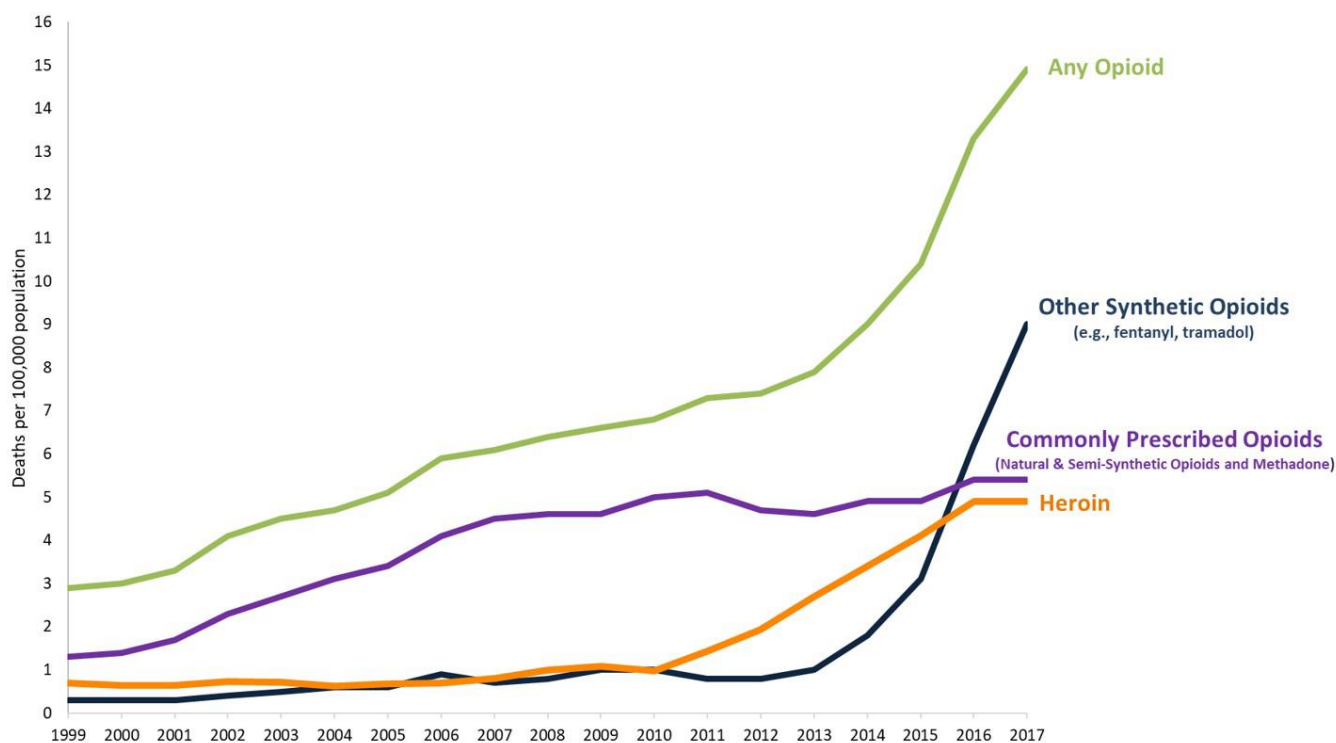


# Opioid Poisoning Deaths, Emergency Department Visits, Hospitalizations, and Substance Abuse Treatment Admissions in Shasta County

## Introduction

The National Survey on Drug Use and Health estimates that in 2016 over 130 people died per day from opioid related drug overdoses, 11.5 million people misused prescription opioids, and 81,000 people used heroin for the first time (NSDUH, 2017). The Centers for Disease Control and Prevention (CDC) reports that between 1999 and 2016, 630,000 people died from a drug overdose in the United States and the number of overdose deaths involving opioids (including prescription opioids and illegal opioids like heroin and illicitly manufactured fentanyl) was 5 times higher in 2016 than in 1999 (CDC, 2018).

Overdose Death Rates Involving Opioids, by Type, United States, 2000-2017



SOURCE: CDC/NCHS, National Vital Statistics System, Mortality. CDC WONDER, Atlanta, GA: US Department of Health and Human Services, CDC; 2018. <https://wonder.cdc.gov/>.



Substance abuse disorders also have serious economic consequences resulting in health care expenses, criminal justice involvement and lost productivity. The total economic burden of prescription opioid abuse in the U.S. was \$78.5 billion in 2013 (Florence, CS et al, 2016). In Shasta County, opioid-related hospitalization charges alone averaged over \$2.9 million per year in 2015-2017 (California Office of Statewide Health Planning and Development (OSHPD), 2015-17). Opioid-related deaths resulted in approximately 1.68 million person-years of life lost in 2016 in the US, approximately two-thirds (1.13 million) to men (Gomez et al., 2018).

In 2017, 198,560 prescriptions for opioids were filled by Shasta County Residents, representing a 9% decrease from 2016. The top five prescribed opioid in 2017 were hydrocodone (55% of all opioid prescriptions filled),

tramadol (14%), oxycodone (12%), morphine (6%), and buprenorphine (4%). The average prescription in Shasta County was filled for 85 pills, which corresponds to over 14 million pills in one year. This is more than 70 pills for every Shasta County resident in 2017 (Controlled Substance Utilization Review and Evaluation System (CURES); data provided by the California Department of Justice).

One hundred and one of the 212 drug poisoning deaths to Shasta County Residents between 2013 and 2017 (48%) included one or more opioids as a contributing cause of death. Unlike nationwide trends, Shasta County has seen a slight reduction in opioid poisoning deaths from 14.0 per 100,000 in 2008-2012 to 11.3 per 100,000 in 2013-2017. This change is not statistically significant.

The terms opiate and opioid are used interchangeably by many. The technical definition of opiate is a drug originating from a naturally-occurring alkaloid of the opium poppy, such as opium, morphine, or codeine. An opioid is a synthetic or semi-synthetic drug such as oxycodone, fentanyl, or methadone that produces opiate-like results. In this report, the term opioid is used throughout to refer to all natural opiates and synthetic and semi-synthetic opioids.

## Methods

Data on opioid-poisoning deaths was collected from the California Comprehensive Death File (CCDF). Emergency department (ED) and hospitalization data was collected from the California Office of Statewide Health Planning and Development (OSHPD). Data on Substance Use Disorder (SUD) treatment admission was collected from the California Outcomes Measurement System (CalOMS). Population data was provided by the California Department of Finance population projections.



For this report, five-year periods of 2008-2012 and 2013-2017 are compared. Five-year averages were used to increase the ability to detect meaningful differences and minimize the effect of random variation that can be amplified by the relatively low number of annual counts for some of the categories. Z-tests were used to detect statistical differences at the 95% confidence level.

Descriptive statistics were compared throughout this report on the following demographic variables: opioid sub-type, gender, race/ethnicity, age group, and ZIP code. Additionally, education level was compared for opioid-poisoning deaths and SUD treatment admissions, but was unavailable for ED visits or hospitalizations.

For deaths, Shasta County residents who died outside of Shasta County are included in this report and residents of other counties who died within Shasta County are excluded. Out-of-state deaths to Shasta County residents (2008-2016) are also included, but 2017 out-of-state death data was not available at publication. This report includes all ED visits and hospitalizations by Shasta County residents to hospitals licensed to provide emergency medical services within California. Out-of-state ED visits and hospitalizations are excluded. For SUD treatment, only those admissions to Shasta County providers that receive any public funding to provide SUD treatment are included. Admissions for clients with a Shasta County or missing ZIP code, and

those listed as homeless are included. Clients with a non-Shasta County ZIP code are excluded, as are admissions to any provider outside of Shasta County.

## Opioid poisoning deaths

The CCDF data contains demographic information of the decedent, as well as underlying and contributing causes of death, and opioid sub-type involved. Deaths from the five-year periods of 2008-2012 (N=124) and 2013-2017 (N=101) are compared. For 2013-2017, 34 poisoning deaths did not identify any specific substance(s) in the contributing cause of death (i.e. polypharmacy, multiple drugs, mixed drugs and alcohol, etc.). These deaths are not included in opioid poisoning deaths.

Just under half of the 212 drug poisoning deaths for 2013-2017 included one or more opioid (48%). Approximately 56% of opioid poisoning deaths were among males (n=57), and although males had a higher rate compared to females, the gap is narrowing (the 2013-2017 rate for males was 1.3 times that of females, down from 2.1 for 2008-2012; **Table 1**). The decrease in opioid poisoning death rate for males (19.1 to 13.0 per 100,000) is statistically significant at the 95% confidence level.

Most deaths were among Non-Hispanic Whites (96%), with the remaining 4% being Hispanic. Non-Hispanic Whites also had a higher rate (13.4 per 100,000) than Hispanics. As the

**Demographic Characteristics of Opioid Poisoning Deaths (2008-2012, 2013-2017)**

Table 1	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
<b>Gender</b>						
Male	83	19.1	15.0-23.2	57	13.0	9.6-16.4
Female	41	9.1	6.3-11.9	44	9.7	6.8-12.6
<b>Total</b>	<b>124</b>	<b>14.0</b>	<b>11.5-16.5</b>	<b>101</b>	<b>11.3</b>	<b>9.1-13.5</b>
<b>Race/Ethnicity</b>						
Non-Hispanic White	114	15.6	12.7-18.4	97	13.4	10.7-16.1
Hispanic	5	6.7	0.8-12.6	4	4.8	0.1-9.4
Other	5	6.4	0.8-11.9	0	N/A	N/A
<b>Total</b>	<b>124</b>	<b>14.0</b>	<b>11.5-16.5</b>	<b>101</b>	<b>11.3</b>	<b>9.1-13.5</b>
<b>Age</b>						
15-24	15	12.9	6.4-19.4	6	5.0	1.0-9.1
25-34	21	20.9	11.9-29.8	22	20.7	12.0-29.3
35-44	20	20.6	11.6-29.6	16	17.1	8.7-25.4
45-54	30	22.7	14.6-30.8	24	20.9	12.6-29.3
55-64	26	20.3	12.5-28.1	28	21.7	13.7-29.8
65+	12	8.0	3.5-12.5	5	2.9	0.4-5.4
<b>Total</b>	<b>124</b>	<b>14.0</b>	<b>11.5-16.5</b>	<b>101</b>	<b>11.3</b>	<b>9.1-13.5</b>
<b>Education Level (25+) *</b>						
Less than HS Graduate	20	27.9	15.7-40.1	15	25.1	12.4-37.8
HS Graduate/GED	58	36.0	26.8-45.3	40	25.2	17.4-33.0
Some College/AA	27	10.9	6.8-15.0	31	11.0	7.1-14.8
Bachelor's Degree or higher	4	3.3	0.1-6.6	4	3.1	0.1-6.1
Unknown	0	N/A	N/A	5	N/A	N/A
<b>Total</b>	<b>109</b>	<b>12.3</b>	<b>10.0-14.6</b>	<b>95</b>	<b>10.7</b>	<b>8.5-12.8</b>

\* Does not include cases under 25 years old

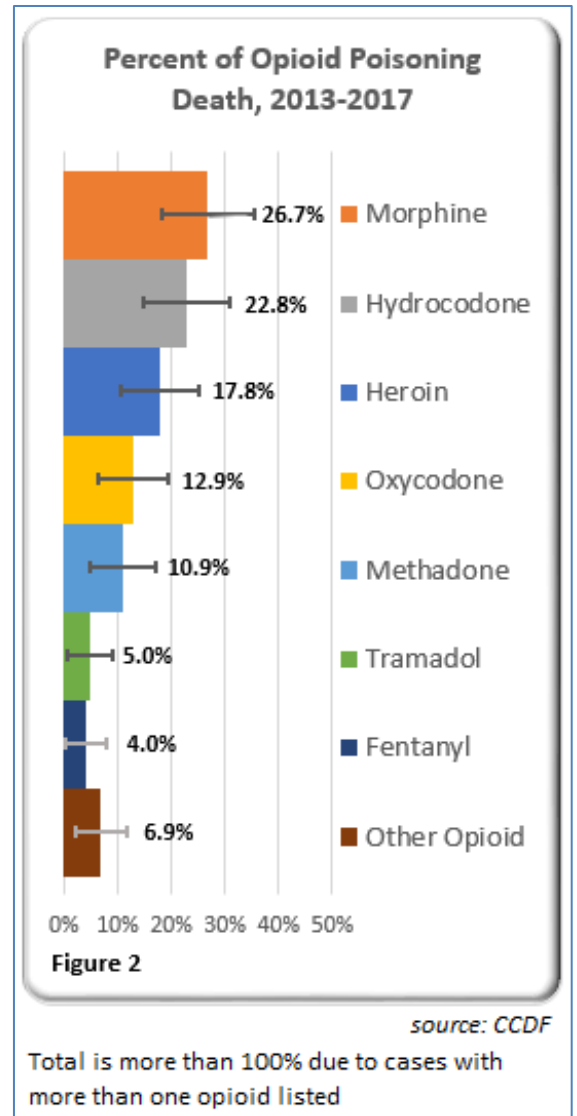
source: CCDF

counts for all other racial groups/ethnicities were less than 20, these rates should be considered unstable.

Over half of all opioid poisoning deaths were to residents between the ages of 45 and 64 (n=52), an age group that only accounts for 27% of the population. The decrease in the opioid poisoning death rate for the 15-24 age group (12.9 to 5.0 per 100,000) is statistically significant at the 95% confidence level.

The rate for opioid poisoning deaths was highest for those with a high school diploma/GED, or less than a high school diploma (25.2 and 25.1 per 100,000 respectively). Residents with some college or an associate’s degree, or a bachelor’s degree or higher had rates that were much lower (11.0 and 3.1 per 100,000 respectively).

Information regarding the specific opioids used was also provided. At least one natural and/or semi-synthetic opioid (ICD 10 code T40.2) was found in 58% of opioid poisoning deaths (n=59). Included in this sub-type were codeine, hydrocodone, hydromorphone, morphine, oxycodone, and oxymorphone. This was followed by heroin (ICD 10 code T40.1, n=18, 18%), methadone (ICD 10 code T40.3, n=11, 11%), and synthetic opioids other than methadone (ICD 10 code T40.6, n=11, 11%; **Table 2**). This sub-type included acetyl fentanyl, buprenorphine, fentanyl, and tramadol. An additional 12 deaths did not identify a specific opioid.



From 2008-2012 to 2013-2017, deaths from natural/semi-synthetic opioids, methadone, and synthetic opioids decreased, while heroin deaths increased. The increase in heroin poisoning deaths and the decrease in

**Opioid Sub-type in Opioid Poisoning Deaths (2008-2012, 2013-2017)\***

Table 2	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Natural/Semi-Synthetic Opioids	73	8.2	6.4-10.1	59	6.6	4.9-8.3
Heroin	4	0.5	0-0.9	18	2.0	1.1-3.0
Methadone	53	6.0	4.4-7.6	11	1.2	0.5-2.0
Sythetic Opioids other than Methadone	14	1.6	0.8-2.4	11	1.2	0.5-2.0
Other or Unknown opioids	1	0.1	0-0.3	12	1.3	0.6-2.1

\* Cause of death may indicate more than one type of opioid found

source: CCDF

methadone poisonings are both statistically significant changes at the 95% confidence level.

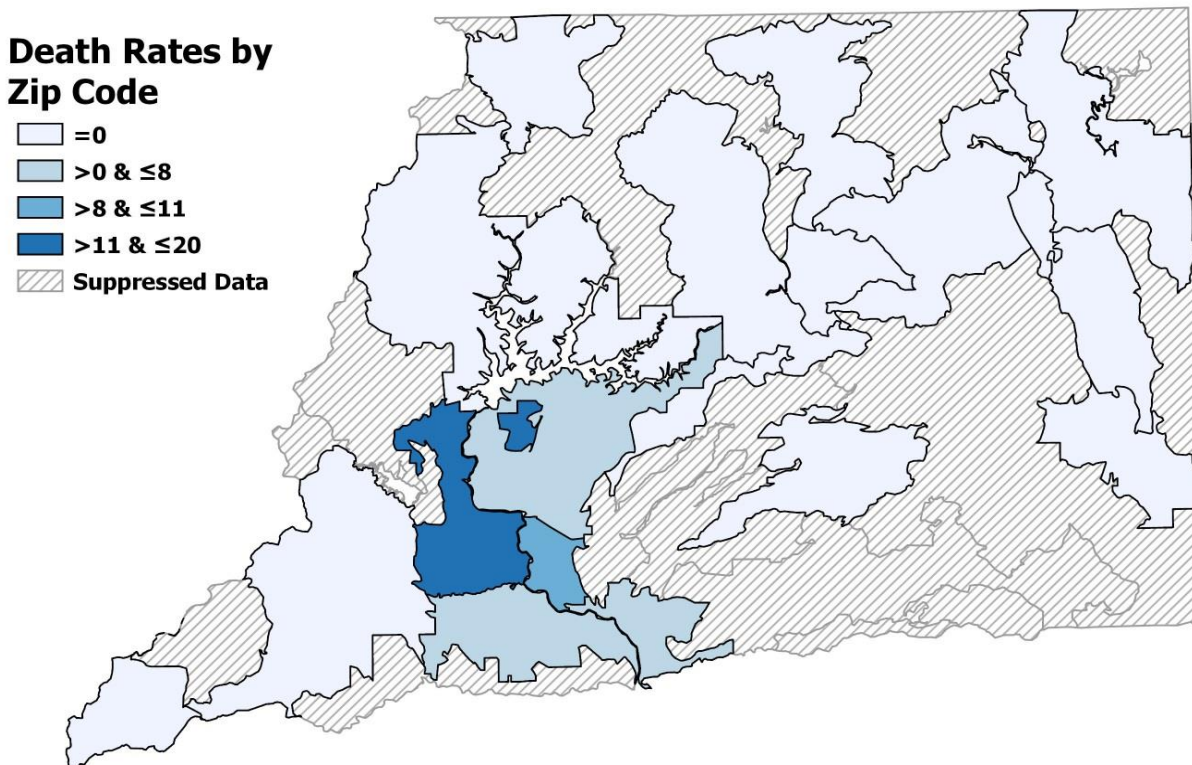
Examining opioid type (i.e. prescription vs. illicit opioids) and intent of use (i.e. intentional or unintentional poisoning) can provide insight into how



deaths (including mixed) has increased from four for 2008-2012 (3%) to eighteen for 2013-2017 (18%). This may be due the limits that prescribers are placing on prescription opioids, making them harder to obtain and the relative availability of illicit opioids.

The geographic distribution of opioid poisoning deaths for 2013-2017 is presented on **Map 1**, and **Table 4** below. Eighty-six percent of opioid poisoning deaths were concentrated in the three incorporated cities of Shasta County: Redding (96001, 96002, and 96003), Anderson (96007), and Shasta Lake (96019). These five ZIP codes account for 81% of Shasta County's population. The highest rates, among ZIP codes with 15 or more deaths between 2013 and 2017, were in Redding 96001 (19.8 per 100,000) and Shasta Lake (19.8 per 100,000). Several ZIP codes had no opioid poisoning deaths in the five-year period, represented in light blue on the map. The ZIP codes listed as suppressed each totaled less than five opioid poisoning death and together totaled 14 for the five-year period (13% of opioid poisoning deaths).

**Map 1. Shasta County Average Annual Opioid Poisoning Death Rates by ZIP Code, 2013-2017 (per 100,000 Residents)**



source: CCDF

There were no statistically significant changes in the rate of opioid poisoning deaths for any Shasta County ZIP code or for the county as a whole from 2008-2012 to 2013-2017. ZIP codes with counts of less than five deaths are indicated by an asterisk in **Table 4**.

**Opioid Poisoning Deaths by Shasta County ZIP Code (2008-2012, 2013-2017)**

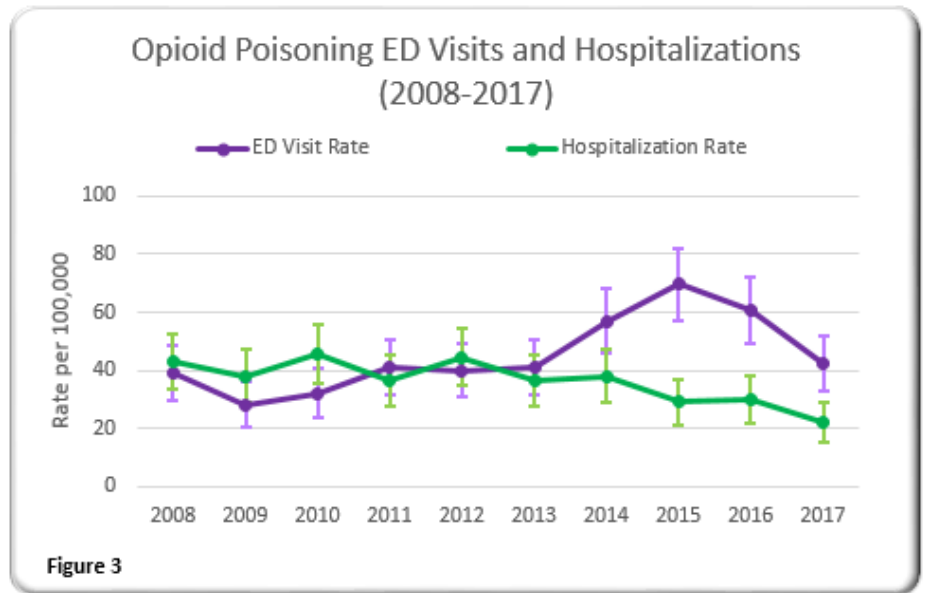
Table 4	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Redding - 96001	30	17.7	11.4-24.1	34	19.8	13.2-26.5
Redding - 96002	19	11.4	6.3-16.5	17	10.3	5.4-15.2
Redding - 96003	29	12.8	8.1-17.5	17	7.6	4.0-11.2
Anderson - 96007	15	13.5	5.3-18.0	9	7.7	2.7-12.7
Bella Vista - 96008	0	0.0	N/A	0	0.0	N/A
Big Bend - 96011	*	*	*	0	0.0	N/A
Burney - 96013	*	*	*	0	0.0	N/A
Cassel - 96016	0	0.0	N/A	0	0.0	N/A
Castella - 96017	0	0.0	N/A	0	0.0	N/A
Shasta Lake - 96019	12	23.7	10.3-37.2	10	19.8	7.5-32.0
Cottonwood - 96022	*	*	*	*	*	*
Fall River Mills - 96028	0	0.0	N/A	0	0.0	N/A
French Gulch - 96033	0	0.0	N/A	*	*	*
Hat Creek - 96040	0	0.0	N/A	0	0.0	N/A
Igo - 96047	*	*	*	0	0.0	N/A
Lakehead - 96051	*	*	*	0	0.0	N/A
McArthur - 96056	0	0.0	N/A	*	*	*
Millville - 96062	0	0.0	N/A	*	*	*
Montgomery Creek - 96065	*	*	*	0	0.0	N/A
Oak Run - 96069	*	*	*	*	*	*
Old Station - 96071	0	0.0	N/A	0	0.0	N/A
Palo Cedro - 96073	*	*	*	*	*	*
Platina - 97076	0	0.0	N/A	0	0.0	N/A
Round Mountain - 96084	*	*	*	0	0.0	N/A
Shasta - 96087	*	*	*	*	*	*
Shingletown - 96088	*	*	*	*	*	*
Whitmore - 96096	*	*	*	0	0.0	N/A
<b>Total</b>	<b>124</b>	<b>14.0</b>	<b>11.3-16.2</b>	<b>101</b>	<b>11.3</b>	<b>9.1-13.5</b>

\* Counts below 5.

source: CCDF

## Opioid poisoning ED visits and Hospitalizations

OSHPD provides data on cases where opioid poisoning was the primary reason for a visit to an ED or hospitalization. The rate of opioid poisoning ED visits per 100,000 Shasta County residents increased from 36.1 for 2008-2012 to 53.9 for 2013-2017. This represents a 50% increase and is statistically significant at the 95% confidence level (**Figure 3**). During the same period, the opioid poisoning hospitalization rate declined by 25% from 41.6 to 31.1 per 100,000.



source: OSHPD-ED & OSHPD-PDD

On 10/1/2015, OSHPD switched from using International Classification of Disease (ICD) 9 to ICD 10 codes for diagnoses and external cause of injury coding for ED visits and hospitalizations. as the change was not a perfect one-for-one switch, comparing counts from prior years to 2015 or 2015 to later years should be done with caution.

## Opioid poisoning ED visits

Data from OSHPD includes all ED visits by Shasta County residents to hospitals licensed to provide emergency medical services within California. ED visits from the five-year periods of 2008-2012 (N=320) and 2013-2017 (N=481) are compared.

The number of ED visits with opioid poisoning as the reason for visit based on the primary diagnosis and/or primary external cause of injury increased by 50% from 320 in 2008-2012 to 481 in 2013-2017 (**Table 5**). Heroin poisoning ED visit rate increased by 629% during this same time (from 3.3 to 23.9 per 100,000), more than accounting for the overall increase. Twenty (4%) of the 481 opioid poisoning ED visits in 2013-2017 also recorded a benzodiazepine as a secondary cause, and an additional 29 with a primary reason of

**Rate of Opioid Poisoning Emergency Department Visits**  
(2008-2012, 2013-2017)

Table 5	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Heroin Poisoning	29	3.3	2.1-5.4	213	23.9	20.7-27.1
Other Opioids	154	17.4	14.6-20.1	193	21.6	18.6-24.7
Opium Poisoning	82	9.3	7.3-11.3	48	5.4	3.9-6.9
Methadone Poisoning	55	6.2	4.6-7.9	27	3.0	1.9-4.2
<b>Total</b>	<b>320</b>	<b>36.1</b>	<b>32.2-40.1</b>	<b>481</b>	<b>53.9</b>	<b>41.9-58.8</b>

source: OSHPD-ED



benzodiazepine included an opioid as secondary. The switch from ICD 9 to ICD 10 coding for ED visits and hospitalizations on 10/1/2015 may have an impact on these counts.

Between 2013 and 2017, there was an average of 96 ED visits per year attributed to opioid poisoning. Fifty-five percent of cases were male (n=264, or an average of 53 per year), while 45% (n=217, 43 per year) were female (Table 6). The opioid poisoning ED visit rate for men increased by 69% over the 2008-2012 total (35.6 to 60.3 per 100,000). ED visits by women increased 30% in the same time (36.6 to 47.8 per 100,000). While the rate of visits for males was lower than females for 2008-2012 (0.97 times that of females), it grew to 1.22 times that of females in 2013-2017. The rate increases for both males and females are statistically significant at the 95% confidence level.

Most opioid poisoning ED visits were to Non-Hispanic White residents (93%) a group that only accounts for 81% of Shasta County residents. As the counts for all other racial/ethnic groups were each less than 20, these counts and rates are not displayed individually. The increase in rate from 2008-2012 to 2013-2017 for Non-Hispanic Whites is statistically significant.

**Demographic Characteristics of Opioid Poisoning Emergency Department Visits (2008-2012, 2013-2017)**

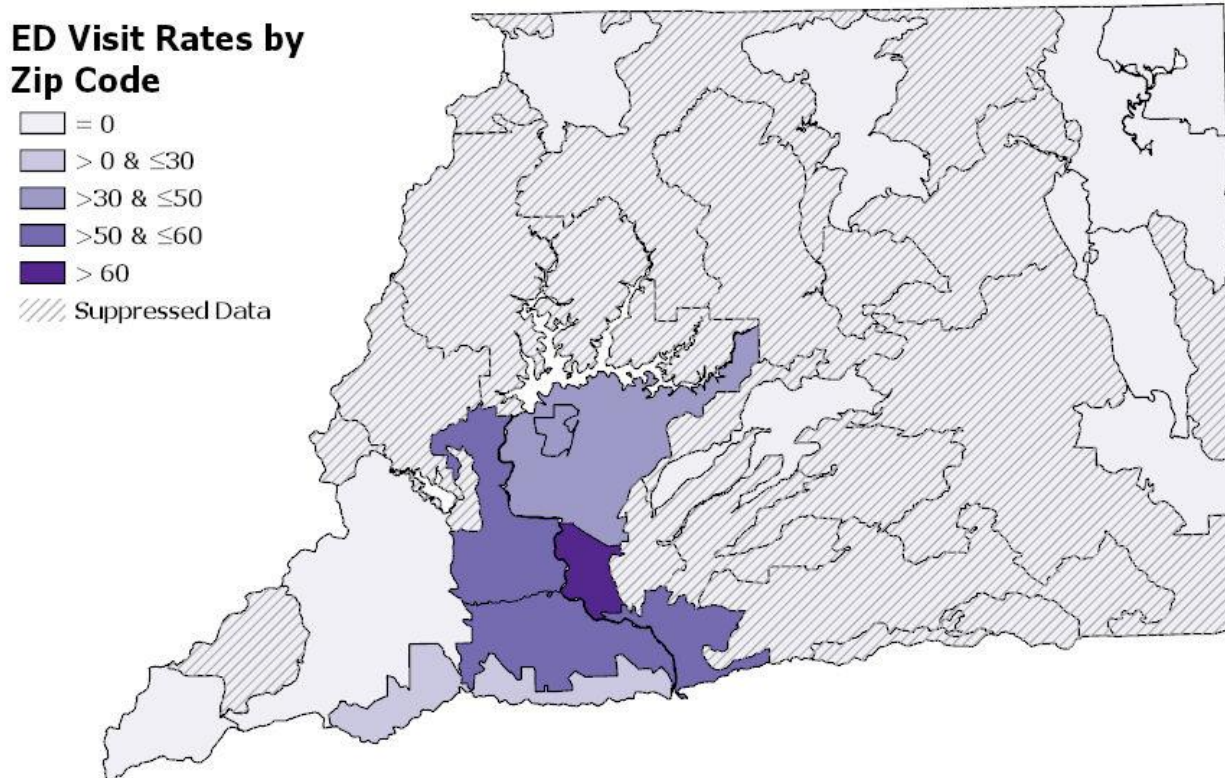
Table 6	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
<b>Gender</b>						
Male	155	35.6	30.0-41.2	264	60.3	53.0-67.6
Female	165	36.6	31.1-42.2	217	47.8	41.4-54.2
<b>Race/Ethnicity</b>						
Non-Hispanic White	295	40.3	35.7-44.9	446	61.7	55.9-67.4
Hispanic or Non-White	25	16.3	9.9-22.7	35	20.8	13.9-27.6
<b>Age</b>						
0-17	30	15.2	9.7-20.6	26	13.7	8.4-18.9
18-24	50	62.7	45.3-80.7	75	88.8	68.7-108.9
25-34	56	55.7	41.1-70.2	145	136.3	114.1-158.5
35-44	30	30.9	19.8-41.9	51	54.4	39.4-69.3
45-54	70	53.0	40.6-65.4	66	57.6	43.7-71.4
55-64	48	37.4	26.8-48.0	63	48.9	36.8-60.9
65+	36	24.0	16.1-31.8	55	31.8	23.4-40.2
<b>Total</b>	<b>320</b>	<b>36.1</b>	<b>32.2-40.1</b>	<b>481</b>	<b>53.9</b>	<b>49.1-58.8</b>

source: OSHPD-ED

Adults between the ages of 18 and 34 accounted for 46% of opioid poisoning ED visits, while only accounting for 21% of the Shasta County population. The highest rate of visits was for people between 25 and 34 (136.3 per 100,000), followed by 18 to 24-year-olds at 88.8. Adults age 45 to 54 and 35 to 45 were next highest (57.6 and 54.4 per 100,000 respectively). Youth (under 18) had the lowest rate (13.7 per 100,000). The rates of opioid poisoning ED visits showed statistically significant increases for the 25-34 and 35-44 age groups from 2008-2012 to 2013-2017.

The geographic distribution for opioid poisoning ED visits for 2013-2017 is presented in **Map 2** and **Table 7** below. Eighty-eight percent of opioid poisoning ED visits were concentrated in the three incorporated cities of Shasta County: Redding (96001, 96002, and 96003), Anderson (96007), and Shasta Lake (96019), and in unincorporated Cottonwood (96022). These six ZIP codes account for 91% of Shasta County's population. Among those ZIP codes with 15 or more ED visits, the highest rates were in Redding 96002 (63.7 per 100,000), Redding 96001 (59.5 per 100,000), and Anderson 96007 (55.7 per 100,000). Several ZIP codes had no opioid poisoning ED visits in the five-year period, represented in light lavender on the map. The ZIP codes listed as suppressed totaled less than 15 opioid poisoning ED visits each and together accounted for 37 for the five-year period (8% of opioid poisoning ED visits). An additional 21 ED visits recorded a non-resident ZIP code (P.O. Box).

**Map 2. Shasta County Average Annual Opioid Poisoning ED Visit Rates by ZIP Code, 2013-2017 (per 100,000 Residents)**



source: OSHPD-ED

The rate of opioid poisoning ED visits showed a statistically significant increase from 2008-2012 to 2013-2017 for the county as a whole and for the following Shasta County ZIP codes: Redding 96002, Redding 96003, and Palo Cendr 96073. ZIP codes with counts of less than 15 ED visits are indicated by an asterisk in **Table 7**.

**Opioid Poisoning ED Visits by Shasta County ZIP Code (2008-2012, 2013-2017)**

Table 7	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Redding - 96001	76	45.3	35.1-55.4	102	59.5	48.0-71.1
Redding - 96002	60	34.4	25.7-43.1	105	63.7	51.6-75.9
Redding - 96003	56	25.2	18.6-31.8	103	45.9	37.0-54.7
Anderson - 96007	49	43.6	31.4-55.8	65	55.7	42.1-69.2
Bella Vista - 96008	*	*	*	*	*	*
Big Bend - 96011	0	0.0	N/A	0	0.0	N/A
Burney - 96013	*	*	*	*	*	*
Cassel - 96016	0	0.0	N/A	0	0.0	N/A
Castella - 96017	*	*	*	0	0.0	N/A
Shasta Lake - 96019	15	29.8	14.7-44.9	25	49.4	30.0-68.8
Cottonwood - 96022	17	20.8	10.9-30.7	23	27.2	16.1-38.3
Fall River Mills - 96028	*	*	*	0	0.0	N/A
French Gulch - 96033	*	*	*	*	*	*
Hat Creek - 96040	0	0.0	N/A	0	0.0	N/A
Igo - 96047	*	*	*	0	0.0	N/A
Lakehead - 96051	0	0.0	N/A	*	*	*
McArthur - 96056	*	*	*	0	0.0	N/A
Millville - 96062	*	*	*	*	*	*
Montgomery Creek - 96065	0	0.0	N/A	*	*	*
Oak Run - 96069	0	0.0	N/A	0	0.0	N/A
Old Station - 96071	0	0.0	N/A	0	0.0	N/A
Palo Cedro - 96073	*	*	*	*	*	*
Platina - 97076	0	0.0	N/A	0	0.0	N/A
Round Mountain - 96084	*	*	*	*	*	*
Shasta - 96087	*	*	*	*	*	*
Shingletown - 96088	*	*	*	*	*	*
Whitmore - 96096	0	0.0	N/A	*	*	*
Non-Residential (P.O. Boxes)	11	N/A		21	N/A	
<b>Total</b>	<b>320</b>	<b>36.0</b>	<b>32.1-40.0</b>	<b>481</b>	<b>53.7</b>	<b>48.9</b>

\* Counts below 15.

source: OSHPD-ED

## Opioid poisoning hospitalizations

Data from OSHPD includes all hospitalizations to Shasta County Residents by hospitals licensed within California. The number of hospitalizations where opioid poisoning was the

Rate of Opioid Poisoning Hospitalizations (2008-2012, 2013-2017)

Table 8	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Other Opioids	146	16.5	13.8-19.2	160	17.9	15.2-20.7
Opium Poisoning	69	7.8	6.0-9.6	49	5.5	4.0-7.0
Methadone Poisoning	144	16.3	13.6-18.9	35	3.9	2.6-5.2
Heroin Poisoning	9	1.0	0.4-0.7	33	3.7	2.4-5.0
<b>Total</b>	<b>368</b>	<b>41.6</b>	<b>40.3-42.9</b>	<b>277</b>	<b>31.1</b>	<b>28.6-33.5</b>

source: OSHPD-PDD

reason for hospitalization based on the primary diagnosis and/or primary external cause of injury showed a 25% decrease from 368 in 2008-2012 to 277 in 2013-2017 (Table 8). Fifty-one (18%) of the 277 opioid hospitalizations for 2013-2017 included a benzodiazepine as a secondary cause, and an additional 26 with a benzodiazepine listed as primary included an opioid as a secondary cause. The switch from ICD 9 to ICD 10 coding for ED visits and hospitalizations on 10/1/2015 may have an impact on these counts.

### Demographic Characteristics of Opioid Poisoning Hospitalizations (2008-2012, 2013-2017)

Table 9	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
<b>Gender</b>						
Male	173	39.7	31.7-43.2	144	32.9	32.4-43.9
Female	195	43.3	37.4-49.6	133	29.3	27.8-38.3
<b>Race/Ethnicity</b>						
Non-Hispanic White	347	47.4	40.7-50.5	258	35.7	36.1-45.4
Hispanic or Non-White	21	13.7	9.9-22.7	19	11.3	7.6-18.5
<b>Age</b>						
0-9	*	*	*	*	*	*
10-17	*	*	*	*	*	*
18-24	22	27.6	16.1-39.1	19	22.5	12.4-32.6
25-34	29	28.8	15.9-35.8	29	27.3	22.0-43.8
35-44	45	46.3	36.3-64.6	19	20.3	17.9-39.6
45-54	95	71.9	58.8-88.0	40	34.9	33.0-57.7
55-64	103	80.3	58.4-88.1	80	62.0	58.9-88.5
65+	58	38.6	28.7-48.6	87	50.2	37.6-58.2
<b>Total</b>	<b>368</b>	<b>41.6</b>	<b>36.3-44.7</b>	<b>277</b>	<b>31.1</b>	<b>31.6-39.5</b>

\* Counts below 15.

source: OSHPD-PDD

Between 2012 and 2016, there was an average of 55 hospitalizations per year attributed to opioid poisoning. Fifty-two percent of cases were male (n=144, or an average of 28 per year), while 48% (n=133, 26 per year) were female (Table 9). The opioid poisoning hospitalization rate for men decreased by 17% over the 2008-2012 total (39.7 to 32.9 per 100,000). Hospitalizations by women decreased 32% in the same time (43.3 to 29.3 per

100,000). While the hospitalization rate for females was higher than males in 2008-2012 (1.09 times the male

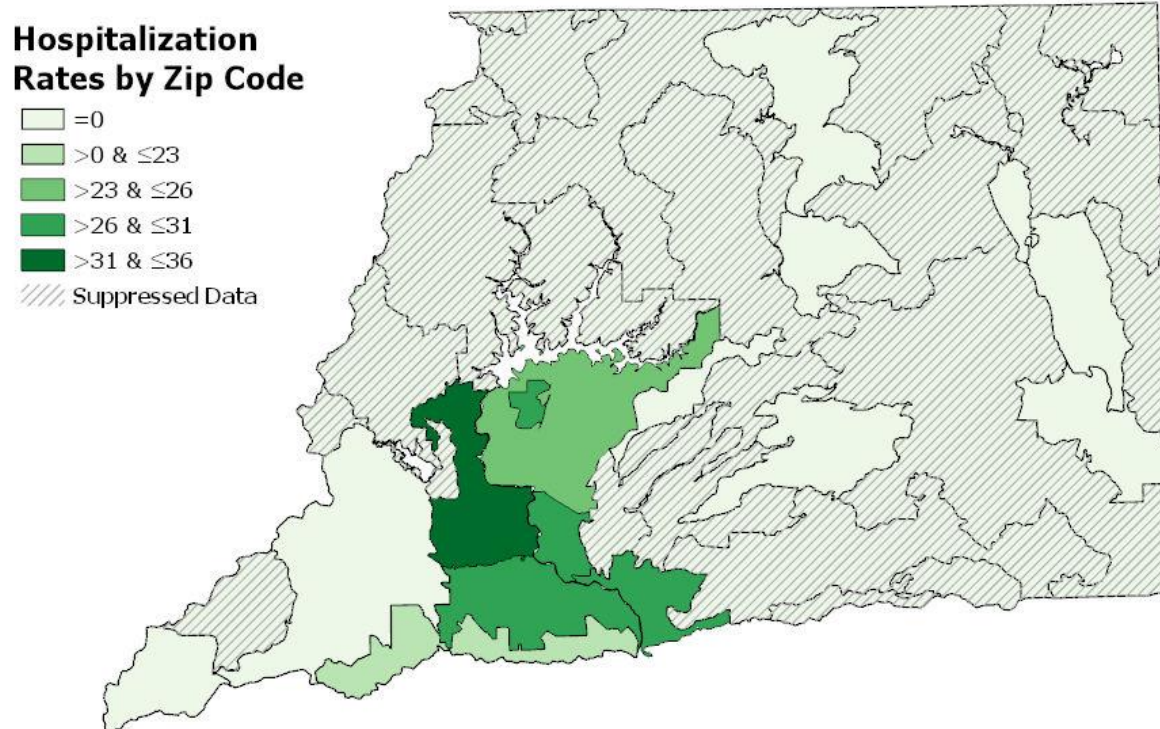
rate), it declined to 0.92 times the rate for males in 2013-2017. The decrease in opioid poisoning hospitalization rate for females is statistically significant at the 95% confidence level.

Most opioid poisoning hospitalizations were to Non-Hispanic White residents (93%). As the counts for all other racial/ethnic groups were each less than 15, these counts and rates are not displayed individually. The decrease in hospitalization rate for Non-Hispanic Whites from 47.4 in 2008-2012 to 35.7 per 100,000 in 2013-2017 was statistically significant at the 95% confidence level.

Adults over age 55 accounted for over half of opioid poisoning hospitalizations (60%), while only accounting for 34% of the Shasta County population. The highest rate of visits was for people between 55 and 64 (62.0 per 100,000), followed by 65 and older (50.2 per 100,000). Youth (under 18) had much lower rates. The decreases in opioid poisoning hospitalization rates for the 0-9, 35-44, and 45-54 age groups were all statistically significant at the 95% confidence level.

The geographic distribution for opioid poisoning hospitalizations for 2013-2017 is presented in **Map 3** and **Table 10** below. Eighty-six percent of opioid poisoning hospitalizations were concentrated in the three incorporated cities of Shasta County: Redding (96001, 96002, and 96003), Anderson (96007), and Shasta Lake (96019), and in unincorporated Cottonwood (96022). These six ZIP codes account for 91% of Shasta County's

**Map 3. Shasta County Average Annual Opioid Poisoning Hospitalization Rates by ZIP Code, 2013-2017 (per 100,000 Residents)**



source: OSHPD-PDD

population. The highest rates, among those ZIP codes with 15 or more hospitalizations between 2012 and 2016, were in Redding 96001 (35.6 per 100,000) and Redding 96002 (31.0 per 100,000). Several ZIP codes had no opioid poisoning hospitalizations in the five-year period, represented in light green on the map. The ZIP codes listed as suppressed totaled less than ten opioid poisoning hospitalizations each and together accounted for 40 for the five-year period (14% of opioid poisoning ED visits). An additional five hospitalizations recorded a non-resident ZIP code (P.O. Box).

The decrease in opioid poisoning hospitalizations between 2008-2012 and 2013-2017 were statistically significant at the 95% confidence level for the county as a whole and for the following Shasta County ZIP codes: Redding 96001 and Anderson 96007. ZIP codes with counts of less than 15 hospitalizations are indicated by an asterisk in **Table 10**.

**Opioid Poisoning Hospitalizations by Shasta County ZIP Code (2008-2012, 2013-2017)**

Table 10	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Redding - 96001	87	51.8	40.9-62.7	61	35.6	26.7-44.5
Redding - 96002	65	37.3	28.2-46.3	51	31.0	22.5-39.5
Redding - 96003	67	30.2	23.0-37.4	58	25.8	19.2-32.5
Anderson - 96007	57	50.7	37.6-63.9	34	29.1	19.3-38.9
Bella Vista - 96008	*	*	*	0	0.0	N/A
Big Bend - 96011	0	0.0	N/A	0	0.0	N/A
Burney - 96013	*	*	*	*	*	*
Cassel - 96016	0	0.0	N/A	0	0.0	N/A
Castella - 96017	0	0.0	N/A	*	*	*
Shasta Lake - 96019	15	29.8	14.7-44.9	15	29.6	14.6-44.6
Cottonwood - 96022	29	35.5	22.6-48.4	17	20.1	10.6-29.7
Fall River Mills - 96028	0	0.0	N/A	*	*	*
French Gulch - 96033	0	0.0	N/A	*	*	*
Hat Creek - 96040	0	0.0	N/A	0	0.0	N/A
Igo - 96047	0	0.0	N/A	0	0.0	N/A
Lakehead - 96051	*	*	*	*	*	*
McArthur - 96056	*	*	*	*	*	*
Millville - 96062	*	*	*	*	*	*
Montgomery Creek - 96065	0	0.0	N/A	0	0.0	N/A
Oak Run - 96069	0	0.0	N/A	*	*	*
Old Station - 96071	0	0.0	N/A	0	0.0	N/A
Palo Cedro - 96073	*	*	*	*	*	*
Platina - 97076	0	0.0	N/A	0	0.0	N/A
Round Mountain - 96084	0	0.0	N/A	*	*	*
Shasta - 96087	*	*	*	*	*	*
Shingletown - 96088	*	*	*	*	*	*
Whitmore - 96096	*	*	*	0	0.0	N/A
Non-Residential (P.O. Boxes)	17	N/A	N/A	5	N/A	N/A
<b>Total</b>	<b>368</b>	<b>41.4</b>	<b>37.2-45.7</b>	<b>277</b>	<b>30.9</b>	<b>27.3-34.6</b>

\* Counts below 15.

source: OSHPD-PDD

## Opioid substance use disorder treatment

CalOMS provided data on SUD treatment admissions where an opioid was the primary problem drug. Admissions from the five-year periods of 2008-2012 (N=1,196) and 2013-2017 (N=2,465) are compared. Approximately one third of SUD treatment admissions included an illicit and/or prescription opioid as the primary problem drug (31% for 2013-2017).

Approximately 51% of opioid SUD treatment admissions were among males (n=1,257), and admissions for females accounted for 49% (n=1,208; **Table 11**). Admission rates for both males and females more than doubled between 2008-2012 and 2013-2017 (108% and 101% increase, respectively). The increase in admission rates for males and females were both statistically significant at the 95% confidence level.

In 2013-2017, most admissions were among Non-Hispanic Whites (87%), followed by Hispanic (6%), and Native American/Alaska Native (4%). Native American/Alaska Natives had the highest rate of admissions (414.8 per 100,000). Non-Hispanic White and African-Americans were next (296.2 and 280.9 per 100,000

**Demographic Characteristics of Opioid SUD Treatment Admissions**

Table 11	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
<b>Gender</b>						
Male	601	138.1	127.0-149.1	1,257	287.0	271.2-302.9
Female	595	132.1	121.5-142.7	1,208	266.1	251.1-281.1
<b>Total</b>	<b>1,196</b>	<b>135.0</b>	<b>127.4-142.7</b>	<b>2,465</b>	<b>276.4</b>	<b>265.5-287.3</b>
<b>Race/Ethnicity</b>						
Non-Hispanic White	1,018	139.0	130.5-147.5	2,142	296.2	283.6-308.7
Hispanic	62	83.1	62.4-103.8	135	161.1	133.9-188.2
Native American/Alaska Native	46	214.1	152.2-275.9	96	414.8	331.8-497.7
African-American	20	290.7	163.3-418.1	21	280.9	160.8-401.1
Other/Unknown	50	99.5	71.9-127.0	71	131.2	100.6-161.7
<b>Total</b>	<b>1,196</b>	<b>135.0</b>	<b>127.4-142.7</b>	<b>2,465</b>	<b>276.4</b>	<b>265.5-287.3</b>
<b>Age</b>						
0-9	*	*	*	*	*	*
10-17	*	*	*	16	18.1	9.2-27.0
18-24	458	574.5	521.9-627.1	680	804.8	744.3-865.3
25-34	385	382.7	344.5-420.9	1,204	1,132.1	1,068.1-1,196.0
35-44	167	171.9	145.9-198.0	319	340.0	302.7-377.3
45-54	116	87.8	71.8-103.8	153	133.4	112.3-154.6
55-64	46	35.8	25.5-46.2	82	63.6	49.8-77.4
65+	*	*	*	*	*	*
<b>Total</b>	<b>1,196</b>	<b>135.0</b>	<b>127.4-142.7</b>	<b>2,465</b>	<b>276.4</b>	<b>265.5-287.3</b>
<b>Education Level (25+)<sup>#</sup></b>						
Less than HS	152	212.1	178.4-245.8	304	205.0	182.0-228.1
HS Graduate/GED	327	203.2	181.1-225.2	908	373.2	349.0-397.5
Some College/AA	192	77.6	66.6-88.6	483	171.0	155.7-186.2
Bachelor's Degree or higher	33	27.4	18.1-36.8	66	51.0	38.7-63.3
Unknown	*	*	*	*	*	*

\* Counts below 15.

source: CalOMS

<sup>#</sup> Does not include cases under 25 years old

respectively). Rates for counts of less than 20 should be considered unstable. The increase in opioid SUD treatment admission rates for Non-Hispanic White, Hispanic, and Native American/Alaska Native were all statistically significant at the 95% confidence level.

Over three quarters of all opioid SUD treatment admissions were to residents between 18 and 34 (n=1,884), an age group that only accounts for 21% of the population. The rate for opioid

**Frequency of Opioid Substance Use Disorder Treatment (Primary Drug)**  
(2008-2012, 2013-2017)

Table 12	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Heroin	299	33.8	29.9-37.6	1817	203.7	194.4-213.1
Other Opioids or Synthetics	413	46.6	42.1-51.1	338	37.9	33.9-41.9
OxyCodone / OxyContin	357	40.3	36.1-44.5	197	22.1	19.0-25.2
Methadone	127	14.3	11.8-16.8	113	12.7	10.3-15.0
<b>Total</b>	<b>1,196</b>	<b>135.0</b>	<b>127.4-142.7</b>	<b>2,465</b>	<b>276.4</b>	<b>265.5-287.3</b>

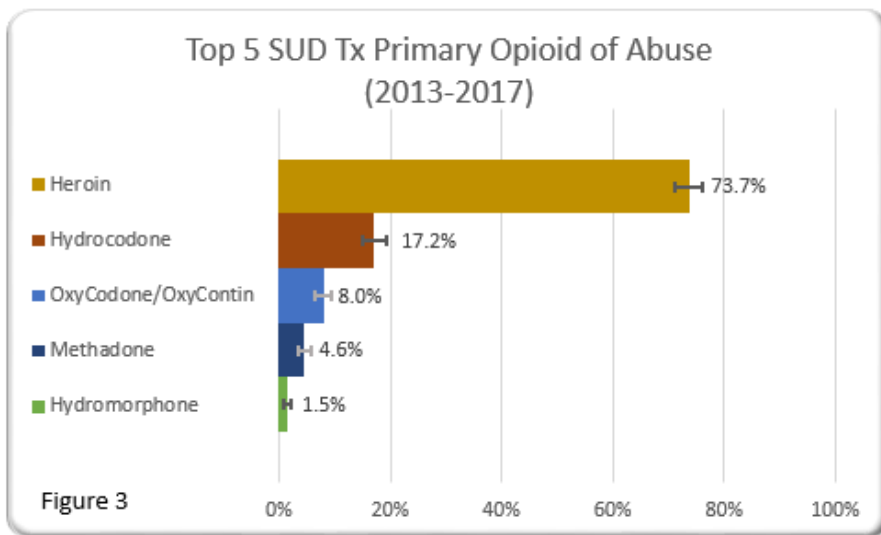
source: CalOMS

admissions was highest for the 25-34 age group followed by the 18-24 age group (1,132.1 and 804.8 per 100,000 respectively). Youth under 18 and older adults (65+) had rates that were much lower. The increase in opioid SUD treatment admission rates for the 18-24, 25-34, 35-44, 45-54, 55-64 age groups are all statistically significant at the 95% confidence level.

The rate for opioid SUD treatment admissions was highest for those with a high school diploma/GED and less than a high school diploma, (373.2 and 205.0 per 100,000 respectively). Residents with some college or an associate's degree, or a bachelor's degree or higher had rates that were much lower (171.0 and 51.0 per 100,000 respectively).

The number of SUD treatment admissions where an opioid was the primary problem drug increased by 106% from 1,196 in 2008-2012 to 2,465 in 2013-2017 (Table 12). The increase is primarily due to the 507% increase in admissions where heroin was the primary drug (299 and 25% of all opioid admissions for 2008-2012 to 1,817 and 74% for 2013-2017). The counts of admissions of oxycodone/oxycotin, methadone and other opioids as the primary problem drug all decreased from 2008-2012 to 2013-2017. The increase in the rate of

heroin admissions and the decrease in the rates of other opioids or synthetics and oxycodone/oxycotin are all statistically significant at the 95% confidence level.



The top five opioids that were identified as the primary drug of abuse in SUD treatment admissions for 2013-2017 were heroin (74%), hydrocodone (17%), oxycodone/oxycotin (8%), methadone (5%), and hydromorphone (2%; Figure 3). These total to more than 100% due to multiple drugs being listed as the primary

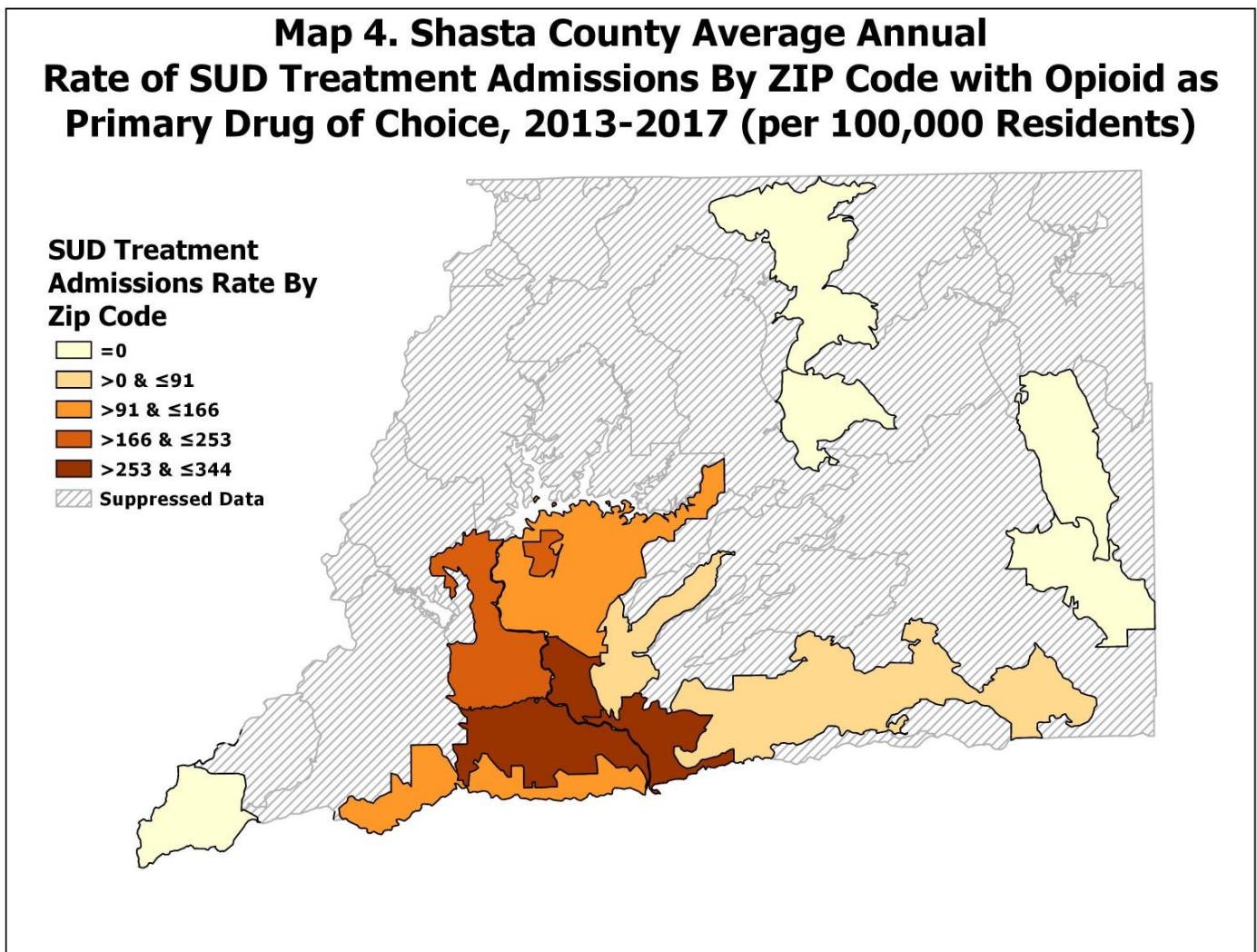
Figure 3  
Total is more than 100% due to cases with more than one opioid listed

source: CalOMS



problem drug for some admissions. For 2013-2017, 19 (0.8%) of the 2,465 admissions that listed an opioid as the primary problem drug also listed a benzodiazepine as the secondary drug, and an additional ten admissions listed a benzodiazepine as primary and an opioid as the secondary problem drug.

The geographic distribution of opioid SUD treatment admissions for 2013-2017 is presented on **Map 4**, and **Table 13** below. Eighty percent of opioid SUD treatment admissions were concentrated in the three incorporated cities of Shasta County: Redding (96001, 96002, and 96003), Anderson (96007), and Shasta Lake (96019), and in Cottonwood (96022). These six ZIP codes account for 91% of Shasta County's population. The highest rates, among those ZIP codes with 15 or more SUD treatment admissions between 2012 and 2016, were in Anderson 96007 (343.4 per 100,000) and Redding 96002 (325.4 per 100,000). Several ZIP codes had no admissions in the five-year period, represented in light yellow on the map. The ZIP codes listed as suppressed each had less than 15 admissions and together totaled 82 for the five-year period (3% of opioid SUD treatment admissions).



source: CalOMS

The rate of opioid SUD treatment admissions increased for most ZIP codes between 2008-2012 and 2013-2017. Increases for Shasta County as a whole and for the following ZIP codes were statistically significant: Redding 96001, 96002, and 96003; Anderson 96007; Shasta Lake 96019; Cottonwood 96022; Round Mountain 96084; and Shingletown 96088. Burney 96013 was the only Shasta County ZIP code that showed a statistically significant decrease. ZIP codes with counts of less than 15 admissions are indicated by an asterisk in **Table 13**.

Opioid SUD Treatment Admissions by Shasta County ZIP Code (2008-2012, 2013-2017)						
Table 13	2008-2012			2013-2017		
	5-Year Total	Average Rate per 100,000	95% Confidence Interval	5-Year Total	Average Rate per 100,000	95% Confidence Interval
Redding - 96001	227	135.2	117.6-152.8	433	252.8	229.0-276.6
Redding - 96002	213	122.2	105.7-138.6	536	325.4	297.9-353.0
Redding - 96003	187	84.2	72.2-96.3	373	166.0	149.2-182.9
Anderson - 96007	188	167.3	143.4-191.3	401	343.4	309.8-377.0
Bella Vista - 96008	*	*	*	*	*	*
Big Bend - 96011	*	*	*	0	0.0	N/A
Burney - 96013	*	*	*	*	*	*
Cassel - 96016	0	0.0	N/A	*	*	*
Castella - 96017	*	*	*	*	*	*
Shasta Lake - 96019	59	117.3	87.3-147.2	105	207.5	167.8-247.2
Cottonwood - 96022	63	77.1	58.1-96.2	118	139.6	114.4-164.8
Fall River Mills - 96028	*	*	*	*	*	*
French Gulch - 96033	*	*	*	*	*	*
Hat Creek - 96040	0	0.0	N/A	0	0.0	N/A
Igo - 96047	*	*	*	*	*	*
Lakehead - 96051	*	*	*	*	*	*
McArthur - 96056	*	*	*	*	*	*
Millville - 96062	*	*	*	*	*	*
Montgomery Creek - 96065	*	*	*	0	0.0	N/A
Oak Run - 96069	0	0.0	N/A	*	*	*
Old Station - 96071	0	0.0	N/A	0	0.0	N/A
Palo Cedro - 96073	*	*	*	15	71.9	35.5-108.2
Platina - 97076	0	0.0	N/A	0	0.0	N/A
Round Mountain - 96084	*	*	*	*	*	*
Shasta - 96087	*	*	*	*	*	*
Shingletown - 96088	*	*	*	20	90.7	51.0-130.5
Whitmore - 96096	0	0.0	N/A	*	*	*
P.O. Boxes/Homeless/Unknown	190	N/A	N/A	382	N/A	N/A
<b>Total</b>	<b>1,196</b>	<b>134.6</b>	<b>127.0-142.2</b>	<b>2,465</b>	<b>275.1</b>	<b>264.2-285.9</b>

\* Counts below 15.

source: CalOMS

## Discussion

The distribution of opioid poisoning deaths, ED visits, hospitalizations and SUD treatment admissions correspond roughly to the population distribution within the county. The three incorporated cities of Redding (96001, 96002, and 96003), Shasta Lake (96019) and Anderson (96007) represent 81% of Shasta County's population, and when Cottonwood is added (96022), this increases to 91%. Redding (96001) and Shasta Lake (96019) have the highest rates of opioid-poisoning death, while Redding (96001 and 96002) have the highest rates of both opioid poisoning ED visits and hospitalizations, and Redding (96002) and Anderson (96007) have the highest rates of Opioid related SUD treatment admissions.

Males are at higher risk of opioid poisoning death, ED visit, hospitalization, and SUD treatment admission, but females are narrowing the gap for deaths. Non-Hispanic Whites are at greater risk for opioid poisoning deaths, ED visits and hospitalizations. This group also makes up 81% of the population in Shasta County. Counts for other racial/ethnic breakdowns are less than 20 and therefore the rates should be considered stable. Native American/Alaska Native are most at risk for opioid related SUD treatment program admissions. Those with less than a high school diploma or with a diploma/GED are at greater risk of opioid poisoning death and SUD treatment admission than those with some college/associates degree or a bachelor's degree or higher.

Older adults are most at risk for opioid poisoning death (45-64 years old) and hospitalizations (45 and older), while younger adults (18-34) are most at risk for opioid-poisoning ED visits and SUD treatment admissions. Questions that are yet to be answered include: Do chronic conditions that are more likely to be present in older adults affect the rate of opioid poisoning deaths and hospitalizations in this age group? Does prolonged substance use and abuse affect the rate of opioid poisoning deaths and hospitalizations in older adults? Are younger adults more likely to carry and be able to use naloxone than older adults? Are older adults more likely to use or abuse opioids by themselves and therefore not have assistance available to administer naloxone or call emergency response in case of an overdose? Are younger adults generally in better health and more likely to be sufficiently treated in the ED, therefore not dying of an opioid poisoning or requiring hospitalization? Further investigation is needed to determine the impact of factors such as these.

Heroin is a growing concern in Shasta County. Although 71% of Shasta County opioid poisoning deaths include at least one prescription opioid, the county has seen decreases in the rates of opioid prescriptions filled, overall opioid poisoning deaths; as well as prescription opioid-poisoning deaths, ED visits, hospitalizations, and SUD treatment admissions. In the same time period, however, heroin poisoning deaths more than tripled, heroin-induced ED visits increased more than eight-fold, heroin induced hospitalizations increased over 300%, and heroin related SUD treatment admissions increased over 500%. According the Drug Enforcement Agency (DEA) heroin use is on the rise because the availability of high-purity heroin is increasing, and many prescription drug abusers have switched to heroin due to the crackdown by federal and state authorities on prescription drug abuse (DEA, 2016).

## Recommendations

- Continue to increase the availability and use of naloxone to reverse opioid overdoses. The U.S. Surgeon General recently issued an advisory on naloxone, emphasized its importance in confronting the nation's opioid epidemic (Surgeon General, 2018). NoRxAbuse is a coalition of health professionals with the purpose of addressing the rapidly escalating abuse of prescription drugs in Northern California. NoRxAbuse

recently provided naloxone kits to the Redding Police Department, and naloxone is available at several Shasta County pharmacies without a prescription.

- Continue to work with prescribers to reduce opioid prescription rates and investigate alternate pain treatment measures. NoRxAbuse provides training to prescribers about evidence-based prescribing guidelines and alternative pain management practices. The opioid prescription rate in Shasta County declined in each of the last five years.
- Continue to increase the availability of evidence-based addiction treatment in Shasta County. Shasta County is part of a regional collaboration that is in the process of bringing a Drug Medi-Cal Organized Delivery System that will provide comprehensive opioid treatment systems that incorporate the continuum of substance use services including medication assisted treatment.

## Limitations

- The California Comprehensive Death File (CCDF) includes all substances listed on the official death certificate as a contributing cause of death. Many deaths include multiple substances, and often the substances are not specifically identified. These facts may lead to a miscount of the number of opioid poisoning deaths, either because an opioid was present on the death certificate and counted as an opioid poisoning death or because the death did not record the substance that turned out to be an opioid.
- Deaths may be ruled as accidental or of unknown intent unless there is clear evidence of suicide (i.e. a suicide note), which may lead to an undercount of suicide poisoning deaths.
- OSHPD shifted from using ICD 9 to ICD 10 in the coding of ED visit and hospitalization diagnoses and external cause of injury on 10/1/2015. ICD 9 provided four codes for opioid poisoning diagnoses and three codes for accidental opioid poisoning. The correlation to ICD 10 which includes seven opioid related poisoning diagnoses codes is not perfect, and may lead to differences in the count of opioid sub-types from ICD 9 before the shift, and ICD 10 after.
- Small counts for many demographic categories including age, race, ethnicity, opioid sub-type, education level, and ZIP code can lead to statistical instability and rates based on counts of less than 20 should be considered unstable.

## References

*Centers for Disease Control and Prevention, Opioid Overdose, <https://www.cdc.gov/drugoverdose/index.html>.*

*Centers for Disease Control and Prevention, 2018 Annual Surveillance Report of Drug-Related Risks and Outcomes, <https://www.cdc.gov/drugoverdose/pdf/pubs/2018-cdc-drug-surveillance-report.pdf>.*

*Florence, Curtis S. PhD; Zhou, Chao PhD; Luo, Feijun PhD; Xu, Likang MD, The Economic Burden of Prescription Opioid Overdose, Abuse, and Dependence in the United States, 2013; Medical Care. Volume 54, Number 10, October 2016.*

*Gomez, T., Tadrous, M., Mamdani, M. M., Paterson, J. M., Juurlink, D. N. (2018). The Burden of Opioid-Related Mortality in the United States, Journal of American Medicine Network Open, JAMA Network Open:(2)1;2018 .e180217.*

doi:10.1001/jamanetworkopen.2018.0217

[https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2682878?utm\\_campaign=articlePDF&utm\\_medium=articlePDFlink&utm\\_source=articlePDF&utm\\_content=jamanetworkopen.2018.0217](https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2682878?utm_campaign=articlePDF&utm_medium=articlePDFlink&utm_source=articlePDF&utm_content=jamanetworkopen.2018.0217)

National Institute on Drug Abuse, *Principles of Drug Addiction Treatment: A Research-Based Guide, Is drug addiction treatment worth the cost?*, <https://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/frequently-asked-questions/drug-addiction-treatment-worth-its-cost>.

State of California, *California Comprehensive Death File data 2008-2017*.

State of California, *California Outcomes Measurement System (CalOMS) Treatment data 2008-2017*.

State of California, Department of Justice, *Controlled Substance Utilization Review and Evaluation System (CURES) database. 2017*, <https://oag.ca.gov/cures>.

State of California, California Office of Statewide Health Planning and Development (OSHPD) *Emergency Department data 2008-2017*.

State of California, California Office of Statewide Health Planning and Development (OSHPD) *Patient Discharge data 2008-2017*.

Substance Abuse and Mental Health Services Administration. (2017). *Key substance use and mental health indicators in the United States: Results from the 2016 National Survey on Drug Use and Health* (HHS Publication No. SMA 17-5044, NSDUH Series H-52). Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. <https://www.samhsa.gov/data/>

*The Web's Free ICD-9-CM Medical Coding Reference, ICD-9 Version 2015 and ICD-10 Version 2017:*  
<http://www.icd9data.com/>.

U.S. Department of Health and Human Services, 2018, *Surgeon General's Advisory on Naloxone and Opioid Overdose:*  
<https://www.surgeongeneral.gov/priorities/opioid-overdose-prevention/naloxone-advisory.html>

U.S. Department of Justice, Drug Enforcement Administration, *2016 National Drug Threat Assessment Summary* (DEA-DCT-DIR-001-17): <https://www.hsdl.org/?abstract&did=797265>

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