Informing Public Safety and Public Health Efforts to Address Kentucky's Drug Overdose Burden, 2015-2016

Prepared by
Ashley Bush, DrPH
Terry Bunn, PhD
Dana Quesinberry, JD
Patrick Ward, MPH

Released by
Kentucky Injury Prevention and Research Center
333 Waller Avenue, Lexington, KY 40504

KIPRC
KENTUCKY INJURY PREVENTION AND RESEARCH CENTER

Kentucky Public Health
Prevent. Promote. Protect.

Overview

Drug use and illegal drug distribution are prevalent, afflicting Kentuckians on a daily basis. In efforts to better understand the relationship between drug use and drug interdiction, crime, and health, this report analyzes drug related data from multiple public health and public safety data sources. Drug related counts and rates are calculated and visually presented at the county level for two years combined, 2015-2016. Counts and rates are used to create a drug overdose risk index score, which is then analyzed using a geospatial tool to identify hot spots at the county level. Hot Spots can be used to help prioritize drug related public safety and public health intervention and prevention policy and program efforts through the identified high-risk counties.

Data & Analysis

Multi-source drug related data was compiled for years 2015-2016 and aggregated at the county level. The drug related data included:

- drug arrests
- drug overdose related deaths
- drug overdose related emergency department visits
- drug overdose related hospitalizations

Arrests: Arrest data was based on the county of occurrence. Arrest counts could be greater than the number of individuals arrested. Data Source: Crime in Kentucky: Commonwealth of Kentucky 2015-2016 Crime Reports, Frankfort, KY: Kentucky State Police.

Deaths: Deaths were based on the county of residence. ICD-10 codes with an underlying cause of death as X40-X44 (accidental/unintentional drug poisoning), X60-X64 (suicide by drug poisoning), X85 (homicide by drug poisoning), and Y10-Y14 (drug poisoning with undetermined intent) were considered drug overdose related deaths. Data Source: Kentucky Death Certificate Database [2015-2016], Frankfort, KY: Kentucky Office of Vital Statistics, Cabinet for Health and Family Services

Emergency Department Visits: Emergency department visits were based on the county of residence. Counts represented encounters of care and could be greater than the number of individual patients treated. To avoid duplicate counts, emergency department visit counts did not include those resulting in inpatient hospitalizations. Drug overdose related hospitalizations were considered those with: 1) an ICD-9-CM diagnosis code in the range 960-979 listed in primary or secondary fields; or 2) an ICD-9-CM code in the range E850-E858, E950.0-E950.5, E962.0, or

E980.0-E980.5 listed in the E-codes; or 3) an ICD-10-CM diagnosis code in the range T36-T50 with a 6th character of 1, 2, 3, or 4; or (4) an ICD-10-CM diagnosis code of T369, T379, T399, T414, T427, T439, T459, T479, or T499 with a 5th character of 1, 2, 3, or 4. Data Source: Kentucky Outpatient Hospitalization Claim Files [2015-2016], Frankfort, KY: Cabinet for Health and Family Services, Office of Health Policy.

Hospitalizations: Hospitalizations were based on the county of residence. Counts represented encounters of care and could be greater than the number of individual patients treated in acute care facilities. Drug overdose related hospitalizations were considered those with: 1) an ICD-9-CM diagnosis code in the range 960-979 listed in primary or secondary fields; or 2) an ICD-9-CM code in the range E850-E858, E950.0-E950.5, E962.0, or E980.0-E980.5 listed in the E-codes; or 3) an ICD-10-CM diagnosis code in the range T36-T50 with a 6th character of 1, 2, 3, or 4; or (4) an ICD-10-CM diagnosis code of T369, T379, T399, T414, T427, T439, T459, T479, or T499 with a 5th character of 1, 2, 3, or 4. Data sources: Kentucky Inpatient Hospitalization Claim Files [2015-2016], Frankfort, KY: Cabinet for Health and Family Services, Office of Health Policy.

Rates for arrests, emergency department visits, and hospitalizations were calculated per 10,000 population. County population counts were derived from the National Center for Health Statistics, Bridged-Race Population Estimates, United States (2015-2016). Fatal drug overdose counts were used in lieu of rates to abide by data suppression agreements.

Related rates and counts were then mapped by county using ArcGIS/ArcMap.

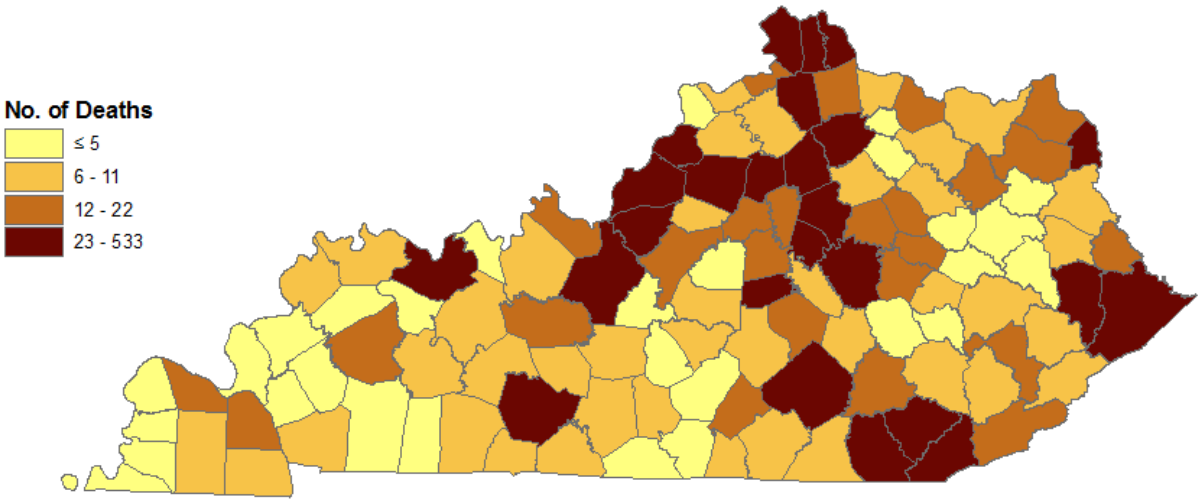
Each respective drug outcome rate and/or count were used to create a Drug Overdose Risk Index Score. Scoring and related methodology were modeled and modified from the

"Development of an opioid overdose index score", 2017. Kentucky Injury Prevention and Research Center presentation[1].

The Drug Overdose Risk Index Score was then analyzed using ArcGIS/ArcMap (geospatial autocorrelation tool). Part of this process included testing the Drug Overdose Risk Index Score for autocorrelation using cluster and outlier analysis (Anselin Local Morans I). Second, statistically significant Hot Spots were identified using Getis-Ord Gi* statistics. Statistically significant (Hot Spots) counties are contingent on the index scores of adjacent counties. For example, county clusters of high Drug Overdose Risk Index Scores would produce Hot Spots. Statistical significance was indicated by p-values of 0.10 (90% Confidence), 0.05 (95% Confidence), and 0.01 (99% Confidence).

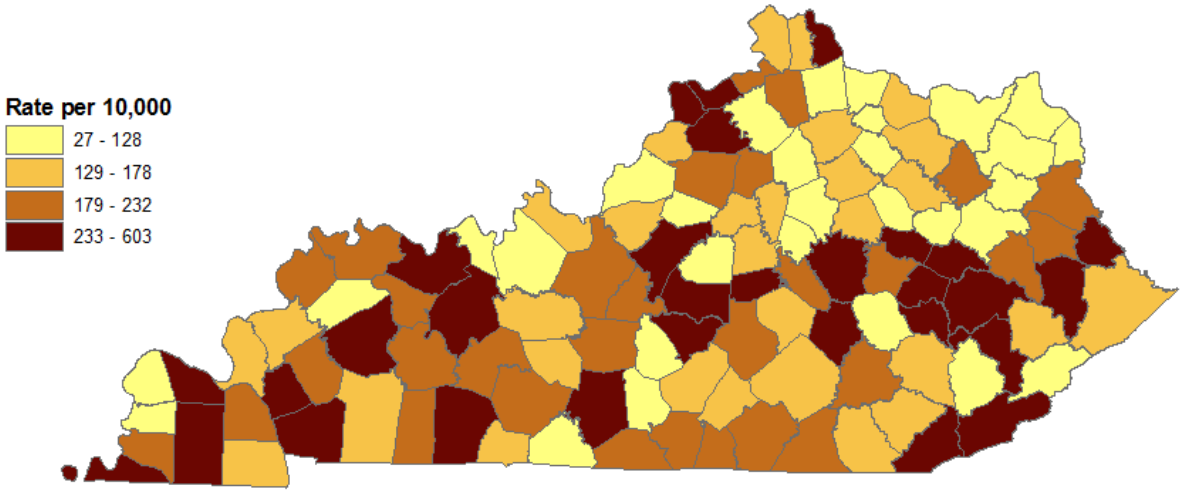
[1] Ward PJ & Bunn TL (2017). Development of an opioid overdose index score. Presented at University of Kentucky College of Public Health Research Day, Lexington, KY, March 30, 2017.

Kentucky Drug Overdose Related Deaths, 2015-2016



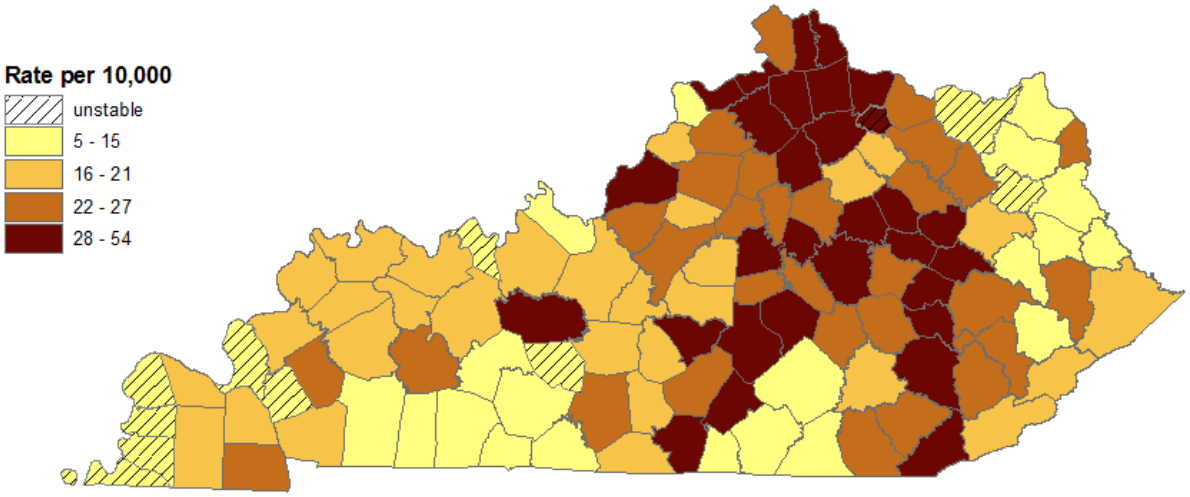
Count is the number of drug overdose deaths by county of residence. Produced by the Kentucky Injury Prevention and Research Center, as a bona fide agent for the Kentucky Department for Public Health. November 2017. Data source: Kentucky Death Certificate Database [2015-2016], Frankfort, KY: Kentucky Office of Vital Statistics, Cabinet for Health and Family Services. Data are provisional and subject to change.

Kentucky Drug Related Arrest Rates, 2015-2016



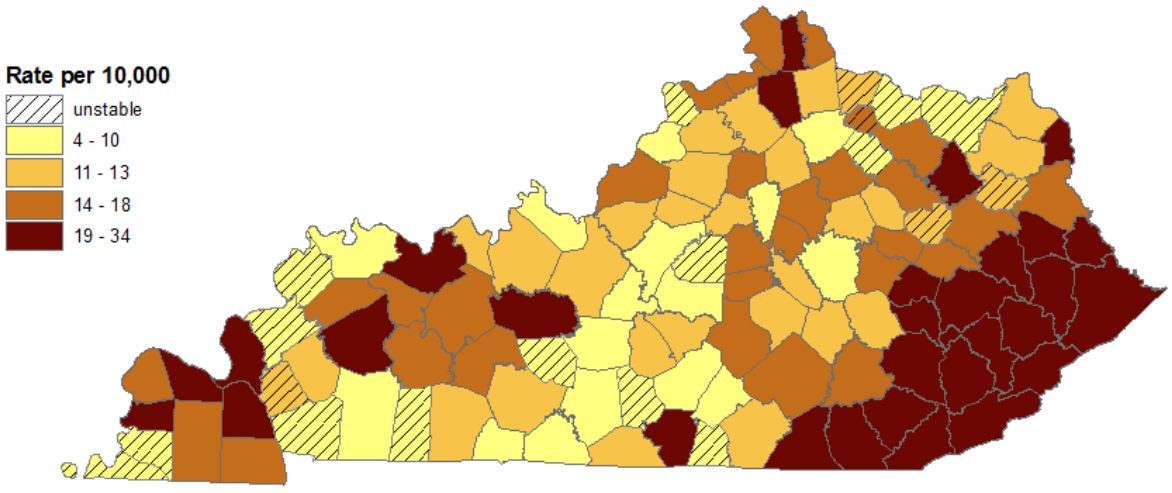
Rates are based on the number of drug related arrests per 10,000 population. Counts are based on county of occurrence. Produced by the Kentucky Injury Prevention and Research Center, as a bona fide agent for the Kentucky Department for Public Health. November 2017. Data source: Crime in Kentucky: Commonwealth of Kentucky 2015-2016 Crime Reports, Frankfort, KY: Kentucky State Police. Data are provisional and subject to change.

Kentucky Drug Overdose Related Emergency Department Visit Rates, 2015-2016



Rates are based on the number of drug overdose related events resulting in emergency department visits per 10,000 Kentucky residents. Emergency department visits resulting in inpatient hospitalizations were not included in emergency department visits counts. Rates based on counts less than 20 may be unstable. Counts are based on county of residence. Produced by the Kentucky Injury Prevention and Research Center, as a bona fide agent for the Kentucky Department for Public Health. November 2017. Data source: Kentucky Outpatient Hospitalization Claim Files [2015-2016], Frankfort, KY: Cabinet for Health and Family Services, Office of Health Policy. Data are provisional and subject to change.

Kentucky Drug Overdose Related Inpatient Hospitalization Rates, 2015-2016



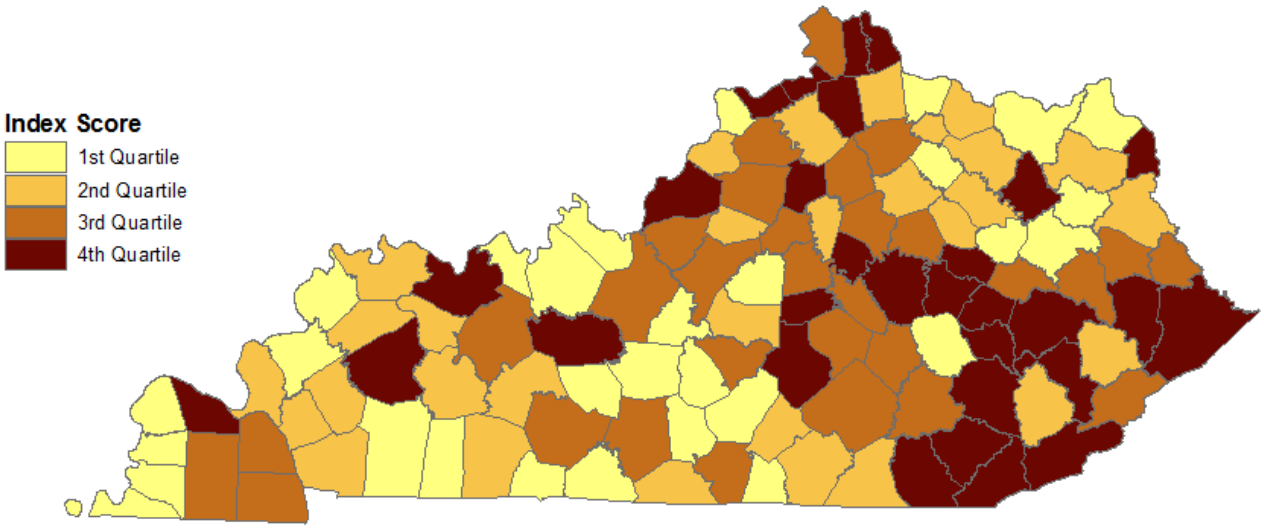
Rates are based on the number of drug overdose related events resulting in inpatient hospitalizations per 10,000 Kentucky residents among acute care facilities. Rates based on counts less than 20 may be unstable. Counts are based on county of residence. Produced by the Kentucky Injury Prevention and Research Center, as a bona fide agent for the Kentucky Department for Public Health. November 2017. Data source: Kentucky Inpatient Hospitalization Claim Files [2015-2016], Frankfort, KY: Cabinet for Health and Family Services, Office of Health Policy. Data are provisional and subject to change.

The Top 10 Counties for Drug Overdose Deaths[1], Drug Arrest Rates[2], Drug Overdose Hospitalization[1] and Emergency Department[1] Rates, 2015-2016

	Drug Overdose Related Deaths	Drug Related Arrest Rate	Drug Overdose Related Inpatient Hospitalization Rate	Drug Overdose Emergency Department Visit Rate
1.	Jefferson	Lyon	Perry	Grant
2.	Fayette	Bell	Letcher	Harrison
3.	Kenton	Carroll	Owsley	Kenton
4.	Campbell	Rockcastle	Magoffin	Carroll
5.	Boone	Owsley	Harlan	Campbell
6.	Madison	Fulton	Rowan	Gallatin
7.	Boyd	Graves	Clay	Jessamine
8.	Pike	Ohio	Carlisle	Pendleton
9.	Hardin	Logan	Bell	Casey
10.	Bell	Hopkins	Knox	Jefferson

[1]Based on the county of residence; [2]Based on the county of occurrence. Produced by Kentucky Injury Prevention and Research Center, as a bona fide agent for the Kentucky Department for Public Health. November 2017. Data Sources: Kentucky Death Certificate Database, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Crime in Kentucky: Commonwealth of Kentucky Crime Reports, Kentucky State Police (KSP); Kentucky Outpatient Services Database, Office of Health Policy; Kentucky Inpatient Hospitalization Claims Files; Cabinet for Health and Family Services, Office of Health Policy. Data are provisional and subject to change.

Kentucky Drug Overdose Risk Index Score, 2015-2016

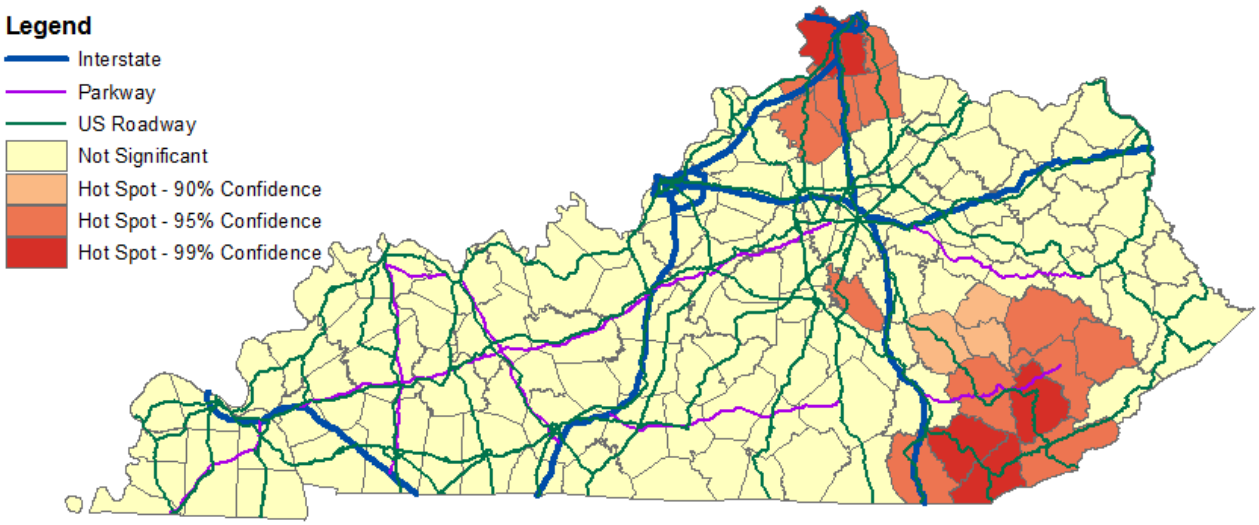


Index Score is calculated by averaging county ranks in the1) drug overdose related deaths; 2) drug arrest rates; 3) drug overdose related emergency department rates; and, 4) drug overdose related hospitalization rates. Produced by the Kentucky Injury Prevention and Research Center, as a bona fide agent for the Kentucky Department for Public Health. November 2017. Data Sources: Kentucky Death Certificate Database, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Crime in Kentucky: Commonwealth of Kentucky Crime Reports, Kentucky State Police (KSP); Kentucky Outpatient Services Database, Office of Health Policy; Kentucky Inpatient Hospitalization Claims Files; Cabinet for Health and Family Services, Office of Health Policy. Data are provisional and subject to change.

Kentucky Counties with the Highest Drug Overdose Risk Index Scores, 2015-2016

1.	Bell
2.	Grant
3.	Campbell
4.	Floyd
5.	Kenton
6.	Perry
7.	Powell
8.	Daviess
9.	McCracken
10-12.	Gallatin, Harlan, Carroll *(tied)*
13.	Owsley
14.	Whitley
15-16.	Rowan, Boyle *(tied)*

Kentucky Drug Overdose Risk Index Hot Spots, 2015-2016



Index Score is calculated by averaging county ranks in the1) drug overdose related deaths; 2) drug arrest rates; 3) drug overdose related emergency department rates; and, 4) drug overdose related hospitalization rates. Produced by the Kentucky Injury Prevention and Research Center, as a bona fide agent for the Kentucky Department for Public Health. November 2017. Data Sources: Kentucky Death Certificate Database, Kentucky Office of Vital Statistics, Cabinet for Health and Family Services; Crime in Kentucky: Commonwealth of Kentucky Crime Reports, Kentucky State Police (KSP); Kentucky Outpatient Services Database, Office of Health Policy; Kentucky Inpatient Hospitalization Claims Files; Cabinet for Health and Family Services, Office of Health Policy. Data are provisional and subject to change.

Statistically Significant Kentucky Drug Overdose Risk Hot Spots (Counties), 2015-2016

Highest Risk (99% Confidence):

Bell, Boone, Kenton, Knox, Leslie

Second Highest Risk (95% Confidence):

Breathitt, Campbell, Clay, Gallatin, Garrard, Grant, Harlan, Knott, Owen, Pendleton, Perry, Whitley

Third Highest Risk (90% Confidence):

Jackson, Lee, Owsley

Summary

Drug overdoses (fatal and nonfatal) and drug related crime remain prevalent across every county in Kentucky. Public health and public safety data were analyzed, and analytic results were used to develop a Drug Overdose Risk Index Score, and to identify statistically significant Drug Overdose Risk Index Hot Spots. The northern and southeastern regions of Kentucky had elevated drug overdose related morbidity and mortality, as well as drug arrests. The counties with the highest combined Drug Overdose Risk Index Scores were Bell, Grant, Campbell, Floyd, and Kenton Counties. The statistically significant Hot Spots were (in alphabetical order): Bell, Boone, Breathitt, Campbell, Clay, Gallatin, Garrard, Grant, Harlan, Jackson, Kenton, Knott, Knox, Lee, Leslie, Owen, Owsley, Pendleton, Perry, and Whitley Counties. Public safety and public health agencies can use this information to prioritize drug related public safety (e.g., enhanced manpower, investigations, and other resources) and public health (e.g., naloxone distribution, harm reduction, healthcare facility, and emergency medical services preparedness responses) intervention and prevention efforts in the identified counties.