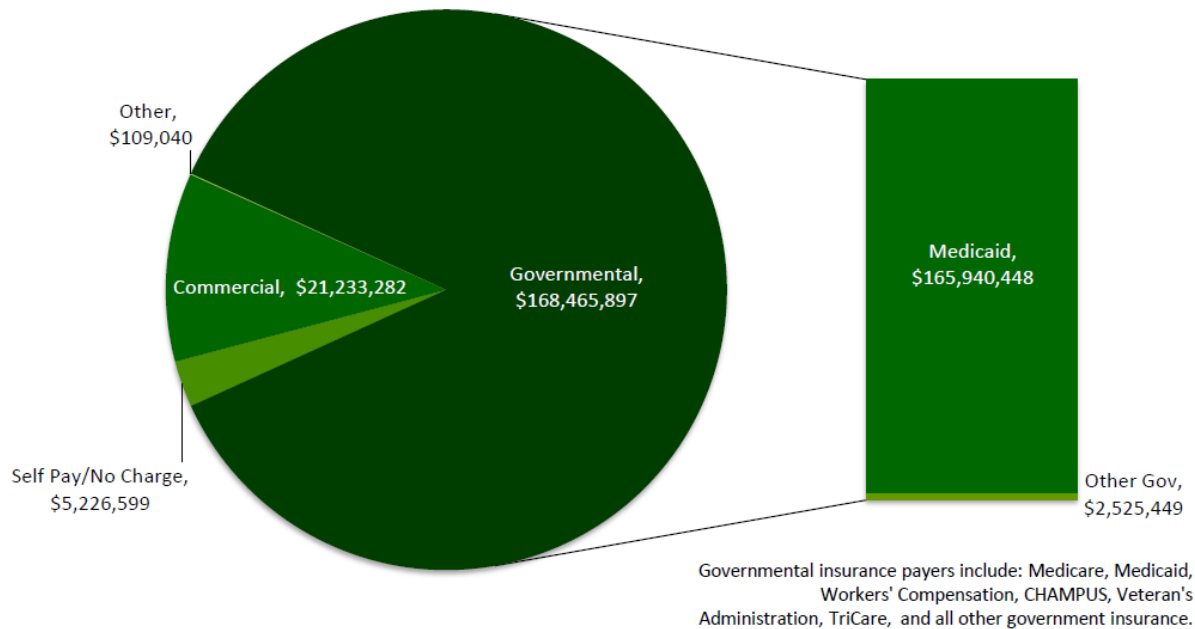
The age/sex distribution seen in the opioid discharges becomes especially concerning when focus shifts to another disturbing trend in Missouri. Neonatal Abstinence Syndrome (NAS)* occurs when a mother uses drugs in utero or passes the substance to her infant through breast milk or the placenta. The infant is born essentially withdrawing from the drug, causing a host of physical manifestations. As the chart** indicates, NAS rates are steadily increasing statewide. There was a 114% increase in NAS counts in just five years between 2011 and 2015.

* The NAS definition here includes all Missouri resident newborns with an ICD-9 code of 779.5 or 760.72 appearing anywhere on the newborn record or a record where the admission date was within the patient's first year of life.

** Data represented in this bar graph are de-duplicated counts of infants who were diagnosed with NAS within the first year of life. Infants with NAS could be discharged more than once, but, in this chart, each child is counted only once. Data for length of stay, charges, and insurance payer displayed in later charts in this section are based upon total discharges during the year; so potentially multiple records for the same child are included in those statistics. Also note that not all the NAS cases have associated charges. Charges associated with the newborn record (for patients with more than one discharge) are primarily used.

The Impact on the Future

Insurance Payers Missouri Resident NAS Discharges 2011-2015



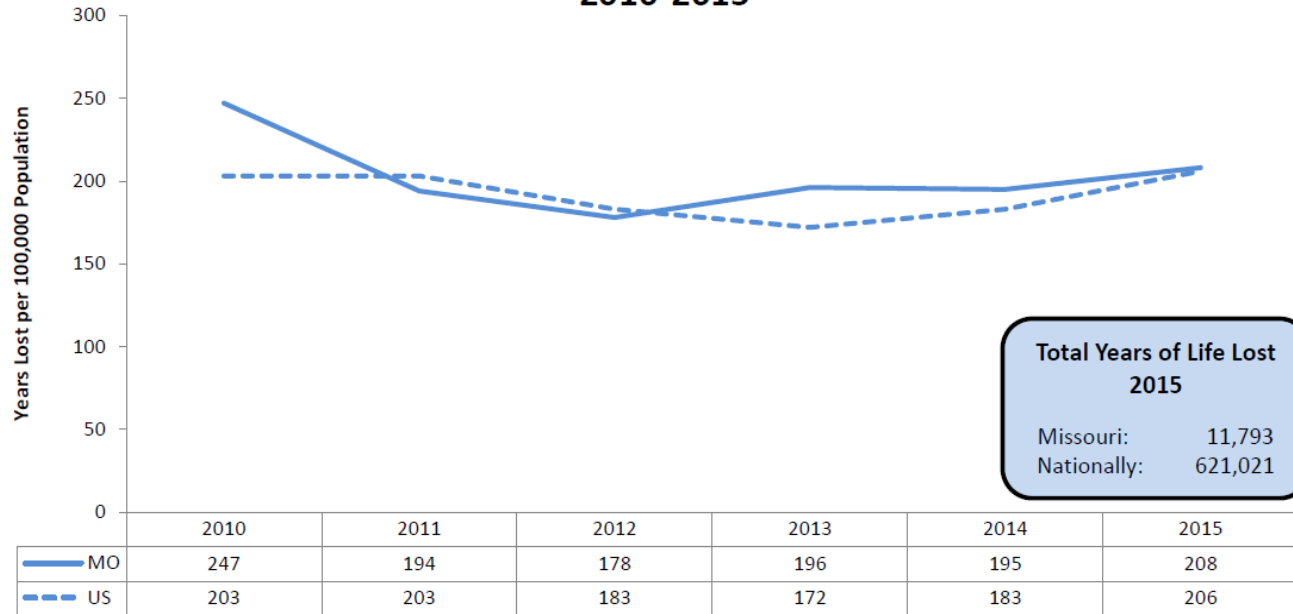
Source: Bureau of Health Care Analysis and Data Dissemination, Missouri Department of Health and Senior Services

For 2011 to 2015, the total cost of care for infants born with NAS was nearly \$196 million. Of the 83% of infants born with NAS who fell under governmental insurance, 99% were on Medicaid. It is important to note that the charges presented here were the initial charges associated with the visit and do not necessarily represent the cost to the hospital for providing the care nor do they represent the amount actually collected by the hospital for providing the care.

* Charts displaying NAS data for length of stay, charges, and insurance payer are based upon total discharges during the first year of life; so potentially multiple records for the same child are included in these statistics.

The Impact on the Future

Years of Potential Life Lost (YPLL) Due to Non-Heroin Opioid Overdose 2010-2015



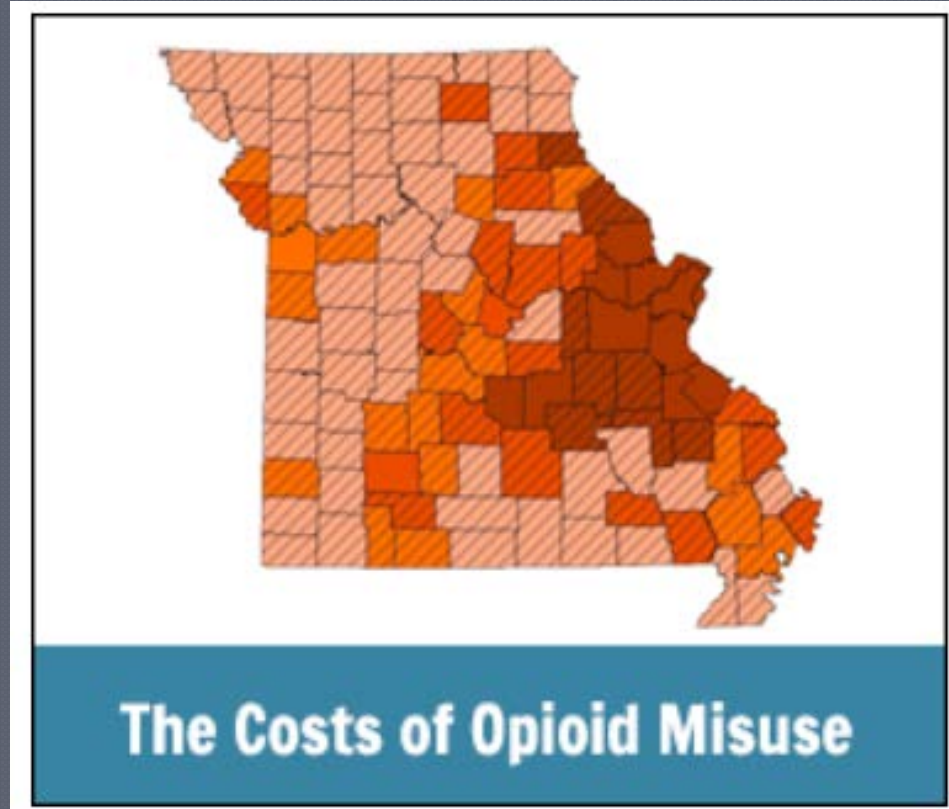
The Trend Line and Table reflect Years of Potential Life Lost per 100,000 Population

Source: Bureau of Vital Statistics, Missouri Department of Health and Senior Services and WONDER, Centers for Disease Control and Prevention

From 2010-2015, the Missouri and United States rates for Years of Potential Life Lost (YPLL) for non-heroin opioid-involved overdose were very similar. In 2015, the average age for non-heroin opioid-involved overdoses in Missouri was 43, whereas it was 44 years old for the nation*. A more elderly population uses non-heroin opioids; therefore, the average age of death is higher than for all opioids or just heroin.

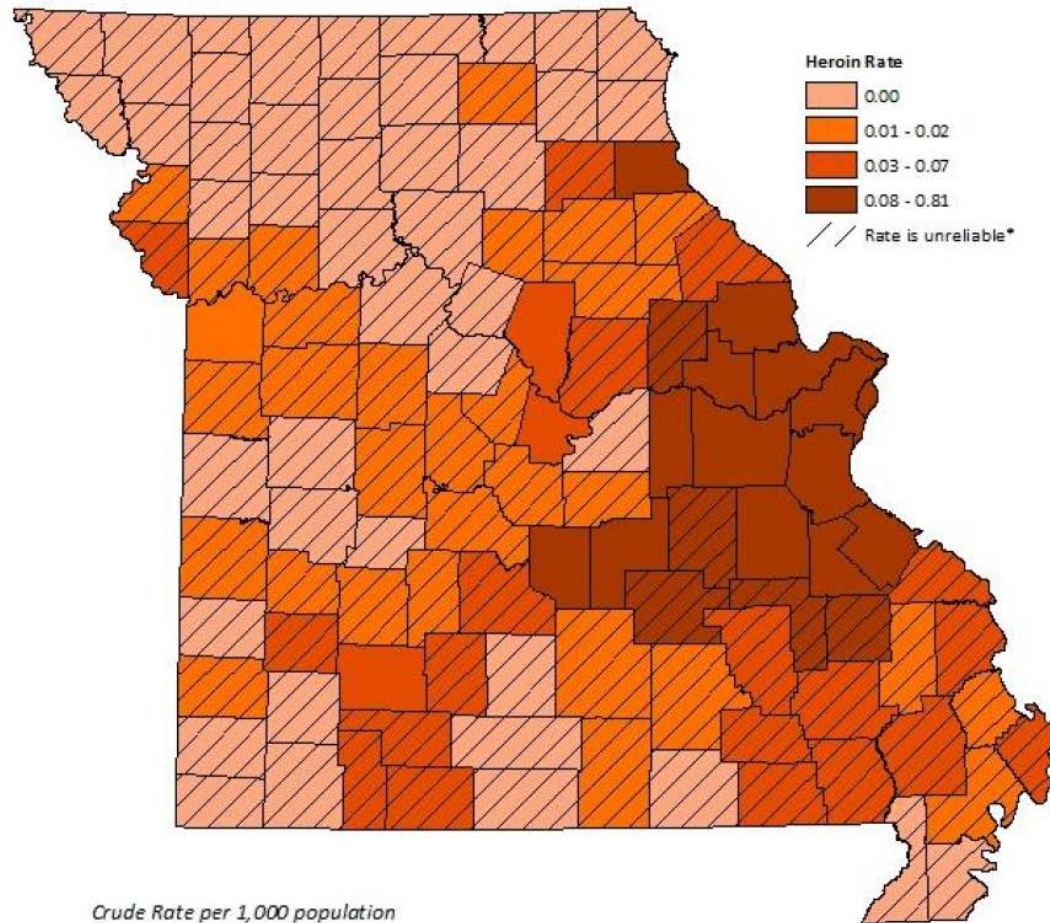
* U.S. figures have been adjusted to match Missouri's definition of heroin versus non-heroin opioids. In situations where the decedent had both heroin and non-heroin in system, Missouri counts that person in the heroin category but not in the non-heroin category. This is in order to avoid duplicate counts of death. U.S. non-heroin figures queried directly from CDC WONDER have not been adjusted; therefore they will not match the above reported numbers.

Dashboard Section 4



The Costs of Opioid Misuse

ER Visits Due to Heroin Misuse 2011-2015



Emergency room discharges due to a heroin-involved diagnosis roughly follow the same geographic trends as deaths due to heroin-involved overdose with the highest rates on the eastern side of the state around St. Louis. However, ER visits show an even more clearly defined line of high rates in counties extending from St. Louis southwest along the I-44 corridor.

Crude Rate per 1,000 population
** Numerator is less than 20*

The Costs of Opioid Misuse

ER Visits Due to Heroin Misuse by County of Residence 2011-2015

County	Counts	Rate	County	Counts	Rate	County	Counts	Rate	County	Counts	Rate
St. Louis City	1,295	0.81	Dade County	2	0.05*	Benton County	1	0.01*	Gentry County	0	0.00*
Jefferson County	560	0.51	Christian County	18	0.04*	Buchanan County	6	0.01*	Grundy County	0	0.00*
Franklin County	219	0.43	Laclede County	7	0.04*	Cass County	7	0.01*	Harrison County	0	0.00*
St. Louis County	1,629	0.33	Taney County	11	0.04*	Cedar County	1	0.01*	Henry County	0	0.00*
Lincoln County	83	0.31	Wayne County	3	0.04*	Dallas County	1	0.01*	Hickory County	0	0.00*
St. Francois County	102	0.31	Boone County	28	0.03	Howell County	2	0.01*	Holt County	0	0.00*
Warren County	52	0.31	Cape Girardeau County	11	0.03*	Jasper County	3	0.01*	Howard County	0	0.00*
St. Charles County	537	0.29	Carter County	1	0.03*	Johnson County	2	0.01*	Knox County	0	0.00*
Gasconade County	20	0.27	Platte County	16	0.03*	Lafayette County	1	0.01*	Lawrence County	0	0.00*
Ste. Genevieve County	20	0.22	Reynolds County	1	0.03*	Moniteau County	1	0.01*	Lewis County	0	0.00*
Iron County	10	0.19*	Stoddard County	4	0.03*	New Madrid County	1	0.01*	Linn County	0	0.00*
Pulaski County	49	0.18	Stone County	4	0.03*	Pettis County	2	0.01*	Livingston County	0	0.00*
Washington County	21	0.17	Webster County	5	0.03*	Ray County	1	0.01*	Macon County	0	0.00*
Marion County	23	0.16	Adair County	3	0.02*	Vernon County	1	0.01*	McDonald County	0	0.00*
Crawford County	18	0.15*	Audrain County	2	0.02*	Andrew County	0	0.00*	Mercer County	0	0.00*
Madison County	9	0.15*	Bollinger County	1	0.02*	Atchison County	0	0.00*	Newton County	0	0.00*
Phelps County	32	0.14	Camden County	5	0.02*	Barry County	0	0.00*	Nodaway County	0	0.00*
Montgomery County	8	0.13*	Clay County	19	0.02*	Barton County	0	0.00*	Oregon County	0	0.00*
Dent County	8	0.10*	Jackson County	68	0.02	Bates County	0	0.00*	Osage County	0	0.00*
Butler County	14	0.07*	Maries County	1	0.02*	Caldwell County	0	0.00*	Ozark County	0	0.00*
Cole County	27	0.07	Miller County	3	0.02*	Carroll County	0	0.00*	Pemiscot County	0	0.00*
Greene County	105	0.07	Monroe County	1	0.02*	Chariton County	0	0.00*	Putnam County	0	0.00*
Mississippi County	5	0.07*	Morgan County	2	0.02*	Clark County	0	0.00*	Saline County	0	0.00*
Perry County	7	0.07*	Polk County	3	0.02*	Clinton County	0	0.00*	Schuyler County	0	0.00*
Callaway County	14	0.06*	Ralls County	1	0.02*	Cooper County	0	0.00*	Scotland County	0	0.00*
Pike County	6	0.06*	Randolph County	2	0.02*	Daviess County	0	0.00*	St. Clair County	0	0.00*
Ripley County	4	0.06*	Scott County	3	0.02*	DeKalb County	0	0.00*	Sullivan County	0	0.00*
Shelby County	2	0.06*	Shannon County	1	0.02*	Douglas County	0	0.00*	Worth County	0	0.00*
			Texas County	3	0.02*	Dunklin County	0	0.00*	Wright County	0	0.00*

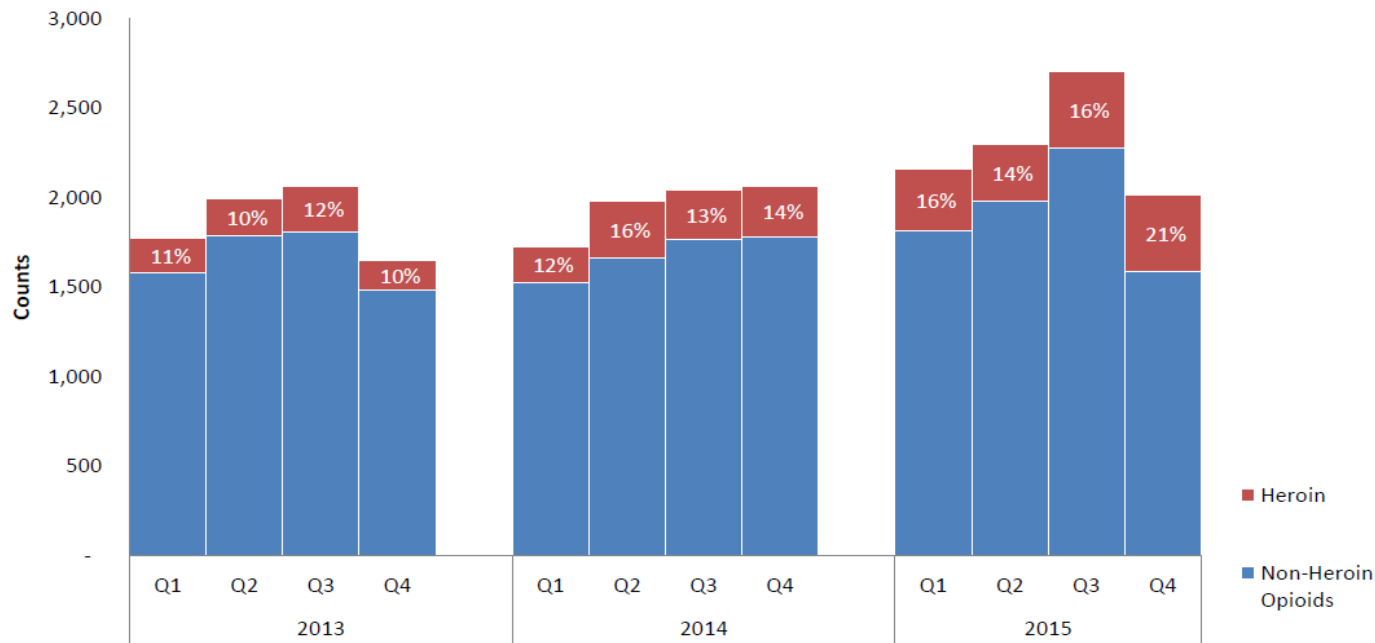
* Rate is unreliable; numerator is less than 20

Crude Rate per 1,000 population

Source: Bureau of Health Care Analysis and Data Dissemination, Missouri Department of Health and Senior Services

The Costs of Opioid Misuse

Missouri Opioid Misuse Emergency Room Discharges 2013-2015

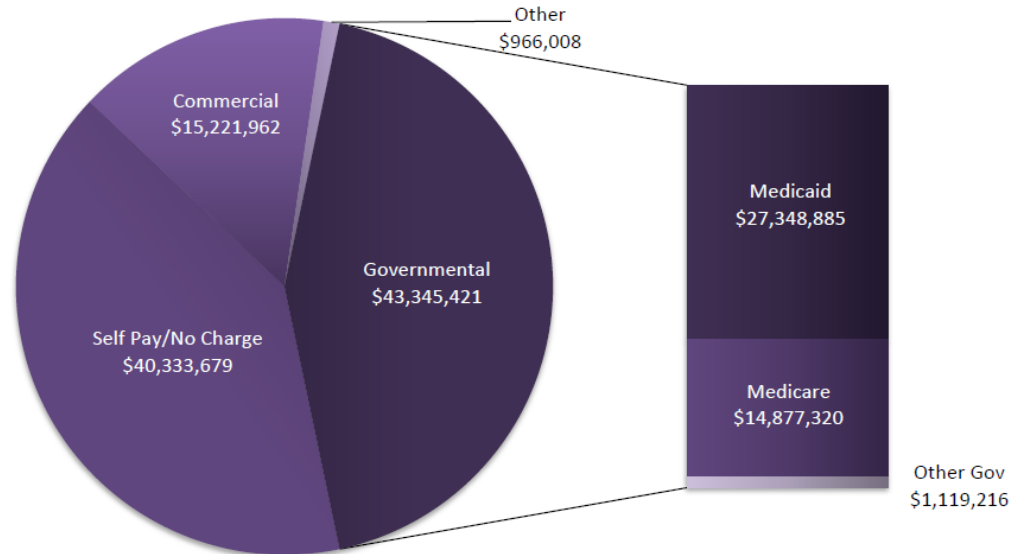


Source: Bureau of Health Care Analysis and Data Dissemination, Missouri Department of Health and Senior Services

Heroin is increasingly becoming more frequent among opioid-involved discharge diagnosis. While the large majority of opioid-involved discharges are still due to non-heroin opioids, there has been a gradual increase in heroin-involved ER visits. They increased from 11% of all cases in first quarter of 2013 to as high as 21% in the fourth quarter of 2015.

The Costs of Opioid Misuse

Insurance Payers Missouri Opioid Misuse Emergency Room Discharges 2011-2015



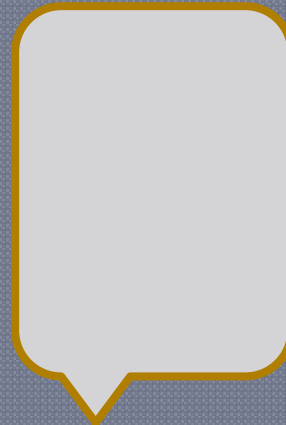
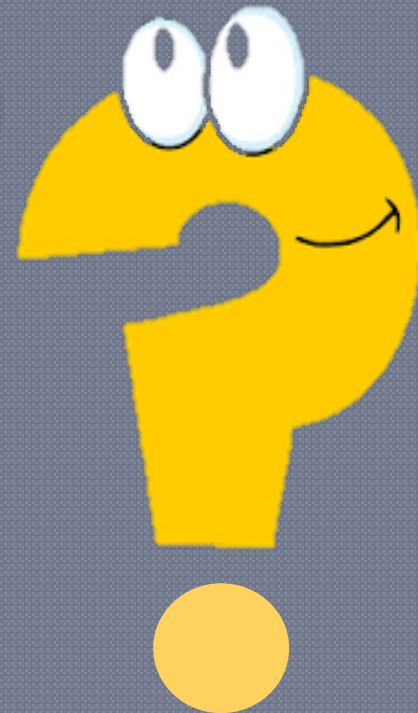
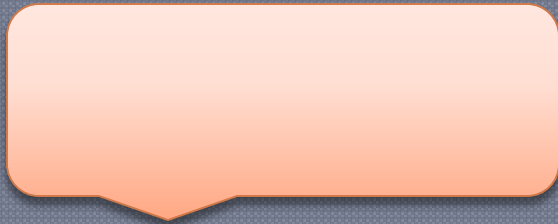
Governmental insurance payers include: Medicare, Medicaid, Workers' Compensation, CHAMPUS, Veteran's Administration, TriCare, and all other government insurance.

**Estimated Emergency Room
Charge Total:
\$99,867,070**

Source: Bureau of Health Care Analysis and Data Dissemination, Missouri Department of Health and Senior Services

Combining the five most recent years, charges for opioid-involved emergency room discharges of Missouri residents were nearly \$100 million. More than 43% of that was paid through governmental insurance sources, with the greatest piece of that subcategory being paid through Medicaid coverage. A large proportion of charges falls in the self-pay/no charge category. This indicates a large amount of the cost of opioid-involved overdoses is either being paid out-of-pocket by patients or being absorbed by hospital safety nets. It is important to note that the charges presented here were the initial charges associated with the visit and do not necessarily represent the cost to the hospital for providing the care nor do they represent the amount actually collected by the hospital for providing the care.

Questions/Comments?





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