Drug Overdose Fatality Surveillance System (DOFSS) 2015 Annual Report

Sarah L. Hargrove, MS
Patrick J. Ward, MPH
Terry L. Bunn, PhD

Kentucky Injury Prevention and Research Center, bona fide agent for the Kentucky Department for Public Health
University of Kentucky
333 Waller Avenue, Suite 202
Lexington, Kentucky 40504-2915
(859) 257-4954
www.kiprc.uky.edu

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GREETINGS

The Kentucky Injury Prevention and Research Center located at the University of Kentucky's College of Public Health, bona fide agent for the Kentucky Department for Public Health, in collaboration with the Kentucky Office of the State Medical Examiner's Office and county coroner offices, is pleased to present the inaugural Kentucky Drug Overdose Fatality Surveillance System (DOFSS) report. Kentucky's unique DOFSS adds utility and value to drug overdose fatality surveillance by providing an additional lens to the drug overdose epidemic through the integration of multiple data sources that contribute additional case-level information that helps identify new and emerging risk factors and health conditions associated with drug overdose deaths in the Commonwealth of Kentucky.

For example, DOFSS data results show that the most common other significant conditions contributing to cause of death for drug overdose deaths was hypertensive heart disease. Confirming that result, Lisinopril, an angiotensin converting enzyme (ACE) inhibitor drug that is prescribed to treat hypertension and heart failure, was the third most common prescription drug found at the scene of drug overdose deaths or at autopsy of drug overdose decedents. These results may indicate that individuals with heart disease are more susceptible to drug overdoses, or that heart-related conditions may be a primary outcome associated with substance use. Further research is needed to more fully examine this finding. DOFSS year 2016 data results will include linked dispensed prescription data from the Kentucky All Schedule Prescription Electronic Reporting (KASPER) system that may provide additional information to generate targeted hypotheses related to this unique finding.

Also, the DOFSS figures comparing mean blood concentrations of commonly identified drugs to related therapeutic ranges in drug overdose decedents show that amphetamine was detected above the related therapeutic range, in addition to the well-known opioids (fentanyl, hydrocodone, morphine, and oxymorphone). This finding indicates that amphetamine (either licit or as a metabolite of illicit methamphetamine) is a major drug contributing to drug overdose fatalities in the Commonwealth of Kentucky that deserves further tracking through DOFSS trends over time, examining linked amphetamine prescriptions dispensed, and further research into amphetamine sourcing.

Last, DOFSS data results highlight the involvement of gabapentin in fatal drug overdoses. Gabapentin was detected in over one-third of all drug overdose decedents with available specific drug results, and was the most frequent drug detected in female drug overdose decedents and among drug overdose decedents over the age of 44 years; gabapentin also was detected in almost half of all drug overdose decedents with histories of mental illness. These results illustrate the need for more research into the prescribing of gabapentin in association with substance use and substance use treatment, either alone or in association with other health conditions, such as chronic pain.

Our heartfelt sympathies go out to the surviving family members, friends, and others who have suffered a loss due to a fatal overdose. Our hope is that this report can help coroners, medical examiners, family members, and healthcare providers, to inform and improve scheduled drug prescribing, substance use disorder treatment, prevention, policy making, and law enforcement drug interdiction.

Sincerely,

Terry Bunn, Director

Kentucky Injury Prevention and Research Center

OVERVIEW

Kentucky's Drug Overdose Fatality Surveillance System (DOFSS) is a comprehensive database that utilizes multiple sources to enhance the Commonwealth's analytical capacity to identify and characterize drug overdose fatalities. Without a centralized death investigation system, Kentucky drug overdose fatality data are not collected by a single agency. DOFSS bridges the gaps by inputting drug overdose decedent data into one centralized database. A comprehensive multi-source database captures additional information on drug overdose fatalities and identifies emerging trends and patterns of drug use that may not be readily identified through analysis of data from a single source.

Data Sources

DOFSS is comprised of:
- Vital statistics death certificates (with NCHS ICD-10 coding)
- Medical examiner autopsy reports
- Coroner investigation reports
- Post-mortem toxicology reports
    - Post-mortem toxicology reports were unavailable in 112 cases
- Kentucky All Schedule Prescription Electronic Reporting (KASPER) records
    - Year 2015 KASPER records were not available for this report

Funding

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The RedCap database used to enter DOFSS data is supported by the Center for Clinical and Translational Research grant support (NIH CTSA UL1TR000117).

Additional Information

Data in DOFSS is provisional and subject to change. Data for this report was analyzed on July 14th, 2017.

Acknowledgement

KIPRC would like to thank the Kentucky Department for Public Health, Office of Vital Statistics for access to death certificate records, Office of Inspector General for access to KASPER data, Office of the State Medical Examiner for access to autopsy reports and post-mortem toxicology reports, and all county coroners for access to coroner report.

Survey

Please take a moment to complete our brief survey regarding this report: https://uky.az1.qualtrics.com/jfe/form/SV_8CVDURmKeSY6xw1.

Suggested Citation

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EXECUTIVE SUMMARY

1. Of the 1,295 drug overdose deaths in year 2015, opioids (82% of all drug overdose deaths) and benzodiazepines (49%) were the drug classes most frequently identified in drug overdose decedents.

2. Morphine (44% of all 1,148 drug overdose deaths with drug-specific results) and gabapentin (36%) were the drugs most frequently detected among drug overdose decedents.

3. The most common two-drug and three-drug combinations identified in drug overdose decedents involved heroin and known heroin metabolites and adulterants. Heroin and morphine were found in 28% of all drug overdose decedents and codeine, heroin, and morphine in 20% of all drug overdose decedents.

4. The most common four-drug combination identified in drug overdose decedents was codeine, heroin, morphine, and THC-COOH (7% of all drug overdose decedents). Morphine is a known metabolite of heroin and codeine is a known adulterant of heroin.

5. Morphine was the most frequent drug detected in male drug overdose decedents (50% of all male drug overdose decedents), whereas, gabapentin was the most frequent drug detected in female drug overdose decedents (45% of all female drug overdose decedents).

6. The most common drug identified in drug overdose decedents under 45 years of age was morphine (65% of all those aged 0-24 years; 60% of all those aged 25-34 years; and 41% of all those aged 35-44 years), whereas, the drug most commonly detected in drug overdose decedents aged 45 years and older was gabapentin (48% of all those aged 45-54 years; and 39% of all those aged 55 and older).

7. Mean blood concentrations of amphetamine, fentanyl, hydrocodone, morphine, and oxymorphone were detected above relevant therapeutic ranges among drug overdose decedents.

8. Opioids were the class of drugs most commonly identified in drug overdose decedents who died either from accidental or suicidal causes of death.

9. The highest numbers of drug overdose deaths occurred in Jefferson (n=211), Kenton (n=111), and Fayette (n=106) counties in year 2015.

10. The highest drug overdose fatality rates occurred in Bell (82 deaths per 100,000 population), Butler (78/100,000), and Kenton (68/100,000) counties in year 2015.

11. The most common other significant conditions contributing to cause of death for drug overdose decedents was heart-related conditions, specifically hypertensive heart disease; 131 of the 1,295 drug overdose decedents (10%) also had hypertensive heart disease that contributed to their deaths.

12. The most common drugs detected in autopsied drug overdose decedents with non-medical related needle or track marks was morphine (83% of the 204 drug overdose decedents with needle or track marks) and heroin (62%).

13. The most common drugs detected in drug overdose decedents with history of mental illness were gabapentin (48% of the 158 drug overdose decedents with histories of mental illness), morphine (38%), and alprazolam (34%).

14. Of the drug overdose decedents who died due to intentional drug overdose (suicide) (n=51), 41% had histories of mental illness.

15. The top prescription drugs found at the scene and/or at autopsy among drug overdose decedents were gabapentin (34% of the 247 drug overdose decedents with pills found at the fatal drug overdose scene), oxycodone (21%), and lisinopril (17%).

16. Autopsy, toxicology, and coroner reports increased the identification of specific drugs involved in drug overdose deaths to 98%, compared to identifying 79% of specific drugs with the use of drug overdose death certificates alone (18% increase).

DEFINITIONS

Drug overdose fatalities were identified from Kentucky death certificates as any deaths with the following underlying cause of death ICD-10 codes: 1) X40-X44 (accidental/unintentional drug poisoning); 2) X60-X64 (suicide by drug poisoning); 3) X85 (homicide by drug poisoning); and 4) Y10-Y14 (drug poisoning with undetermined intent).

DOFSS cases include all drug overdose fatalities that occurred in Kentucky, regardless of decedent state of residence. Unless otherwise noted, both Kentucky residents and out-of-state residents who died of drug overdoses in Kentucky are included in DOFSS data counts.

Chi-Squared Test: A statistical test of the dependence of two categorical variables, under the null hypothesis that the two variables are independent. The alternative hypothesis is that the variables are dependent.

Fischer's Exact Test: An "exact" statistical test of the dependence of two categorical variables, under the null hypothesis that the two variables are independent. The alternative hypothesis is that the variables are dependent. Exact tests are used when the sample size is too small to meet the assumptions of traditional statistical tests, such as the chi-square test of independence.

Interquartile Range (IQR): A measure of statistical dispersion between 75th and 25th percentiles, IQR= Q_3-Q_1

P-Value: The probability of finding the observed results under the assumption that the null hypothesis is true. P-values less than 0.05 are typically treated as "significant," that is, that there is sufficient evidence to reject the assumption that the null hypothesis is true in favor of the alternative hypothesis.

Therapeutic Range: A clinical reference range of blood plasma or serum concentration of a drug that is expected to achieve the desired therapeutic effects.

2015 KENTUCKY DRUG OVERDOSE FATALITY SURVEILLANCE DATA

Table 1. Drug Classes Detected Among Drug Overdose Decedents in Kentucky, 2015[1]

Drug Class[2,3]	Count[4]	Percentage[5]
OPIOIDS[6]	1,067	82.39%
BENZODIAZEPINES	632	48.80%
ANTICONVULSANTS	472	36.45%
CANNABINOIDS	307	23.71%
ALCOHOL	239	18.46%
COCAINE	164	12.66%
AMPHETAMINES	160	12.36%
STIMULANTS	72	5.56%
ANTIDEPRESSANTS	52	4.02%
NON-OPIOID ANALGESICS	39	3.01%
BARBITURATES	28	2.16%
CARDIOVASCULAR AGENTS	22	1.70%
ANTIHISTAMINES	21	1.62%
SEDATIVES/HYPNOTICS	13	1.00%
ANTIPSYCHOTICS	12	0.93%
NARCOTICS	<5	-
ANTIBIOTICS	<5	-
ANESTHETICS	<5	-
GASTROINTESTINAL AGENTS	<5	-
BATH SALTS	<5	-
NEUROLOGICAL AGENTS	<5	-

1. Drug testing of blood, urine, and/or vitreous fluids.
2. Drug classes are not mutually exclusive; decedents may have multiple drug classes detected
3. Multiple drugs within the same drug class are counted as one drug class incident per decedent
4. Counts less than 5 were suppressed according to state data release policy
5. Percentage is based on total number of DOFSS drug overdose fatalities, n=1,295
6. Opioids includes all opium-like substances (including natural opiates and synthetic opioids)

Produced by the Kentucky Injury Prevention and Research Center, a bona fide agent for the Kentucky Department for Public Health. October 2017. Kentucky data sources: Death Certificates, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Post-mortem Toxicology Records, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Autopsy Reports, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Kentucky All Schedule Prescription Electronic Reporting, Office of Inspector General, Cabinet for Healthy and Family Services; and Kentucky Coroner Investigation Reports, County Coroners' Offices. Data outputs draw from selected DOFSS data sources. Data are provisional and subject to change.

Table 2. Most Frequent Drugs Detected Among Drug Overdose Decedents in Kentucky, 2015

Drug[1-2]	Count	Percentage[3]
MORPHINE	574	44.32%
GABAPENTIN	466	35.98%
HEROIN[4]	366	28.26%
ALPRAZOLAM[5]	351	27.10%
FENTANYL[6]	334	25.79%
CODEINE	309	23.86%
CARBOXY-TETRAHYDROCANNABINOL (THC-COOH)	301	23.24%
OXYCODONE	291	22.47%
HYDROCODONE	244	18.84%
OXYMORPHONE	242	18.69%
ETHANOL	237	18.30%
CLONAZEPAM[7]	233	17.99%
HYDROMORPHONE	230	17.76%
DIAZEPAM	183	14.13%
OXAZEPAM	167	12.90%
COCAINE[8]	164	12.66%
TEMAZEPAM	151	11.66%
TETRAHYDROCANNABINOL (THC)	135	10.42%
BUPRENORPHINE[9]	123	9.50%
METHAMPHETAMINE	112	8.65%
AMPHETAMINE	100	7.72%
METHADONE[10]	92	7.10%

[1]Drug testing of blood, urine, and/or vitreous fluids.

[2]Drugs are not mutually exclusive; decedents may have more than one drug detected

[3]Percentage is based on total number of DOFSS drug overdose fatalities, n=1,295

[4]Heroin identified by metabolite '6-monoacetylmorphine.'

[5]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

[6]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

[7]Clonazepam identified by 'clonazepam.' and/or '7-aminoclonazepam.'

[8]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'

[9]Buprenorphine identified by 'buprenorphine.' and/or 'norbuprenorphine.'

[10]Methadone identified by 'methadone' and/or 'EDDP'

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Figure 1. Most Frequent Drugs Found in Combination with a Commonly Detected Drug Among Drug Overdose Decedents in Kentucky, 2015[1-2]
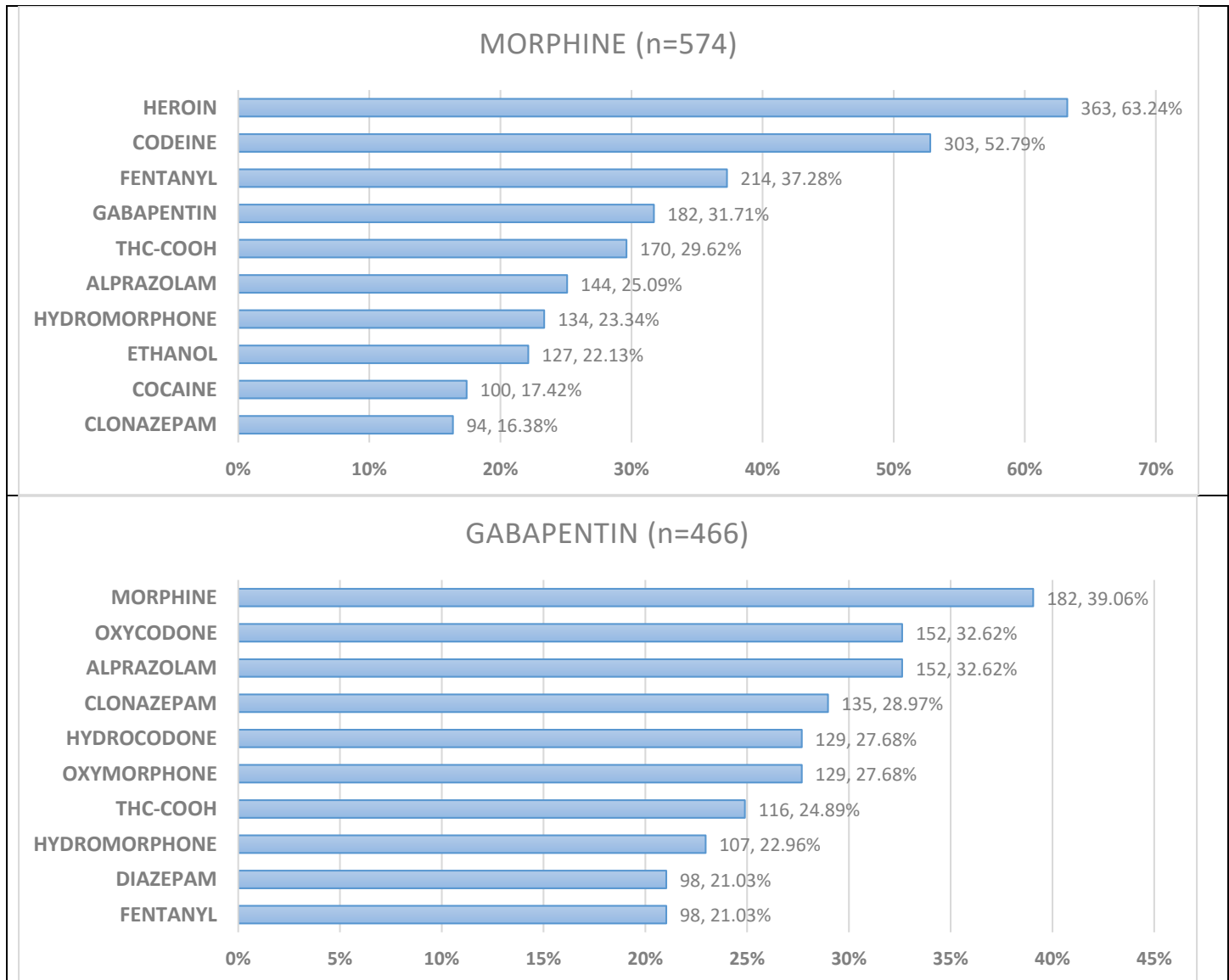
MORPHINE (n=574)

Drug	Value
HEROIN	363, 63.24%
CODEINE	303, 52.79%
FENTANYL	214, 37.28%
GABAPENTIN	182, 31.71%
THC-COOH	170, 29.62%
ALPRAZOLAM	144, 25.09%
HYDROMORPHONE	134, 23.34%
ETHANOL	127, 22.13%
COCAINE	100, 17.42%
CLONAZEPAM	94, 16.38%

GABAPENTIN (n=466)

Drug	Value
MORPHINE	182, 39.06%
OXYCODONE	152, 32.62%
ALPRAZOLAM	152, 32.62%
CLONAZEPAM	135, 28.97%
HYDROCODONE	129, 27.68%
OXYMORPHONE	129, 27.68%
THC-COOH	116, 24.89%
HYDROMORPHONE	107, 22.96%
DIAZEPAM	98, 21.03%
FENTANYL	98, 21.03%

[1]Drug testing of blood, urine, and/or vitreous fluids.
[2]Drugs are not mutually exclusive; decedents may have more than one drug detected.

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HEROIN (n=366)

Drug	Value
MORPHINE	363, 99.18%
CODEINE	258, 70.49%
THC-COOH	126, 34.43%
FENTANYL	123, 33.61%
ALPRAZOLAM	103, 28.14%
GABAPENTIN	95, 25.96%
ETHANOL	91, 24.86%
HYDROMORPHONE	77, 21.04%
COCAINE	69, 18.85%
THC	60, 16.39%

ALPRAZOLAM (n=351)

Drug	Value
GABAPENTIN	152, 43.30%
MORPHINE	144, 41.03%
OXYCODONE	129, 36.75%
HYDROCODONE	121, 34.47%
OXYMORPHONE	109, 31.05%
THC-COOH	109, 31.05%
HYDROMORPHONE	103, 29.34%
HEROIN	103, 29.34%
CLONAZEPAM	84, 23.93%
CODEINE	81, 23.08%

[3]Heroin identified by metabolite '6-monoacetylmorphine.'
[4]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

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FENTANYL (n=334)

Drug	Value
MORPHINE	214, 64.07%
HEROIN	123, 36.83%
THC-COOH	101, 30.24%
GABAPENTIN	98, 29.34%
ALPRAZOLAM	80, 23.95%
OXYCODONE	75, 22.46%
CODEINE	70, 20.96%
COCAINE	67, 20.06%
OXYMORPHONE	61, 18.26%
ETHANOL	56, 16.77%

CODEINE (n=309)

Drug	Value
MORPHINE	303, 98.06%
HEROIN	258, 83.50%
THC-COOH	99, 32.04%
GABAPENTIN	92, 29.77%
HYDROMORPHONE	84, 27.18%
ALPRAZOLAM	81, 26.21%
FENTANYL	70, 22.65%
ETHANOL	63, 20.39%
CLONAZEPAM	56, 18.12%
COCAINE	53, 17.15%

[5]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

Carboxy Tetrahydrocannabinol (THC-COOH) (n=301)

Drug	Value
MORPHINE	170, 56.48%
THC	134, 44.52%
HEROIN	126, 41.86%
GABAPENTIN	116, 38.54%
ALPRAZOLAM	109, 36.21%
FENTANYL	101, 33.55%
CODEINE	99, 32.89%
CLONAZEPAM	78, 25.91%
OXYCODONE	74, 24.58%
HYDROMORPHONE	65, 21.59%

ETHANOL (n=237)

Drug	Value
MORPHINE	127, 53.59%
HEROIN	91, 38.40%
GABAPENTIN	65, 27.43%
CODEINE	63, 26.58%
ALPRAZOLAM	58, 24.47%
FENTANYL	56, 23.63%
HYDROCODONE	49, 20.68%
THC-COOH	48, 20.25%
COCAINE	41, 17.30%
HYDROMORPHONE	35, 14.77%

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BUPRENORPHINE (n=123)

Drug	Value
GABAPENTIN	75, 60.98%
ALPRAZOLAM	54, 43.90%
CLONAZEPAM	47, 38.21%
MORPHINE	46, 37.40%
THC-COOH	44, 35.77%
HEROIN	32, 26.02%
OXAZEPAM	31, 25.20%
CODEINE	29, 23.58%
METHAMPHETAMINE	28, 22.76%
TEMAZEPAM	28, 22.76%
DIAZEPAM	28, 22.76%

METHAMPHETAMINE (n=112)

Drug	Value
AMPHETAMINE	71, 63.39%
MORPHINE	50, 44.64%
THC-COOH	48, 42.86%
GABAPENTIN	47, 41.96%
ALPRAZOLAM	33, 29.46%
HEROIN	33, 29.46%
CODEINE	32, 28.57%
BUPRENORPHINE	28, 25.00%
OXAZEPAM	27, 24.11%
TEMAZEPAM	24, 21.43%
HYDROMORPHONE	24, 21.43%

[6]Buprenorphine identified by 'buprenorphine.' and/or 'norbuprenorphine.'

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METHADONE (n=92)

Drug	Count, Percentage
GABAPENTIN	50, 54.35%
CLONAZEPAM	34, 36.96%
ALPRAZOLAM	31, 33.70%
OXYCODONE	30, 32.61%
OXYMORPHONE	27, 29.35%
THC-COOH	23, 25.00%
DIAZEPAM	22, 23.91%
MORPHINE	22, 23.91%
OXAZEPAM	20, 21.74%
TEMAZEPAM	19, 20.65%

[7]Methadone identified by 'methadone' and/or 'EDDP.'

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Table 3. Most Common Two-Drug Combinations Detected Among Drug Overdose Decedents in Kentucky, 2015

Two-Drug Combination[1-2]	Count	Percentage[3]
Heroin[4] and Morphine	363	28.03%
Codeine and Morphine	303	23.40%
Codeine and Heroin[4]	258	19.92%
Fentanyl[5] and Morphine	214	16.53%
Gabapentin and Morphine	182	14.05%
Morphine and THC-COOH	170	13.13%
Gabapentin and Oxycodone	152	11.74%
Alprazolam[6] and Gabapentin	152	11.74%
Alprazolam[6] and Morphine	144	11.12%
Clonazepam[7] and Gabapentin	135	10.42%

[1]Drug testing of blood, urine, and/or vitreous fluids.

[2]Decedents may have had more than one drug combination detected.

[3]Percentage is based on total number of DOFSS drug overdose fatalities, n=1,295.

[4]Heroin identified by metabolite '6-monoacetylmorphine.'

[5]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

[6]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

[7]Clonazepam identified by 'clonazepam.' and/or '7-aminoclonazepam.'

Table 4. Most Common Three-Drug Combinations Detected Among Drug Overdose Decedents in Kentucky, 2015

Three-Drug Combination[1-2]	Count	Percentage[3]
Codeine, Heroin[4], and Morphine	258	19.92%
Heroin[4], Morphine, and THC-COOH	126	9.73%
Fentanyl[5], Heroin[4], and Morphine	121	9.34%
Gabapentin, Oxycodone, and Oxymorphone	107	8.26%
Alprazolam[6], Heroin[4], and Morphine	103	7.95%
Codeine, Morphine, and THC-COOH	99	7.64%
Alprazolam[6], Oxycodone, and Oxymorphone	98	7.57%
Gabapentin, Heroin[4], and Morphine	95	7.34%
Ethanol, Heroin[4], and Morphine	91	7.03%
Codeine, Gabapentin, and Morphine	89	6.87%

[1]Drug testing of blood, urine, and/or vitreous fluids.
[2]Decedents may have had more than one drug combination detected.
[3]Percentage is based on total number of DOFSS drug overdose fatalities, n=1,295.
[4]Heroin identified by metabolite '6-monoacetylmorphine.'
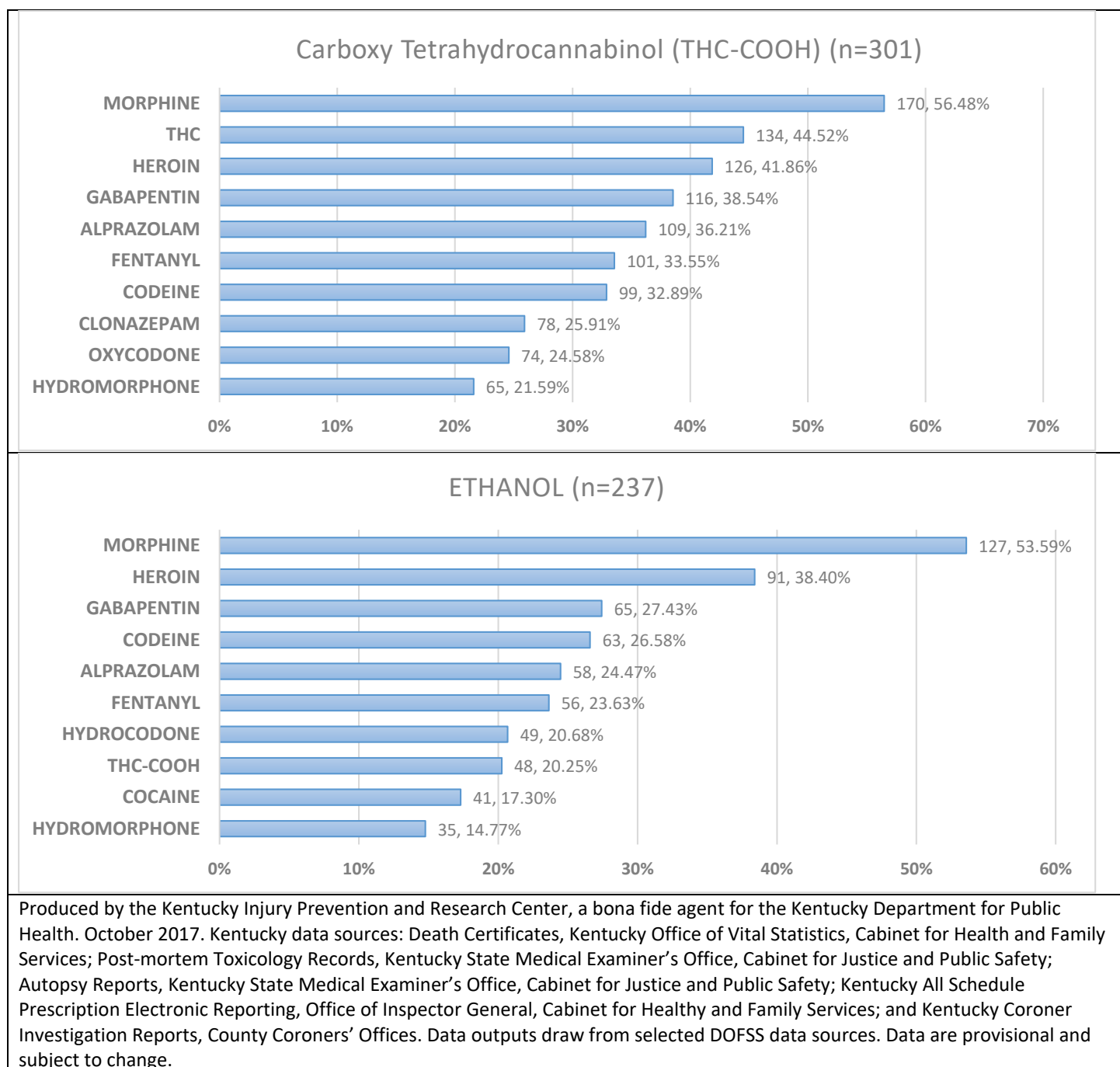[5]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'
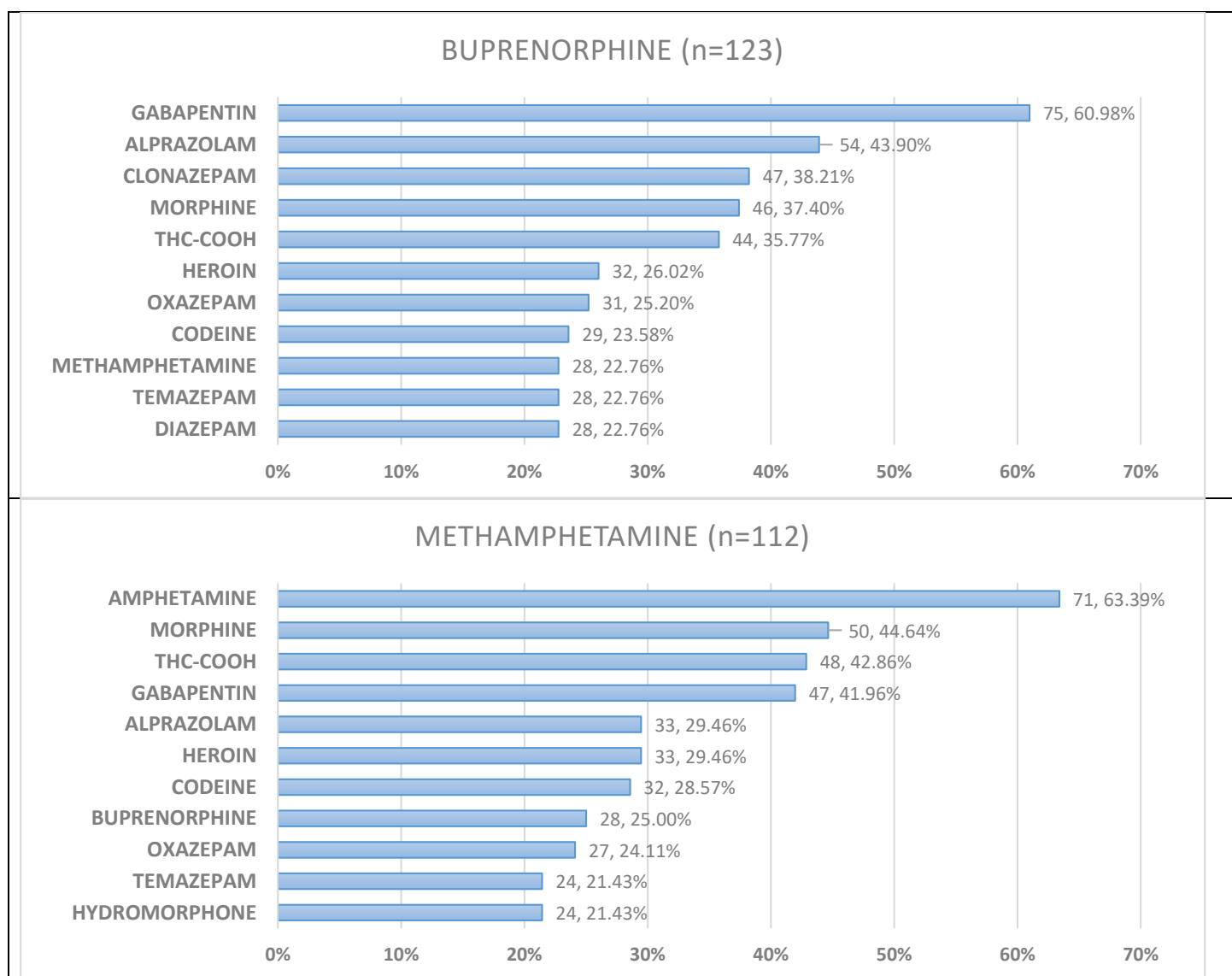[6]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

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Table 5. Most Common Four-Drug Combinations Detected Among Drug Overdose Decedents in Kentucky, 2015

Four-Drug Combination[1-2]	Count	Percentage[3]
Codeine, Heroin[4], Morphine, and THC-COOH	86	6.64%
Alprazolam[5], Codeine, Heroin[4], and Morphine	76	5.87%
Codeine, Heroin[4], Hydromorphone, and Morphine	70	5.41%
Codeine, Gabapentin, Heroin[4], and Morphine	69	5.33%
Codeine, Morphine, THC, and THC-COOH	60	4.63%
Codeine, Fentanyl[6], Heroin[4], and Morphine	59	4.56%
Codeine, Ethanol, Heroin[4], and Morphine	54	4.17%
Alprazolam[5], Gabapentin, Oxycodone, and Oxymorphone	50	3.86%
Fentanyl[6], Heroin[4], Morphine, and THC-COOH	49	3.78%
Cocaine[7], Codeine, Heroin[4], and Morphine	48	3.71%

[1]Drug testing of blood, urine, and/or vitreous fluids.

[2]Decedents may have had more than one drug combination detected.

[3]Percentage is based on total number of DOFSS drug overdose fatalities, n=1,295.

[4]Heroin identified by metabolite '6-monoacetylmorphine.'

[5]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

[6]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

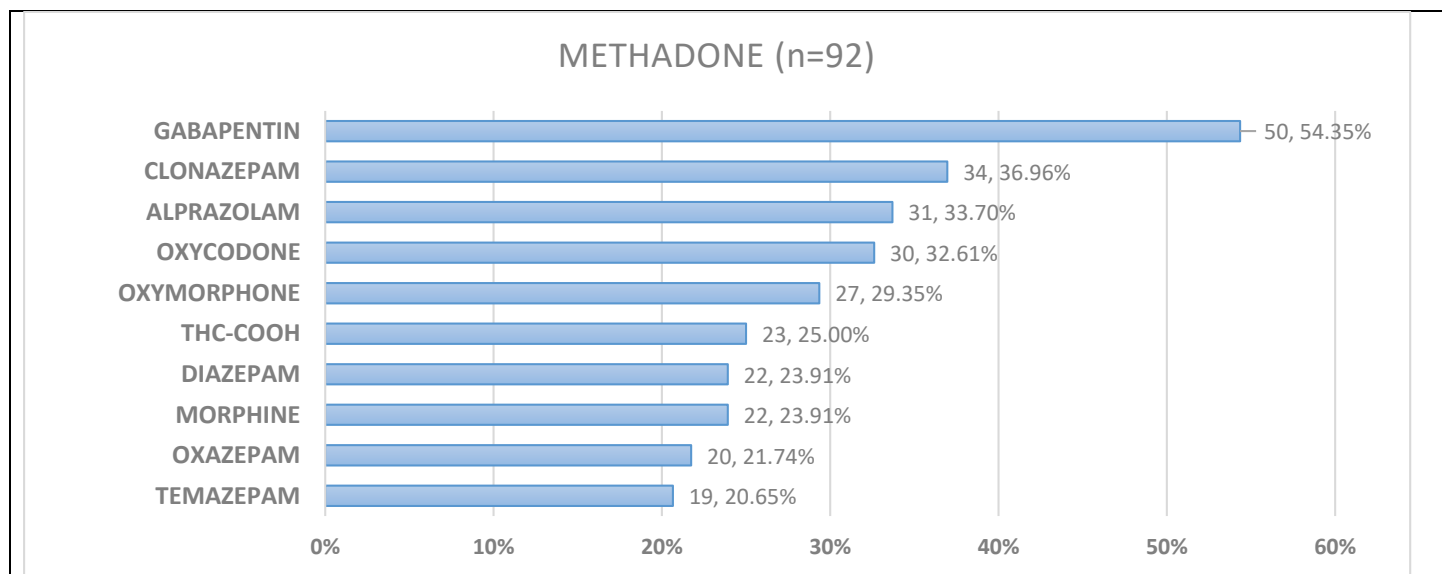[7]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'

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DRUG OVERDOSE FATALITY DEMOGRAPHICS

Table 6. Most Common Drugs Identified Among Drug Overdose Decedents in Kentucky by Gender, 2015

Drug[1-2]	Female (N=510)	Male (N=785)	P-value[3]
MORPHINE	183 (35.9%)	391 (49.8%)	<0.001
GABAPENTIN	228 (44.7%)	238 (30.3%)	<0.001
HEROIN[4]	95 (18.6%)	271 (34.5%)	<0.001
ALPRAZOLAM[5]	155 (30.4%)	196 (25.0%)	0.03
FENTANYL[6]	108 (21.0%)	226 (28.8%)	0.002
CODEINE	89 (17.5%)	220 (28.0%)	<0.001
THC-COOH	105 (20.6%)	196 (25.0%)	0.07
OXYCODONE	126 (24.7%)	165 (21.0%)	0.12
OXYMORPHONE	97 (19.0%)	145 (18.4%)	0.80
HYDROCODONE	110 (21.6%)	134 (17.0%)	0.04
HYDROMORPHONE	83 (16.3%)	147 (18.7%)	0.26
COCAINE[7]	61 (12.0%)	103 (13.1%)	0.54

[1]Drug testing of blood, urine, and/or vitreous fluids.
[2]Drugs are not mutually exclusive; decedents may have more than one drug detected.
[3]p-value from chi-square test of independence.
[4]Heroin identified by metabolite '6-monoacetylmorphine.'
[5]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'
[6]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'
[7]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'

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Table 7. Most Common Drugs Identified Among Drug Overdose Decedents in Kentucky by Age Group, 2015

Drug[1-2]	0-24 years (N=79)	25-34 years (N=302)	35-44 years (N=349)	45-54 years (N=349)	55+ years (N=216)
MORPHINE	51 (64.6%)	181 (59.9%)	143 (41.0%)	130 (37.2%)	69 (31.9%)
GABAPENTIN	9 (11.4%)	71 (23.5%)	134 (38.4%)	167 (47.9%)	85 (39.4%)
HEROIN[3]	40 (50.6%)	125 (41.4%)	87 (24.9%)	75 (21.5%)	39 (18.1%)
ALPRAZOLAM[4]	19 (24.1%)	72 (23.8%)	93 (26.6%)	109 (31.2%)	58 (26.9%)
FENTANYL[5]	28 (35.4%)	113 (37.4%)	96 (27.5%)	70 (20.1%)	27 (12.5%)
CODEINE	32 (40.5%)	110 (36.4%)	63 (18.1%)	70 (20.1%)	34 (15.7%)
THC-COOH	34 (43.0%)	89 (29.5%)	74 (21.2%)	79 (22.6%)	25 (11.6%)
OXYCODONE	5 (6.3%)	43 (14.2%)	78 (22.3%)	104 (29.8%)	61 (28.2%)
OXYMORPHONE	5 (6.3%)	39 (12.9%)	76 (21.8%)	77 (22.1%)	45 (20.8%)
HYDROCODONE	5 (6.3%)	33 (10.9%)	62 (17.8%)	86 (24.6%)	58 (26.9%)
HYDROMORPHONE	14 (17.7%)	49 (16.2%)	50 (14.3%)	72 (20.6%)	45 (20.8%)
COCAINE[6]	5 (6.3%)	42 (13.2%)	52 (14.9%)	46 (13.2%)	19 (8.8%)

[1]Drug testing of blood, urine, and/or vitreous fluids.

[2]Drugs are not mutually exclusive; decedents may have more than one drug detected.

[3]Heroin identified by metabolite '6-monoacetylmorphine.'

[4]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

[5]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

[6]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'

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Table 8. Top Drugs Identified Among Drug Overdose Decedents in Kentucky by Race, 2015[1]

Drugs[2-3]	Black (N=54)	White (N=1231)
MORPHINE	23 (42.6%)	545 (44.3%)
GABAPENTIN	15 (27.8%)	449 (36.5%)
HEROIN[4]	15 (27.8%)	346 (28.1%)
ALPRAZOLAM[5]	6 (11.1%)	343 (27.9%)
FENTANYL[6]	17 (31.5%)	312 (25.3%)
CODEINE	12 (22.2%)	293 (23.8%)
THC-COOH	17 (31.5%)	283 (23.0%)
OXYCODONE	6 (11.1%)	283 (23.0%)
OXYMORPHONE	6 (11.1%)	235 (19.1%)
HYDROCODONE	5 (9.3%)	239 (19.4%)
HYDROMORPHONE	5 (9.3%)	225 (18.3%)
COCAINE[7]	23 (42.6%)	140 (11.4%)

[1]Asian/PI, Indian, Other, and Unknown Race were excluded from this analyses due to low counts.
[2]Drug testing of blood, urine, and/or vitreous fluids.
[3]Drugs are not mutually exclusive; decedents may have more than one drug detected.
[4]Heroin identified by metabolite '6-monoacetylmorphine.'
[5]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'
[6]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'
[7]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'

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Figure 2. Most Common Prescription Drugs Identified Among Drug Overdose Decedents in Kentucky by Median Blood Concentration and Therapeutic Range, 2015[1-6]
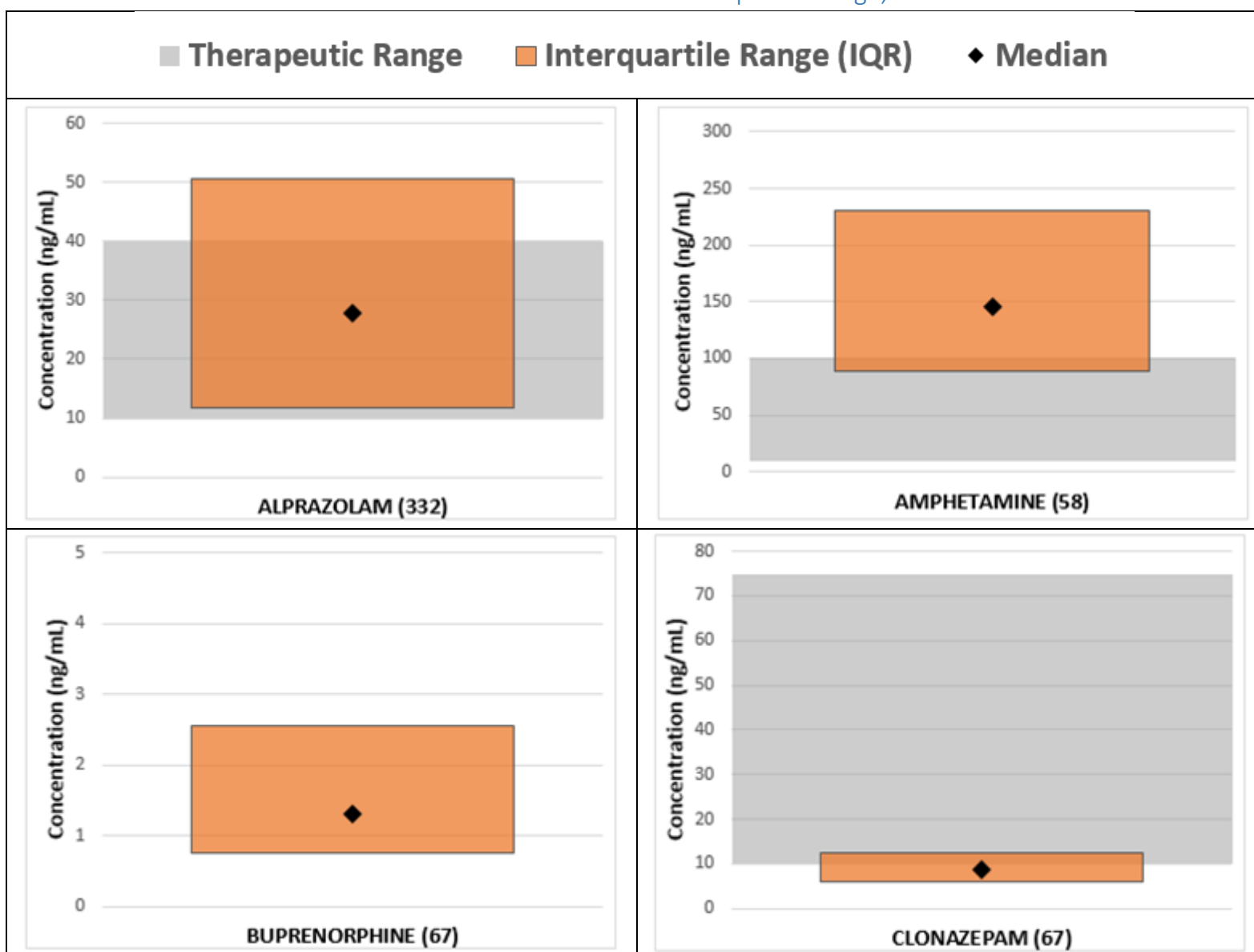
[1]A therapeutic range for buprenorphine has not been clearly established (https://www.ata-journal.org/articles/ata/pdf/2004/04/ata20044p275.pdf).

[2]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

[3]Buprenorphine identified by 'buprenorphine.' and/or 'norbuprenorphine.'

[4]Clonazepam identified by 'clonazepam.' and/or '7-aminoclonazepam.'

Legend: Therapeutic Range | Interquartile Range (IQR) | ◆ Median

[5] Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

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■ Therapeutic Range **□ Interquartile Range (IQR)** **◆ Median**

HYDROCODONE (177)

HYDROMORPHONE (36)

METHADONE (80)

MORPHINE (465)

[6]Methadone identified by 'methadone' and/or 'EDDP.'

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Therapeutic Range ■   **Interquartile Range (IQR)** ■   ◆ **Median**

NORDIAZEPAM (133)

OXYCODONE (238)

OXYMORPHONE (67)

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Table 9. Most Common Drug Classes Identified Among Drug Overdose Decedents in Kentucky by Suicide and Accidental Manners of Death, 2015[1]

Drug Class[2-3]	Suicide, n=51 (%)	Accident, n=1164 (%)	Chi-Square p-value[4]	Fischer's Exact p-value[5]
OPIOIDS[6]	25 (49.02%)	976 (83.85%)	<0.001	-
BENZODIAZEPINES	19 (37.25%)	563 (48.37%)	0.16	-
ANTICONVULSANTS	13 (25.49%	429 (36.86%)	0.13	-
CANNABINOIDS	8 (15.69%)	279 (23.97%)	0.21	-
ALCOHOL	6 (11.76%)	212 (18.21%)	0.30	-
COCAINE	<5	149 (12.80%)	0.03	-
AMPHETAMINES	5 (9.80%)	142 (12.20%)	0.73	-
STIMULANTS	17 (33.33%)	45 (3.87%)	<0.001	<0.001
ANTIDEPRESSANTS	17 (33.33%)	31 (2.66%)	<0.001	<0.001
NON-OPIOID ANALGESICS	10 (19.61%)	24 (2.06%)	<0.001	<0.001
BARBITURATES	<5	24 (2.06%)	1.00	1.00
CARDIOVASCULAR AGENTS	8 (15.69%)	12 (1.03%)	<0.001	<0.001
ANTIHISTAMINES	8 (15.69%)	12 (1.03%)	<0.001	<0.001
SEDATIVES/HYPNOTICS	5 (9.80%)	7 (0.60%)	<0.001	<0.001
ANTIPSYCHOTICS	<5	7 (0.60%)	<0.001	<0.001
NARCOTICS	<5	<5	0.42	0.16
ANTIBIOTICS	0	<5	1.00	1.00
ANESTHETICS	0	<5	1.00	1.00
GASTROINTESTINAL AGENTS	0	<5	1.00	1.00
BATH SALTS	0	<5	1.00	1.00
NEUROLOGICAL AGENTS	0	<5	1.00	1.00

[1]Undetermined, Homicide, and Natural Manners of Death were excluded from this analysis.

[2]Drug testing of blood, urine, and/or vitreous fluids.

[3]Drugs are not mutually exclusive; decedents may have more than one drug detected.

[4]*p*-value from chi-square test of independence.

[5]*p*-value from Fisher-exact test for instances where chi-square assumptions may be violated.

[6]Opioids includes all opium-like substances (including natural opiates and synthetic opioids).

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Table 10. Kentucky Resident Drug Overdose Fatality Counts and Rates, 2015

County	Count[1]	Rate (per 100,000 population)[2-3]
Adair	<5	*
Allen	<5	*
Anderson	7	*
Ballard	<5	*
Barren	5	*
Bath	<5	*
Bell	23	82.29
Boone	49	39.32
Bourbon	5	*
Boyd	21	42.93
Boyle	9	*
Bracken	5	*
Breathitt	<5	*
Breckinridge	<5	*
Bullitt	14	18.19
Butler	10	77.91
Caldwell	<5	*
Calloway	5	*
Campbell	44	48.10
Carlisle	0	*
Carroll	<5	*
Carter	9	*
Casey	5	*
Christian	<5	*
Clark	13	36.46
Clay	6	*
Clinton	6	*
Crittenden	<5	*
Cumberland	<5	*
Daviess	13	13.24
Edmonson	7	*
Elliott	<5	*
Estill	6	*
Fayette	106	34.38
Fleming	6	*
Floyd	17	43.99
Franklin	12	24.11
Fulton	0	*

Gallatin	8	*
Garrard	<5	*
Grant	8	*
Graves	5	*
Grayson	6	*
Green	<5	*
Greenup	10	27.41
Hancock	<5	*
Hardin	9	*
Harlan	9	*
Harrison	8	*
Hart	<5	*
Henderson	<5	*
Henry	7	*
Hickman	<5	*
Hopkins	6	*
Jackson	<5	*
Jefferson	211	27.92
Jessamine	13	25.83
Johnson	6	*
Kenton	111	68.10
Knott	<5	*
Knox	19	59.73
Larue	0	*
Laurel	12	20.08
Lawrence	<5	*
Lee	6	*
Leslie	<5	*
Letcher	7	*
Lewis	6	*
Lincoln	<5	*
Livingston	<5	*
Logan	<5	*
Lyon	<5	*
Madison	29	33.78
Magoffin	<5	*
Marion	<5	*
Marshall	<5	*
Martin	9	*
Mason	<5	*

McCracken	7	*
McCreary	<5	*
McLean	0	*
Meade	5	*
Menifee	0	*
Mercer	5	*
Metcalfe	<5	*
Monroe	<5	*
Montgomery	9	*
Morgan	0	*
Muhlenberg	<5	*
Nelson	7	*
Nicholas	<5	*
Ohio	8	*
Oldham	15	23.80
Owen	<5	*
Owsley	<5	*
Pendleton	5	*
Perry	11	39.23
Pike	21	33.11
Powell	6	*
Pulaski	11	17.29
Robertson	0	*
Rockcastle	<5	*
Rowan	5	*
Russell	7	*
Scott	13	25.91
Shelby	16	36.13
Simpson	7	*
Spencer	6	*
Taylor	5	*
Todd	<5	*
Trigg	5	*
Trimble	<5	*
Union	5	*
Warren	15	12.61
Washington	<5	*
Wayne	<5	*
Webster	<5	*
Whitley	16	44.70

Wolfe	<5	*
Woodford	9	*

[1]Counts less than 5 were suppressed according to state data release policy.

[2]Rates based on Counts less than 10 were suppressed according to the state data release policy.

[3]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.
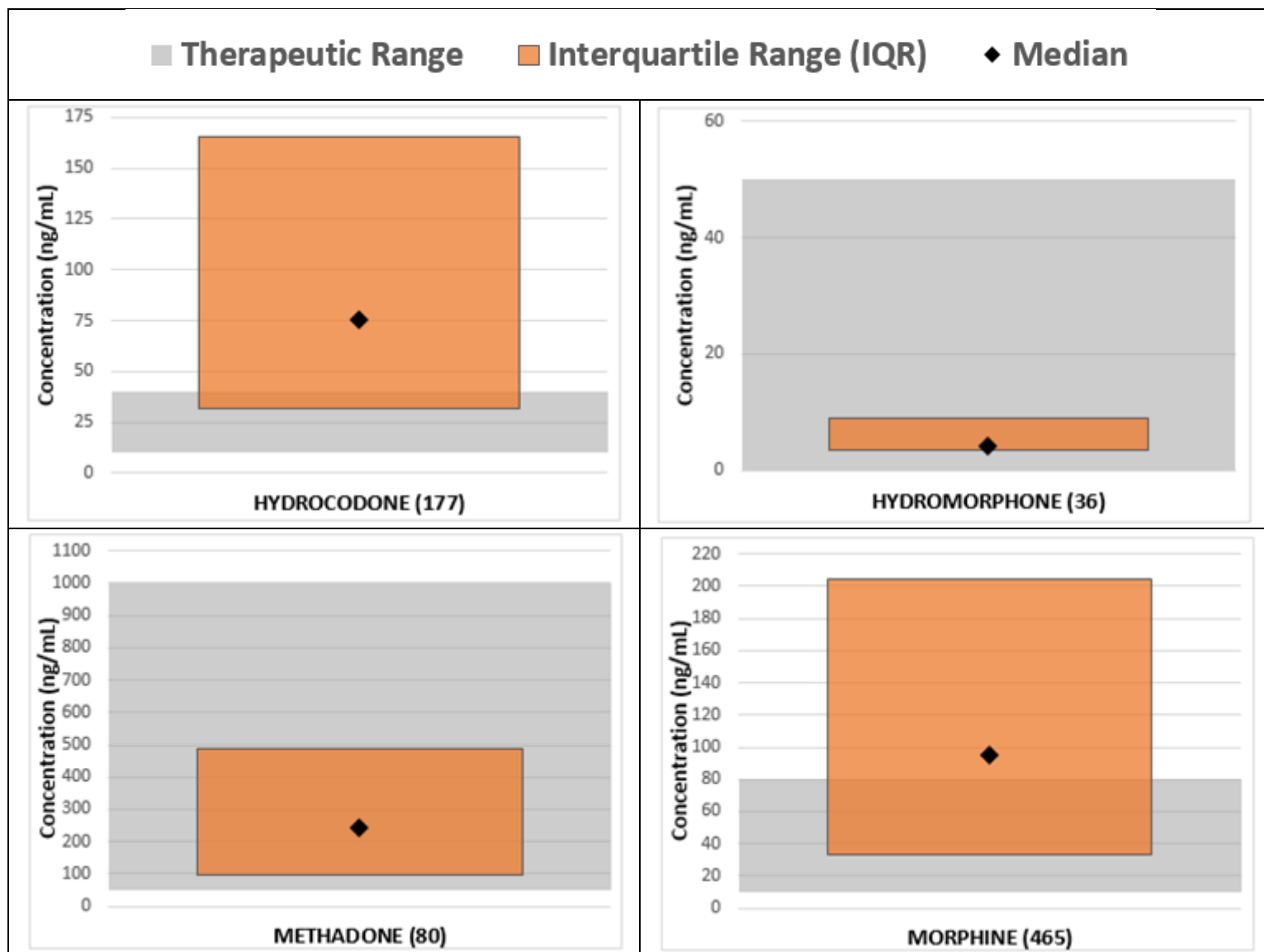
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Figure 3. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population, 2015[1-2]

Overdose Rate
- 0.0
- 0.1 - 28.2
- 28.3 - 48.2
- 48.3 - 93.4
- Supressed
- Unstable

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
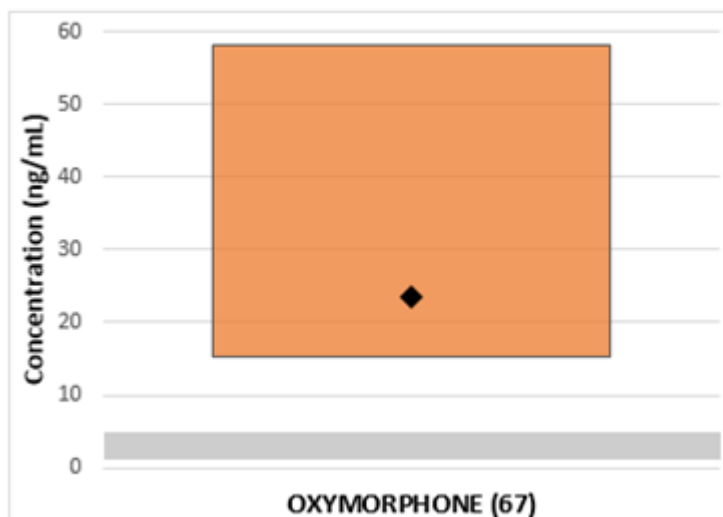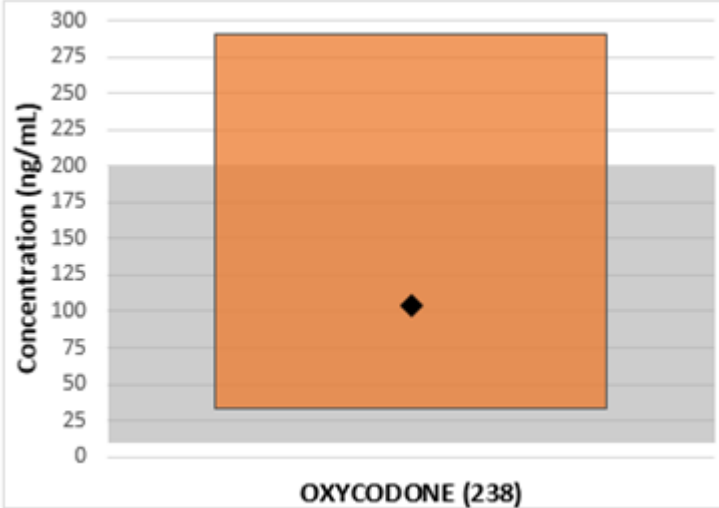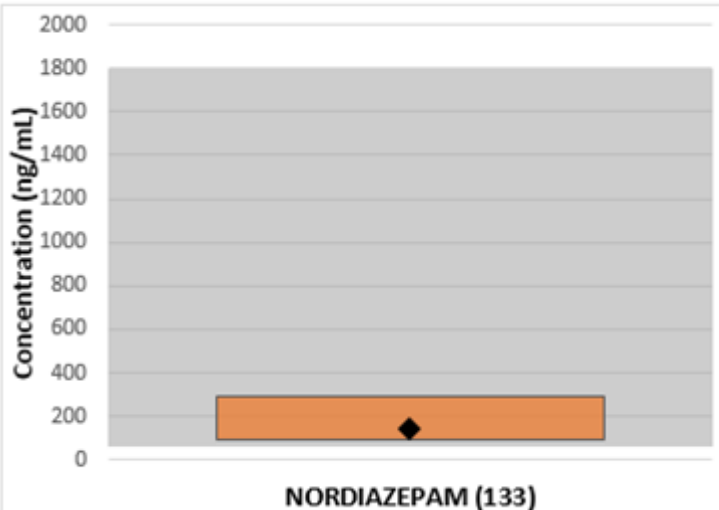[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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Table 11. Kentucky Resident Drug Overdose Fatality Counts and Rates by Kentucky Area Development District (ADD), 2015

ADD District	Count	Rate (Number of Drug Overdose Deaths per 100,000 population)[1]
Barren River	56	19.25
Big Sandy	55	36.41
Bluegrass	249	31.44
Buffalo Trace	21	37.32
Cumberland Valley	91	38.67
FIVCO	46	33.76
Gateway	18	21.81
Green River	33	15.33
Kentucky River	39	35.04
KIPDA	270	27.50
Lake Cumberland	50	24.05
Lincoln Trail	36	13.19
Northern Kentucky	229	51.07
Pennyrile	24	10.98
Purchase	24	12.21
[1]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.		
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Table 12. Kentucky Resident Drug Overdose Fatality Counts Involving Scheduled and Non-Scheduled Drugs by Kentucky Area Development District (ADD), 2015[1-2]

ADD District	Schedule I	Schedule II	Schedule III	Schedule IV	Non-Scheduled
Barren River	14	49	<5	39	38
Big Sandy	15	44	14	43	39
Bluegrass	101	213	21	113	123
Buffalo Trace	8	16	<5	5	<5
Cumberland Valley	21	67	28	64	60
Fivco	18	36	7	20	29
Gateway	<5	15	<5	9	8
Green River	6	27	<5	18	20
Kentucky River	13	29	8	23	20
KIPDA	156	227	17	119	141
Lake Cumberland	14	38	9	27	28
Lincoln Trail	12	30	<5	20	16
Northern Kentucky	123	200	19	102	103
Pennyrile	8	19	0	12	13
Purchase	<5	21	<5	20	10

[1]Schedule V drugs were not included due to a low count
[2]Counts less than 5 were suppressed according to state data release policy.

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Table 13. Kentucky Resident Drug Overdose Fatality Counts Involving Specific Drugs by Kentucky Area Development District (ADD), 2015[1]

ADD District	Heroin	Fentanyl	Heroin with Fentanyl	Methamphetamine
Barren River	<5	6	<5	<5
Big Sandy	<5	<5	0	<5
Bluegrass	76	95	33	9
Buffalo Trace	5	6	<5	0
Cumberland Valley	<5	10	0	13
Fivco	11	11	5	<5
Gateway	<5	5	0	<5
Green River	<5	<5	0	<5
Kentucky River	<5	<5	0	<5
KIPDA	126	48	17	33
Lake Cumberland	5	5	<5	9
Lincoln Trail	5	<5	<5	8
Northern Kentucky	101	111	55	11
Pennyrile	0	<5	0	6
Purchase	<5	<5	0	0

[1]Counts less than 5 were suppressed according to state data release policy.

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Figure 4. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population by Area Development District, 2015[1-2]

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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Figure 5. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Schedule I Drugs by Area Development District (ADD), 2015[1-2]

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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Figure 6. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Schedule II Drugs by Area Development District (ADD), 2015[1]

[1]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

Produced by the Kentucky Injury Prevention and Research Center, a bona fide agent for the Kentucky Department for Public Health. October 2017. Kentucky data sources: Death Certificates, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Post-mortem Toxicology Records, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Autopsy Reports, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Kentucky All Schedule Prescription Electronic Reporting, Office of Inspector General, Cabinet for Healthy and Family Services; and Kentucky Coroner Investigation Reports, County Coroners' Offices. Data outputs draw from selected DOFSS data sources. Data are provisional and subject to change.

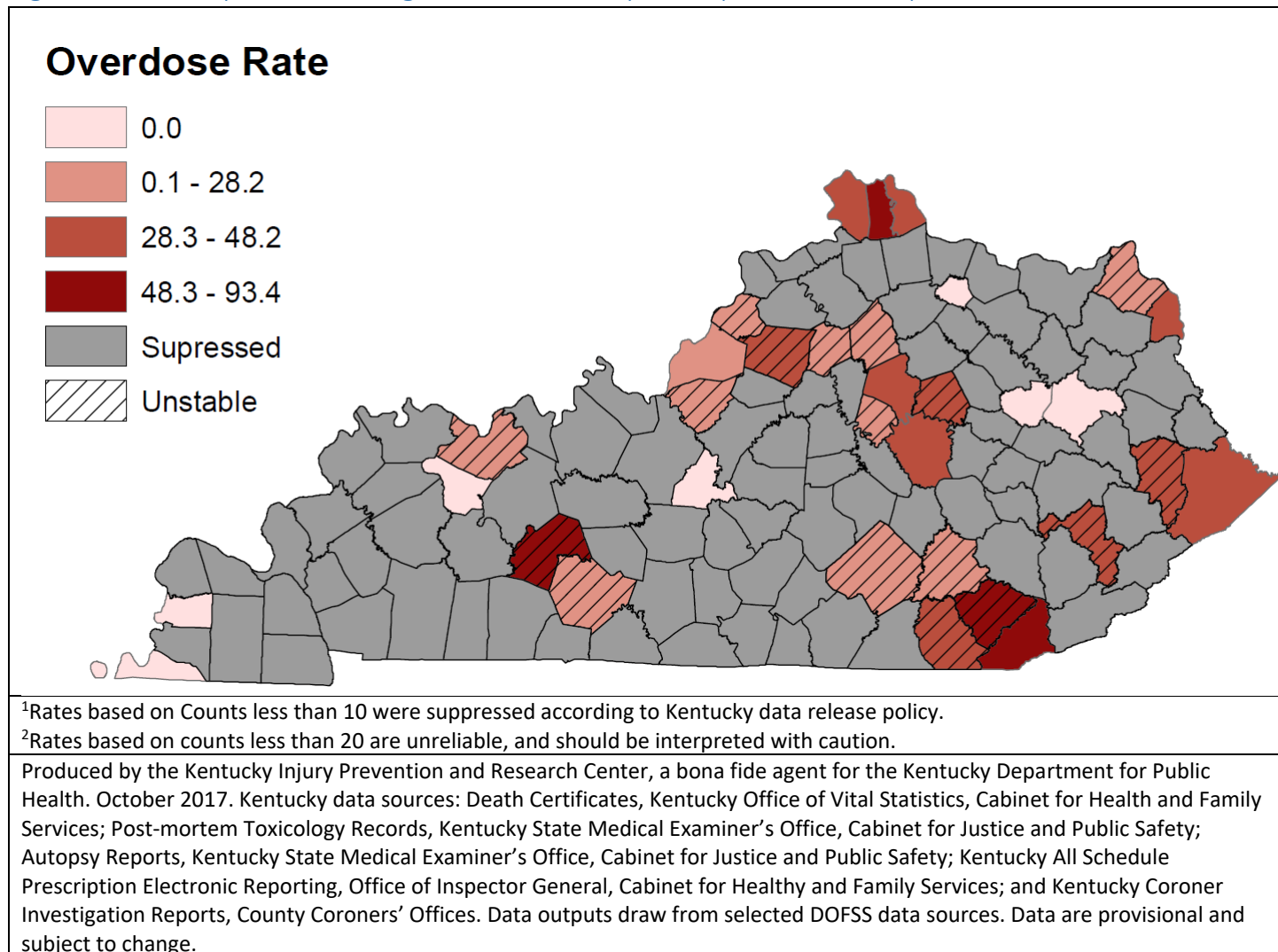Figure 7. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Schedule III Drugs by Area Development District (ADD), 2015[1-2]

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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Figure 8. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Schedule IV Drugs by Area Development District (ADD), 2015[1-2]

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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Figure 9. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Non-Scheduled Drugs by Area Development District (ADD), 2015[1-2]

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

Produced by the Kentucky Injury Prevention and Research Center, a bona fide agent for the Kentucky Department for Public Health. October 2017. Kentucky data sources: Death Certificates, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Post-mortem Toxicology Records, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Autopsy Reports, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Kentucky All Schedule Prescription Electronic Reporting, Office of Inspector General, Cabinet for Healthy and Family Services; and Kentucky Coroner Investigation Reports, County Coroners' Offices. Data outputs draw from selected DOFSS data sources. Data are provisional and subject to change.

Figure 10. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Heroin by Area Development District (ADD), 2015[1-2]

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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Figure 11. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Fentanyl by Area Development District (ADD), 2015[1-2]

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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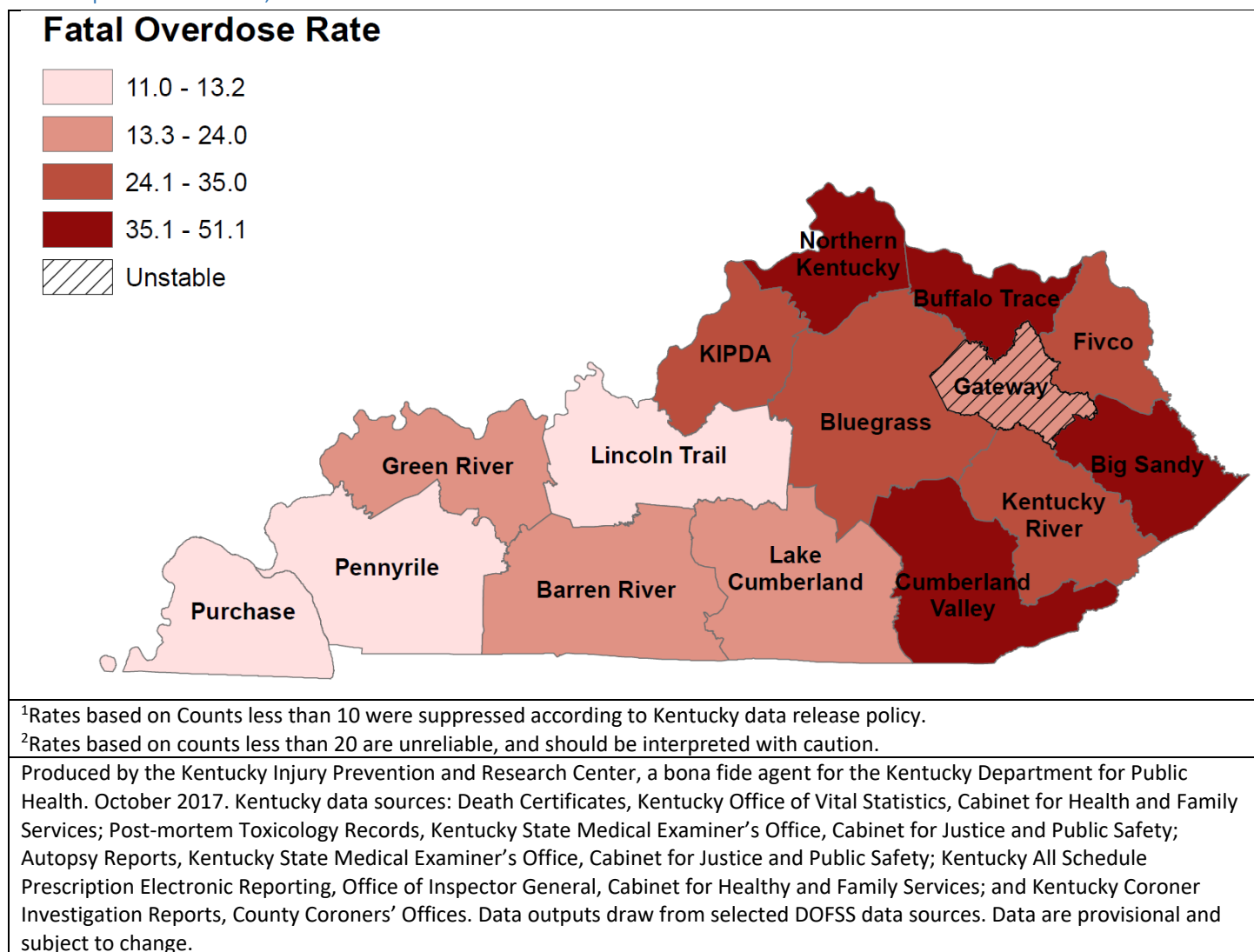
Figure 12. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Heroin and Fentanyl by Area Development Districts (ADD), 2015[1-2]
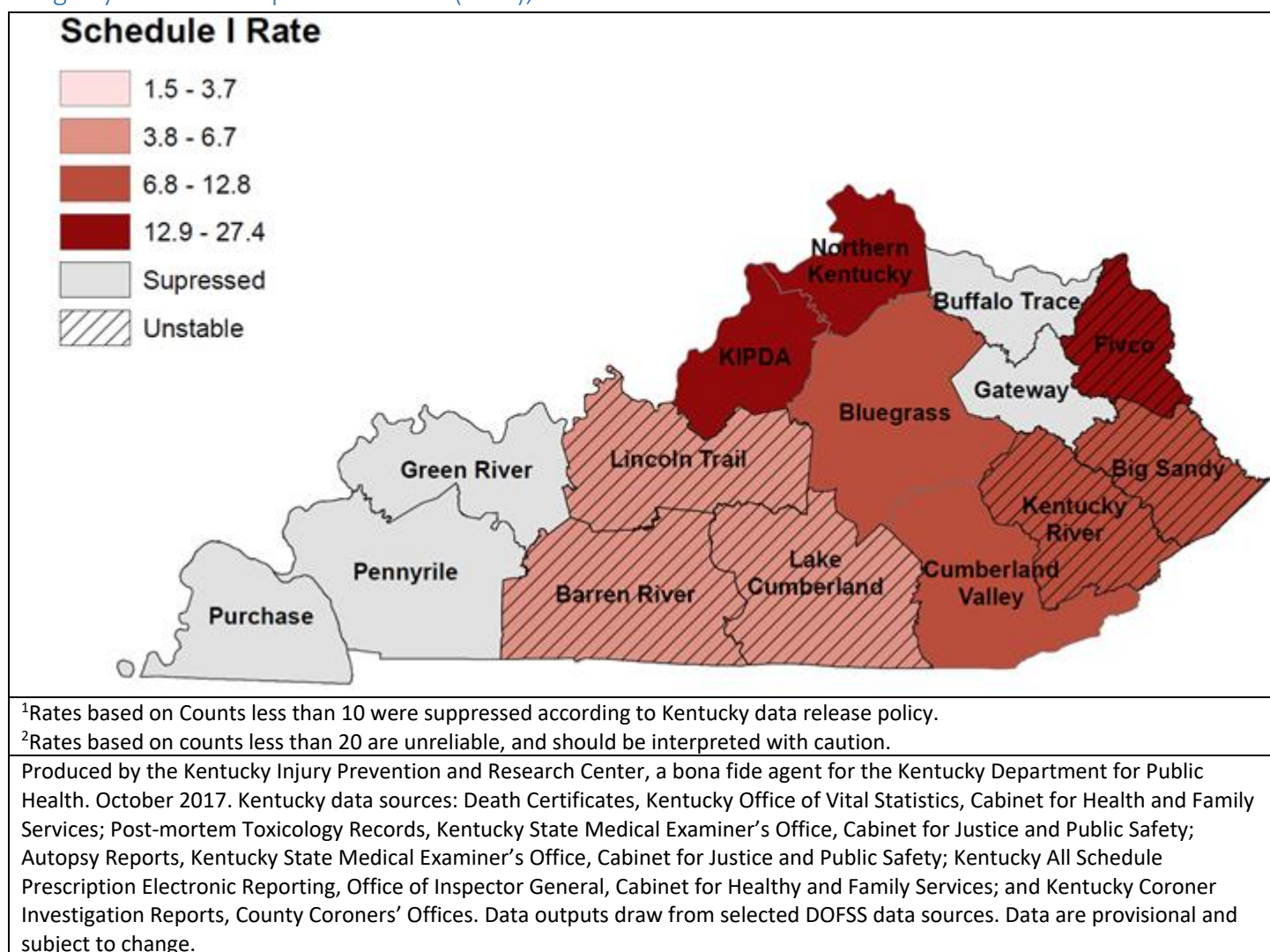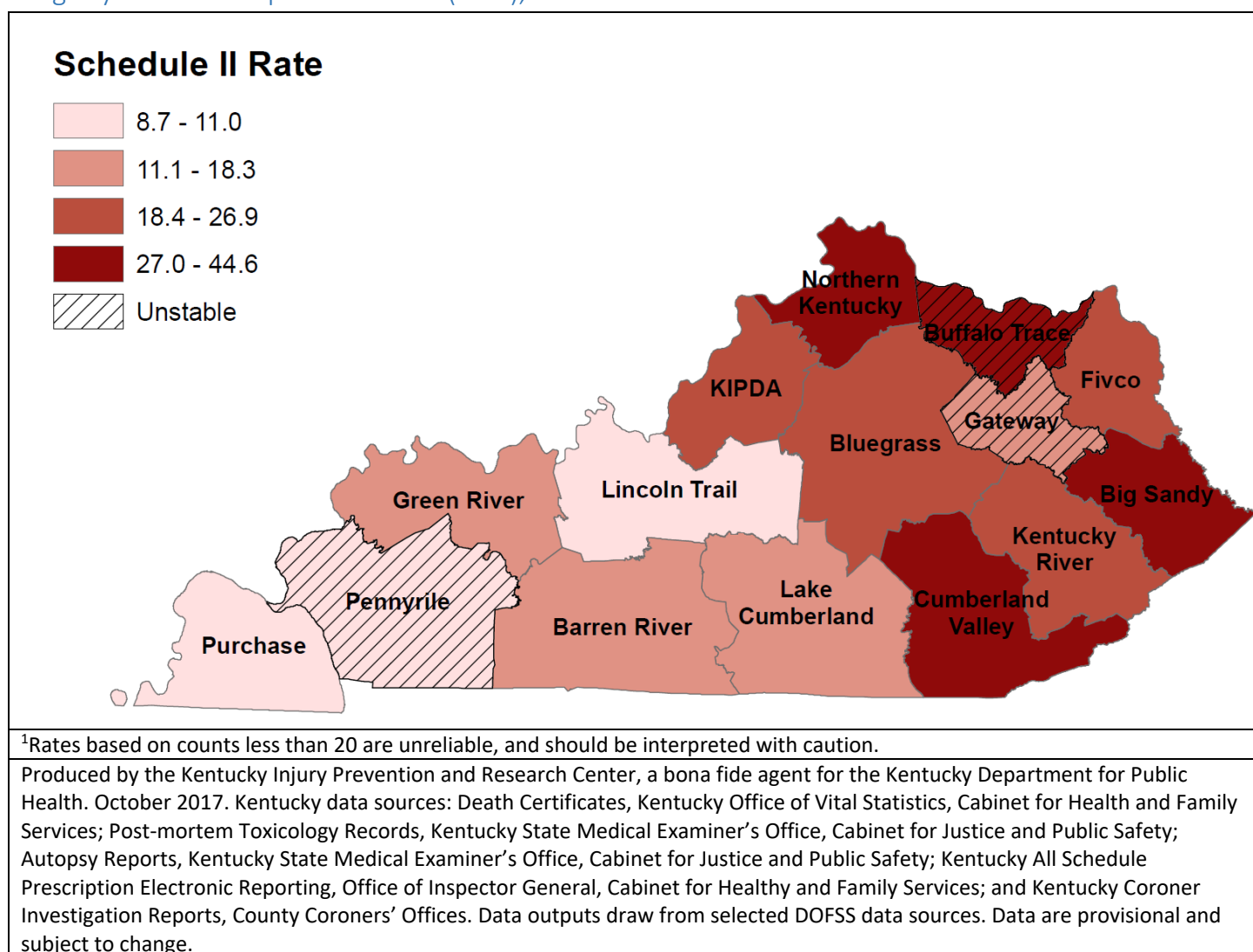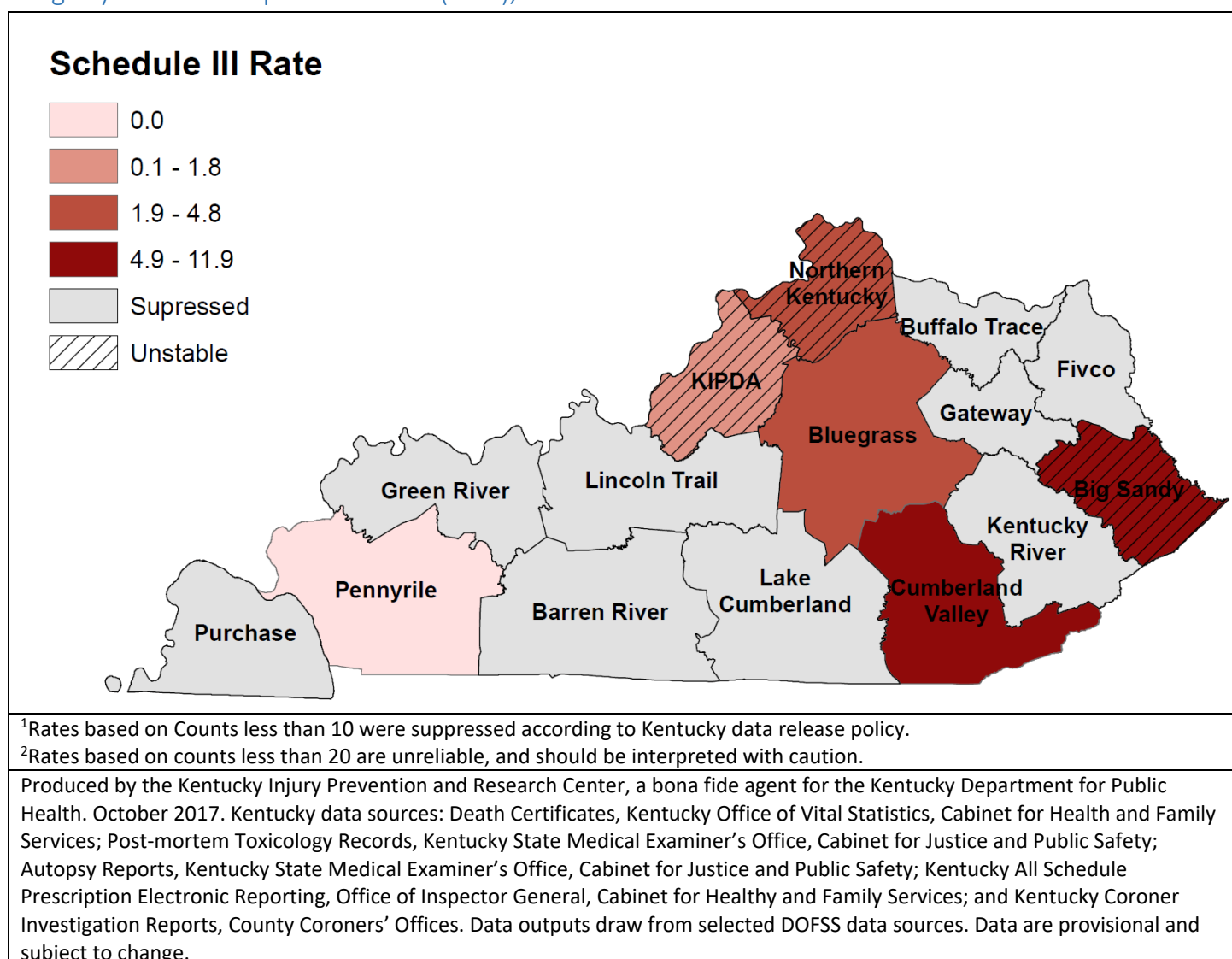

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

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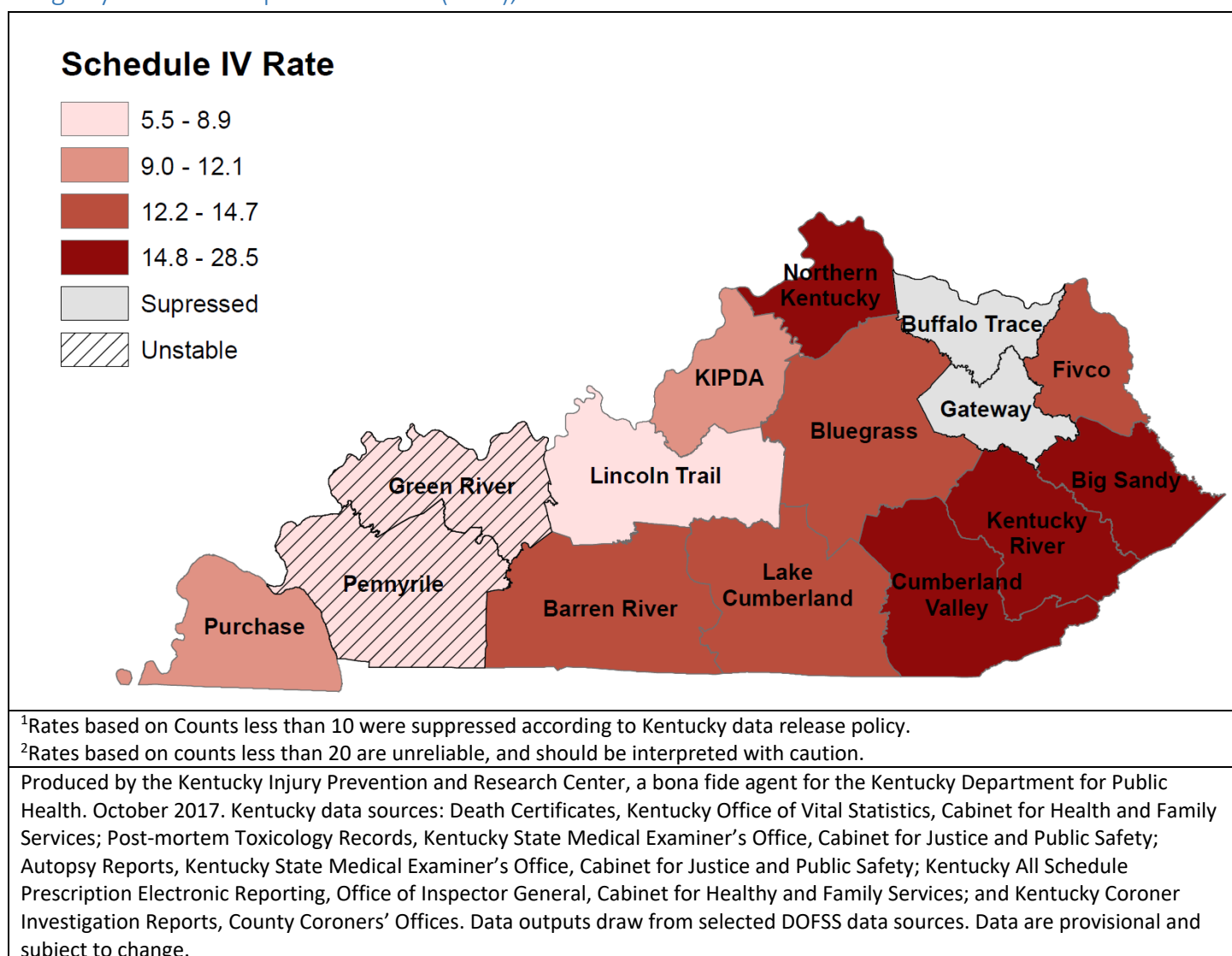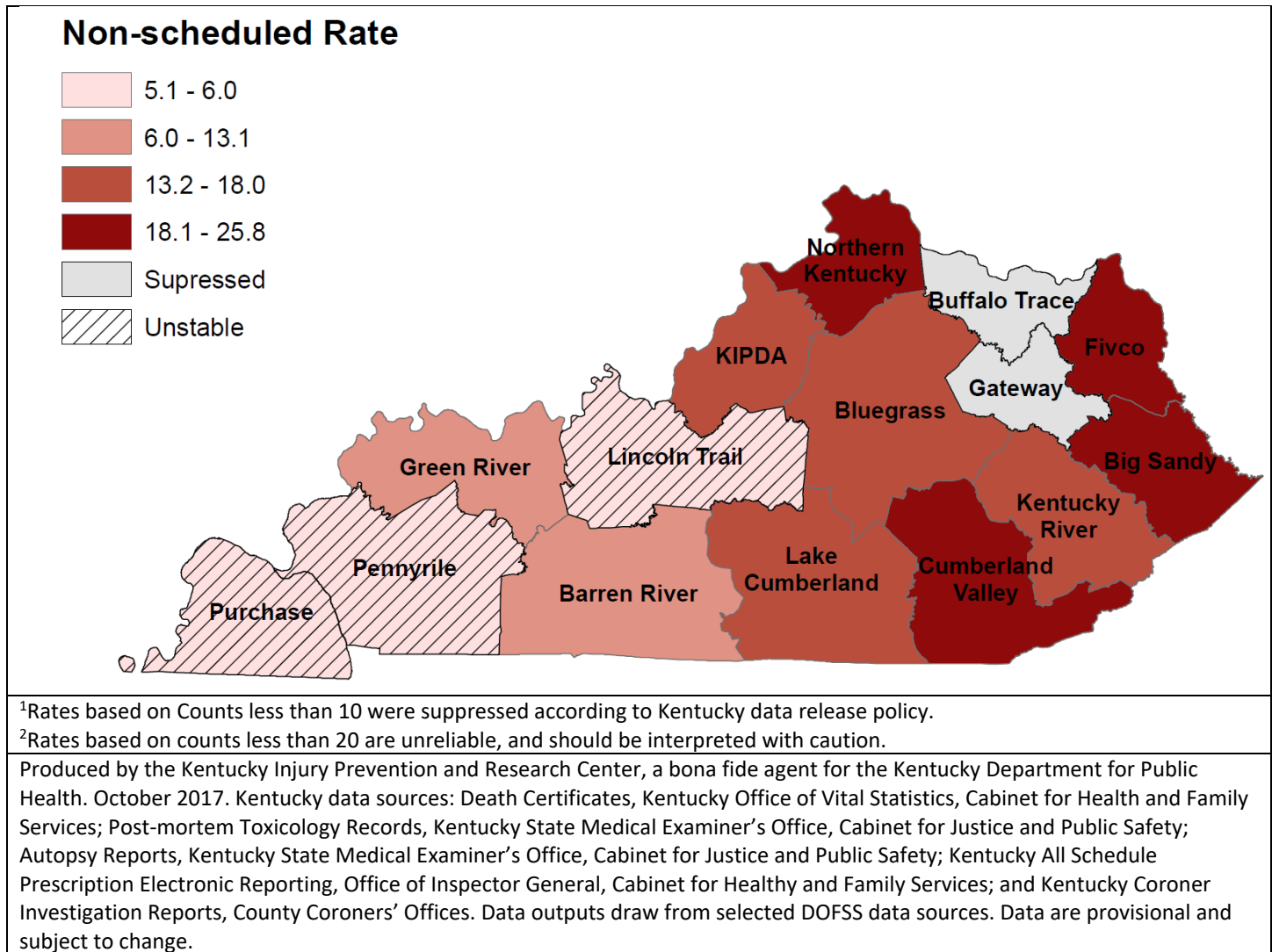
Figure 13. Kentucky Resident Drug Overdose Fatality Rates per 100,000 Population Involving Methamphetamine by Area Development District (ADD), 2015[1-2]
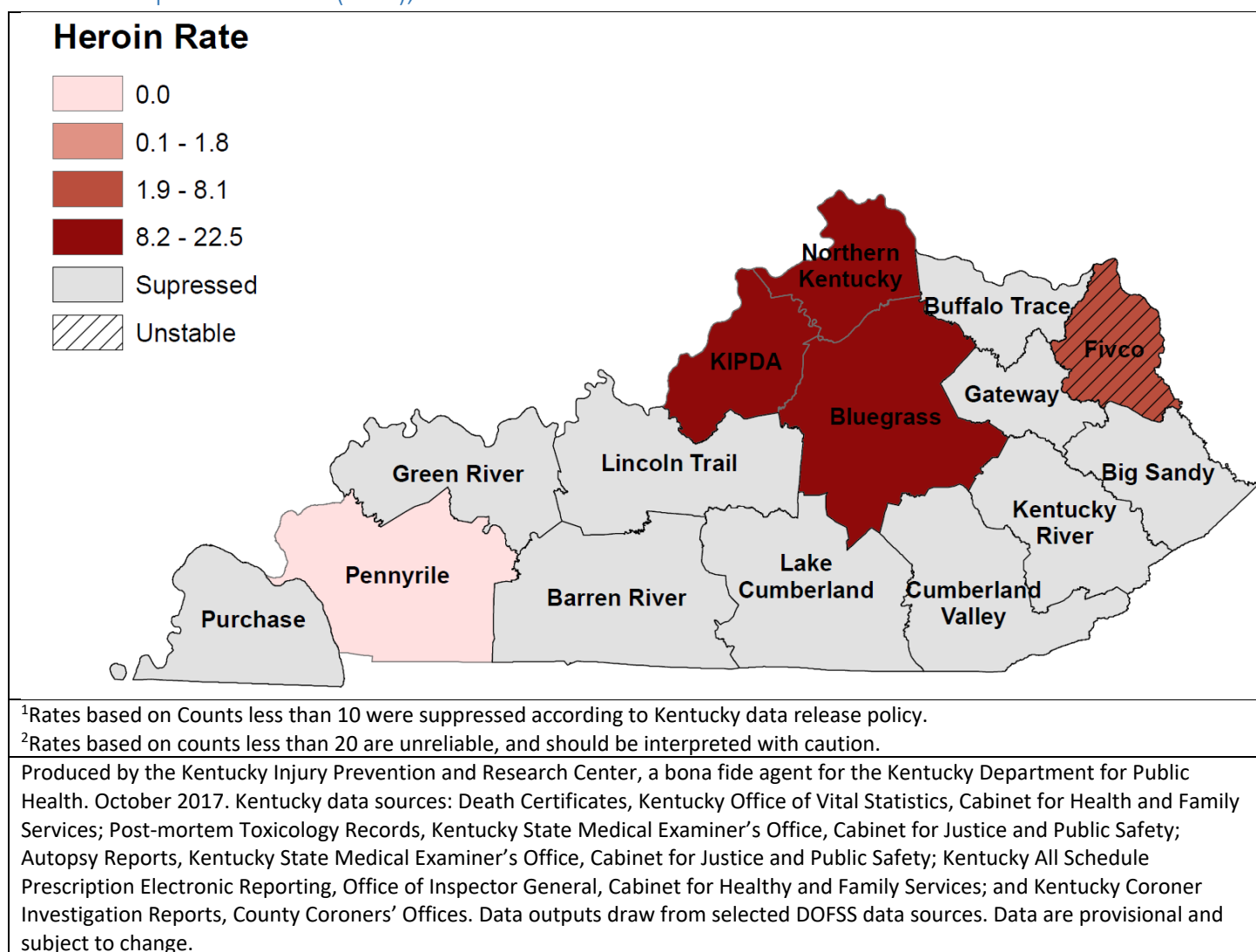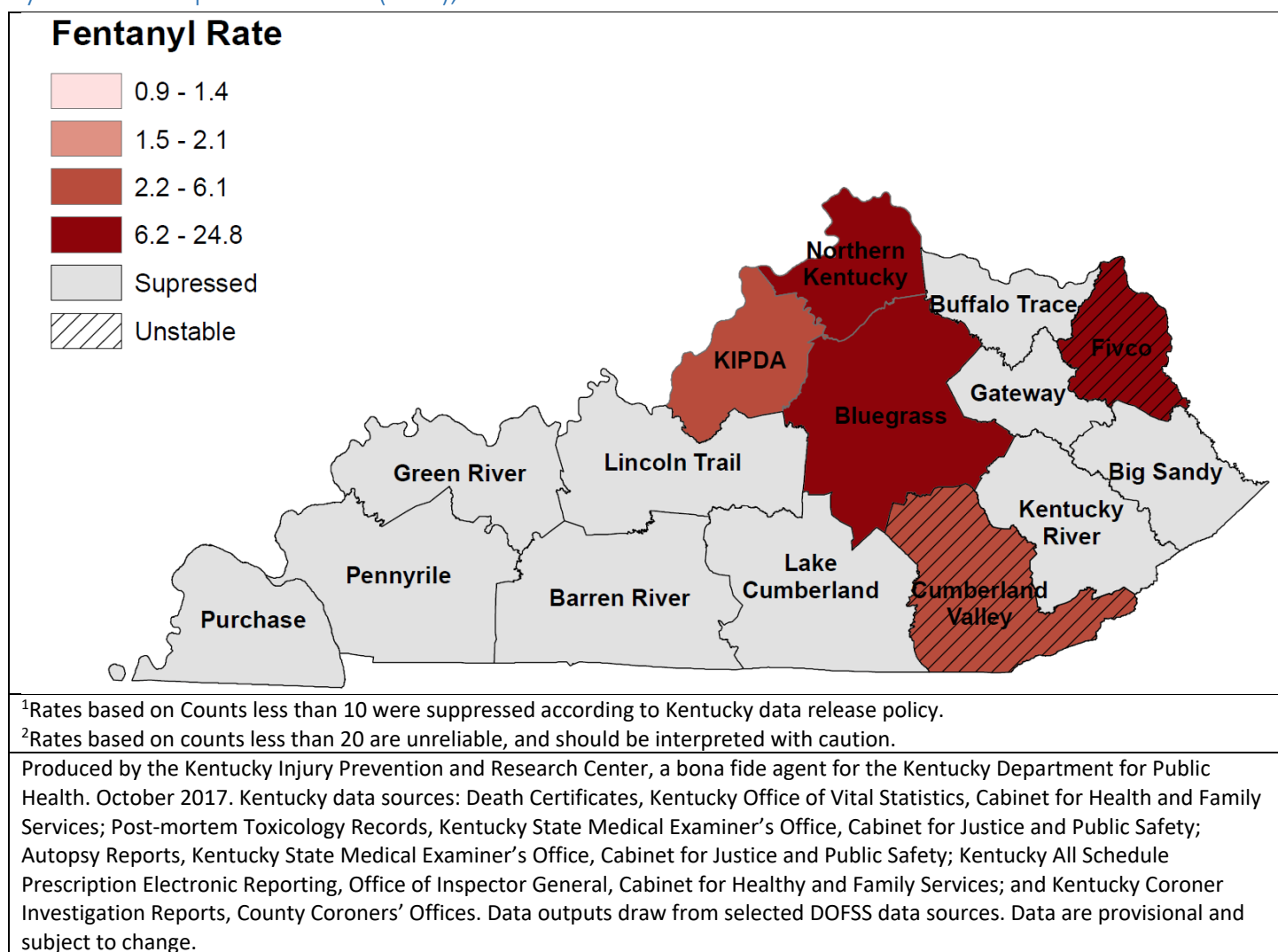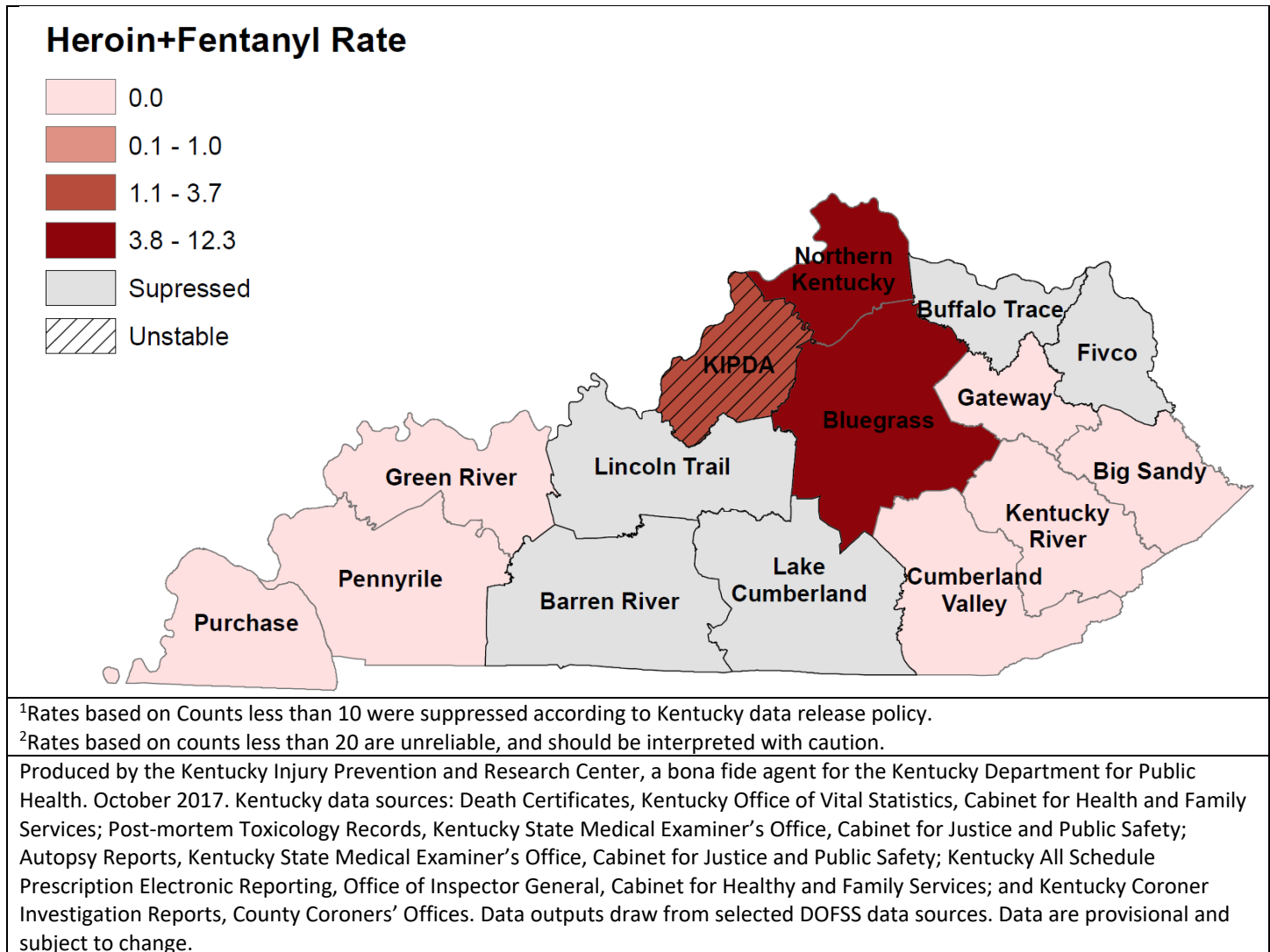

[1]Rates based on Counts less than 10 were suppressed according to Kentucky data release policy.
[2]Rates based on counts less than 20 are unreliable, and should be interpreted with caution.

Produced by the Kentucky Injury Prevention and Research Center, a bona fide agent for the Kentucky Department for Public Health. October 2017. Kentucky data sources: Death Certificates, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Post-mortem Toxicology Records, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Autopsy Reports, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Kentucky All Schedule Prescription Electronic Reporting, Office of Inspector General, Cabinet for Healthy and Family Services; and Kentucky Coroner Investigation Reports, County Coroners' Offices. Data outputs draw from selected DOFSS data sources. Data are provisional and subject to change.
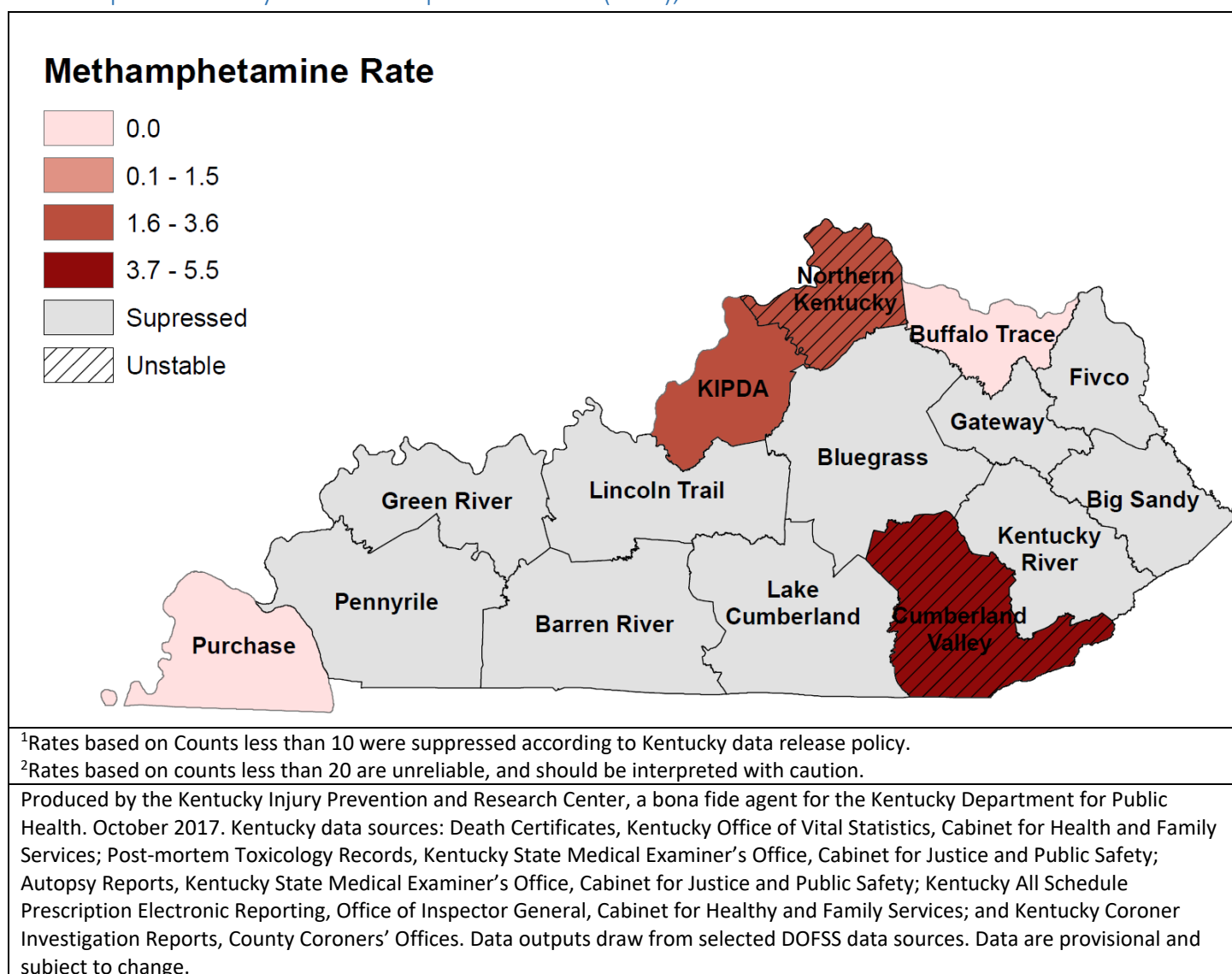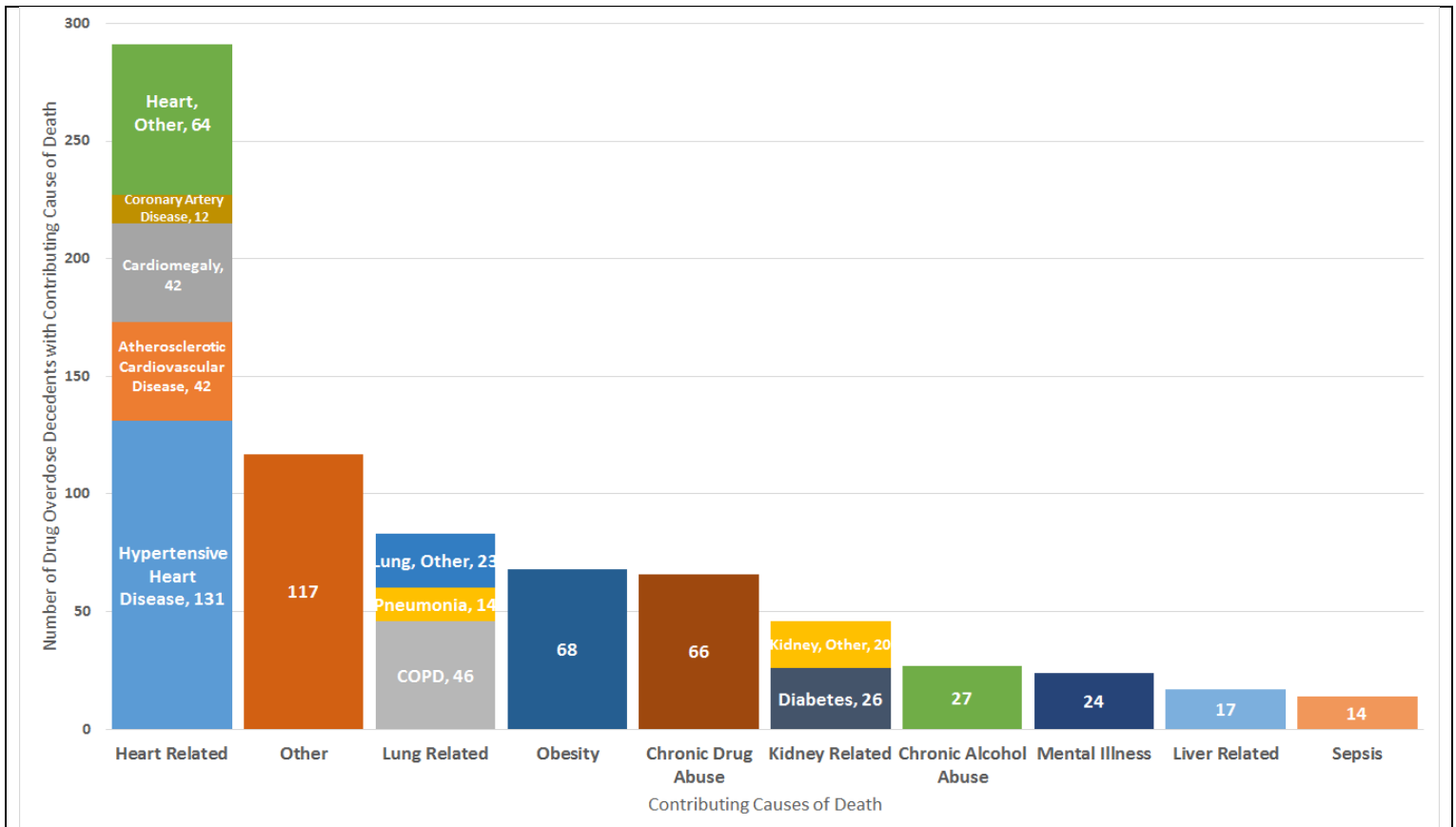
Figure 14. Other Significant Conditions Contributing to Death for Drug Overdose Decedents in Kentucky, 2015[1-4]

[1]Other significant conditions contributing to death are not mutually exclusive, death may be counted in more than one applicable category.
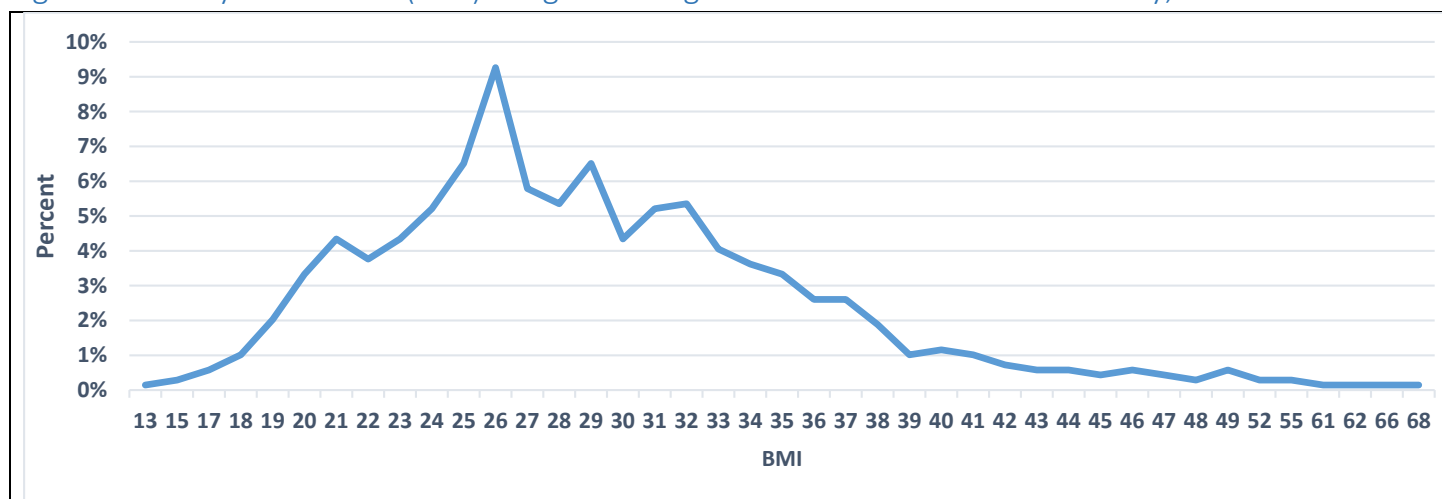[2]Of 1295 Kentucky drug overdose decedents, 383 decedents had a listed other significant condition contributing to death on death certificate and/or autopsy report.
[3]Mechanisms of death recorded on death certificate as a significant condition contributing to death were not included.
[4]Other categories refer to all low count significant condition contributing to death

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Figure 15. Body Mass Index (BMI) Range for Drug Overdose Decedents in Kentucky, 2015[1-2]

[1]BMI information was available for 53.36% of total drug overdose decedent cases (691/1,295).
[2]Percentages based on total number of drug overdose decedents with BMI information (n=691).

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Table 14. Drug Overdose Decedent Body Mass Index Percentile Median Determination

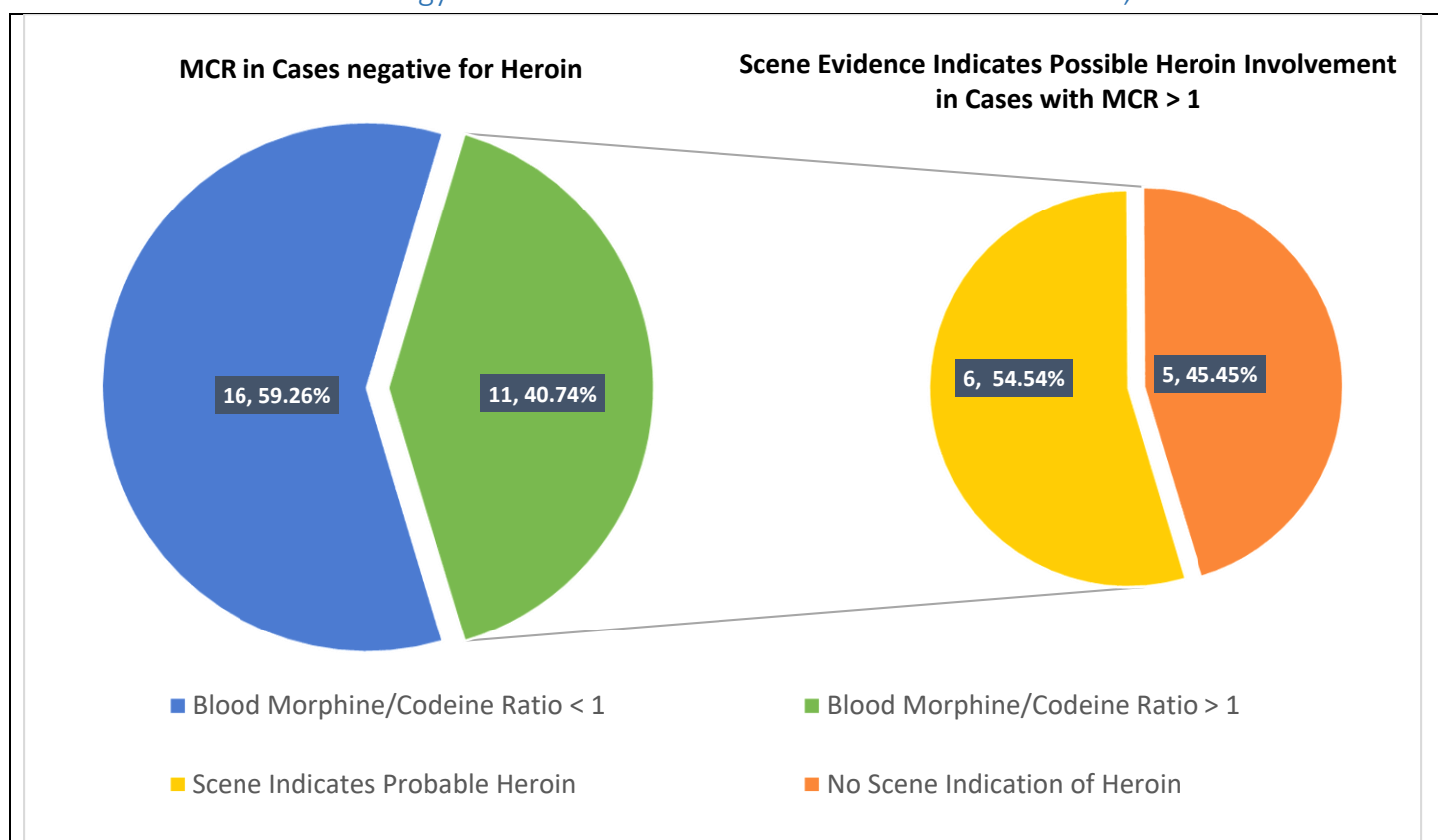| BMI Percentile						
0.05	0.1	0.25	0.5 Median	0.75	0.9	0.95
20	21	24.5	28	33	38	42

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Figure 16. Morphine-Codeine Ratio (MCR) in Drug Overdose Decedents in Kentucky with Negative Heroin Post-mortem Toxicology Results[1] and Scene Indication of Possible Heroin, 2015[1]

MCR in Cases negative for Heroin

Scene Evidence Indicates Possible Heroin Involvement in Cases with MCR > 1

16, 59.26%   11, 40.74%   6, 54.54%   5, 45.45%

- ■ Blood Morphine/Codeine Ratio < 1
- ■ Blood Morphine/Codeine Ratio > 1
- ■ Scene Indicates Probable Heroin
- ■ No Scene Indication of Heroin

[1]MCR calculated 1) if blood post-mortem toxicology was positive for both morphine and codeine and 2) blood, urine, or vitreous were negative for 6-monoacetylmorphine (n=27).

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Table 15. Common Drugs Detected in Post-mortem Toxicology Testing Results of Drug Overdose Decedents in Kentucky with Non-Medical Related Needle or Track Marks, 2015[1-3]

	Evidence of Needle or Track Marks?[3]		
	Yes (%)	No (%)	p-value[4]
Evidence of Needle or Track Marks	204	482	-
Morphine	169 (82.8%)	237 (49.2%)	<0.001
Heroin[5]	127 (62.3%)	146 (30.3%)	<0.001
Codeine	103 (50.5%)	120 (24.9%)	<0.001
Fentanyl[6]	76 (37.3%)	130 (28.1%)	0.01
THC-COOH	64 (31.4%)	124 (25.7%)	0.13
Gabapentin	60 (29.4%)	181 (37.6%)	0.04
Alprazolam[7]	50 (24.5%)	140 (29.0%)	0.22
Hydromorphone	45 (22.1%)	105 (21.8%)	0.94
Cocaine[8]	30 (14.7%)	70 (14.5%)	0.95
Clonazepam[9]	29 (14.2%)	109 (22.6%)	0.01
Methamphetamine	28 (13.7%)	45 (9.3%)	0.09
Oxycodone	27 (13.2%)	118 (24.5%)	<0.001
Oxymorphone	23 (11.3%)	111 (23.0%)	<0.001
Hydrocodone	17 (8.3%)	100 (20.7%)	<0.001

[1]Detected drugs identified in blood, urine, and/or vitreous fluids.
[2]Drugs are not mutually exclusive; decedents may have more than one drug detected.
[3]Non-medical related needle marks or tracks marks identified at autopsy (only autopsied cases are presented, n=686).
[4]p-value from chi-square test of independence.
[5]Heroin identified by metabolite '6-monoacetylmorphine.'
[6]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'
[7]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'
[8]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'
[9]Clonazepam identified by 'clonazepam.' and/or '7-aminoclonazepam.'

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Table 16. Common Drugs Detected in Post-Mortem Toxicology Test Results of Drug Overdose Decedents in Kentucky with Drug Paraphernalia Recovered at Scene and/or Autopsy (N=355), 2015[1-2]

	Drug Paraphernalia Recovered?	
	Yes (%)	No/Unknown (%)
Drug Paraphernalia Recovered	355	940
Morphine	237 (66.8%)	337 (35.9%)
Heroin[3]	166 (46.8%)	200 (21.3%)
Codeine	137 (38.6%)	172 (18.3%)
Fentanyl[4]	135 (38.0%)	199 (21.2%)
Gabapentin	101 (28.5%)	365 (38.8%)
THC-COOH	100 (28.2%)	201 (21.4%)
Alprazolam[5]	89 (25.1%)	262 (27.9%)
Hydromorphone	74 (20.8%)	156 (16.6%)
Oxycodone	69 (19.4%)	222 (23.6%)
Oxymorphone	63 (17.7%)	179 (19.0%)
Cocaine[6]	60 (16.9%)	104 (11.1%)
Clonazepam[7]	58 (16.3%)	175 (18.6%)
Hydrocodone	51 (14.4%)	193 (20.5%)
Methamphetamine	28 (7.9%)	84 (8.9%)
[1]Detected drugs identified in blood, urine, and/or vitreous fluids. [2]Drugs are not mutually exclusive; decedents may have more than one drug detected. [3]Heroin identified by metabolite '6-monoacetylmorphine.' [4]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.' [5]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.' [6]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.' [7]Clonazepam identified by 'clonazepam.' and/or '7-aminoclonazepam.'		
Produced by the Kentucky Injury Prevention and Research Center, a bona fide agent for the Kentucky Department for Public Health. October 2017. Kentucky data sources: Death Certificates, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Post-mortem Toxicology Records, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Autopsy Reports, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Kentucky All Schedule Prescription Electronic Reporting, Office of Inspector General, Cabinet for Healthy and Family Services; and Kentucky Coroner Investigation Reports, County Coroners' Offices. Data outputs draw from selected DOFSS data sources. Data are provisional and subject to change.		

Table 17. Decedent Known History of Substance Abuse by Drug Paraphernalia Recovered at Scene and/or Autopsy (N=355), 2015

	Decedent History of Substance Abuse?[1]	
	Yes (%)	No/Unknown (%)
Drug Paraphernalia Recovered	247 (69.6%)	108 (30.4%)

[1]History of substance abuse determined by coroner investigation or medical records.

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Table 18. Common Drugs Detected in Post-mortem Toxicology Test Results of Drug Overdose Decedents with Known Histories of Substance Abuse, in Kentucky (N=624), 2015[1-2]

	Decedent History of Substance Abuse?	
	Yes (%)	No/Unknown (%)
History of Substance Abuse[3]	624	671
Morphine	375 (60.1%)	199 (29.7%)
Heroin[4]	245 (39.3%)	121 (18.0%)
Gabapentin	217 (34.8%)	249 (37.1%)
Fentanyl[5]	210 (33.7%)	124 (18.5%)
Codeine	204 (32.7%)	105 (15.6%)
Alprazolam[6]	175 (28.0%)	176 (26.2%)
THC-COOH	168 (26.9%)	133 (19.8%)
Oxycodone	127 (20.4%)	164 (24.4%)
Clonazepam[7]	116 (18.6%)	117 (17.4%)
Hydromorphone	116 (18.6%)	114 (17.0%)
Oxymorphone	111 (17.8%)	131 (19.5%)
Hydrocodone	98 (15.7%)	146 (21.8%)
Cocaine[8]	92 (14.7%)	72 (10.7%)
Methamphetamine	58 (9.3%)	54 (8.0%)

[1]Detected drugs identified in blood, urine, and/or vitreous fluids.

[2]Drugs are not mutually exclusive; decedents may have more than one drug detected.

[3]History of substance abuse determined by coroner investigation or medical records.

[4]Heroin identified by metabolite '6-monoacetylmorphine.'

[5]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

[6]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

[7]Clonazepam identified by 'clonazepam.' and/or '7-aminoclonazepam.'

[8]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'

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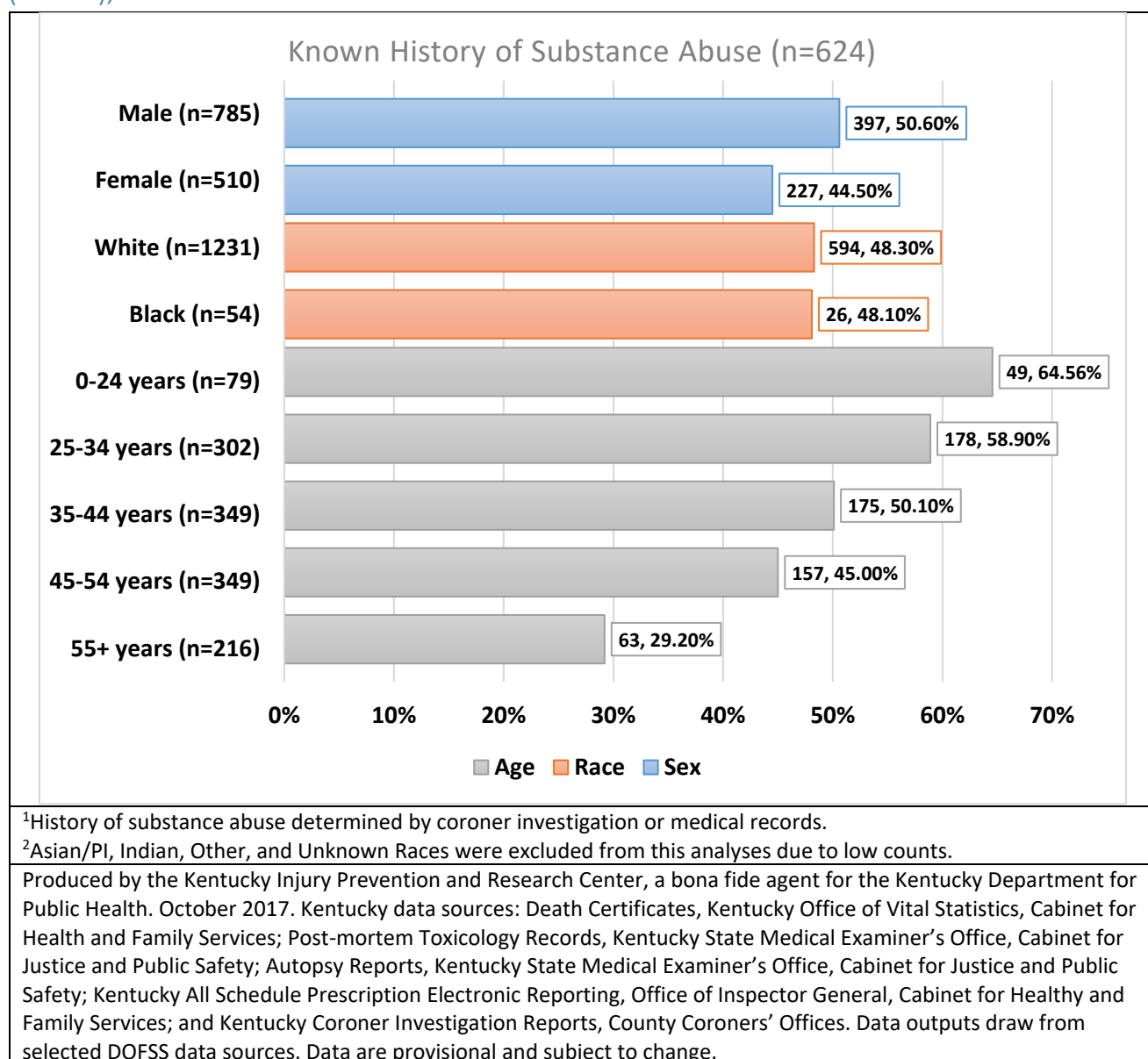Figure 17. Demographics of Drug Overdose Decedents in Kentucky with Known Histories of Substance Abuse (N=624), 2015[1-2]

Known History of Substance Abuse (n=624)

Category	Value
Male (n=785)	397, 50.60%
Female (n=510)	227, 44.50%
White (n=1231)	594, 48.30%
Black (n=54)	26, 48.10%
0-24 years (n=79)	49, 64.56%
25-34 years (n=302)	178, 58.90%
35-44 years (n=349)	175, 50.10%
45-54 years (n=349)	157, 45.00%
55+ years (n=216)	63, 29.20%

Legend: Age, Race, Sex

[1]History of substance abuse determined by coroner investigation or medical records.
[2]Asian/PI, Indian, Other, and Unknown Races were excluded from this analyses due to low counts.

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Table 19. Suicide vs. Other Manners of Death among Drug Overdose Decedents in Kentucky with Known Histories of Substance Abuse (N=624), 2015

Manner of Death	Decedent History of Substance Abuse?[1]	
	Yes (%)	No/Unknown (%)
Suicide (n=51)	14 (27.5%)	37 (72.5%)
Accidental (n=1,164)	610 (52.4%)	554 (47.6%)

[1]History of substance abuse determined by coroner investigation or medical records.

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Table 20. Opioid-Involved Drug Overdoses among Drug Overdose Decedents in Kentucky with Known Histories of Chronic Pain (N=103), 2015

Type of Overdose	Decedent History of Chronic Pain?[1]	
	Yes (%)	No/Unknown (%)
Opioid-involved Fatal Overdose (n=1,067)	96 (9.0%)	971 (91.0%)
Other Fatal Overdose (n=228)	7 (3.1%)	221 (96.9%)

[1]History of chronic pain determined by coroner investigation or medical records.

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Table 21. Common Drugs Detected in Post-mortem Toxicology Test Results of Drug Overdose Decedents in Kentucky with Known Histories of Mental Illness (N=158), 2015[1-2]

	History of Mental Illness?	
	Yes (%)	No/Unknown (%)
History of Mental Illness[3]	158	1137
Gabapentin	75 (48.1%)	391 (34.4%)
Morphine	60 (38.0%)	514 (45.2%)
Alprazolam[4]	54 (34.2%)	297 (26.1%)
Clonazepam[5]	48 (30.4%)	185 (16.3%)
THC-COOH	41 (25.9%)	260 (22.9%)
Oxycodone	40 (25.3%)	251 (22.1%)
Heroin[6]	39 (24.7%)	327 (28.8%)
Codeine	36 (22.8%)	273 (24.0%)
Fentanyl[7]	35 (22.2%)	299 (26.3%)
Oxymorphone	34 (21.5%)	208 (18.3%)
Hydrocodone	32 (20.3%)	212 (18.7%)
Hydromorphone	25 (15.8%)	205 (18.0%)
Cocaine[8]	21 (13.3%)	143 (12.6%)
Methamphetamine	13 (8.2%)	99 (8.7%)

[1]Drugs identified in blood, urine, and/or vitreous fluids.

[2]Drugs are not mutually exclusive; decedents may have more than one drug detected.

[3]History of mental illness determined by coroner investigation or medical records.

[4]Alprazolam identified by 'alprazolam.' and/or 'a-OH-alprazolam.'

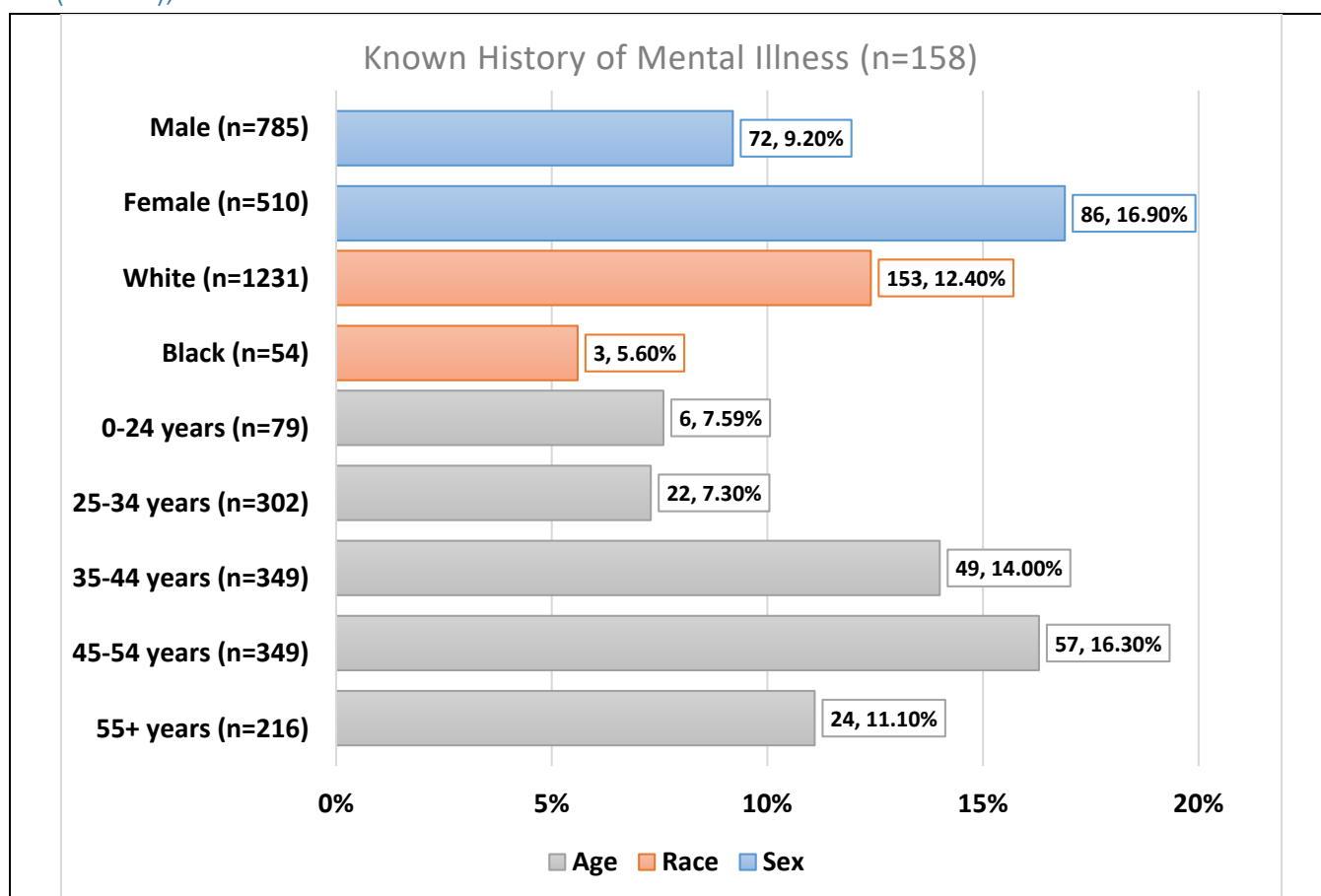[5]Clonazepam identified by 'clonazepam.' and/or '7-aminoclonazepam.'

[6]Heroin identified by metabolite '6-monoacetylmorphine.'

[7]Fentanyl identified by 'fentanyl.' and/or 'norfentanyl.'

[8]Cocaine identified by 'cocaine.', 'cocaethylene', and/or 'benzoylecgonine.'

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Figure 18. Demographics of Drug Overdose Decedents in Kentucky with Known Histories of Mental Illness (N=158), 2015[1-2]

Known History of Mental Illness (n=158)

Category	Value
Male (n=785)	72, 9.20%
Female (n=510)	86, 16.90%
White (n=1231)	153, 12.40%
Black (n=54)	3, 5.60%
0-24 years (n=79)	6, 7.59%
25-34 years (n=302)	22, 7.30%
35-44 years (n=349)	49, 14.00%
45-54 years (n=349)	57, 16.30%
55+ years (n=216)	24, 11.10%

Legend: Age ■ Race ■ Sex ■

[1]History of mental illness determined by coroner investigation or medical records.
[2]Asian/PI, Indian, Other, and Unknown Race were excluded from this analyses due to low counts.

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Table 22. Suicidal Manner of Death vs. Accidental Manner of Death among Drug Overdose Decedents in Kentucky with Known Histories of Mental Illness (N=158), 2015

Manner of Death	Decedent History of Mental Illness?[1]	
	Yes (%)	No/Unknown (%)
Suicide (n=51)	21 (41.2%)	30 (58.8%)
Accidental (n=1164)	137 (11.8%)	1027 (88.2%)
[1]History of mental illness determined by coroner investigation or medical records.		
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Table 23. Top Prescription Drugs Found at Scene and/or at Autopsy Among Drug Overdose Decedents in Kentucky, 2015

Drug[1]	Count	Percent[2]
Gabapentin	84	33.73%
Oxycodone	53	21.29%
Lisinopril	41	16.47%
Hydrocodone	40	16.06%
Alprazolam	34	13.65%
Clonazepam	31	12.45%
Quetiapine	22	8.84%
Omeprazole	21	8.43%
Trazodone	20	8.03%
Citalopram	17	6.83%
Metformin	17	6.83%
Cyclobenzaprine	16	6.43%
Diazepam	16	6.43%
Amitriptyline	14	5.62%
Methadone	14	5.62%
Tizanidine	14	5.62%
Amlodipine	13	5.22%
Fluoxetine	13	5.22%
Atorvastatin	12	4.82%
Hydroxyzine	12	4.82%

[1]Drugs are not mutually exclusive; decedents may have more than one prescription drug found at scene and/or autopsy.
[2]Percentage is based on total number of DOFSS drug overdose fatalities with drugs found at scene and/or autopsy, n=249.

Produced by the Kentucky Injury Prevention and Research Center, a bona fide agent for the Kentucky Department for Public Health. August 2017. Kentucky data sources: Death Certificates, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Post-mortem Toxicology Records, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Autopsy Reports, Kentucky State Medical Examiner's Office, Cabinet for Justice and Public Safety; Kentucky All Schedule Prescription Electronic Reporting, Office of Inspector General, Cabinet for Healthy and Family Services; and Kentucky Coroner Investigation Reports, County Coroners' Offices. Data outputs draw from selected DOFSS data sources. Data are provisional and subject to change.

DOFSS Quality Control Measures

Table 24. Number and Percentage of Drug Overdose Fatality Coroner Investigation Reports Received for DOFSS, 2015

Investigative Report Received?	Number (%)
Yes	939 (72.5%)
No	356 (27.5 %)
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Table 25. Contribution of Individual Kentucky Drug Overdose Fatality Surveillance System Data Sources in the Identification of Specific Drug Involvement, 2014-2015

Level Analysis[1]	Number Of Drug Overdose Fatalities With Specific Drugs Indicated After Level Analysis, 2014, N=1,089 (%)	Number Of Drug Overdose Fatalities With Specific Drugs Indicated After Level Analysis, 2015, N=1,295 (%)	% Change from 2014
Level 1	837 (76.86%)	1,029 (79.46%)	3.30%
Level 2	913 (83.84%)	1,134 (87.57%)	4.30%
Level 3	1,061 (97.43%)	1,264 (97.61%)	0.20%
Level 4	1,062 (97.52%)	1,266 (97.76%)	0.20%

[1]Level 1: Death Certificate as sole data source; Level 2: Death Certificate and Autopsy Report data sources; Level 3: Death Certificate, Autopsy Report, and Toxicology Report data sources; Level 4: Death Certificate, Autopsy Report, Toxicology Report, and Coroner report data sources.

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