



**Knox County Regional Forensic Center  
Drug Related Death Report  
2010 – 2015  
for  
Knox and Anderson Counties**

**August 2016**

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# Letter from the Chief Medical Examiner.....

## **Changing Landscapes and Dangerous Trends in Drug Overdose Deaths**

Substance abuse is as old as mankind. So is the art of healing. Unfortunately, for the first time in our conscious history, right here in the United States, the healers may have unintentionally encouraged the scourge of substance abuse. After I relocated from a major Midwestern city to East Tennessee in 2002, I was frequently asked if I experienced a “culture shock” after the move. Initially I did. However, it had nothing to do with the overall lifestyle, the Southern hospitality, the weather or the less hectic pace. I was shocked to see firsthand how many individuals abused prescription medications and eventually succumbed to addiction. I was surprised to see these were not necessarily the individuals who fit the stereotype of “typical drug abusers” that I encountered in my previous job in a high crime city. Here in East Tennessee, the substance abuse victims were the ordinary people, the next door neighbors, our family members, the veterans, young and old, sick and apparently healthy who just briefly experienced some sort of pain. The common theme for many of these individuals was that they were either overprescribed pain medication or they “borrowed” someone else’s pain pills in order to self-medicate.

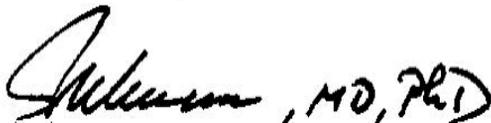
Until 2014 when Knox County Government took over the Medical Examiner’s Office and provided additional resources, all I could do for over a decade was talk about my impressions, observations and experiences. The good news is increased staffing has enabled us to begin to analyze the data collected over the years. We finally have the concrete numbers and are able to present the actual data from the past five years in a meaningful fashion. The bad news is, the data shows us that the substance abuse deaths are trending upward and the trend does not look promising for our community. The Tennessee Department of Health recently released a statement that



for the first time ever, the overdose deaths have surpassed the death rate for motor vehicle accidents. Through our data analysis, we have assessed that in addition to the overprescribing of narcotics, drug diversion (reselling of prescribed narcotics) is another plague that stems from the healthcare providers' actions, as is polypharmacy or the simultaneous use of multiple medications that have abuse potential. In many instances, combining and mixing of both prescription pills and illicit substances leads to devastating outcomes.

We have also discovered substance abuse plays a role in many other types of deaths, particularly traffic accidents. Neonatal Abstinence Syndrome is another painful collective experience that has produced new challenges for the community. The effects of substance abuse on our society are far reaching and could attain epidemic proportions unless the entire region and the State stand together against this disturbing trend. Our first order of business is recognizing and acknowledging the problem by both the healthcare workers and the public. Next, public health officials need to continuously inform and educate the entire community about the dangers of pain medication overprescribing. Information regarding trends of illicit drug abuse, as well as the designer drug dangers and availability need to be disseminated, particularly among school-aged children. Recent legislation such as the Tennessee Prescription Safety Act is a positive step forward, but can only go so far. Knowledge is power and what we are about to present to you, the stakeholders, we hope will spark interest and initiate a meaningful conversation on how to combat, slow down and eventually eliminate both illicit and prescription substance abuse.

Your Medical Examiner



Darinka Mileusnic-Polchan, MD, PhD



# Trends and Concerns

The Knox County Regional Forensic Center's Drug Related Death Report for 2010 – 2015 provides one piece of the picture for Knox and Anderson Counties' drug problem. This report indicates an overall upward trend of drug related death cases and the number and types of drugs associated with drug related deaths. The majority of the Drug Related Deaths involve pharmaceutical drugs. In addition, this report highlights that drug related deaths in Knox and Anderson counties are predominantly related to prescription drugs and in the 45 – 54 year old age range.

## **Report Highlights for Knox and Anderson Counties**

- The number of Drug Related Deaths from 2010 to 2015 has doubled.
- Drug related deaths occur more frequently in the 45 – 54 year old age category than any other age category.
- Prescription drug related deaths account for approximately 75% of the deaths from 2010 – 2015 vs. illicit drugs.
- Oxycodone is the most frequently found drug in drug related deaths for each of the years between 2010 – 2015.
- The Age Adjusted Rate for Drug Related Cases per 100,000 in Knox and Anderson Counties is higher than the National or Tennessee rate for each of the years between 2010 – 2015.
- Since 2010, there has been an increase in the number and types of drugs being used.
- Five zip codes (37918, 37920, 37917, 37912, and 37849) have made the top 10 list of home residence zip codes each year from 2010 – 2016.
- Tentative 2016 figures indicate a continued increase in the number of drug related death cases. Prescription drugs continue to be the most frequently found drugs in a drug related death. However, there is an increased presence of non-prescription (or illicit) drugs in drug related deaths.

Based on the Knox and Anderson county data, Drug Related Deaths occur mainly with people you work and go to church with and the parents of the kids our kids play and go to school with. They live next door and in our in neighborhoods. They mainly die from prescription medications (we did not evaluate whether the prescription medications were taken properly or were diverted).



## Concerns

The Regional Forensic Center is concerned that the 6 year trend of increasing Drug Related Deaths will continue. We believe that we will continue to see a high incidence of pharmaceutical related deaths. However, based upon changing legislation in pain management, we believe we will start seeing an increase in non-pharmaceutical (or illicit) and emerging designer drug related deaths. Based on the data, we believe the 45 – 54 year old age group will continue to be the lead age group followed by the 55 – 64 year old age group.

Knox and Anderson Counties each have several organizations designed to address drug related issues and the Regional Forensic Center partners with many of these agencies. However, currently there is not an organization or coalition capable of monitoring, reporting, and coordinating efforts to reduce Drug Related Deaths or Drug Use.

The Knox County Regional Forensic Center has some system concerns:

- Data sharing (real time monitoring and reporting)
- Continued increases in prescription pharmaceutical abuse
- Lack of a plan to effectively and fairly address pharmaceutical abuse
- Lack of a plan to address the fallout of pain management protocol changes, changes in legislation of pain clinics, and a diversion to illicit drugs by the user
- Lack of a statewide electronic Death Certificate system in order to collect data on all deaths and share in real time

Real time monitoring and reporting are a deficit across the country. Staff at the Regional Forensic Center have put together a plan to address the issue of real time monitoring, reporting, and coordination of efforts to reduce Drug Related Deaths or Drug Use. The plan was been presented at the Office of the National Drug Control Policy and is being presented to other federal agencies in an attempt to gain funding to start and sustain a Regional coalition, led by the Regional Forensic Center, capable of monitoring, reporting, and coordinating efforts to combat drug related issues.



# Background on the Knox County Regional Forensic Center

## Function

The Knox County Regional Forensic Center serves the living, by investigating deaths that are unnatural and/or unexpected. Such deaths have implications to the greater community. This task begins with careful investigation at the scene of death, supplemented when appropriate, by autopsy examination, toxicology and other testing. The RFC Staff helps the community by determining the cause and manner of death, recognizing and collecting evidence needed for adjudication, defining public health and product safety risks and providing compassionate services to families.

## Background

The Knox County Medical Examiner's Office has been in existence since the early 1950's when it operated out of a small, one-room morgue. In 1998, the Regional Forensic Center began operating out of the University of Tennessee Medical Center. In 2014, the Knox County government, with financial support from the State of Tennessee, built an 18,000 sq. ft. state of the art facility located at 2761 Sullins Street in Knoxville, Tennessee.

The Knox County Regional Forensic Center (RFC) serves as the Chief Medical Examiner for Knox and Anderson counties. The RFC provides autopsy and consultative service for 25 counties in East and Middle Tennessee.

The Knox County RFC operates 24/7/365. We have at least one autopsy technician at the facility and a medicolegal death investigator available to respond to death scene investigations at all times. In addition, there is a Medical Examiner/Forensic Pathologist on duty or on-call 24/7/365.



The RFC is a department of the Knox County government reporting to the Knox County Mayor. Mayor Burchett was instrumental in securing funding and leading the development of the new RFC building as well as assuring appropriate staffing and funding for RFC operations.

In June of 2016, the KCRFC received FULL accreditation from the National Association of Medical Examiners (NAME). The awarding letter indicated that “The Knox County Regional Forensic Center is an excellent model for any aspiring regional center, anywhere”.



### **Organization**

The RFC has 29 staff consisting of a Senior Director, Chief Medical Examiner, Deputy Chief Medical Examiner, two Assistant Medical Examiners/Forensic Pathologists, Forensic Quality Improvement Manager, Business Office Manager, 3 Forensic Clerks, Medicolegal Death Investigator Manager, 6 Medicolegal Death Investigators, Autopsy Technician Manager, 10 Autopsy Technicians, and Administrative Assistant. In addition, we have on contract a part-time Forensic Anthropologist.

All of our Medical Examiners are board certified by the American Board of Pathology in Anatomic and Clinical Pathology and the American Board of Pathology Certification in Forensic Pathology. In addition, they hold appointments as Assistant Professors with the University of Tennessee Graduate School of Medicine.

Our Forensic Anthropologist is board certified by the American Board of Forensic Anthropology (ABFA). In addition, he has a faculty appointment with the Department of General Dentistry's Forensic Odontology program in the Graduate School of Medicine at the University of Tennessee Medical Center.

Our Medicolegal Death Investigators are required to become certified by the American Board of Medicolegal Death Investigators (ABDMI). The RFC's Medicolegal



Death Investigator Manager and an investigator are Fellows with ABMDI. Four of our Medicolegal Death Investigators are Diplomats with ABMDI. And, one of our Medicolegal Death Investigators are in the process of being certified by ABMDI.

### **Services Provided and Region Covered**

The Knox County Regional Forensic Center is responsible for the investigation and certification of cause and manner of death of all sudden, unexpected, violent, suspicious, or unnatural deaths that occur in Knox and Anderson Counties. The cause of death is a disease, injury, drug toxicity, or combination of factors that causes a physiologic derangement severe enough to result in death. The manner of death refers to the circumstances surrounding how the death came about and is divided into five categories: natural, accident, suicide, homicide, and undetermined.

The Knox County RFC also provides autopsy and consultative services for similar-type deaths occurring in 25 East and Middle Tennessee counties at the written request of the local authorities.



# Reporting Deaths and Medical Examiner Statutes in Tennessee

The Medical Examiner system in Tennessee is a County Based system. There are 5 Regional Forensic Centers, operating independently and are all nationally accredited by NAME, which provide autopsy and autopsy related services for the rural counties. The State Office of the Chief Medical Examiner exists to educate County Medical Examiners and assist County Medical Examiners as requested. Tennessee Statute § 38-7-Part 1 explains the Medical Examiner system in Tennessee and provides direction for its operation.

***Tennessee Code Annotated (TCA) § 38-7-108. Death under suspicious, unusual or natural circumstances.***

*Any physician, undertaker, law enforcement officer, or other person:*

- Having knowledge of the death of any person from violence or trauma of any type,*
- Suddenly when in apparent health*
- Sudden unexpected death of infants and children*
- Deaths of prisoners or persons in state custody*
- Deaths on the job or related to employment*
- Deaths believed to represent a threat to public health*
- Deaths where neglect or abuse of extended care residents are suspected or confirmed*
- Deaths where the identity of the person is unknown or unclear*
- Deaths in any suspicious/unusual/unnatural manner*
- Found dead*
- Where the body is to be cremated*

*Shall immediately notify the County Medical Examiner or the District Attorney General, the local police or the sheriff, who in turn shall notify the County Medical Examiner. The notification shall be directed to the County Medical Examiner in the county where the death occurred.*

The Regional Forensic Center works to educate our partners on the law and the nuances of the law to assure proper death reporting.



# Importance of On-Scene Investigation by Medicolegal Death Investigators

In Tennessee, potential drug related deaths fall under medical examiner jurisdiction (TCA § 38-7-108). In Knox and Anderson Counties, when a potential drug related death is reported to the medical examiner, the death scene investigation is performed by medicolegal death investigators at the Knox County Regional Forensic Center (RFC). The medicolegal death investigators (MDIs) follow the guidelines and policies of the RFC which include recommendations and investigation guidelines established by national organizations such as the National Association of Medical Examiners (NAME), the National Institute of Justice (NIJ), the American Board of Medicolegal Death Investigation (AMBDI), and the Tennessee Code Annotated. Medical death investigators are considered the on-scene eyes and ears of the forensic pathologist or medical examiner at the scene. The focus of the MDI is the collection of evidence and information that will assist the forensic pathologist and/or medical examiner in determining cause and manner of death.

Accurate cause and manner of death determinations require integration of scene investigative findings, body examination findings, and toxicology. This is especially true in potential and suspected drug related deaths. The medical investigator will document many important findings, such as: the position and location of the decedent at the scene, any resuscitative measures (IVs, intubation, etc.), the presence or absence of evidence of drug use, including: opioid and other scheduled medications, drug paraphernalia (needles, spoons, cut straws, crushed tablets, pill crushers, etc.), packets of powder or crystals, overlapping prescriptions for the same medication from different prescribers, prescriptions in other people's names, mixed pills in pill bottles, the presence of naloxone, and altered transdermal patches. All of the decedent's prescription medication is collected, documented, and inventoried. A



complete medication inventory will include name and strength of the medication, administration regimen, number of pills prescribed, number of pills remaining, and the pharmacy and prescriber information.

The medicolegal death investigator and law enforcement officers serve cooperative and similar, yet distinct, purposes: the death investigator conducts an independent, objective medical investigation and is responsible for the body at a death scene, whereas law enforcement is responsible for the entire scene and often have different investigative goals and responsibilities. Medical death investigators also act as liaisons among medical examiners, law enforcement officials, and the decedent's family members. In addition, medicolegal death investigators often have easier and more direct access to a decedent's medical records, prescription histories, and prescription monitoring databases that are of prime importance in investigation of a potential drug related deaths.

Medicolegal Death Investigators, working for and under the direction of the county Medical Examiner, provide an essential function in death scene investigation. The MDIs at the Knox County Regional Forensic Center provide 24/7 coverage in Knox and Anderson counties. In addition, they are registered diplomats through the AMBDI and work under the direction of the Chief Medical Examiner and Senior Director.



# Report Methodology

## Data Sources

This Drug Related Death Report is derived from data in the Knox County Regional Forensic Center's (RFC) Medical Examiner database, Death Certificates certified by RFC Forensic Pathologists, and Medical Examiner case files for autopsies and examinations performed for Knox and Anderson counties at the Knox County Regional Forensic Center by its Forensic Pathologists from January 1, 2010 – December 31, 2015.

## Reasoning for the Selection of Knox and Anderson Counties

Dr. Mileusnic-Polchan is the Chief Medical Examiner for Knox and Anderson counties. In addition, the Regional Forensic Center provides death scene investigation for Knox and Anderson counties. The Medicolegal Death Investigators work for the Regional Forensic Center and follow guidelines established by the Regional Forensic Center, Chief Medical Examiner and Senior Director.

## How Data was Derived

An initial data file was collated from the Medical Examiner database to identify possible drug related cases for January 1, 2010 – December 31, 2015 in the Accident-Non-Motor Vehicle and Suicide categories for cause and manner of death.

Parameters were adjusted to include all cases where a toxicology report was requested and the data pull was rerun to determine a more specific dataset for possible drug related cases. The file with possible drug related cases was then utilized to pull related Death Certificates and Medical Examiner case files.

A file with specific data elements was created to perform data extraction from the Death Certificates and Medical Examiner case files in order to assure the record was



complete for each case. Once data extraction was performed from the Death Certificates and Medical Examiner case files (to include laboratory reports), data was reviewed to assure accuracy and that the data properly reflected case outcomes. It was a requirement that a laboratory report specify the drug or drug class and the Forensic Pathologists determine that the listed drug caused or contributed to death in order for it to be counted as a drug related death. Additionally, cause of death or contributory causes of death including "overdose, toxicity, toxic effects of, polypharmacy, intoxication, mixed drugs" were included. This cohort specifically excludes chronic effects of drugs and alcohol where the manner of death was deemed to be "natural". Then, the Medical Examiner database was updated to reflect accurate information for each case.

A data file was then extracted from the Medical Examiner database to begin running statistics and produce drug related death reports.

### **Data Limitations/Caveats**

The reports derived from this data have the following limitations:

1. This report only reflects data from autopsies and exams performed for Knox and Anderson counties between January 1, 2010 – December 31, 2015.
2. The data sources (Medical Examiner database, Death Certificates, and Medical Examiner Case files) are evolving over time. The reports reflect data available and Regional Forensic Center processes/policies at the time of the Autopsy Report and Death Certificate signing. It does not annotate changes in laboratory testing or an increased focus on drug related death cases.
3. The Medical Examiner database currently is not adequate to accurately reflect drug related death information by itself. The Medical Examiner database must be cross referenced with Death Certificate data and Medical Examiner Case file data. Changes are being made to the Medical Examiner database to assist in identifying and tracking drug related death cases.



4. This report does not account for decedents dying in hospitals, medical facilities or other facilities/locations where the Medical Examiner was not informed of the death. By statute, the Medical Examiner's Office is required to be informed of certain deaths. However, hospitals, medical facilities or other facilities/locations do not always notify the Medical Examiner which means that this report cannot account for drug related deaths not reported to the Knox and Anderson counties' Medical Examiner's Office. Therefore, we believe this report is an undercount of the total number of overdose deaths.
5. This report will not accurately reflect drugs associated with death when a patient enters the hospital and the hospital does not perform a drug screen or only does a urine drug screen and the patient subsequently dies after being in the hospital for a week or more and is then reported to the Medical Examiner. Therefore, when there was not enough blood or material from the hospital to accurately test for drugs, the case will not be able to be classified as a drug related case.
6. Tennessee does have some regulations, rules, and laws in place to address drug related deaths.
  - a. By statute (*Tennessee Code Annotated (TCA) § 38-7-108*), the Medical Examiner's Office is required to be informed of certain deaths.
    - Hospitals, medical facilities or other organizations do not always report deaths appropriately or they do not report the death at all.
    - When physicians certify cause of death on Death Certificates, they often do not accurately annotate the Cause and Manner of Death which results in cases not being reported to the Medical Examiner's Office and drug related deaths not being properly reported.



- b. An unfunded Tennessee Rule was put in place by the Tennessee Department of Health's Office of the Chief Medical Examiner in November 2013 to address opiate, illegal, or drug overdose deaths. However, no coordination of effort was made with County Medical Examiners in its development, little to no education was provided on the change, and no funding was provided to carry out the Rule.
  - c. County Medical Examiners are required to approve each Cremation Request in their own county. The Knox County Regional Forensic Center does catch deaths, for Knox and Anderson counties, which were unreported by Hospitals, medical facilities or other organizations when the Medical Examiner reviews the Cremation Request. When the Medical Examiner determines that the death should have been reported, the body is usually ordered to be brought to the Regional Forensic Center for exam and/or autopsy. During the exam and/or autopsy, we do find some drug related deaths that were not properly reported to the Medical Examiner's Office.
7. This report will not provide data or information on the appropriate use of prescription drugs or diversion. It simply reports the presence of the drug in the body at death and reports its impact on the cause and manner of death.
8. This report does provide a more detailed view into Drug Related Deaths in Knox and Anderson counties than Death Certificate data from Knox and Anderson counties since, as indicated from Centers of Disease Control and Prevention (CDC) reports:
- A. 1 in 5 drug overdose deaths have no specific drug listed on the Death Certificate
  - B. Many Death Certificates indicate multiple drugs present because most deaths are caused by more than one drug
  - C. Often it is difficult to identify which drug is the cause of death when multiple drugs are present
  - D. CDC Death Certificate data is coded and grouped into drug classes



# Recommendations

1. Funding at the local County Medical Examiner and Regional Forensic Center level should be made available to facilitate examination/autopsy and toxicology testing for drug related cases. As the number of drug related deaths and the cost of testing increases, there will need to be a corresponding increase in funding to assure the most accurate data.
2. The creation and utilization of a statewide electronic Death Certificate process utilized by all physicians would facilitate drug related death reporting and create the ability to have real time tracking of all drug related death data and information. Since Medical Examiners only certify a relatively small percentage of all deaths and do not have all cases appropriately referred to them, the utilization of a statewide electronic Death Certificate would provide the most data when examining drug related deaths.
3. A training program is needed for physicians, hospitals, medical facilities and other organizations to assure their understanding of reporting requirements for death cases to their County Medical Examiner. Then, a methodology to hold these groups accountable for reporting to the County Medical Examiner needs to be established and implemented.
4. Funding for the creation of a Regional Coalition, led by the Regional Forensic Center, to coordinate the collection, dissemination, and utilization of drug related data to assist the legal system (Attorney Generals, Sheriffs, and Police), coalitions, medical organizations, and others to affect positive change in the system and the reduction of drug related issues and deaths.



# Acknowledgements

The Knox County Regional Forensic Center thanks the following individuals and organizations for their invaluable contribution to this report.

Ms. Sanya Sharma, MPH – Ms. Sharma was a University of Tennessee Department of Public Health intern at the Regional Forensic Center who was part of the data group responsible for gathering the data and creating the report.

Dr. Amy Hawes – For assistance in data gathering and report preparation.

Ms. Alison McNabb – Ms. McNabb assisted in pulling data from the Medical Examiner database.

KGIS and Mr. Will Fontanez – Mr. Fontanez works for KGIS and created the zip code maps.

Metro Drug Coalition – Ms. Pershing and the Metro Drug Coalition assisted with a discussion of data needs for the community and with spreading the word of our data release.

Ms. Kathy Brown (Director, MPH Program, Department of Public Health, University of Tennessee) and Mr. Jody Persino (Regional Forensic Center) for their review of the report.

Mayor Tim Burchett for his continued supporting in strengthening the Medical Examiner system in Knox County and the region.



# DRUG RELATED DEATH DATA 2010 – 2015 for KNOX and ANDERSON COUNTIES

The following graphs represent Knox County Regional Forensic Center (KCRFC) data from Autopsies and External Examinations performed for Knox and Anderson Counties between 2010 – 2015.

The data was taken from the KCRFC Medical Examiner Database, Medical Examiner Case Files, and Death Certificates signed by the KCRFC Forensic Pathologists.

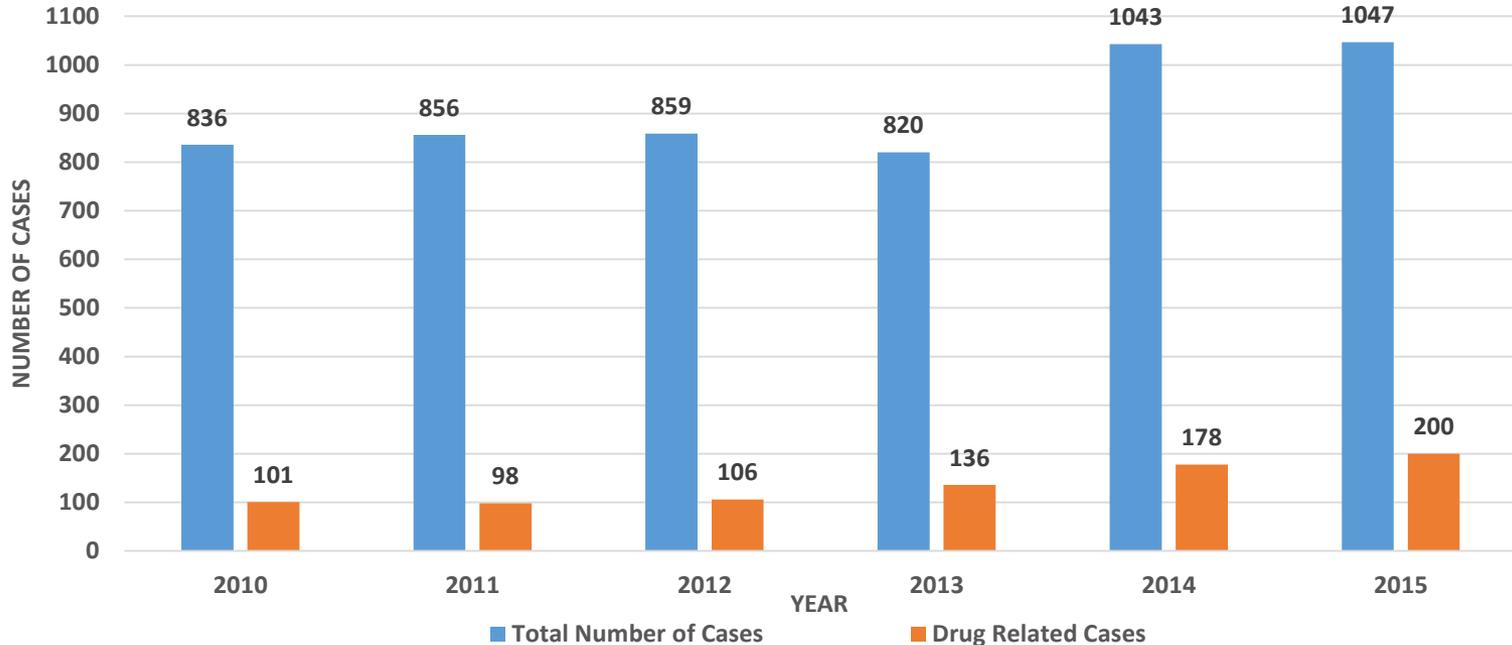
Data will be displayed for Knox and Anderson combined, Knox only, and Anderson only in order to provide actionable data for both counties.

The reader should remember the caveats and limitations to the data as expressed within this report and/or on the graphs/tables.





## Knox and Anderson Counties Total Cases Vs Drug Related Death Cases 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

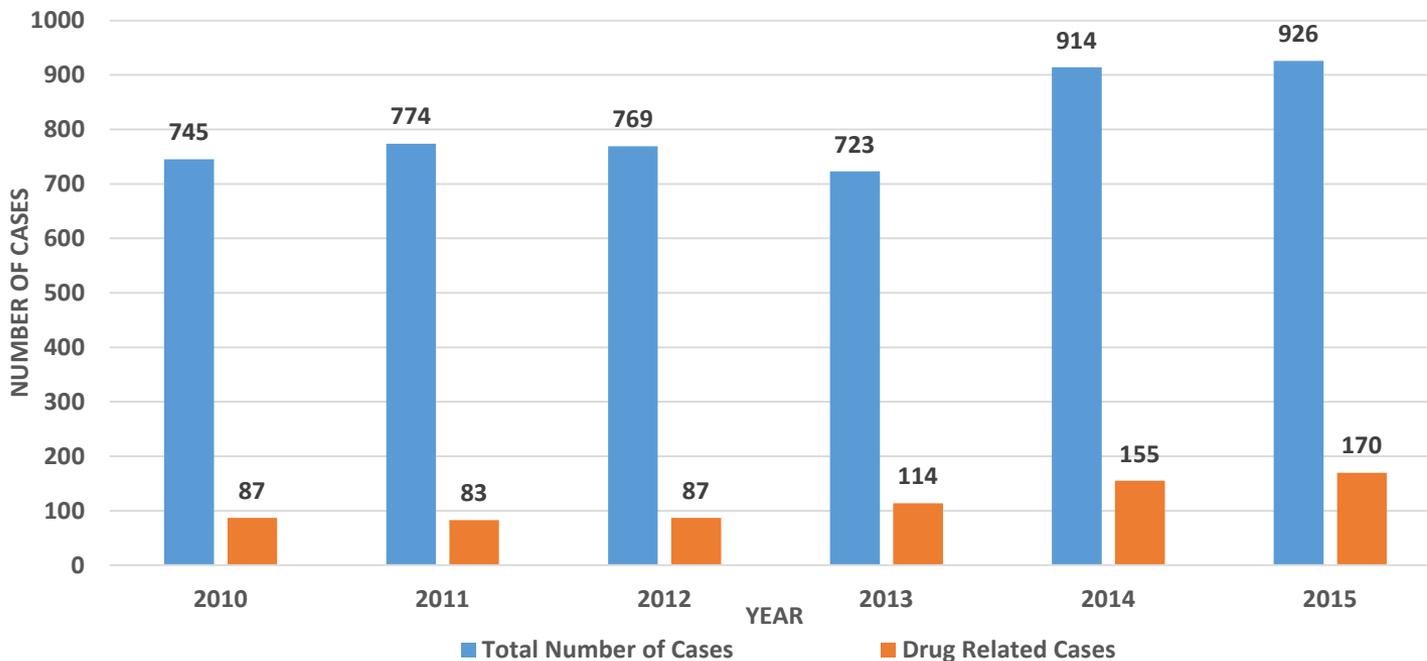
**NOTES:** 1. Total Number of Cases = Autopsies and Examinations conducted for Knox and Anderson counties

The number of autopsies and examinations have increased by 25% while the number of drug related cases has doubled over the past six years.





## Knox County Total Cases Vs Drug Related Death Cases 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**NOTES:** 1. Total Number of Cases = Autopsies and Examinations conducted for Knox county

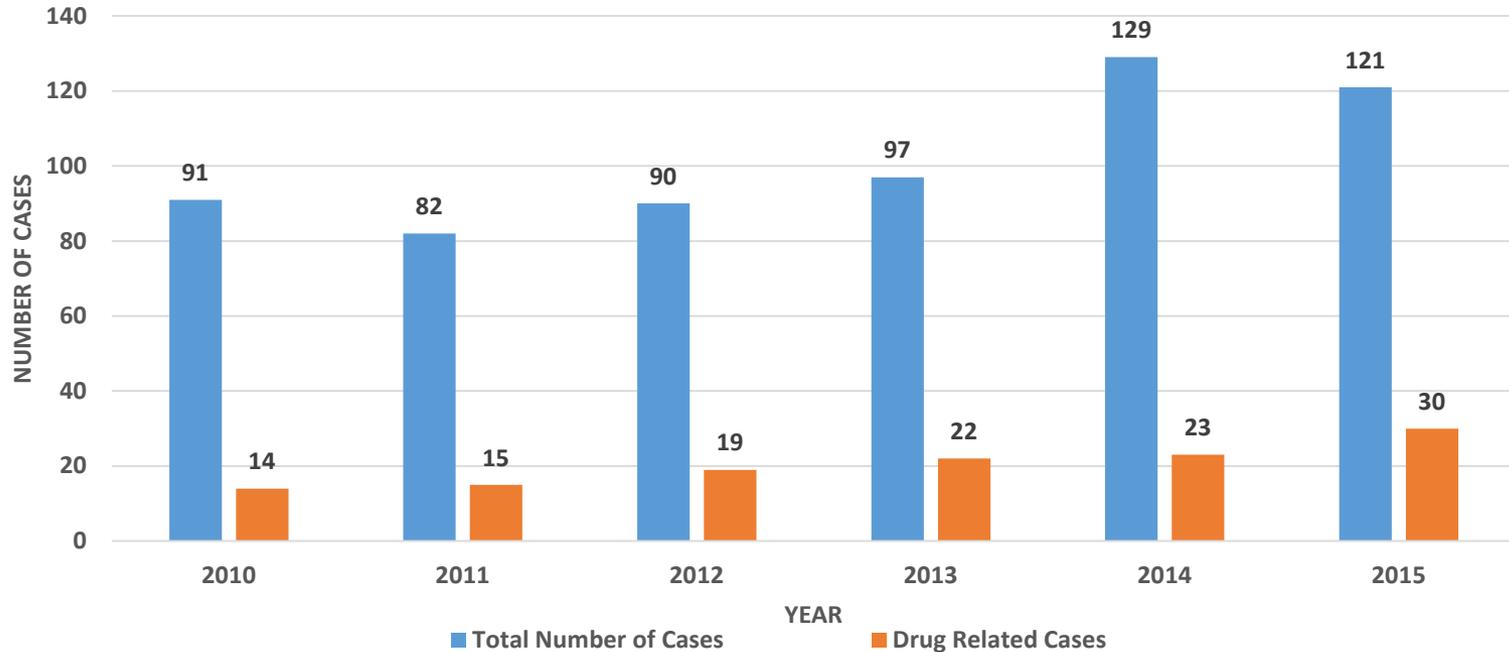
2. Drug Related Cases = Autopsies and Examinations in Knox county where the Manner of Death was Suicide or Non-Motor

The number of autopsies and examinations have increased by nearly 24% while the number of drug related cases has nearly doubled over the past six years.





## Anderson County Total Cases Vs Drug Related Death Cases 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**NOTES:** 1. Total Number of Cases = Autopsies and Examinations conducted for Anderson county

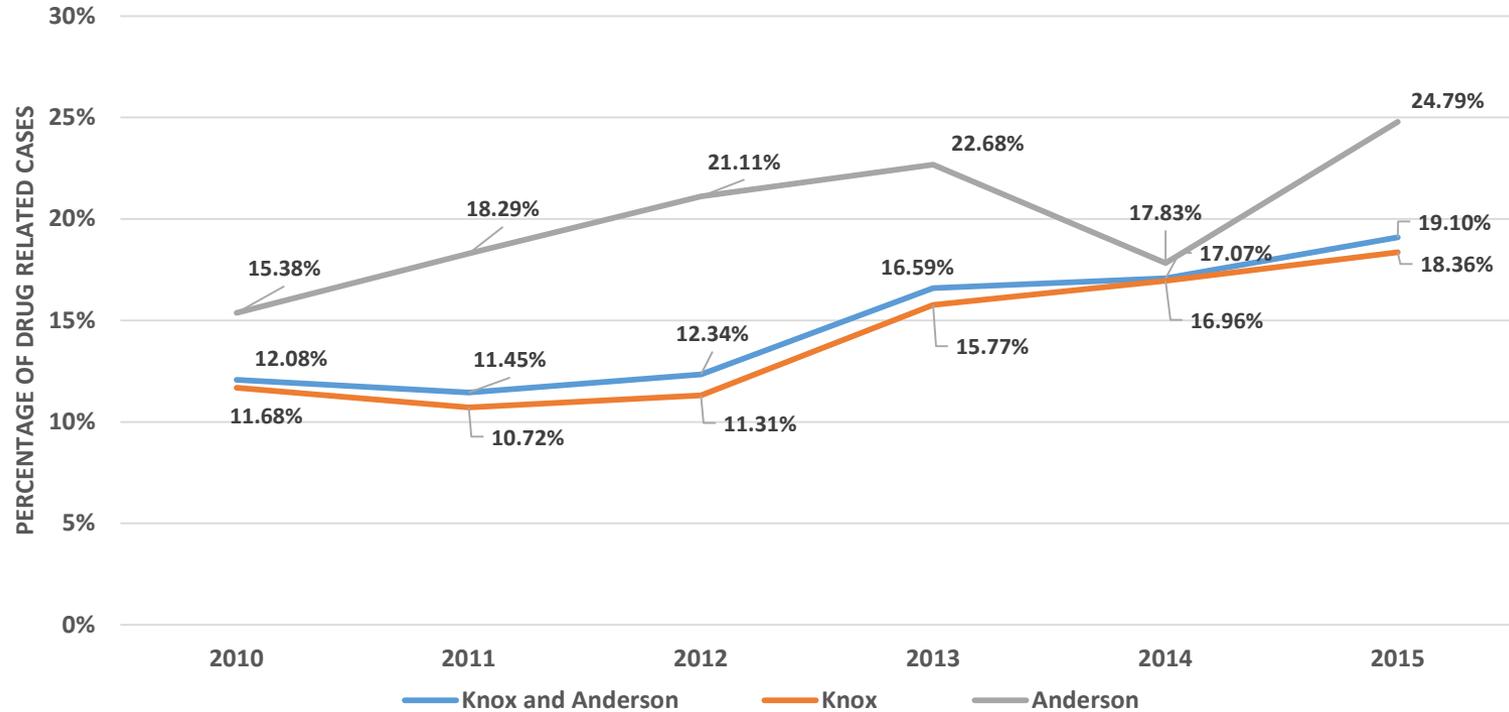
2. Drug Related Cases = Autopsies and Examinations in Anderson county where the Manner of Death was Suicide or Non-

The number of autopsies and examinations have increased by 33% while the number of drug related cases has doubled over the past six years.





## Knox and Anderson Counties Percentage of Drug Related Death Cases 2010 - 2015



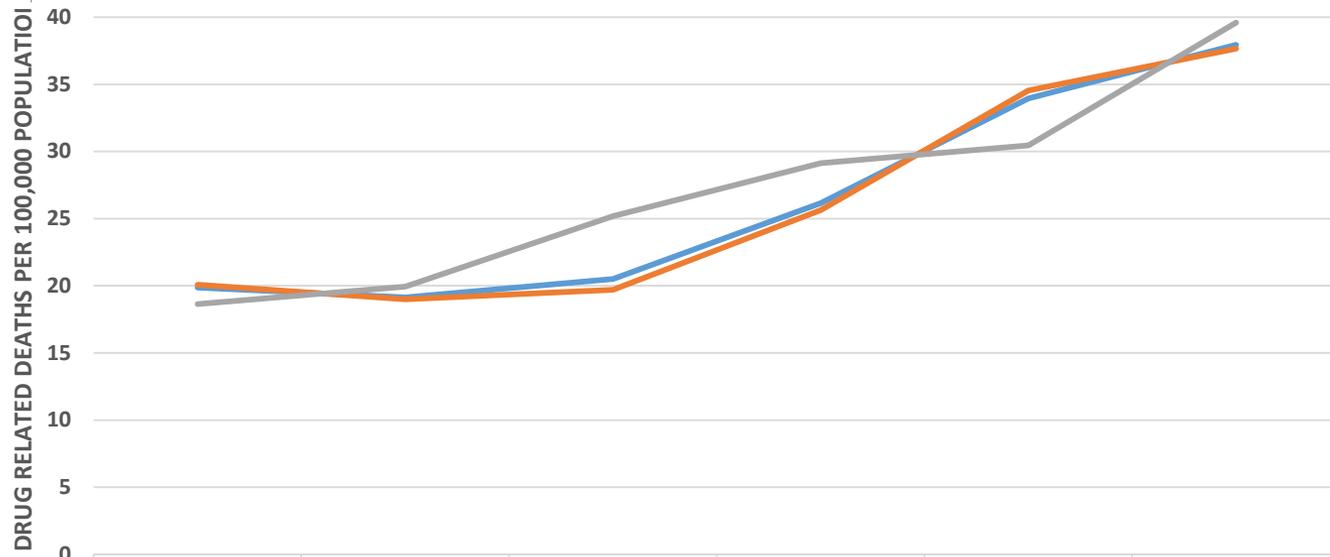
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

Over the past 6 years, the percentage of drug related deaths has been increasing.





## Knox and Anderson Counties Drug Related Death Cases per 100,000 Population 2010 - 2015



	2010	2011	2012	2013	2014	2015
Total	19.9	19.1	20.5	26.2	34.0	38.0
Knox County	20.1	19.0	19.7	25.6	34.6	37.7
Anderson County	18.6	19.9	25.2	29.1	30.5	39.6

**Data Sources:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

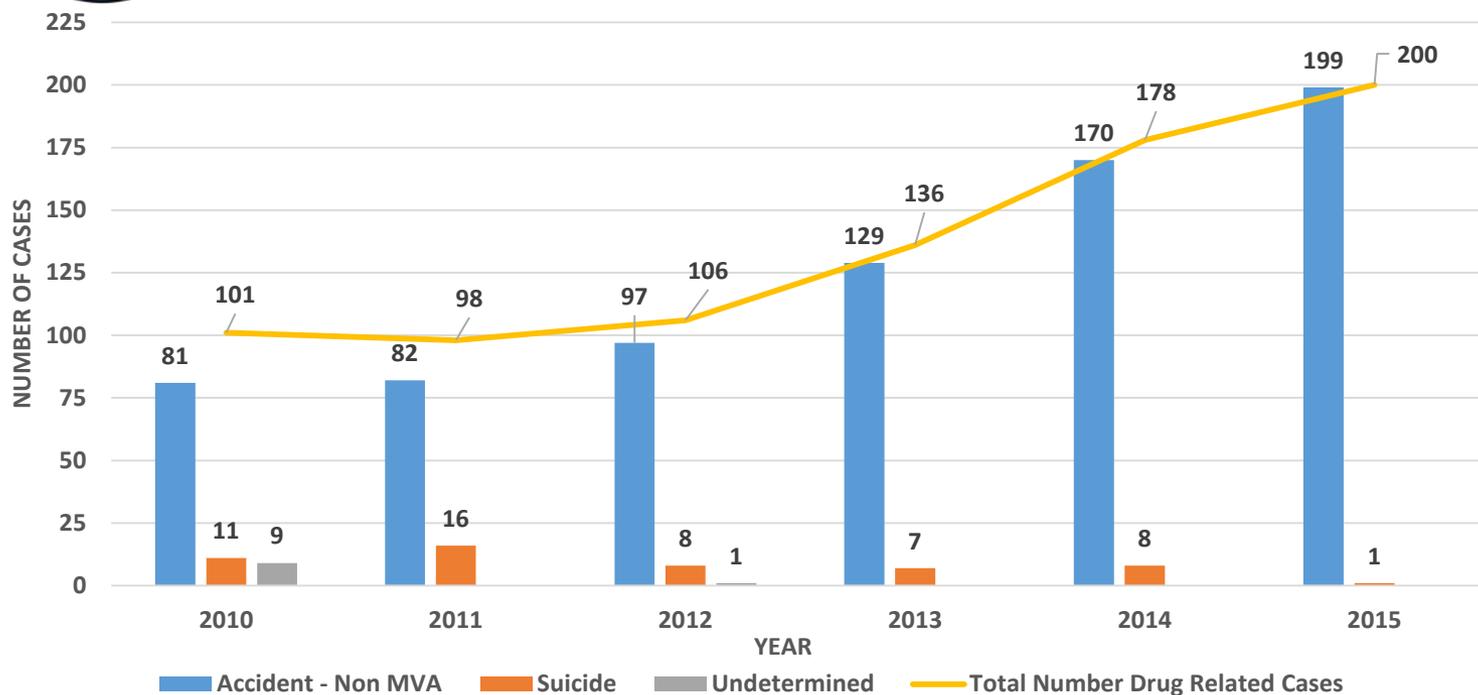
Census population from US Census Bureau "American Fact Finder" - [http://factfinder.census.gov/faces/nav/jsf/pages/community\\_facts.xhtml](http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml).

The crude rate of Drug Related Deaths per 100,000 population has doubled from 2010 – 2015 for Knox and Anderson counties. This rate only represents cases conducted at the Regional Forensic Center. It does not represent all Drug Related Deaths in Knox and Anderson county since not all deaths are properly reported either by institutions such as hospitals or through physicians filling out death certificates.





## Knox and Anderson Counties Manner of Death for Drug Related Death Cases 2010 - 2015



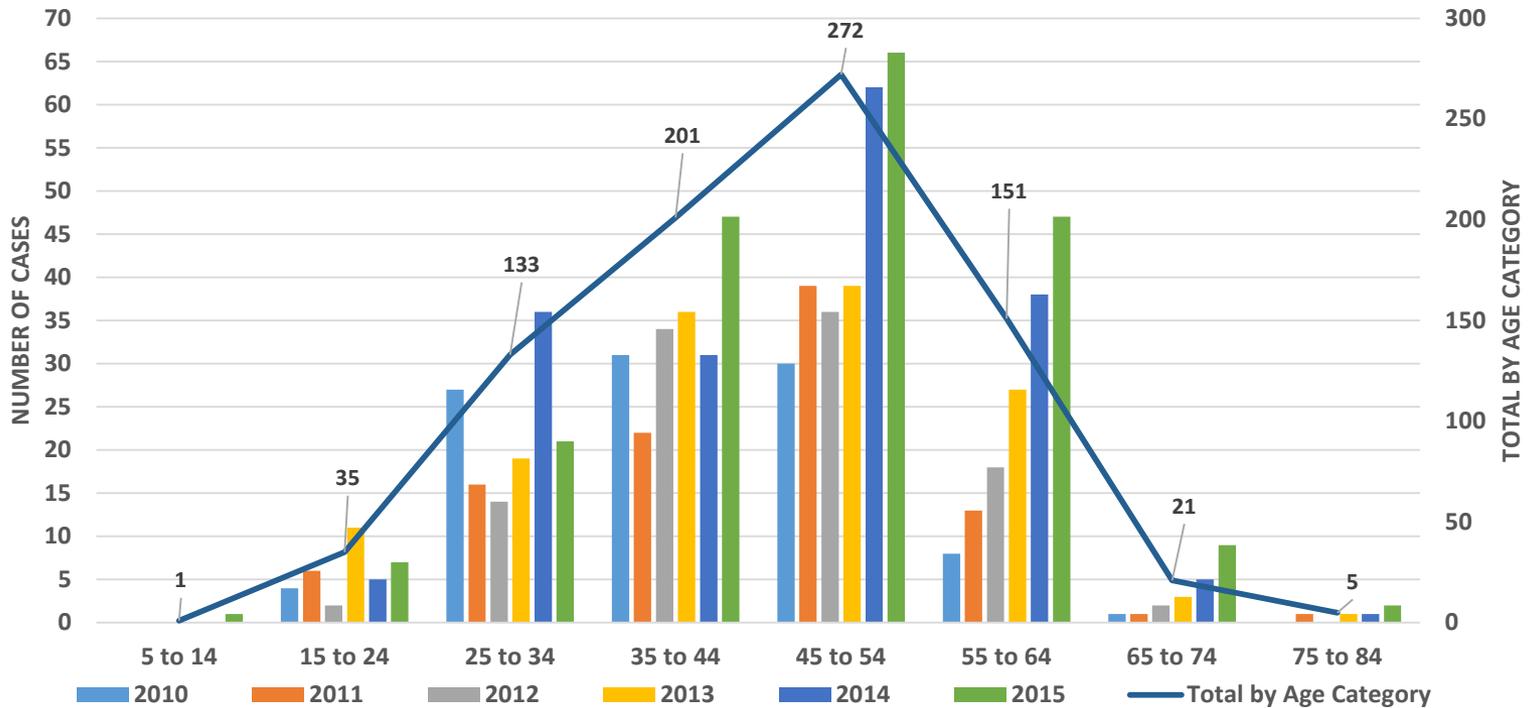
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

Drug Related Death cases have a Manner of Death classification of either Accident-Non Motor Vehicle or Suicide. Often, determining if a case is classified as a Suicide can be difficult based on the available forensic evidence. Sometimes, there is not enough forensic evidence to properly determine the Manner of Death and it will be classified as Undetermined. In 2014, the CDC classified drug related deaths at the national level as 82% unintentional, 12% suicides, and 6% undetermined.





## Knox and Anderson Counties Age Distribution for Drug Related Death Cases 2010 - 2015



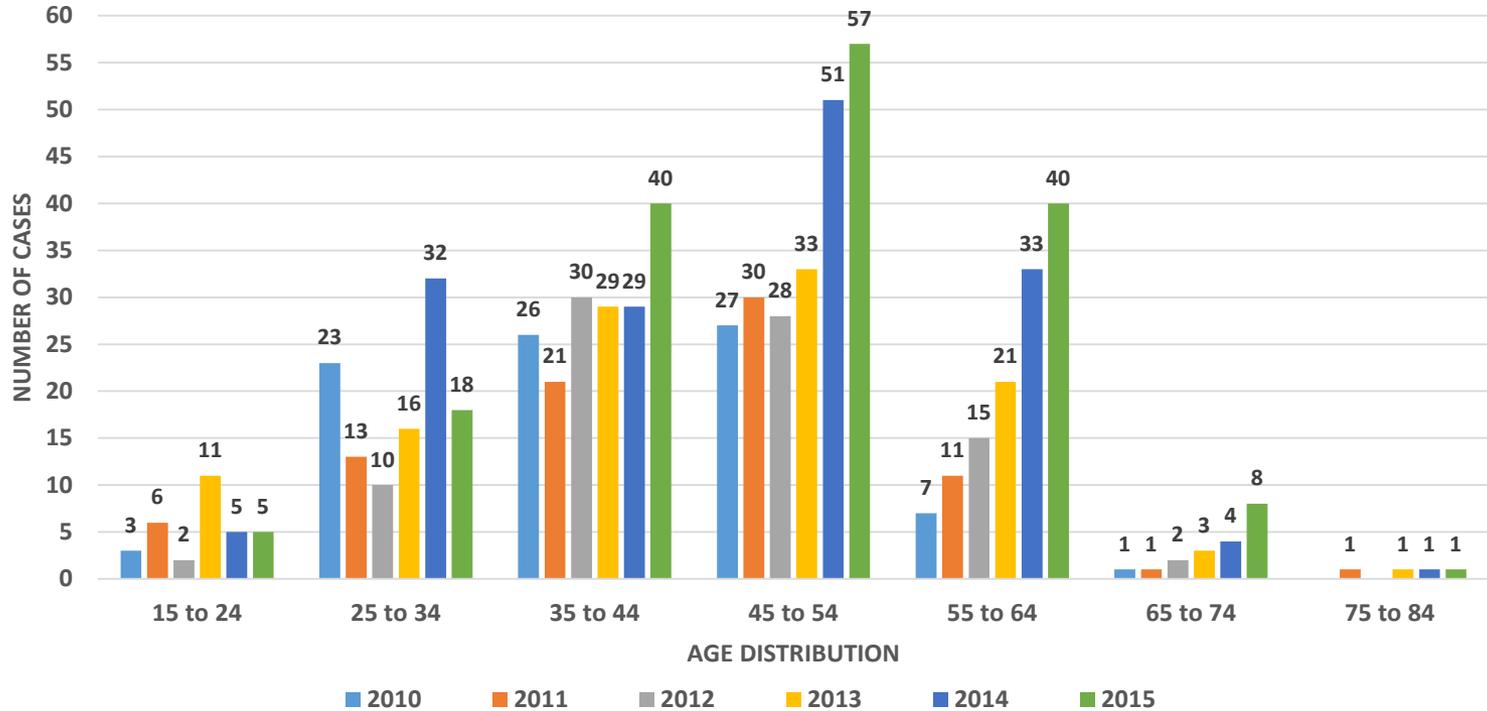
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

Most Drug Related Deaths occur in the 45 – 54 year old age group. The 35 – 44 and 55 – 64 year age groups have shown steady increases. These numbers represent actual case numbers. According to CDC statistics, the 45 to 54 year old age group is the predominant group at the national level dying of drug related issues.





## Knox County Age Distribution for Drug Related Death Cases 2010 - 2015



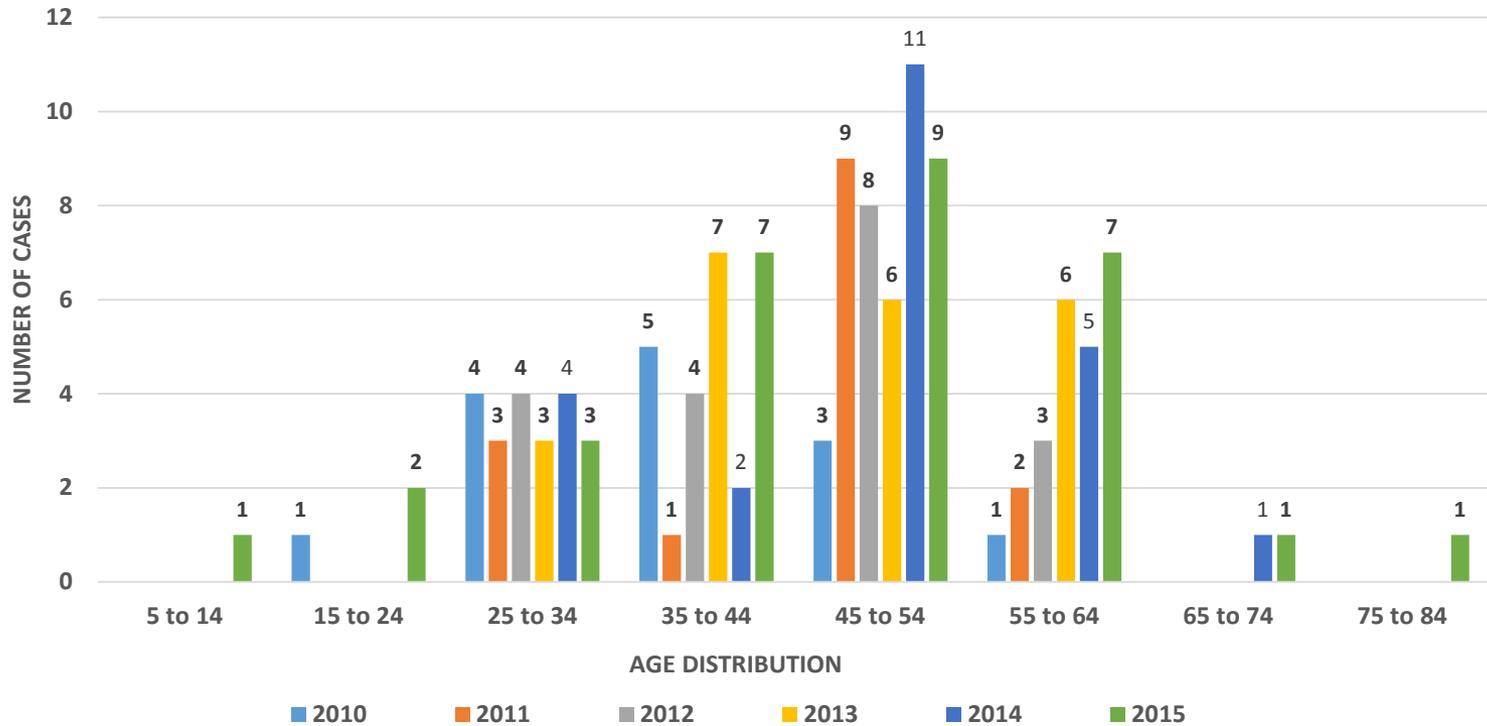
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

In Knox County, the predominant age group for Drug Related Deaths is 45 – 54 years of age. The 35 – 44 and 55 – 64 are the next age groups with the most Drug Related Deaths.





## Anderson County Age Distribution for Drug Related Death Cases 2010 - 2015



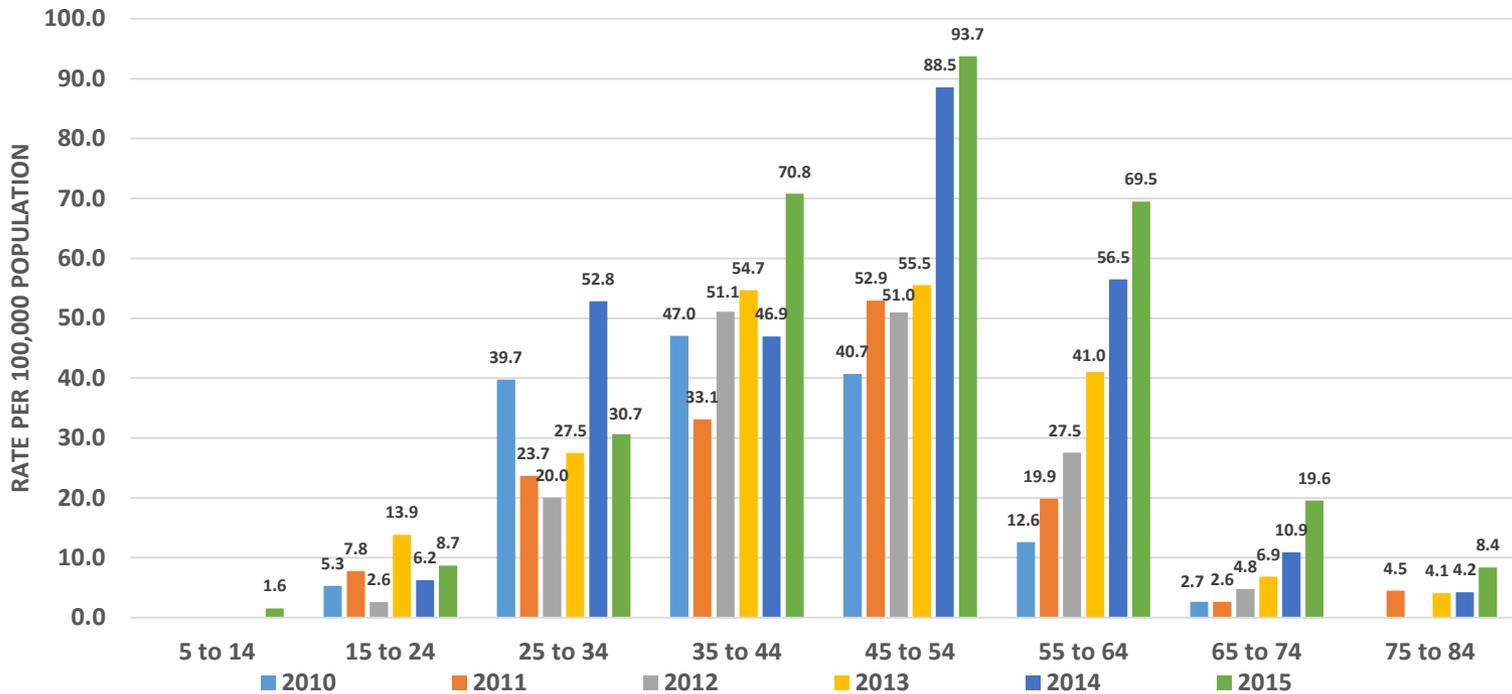
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

In Anderson County, the predominant age group for Drug Related Deaths is 45 – 54 years of age. The 35 – 44 and 55 – 64 are the next age groups with the most Drug Related Deaths.





## Knox and Anderson Counties Age Specific Rate per 100,000 for Drug Related Death Cases 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

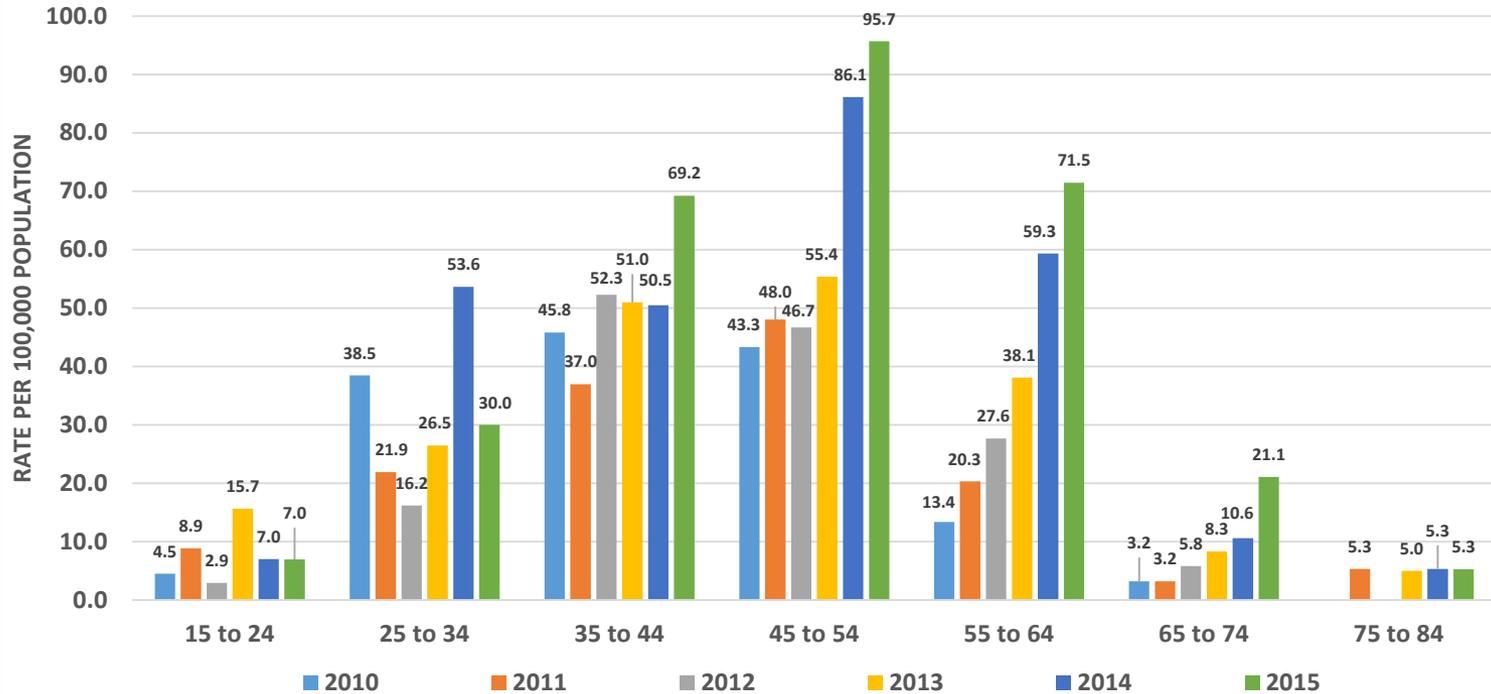
**Population Data Source:** American Fact Finder, U.S. Census.

In 2014 and 2015, the 45 – 54 year age group saw a significant increase and they have the highest age specific rate. In addition in 2015, the 35 – 44, 55 – 64, 65 – 74, and 75 – 84 age groups saw significant increases in their age specific Drug Related Death rates.





## Knox County Age Specific Rate per 100,000 for Drug Related Death Cases 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

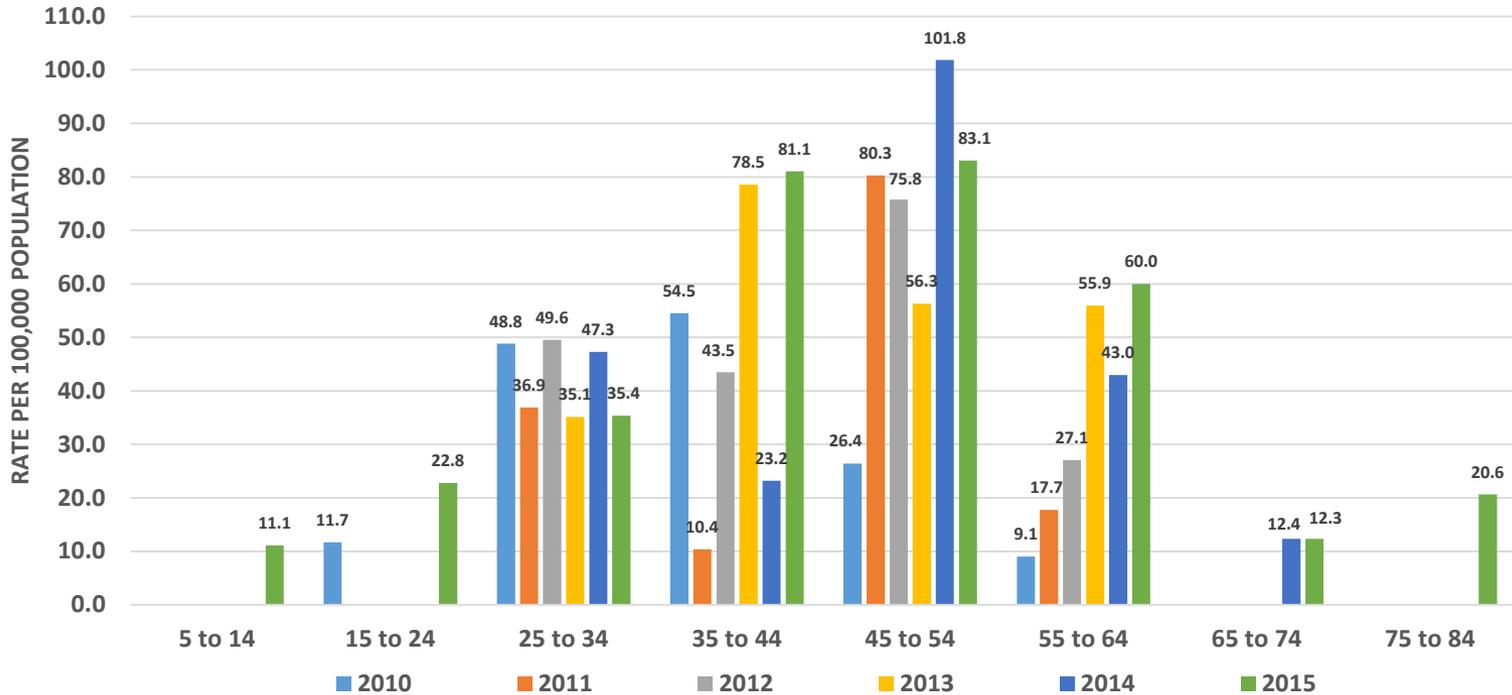
**Population Data Source:** American Fact Finder, U.S. Census.

In Knox County in 2014 and 2015, the 45 – 54 year age group saw a significant increase and they have the highest age specific rate. In addition in 2015, the 35 – 44, 55 – 64, and 65 – 74 age groups saw significant increases in their age specific Drug Related Death rates.





## Anderson County Age Specific Rate per 100,000 for Drug Related Death Cases 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

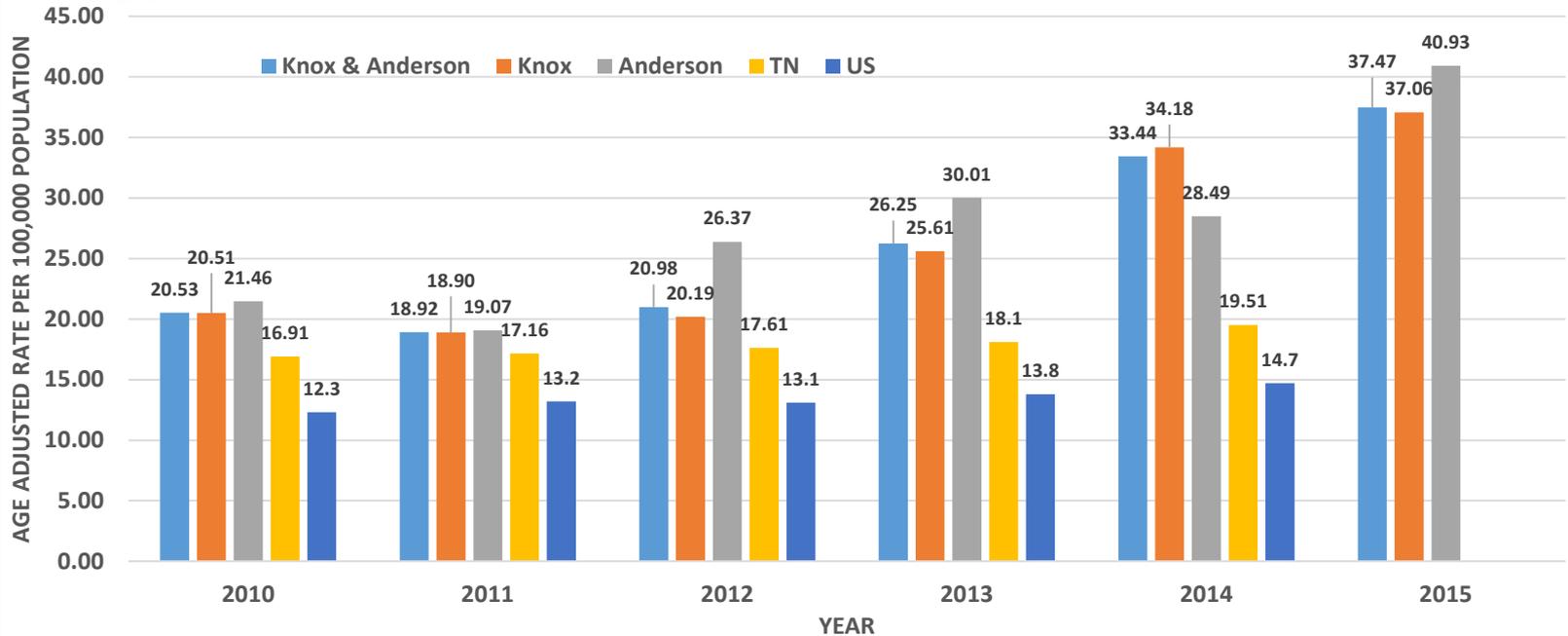
**Population Data Source:** American Fact Finder, U.S. Census.

In Anderson County, the 45 – 54 and 35 – 44 year age groups have the highest age specific rates.





## Age Adjusted Rate per 100,000 for Drug Related Death Cases Knox vs Anderson vs TN vs US 2010 - 2015



**NOTES:**

**Data Source:** Knox and Anderson - Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

TN and US - CDC/NCHS, National Vital Statistics System, mortality data and Health Indicators Warehouse. (2015 data unavailable)

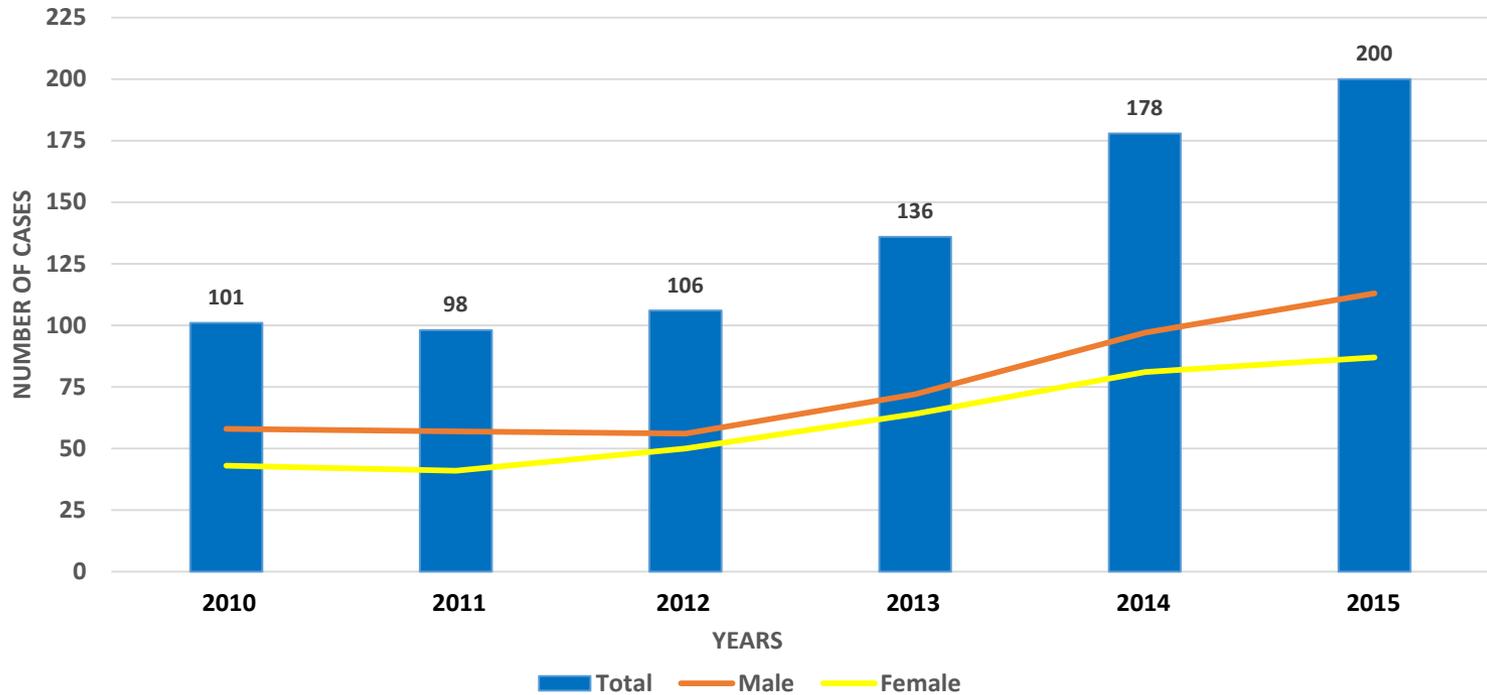
**Population Data Source:** American Fact Finder, U.S. Census.

The chart above depicts the Age Adjusted Rate per 100,000 population for Drug Related Death Cases for Knox, Anderson, Tennessee, and the United States. 2015 data for TN and the US is unavailable.





## Knox and Anderson Counties Gender Distribution for Drug Related Death Cases 2010 - 2015

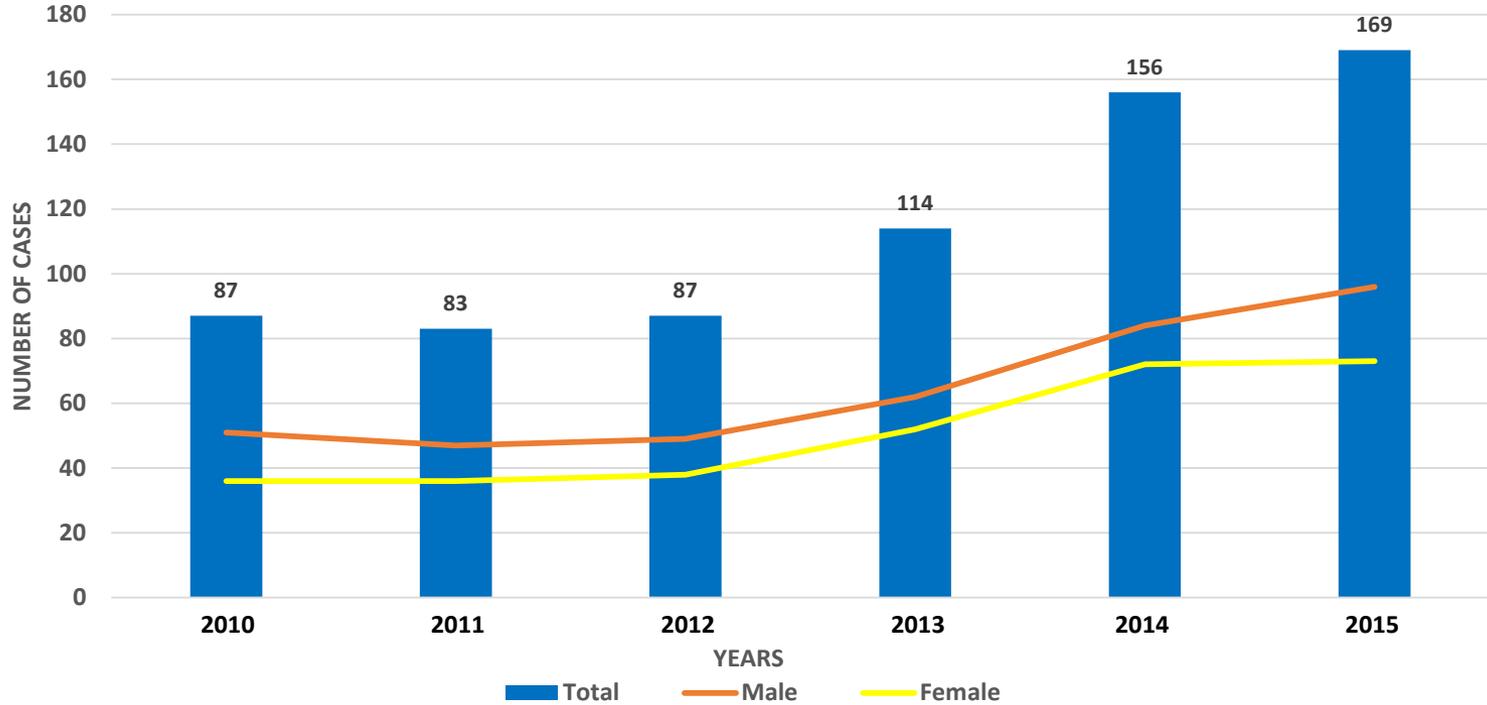


Data Source: Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.





## Knox County Gender Distribution for Drug Related Death Cases 2010 - 2015

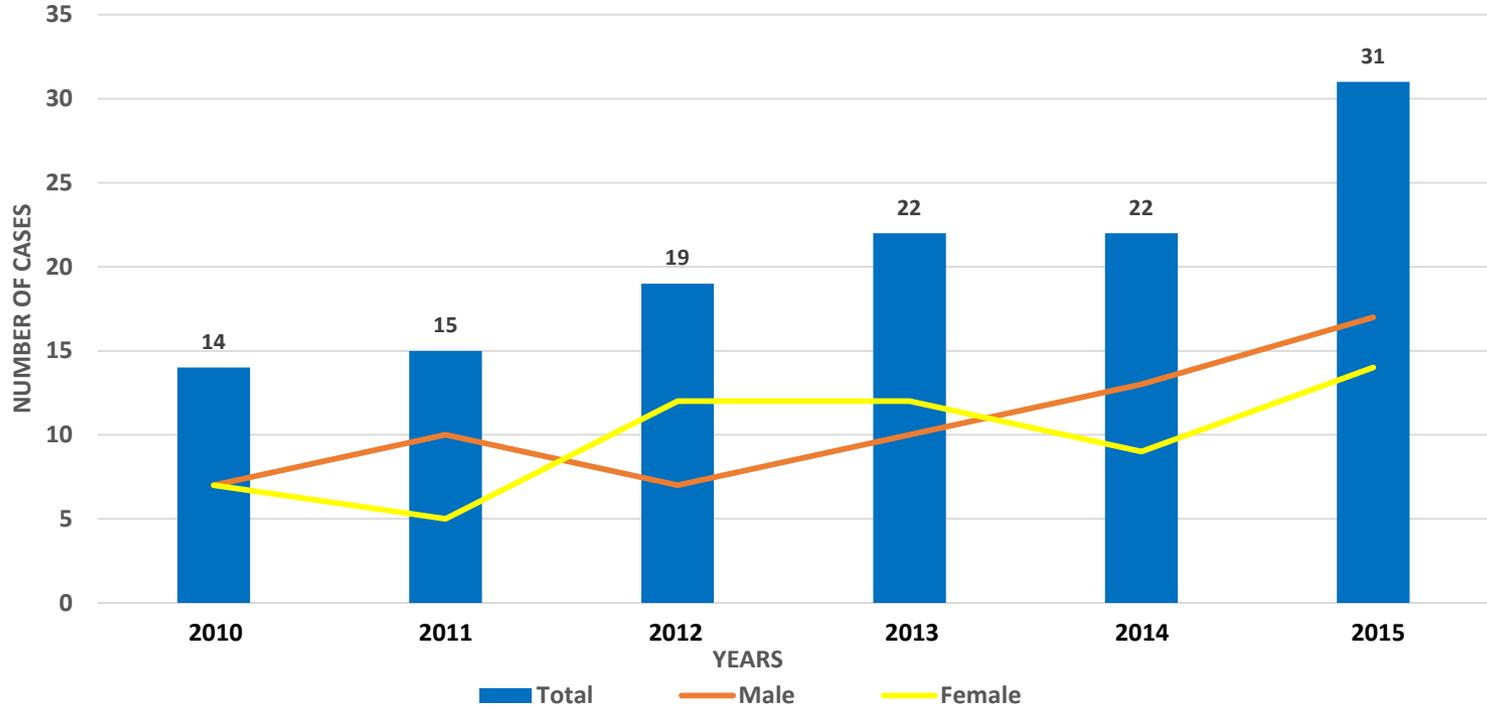


Data Source: Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.





## Anderson County Gender Distribution for Drug Related Cases 2010 - 2015



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.



# Zip Code Distribution and Choropleth Maps by Year and County

The following Zip Code Data represents Home Addresses and Location of Injury for Drug Related Deaths which had an autopsy or examination between 2010 – 2015 for Knox and Anderson Counties at the Knox County Regional Forensic Center. The Data Source and Notes are listed here for the Zip Code related pages.

KGIS assisted by creating the choropleth maps. The choropleth maps represent either the Home Address or the Location of Injury for the decedent. The percentage in the block group was derived by dividing the number of decedents in that block group by the population within that block group.

Additionally, we have provided a map of the Pain Clinic locations within Knox and Anderson counties.

**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**Notes:**

1. Pain Clinics are located along easy access routes.
2. The Home Address Location maps represent where the people who died of a drug related death lived.
3. The Location of Injury Address maps represent where drug related death or injury occurred.



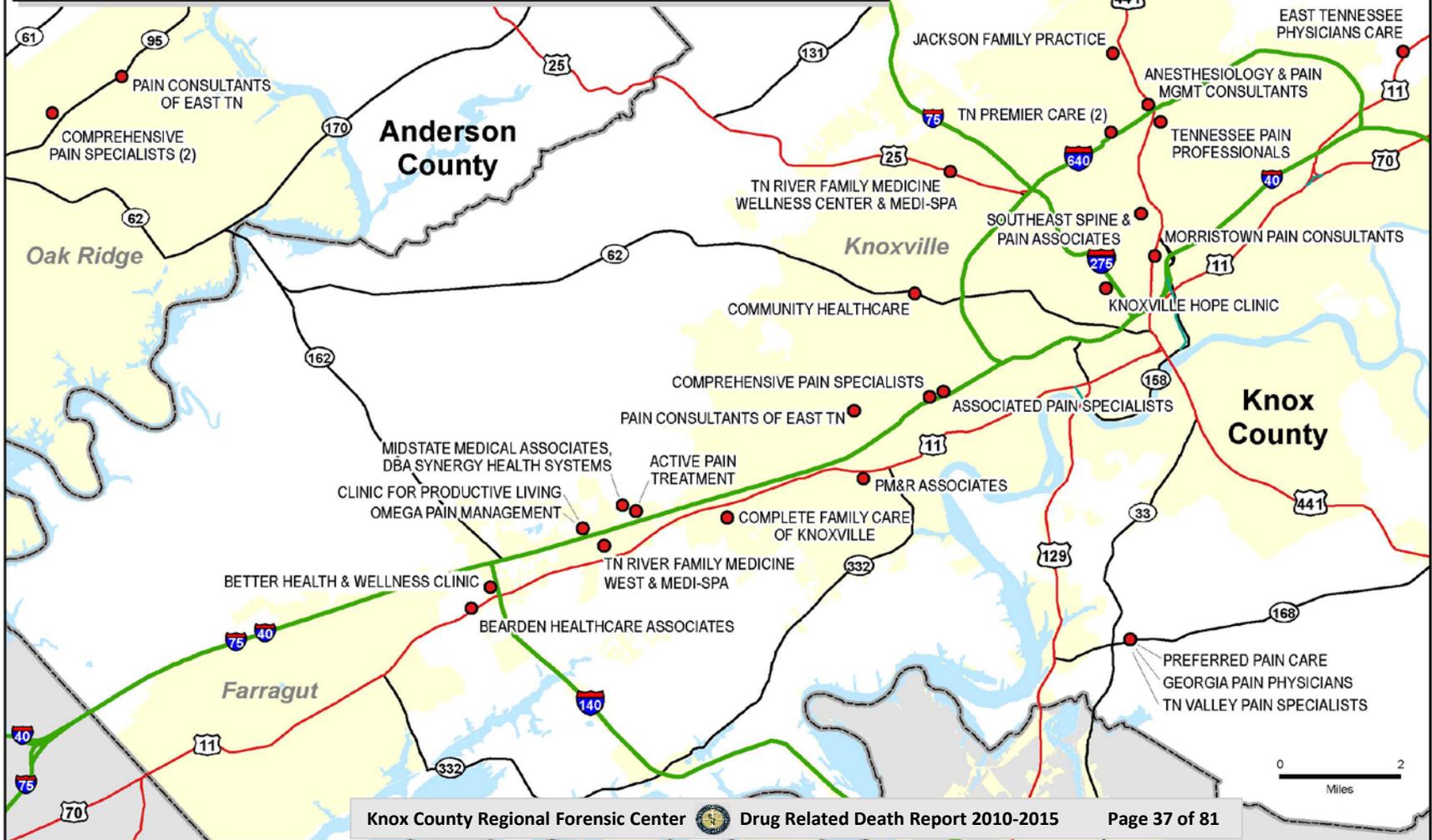
 <b>10 Most Prominent Home Residence Zip Codes by Year for Drug Related Deaths</b>						
	2010	2011	2012	2013	2014	2015
#1	37918	37918	37917	37920	37921	37918
#2	37921	37920	37920	37917	37912	37920
#3	37919	37917	37918	37914	37920	37917
#4	37912	37912	37716	37912	37917	37912
#5	37830	37914	37830	37849	37918	37716
#6	37849	37830	37849	37921	37914	37914
#7	37914	37849	37912	37931	37922	37849
#8	37917	37924	37919	37918	37938	37938
#9	37909	37769	37921	37919	37923	37721
#10	37920	37840	37931	37923	37849	37830

**NOTE:** Color coded Zip Codes represent Zip Codes that made the top 10 list all 6 years.

There are 5 zip codes that appear each year within the Top 10 Most Prominent Home Residence Zip Codes for Drug Related Deaths for Knox and Anderson Counties. The following pages are choropleth maps showing the highest number of deaths per Zip Code by Location of Injury and Home Residence. In addition, there is a map indicating the location of Pain Clinics in Knox and Anderson Counties.

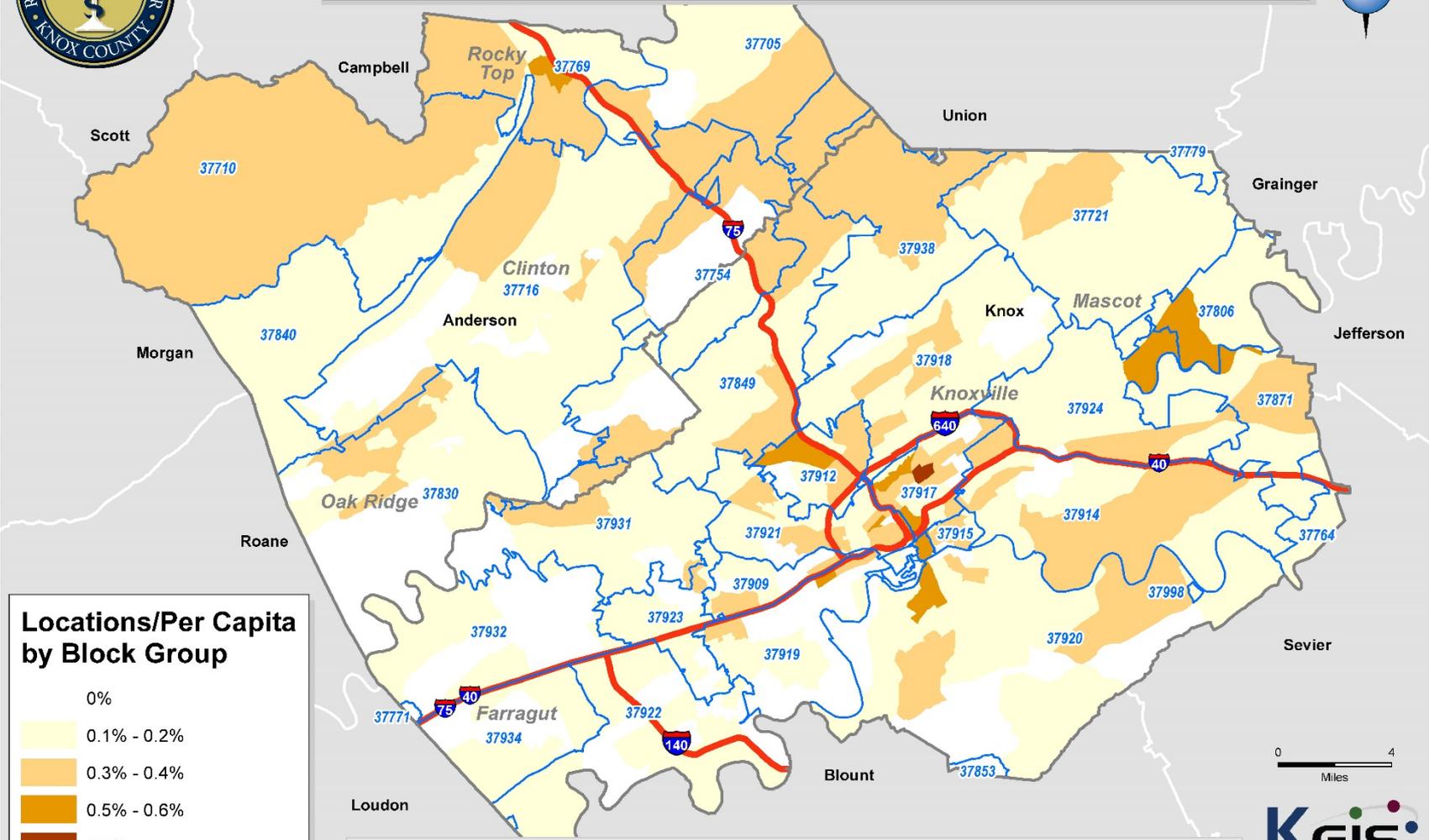


# ANDERSON and KNOX COUNTY PAIN CLINIC LOCATIONS in 2016





# Home Address Locations for Drug Related Death Cases in Knox and Anderson Counties for 2010 - 2015



**Locations/Per Capita by Block Group**

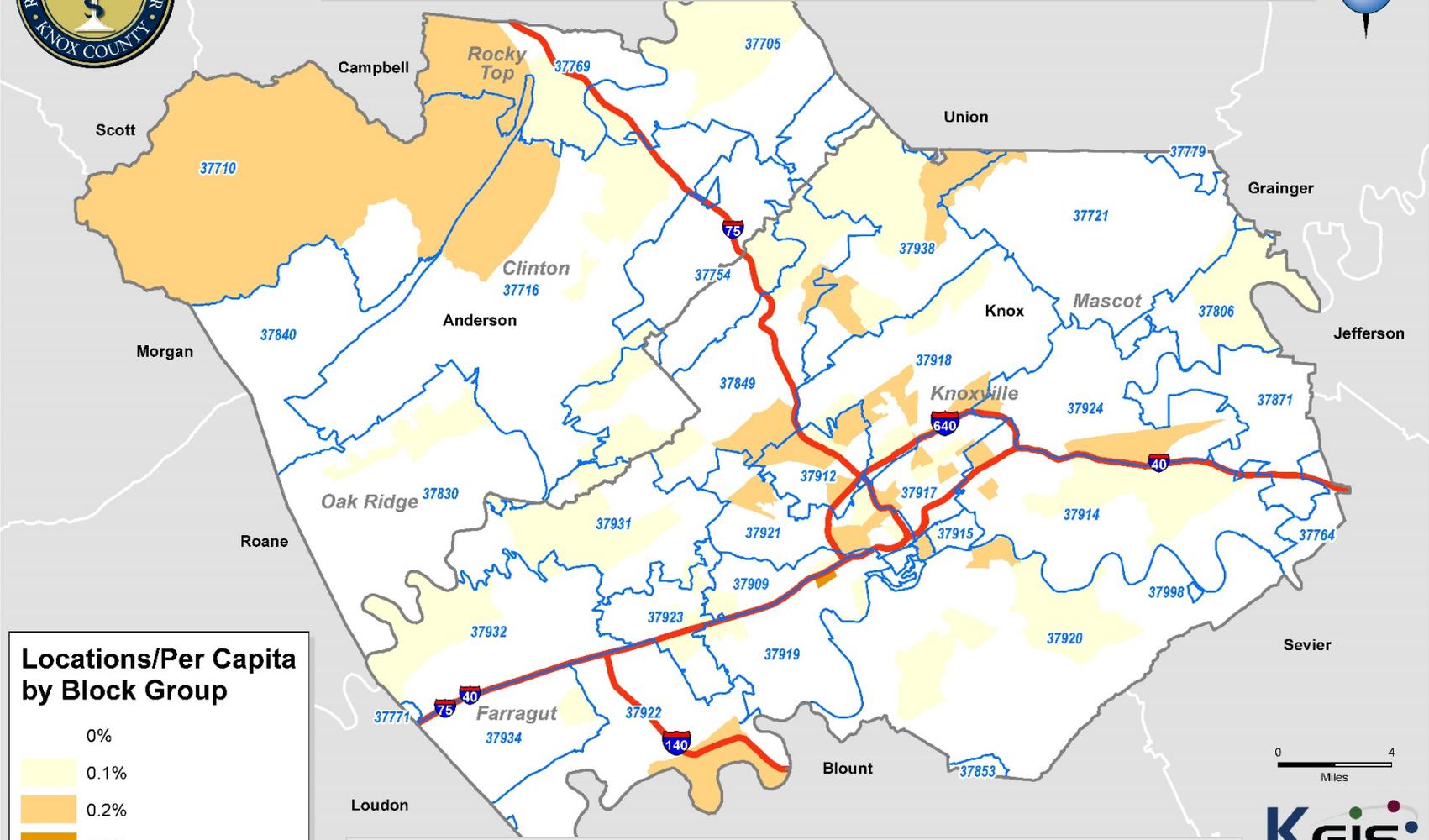
- 0%
- 0.1% - 0.2%
- 0.3% - 0.4%
- 0.5% - 0.6%
- 0.7%







# Home Address Locations for Drug Related Death Cases in Knox and Anderson Counties for 2010



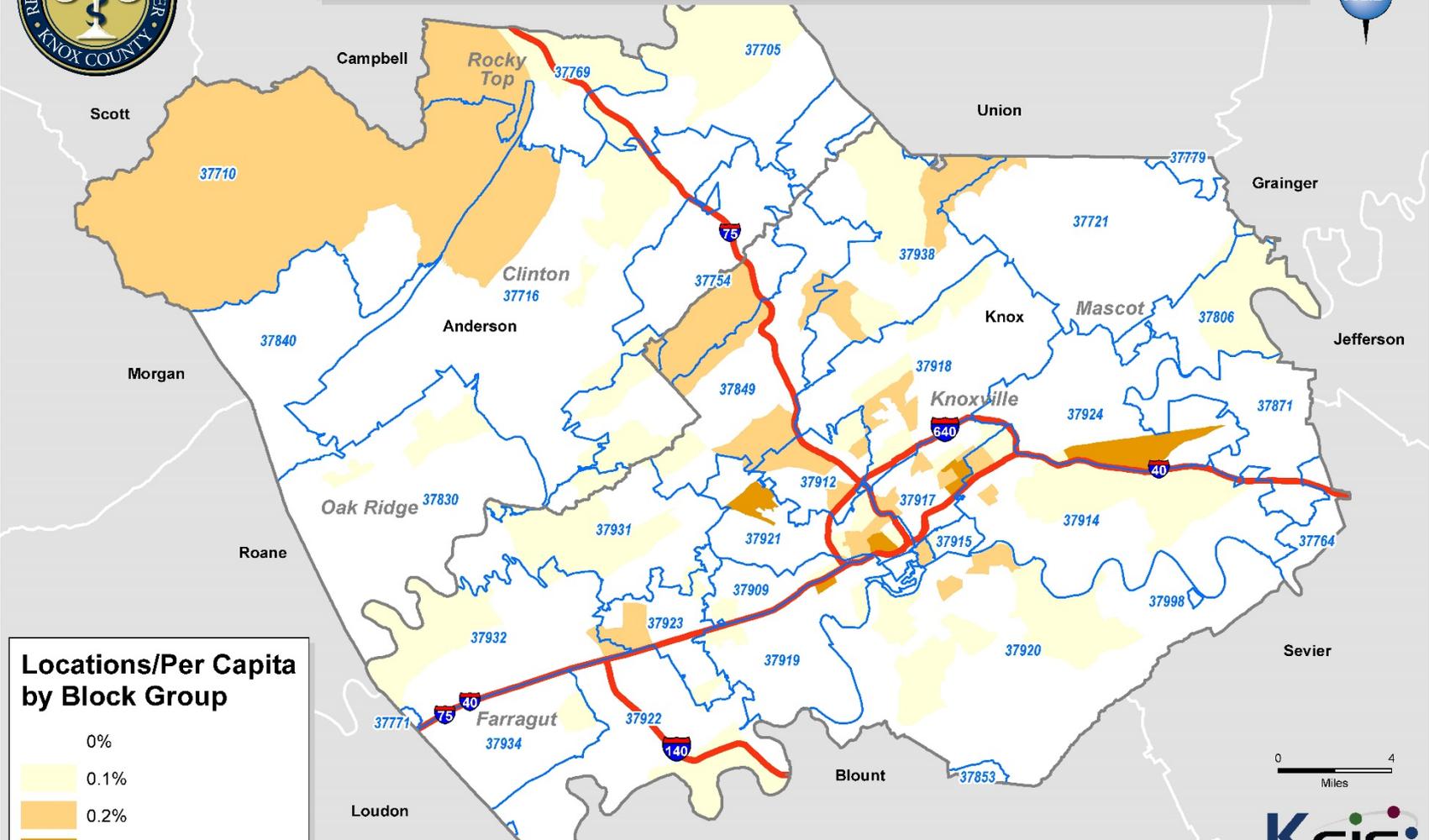
**Locations/Per Capita by Block Group**

- 0%
- 0.1%
- 0.2%
- 0.3%



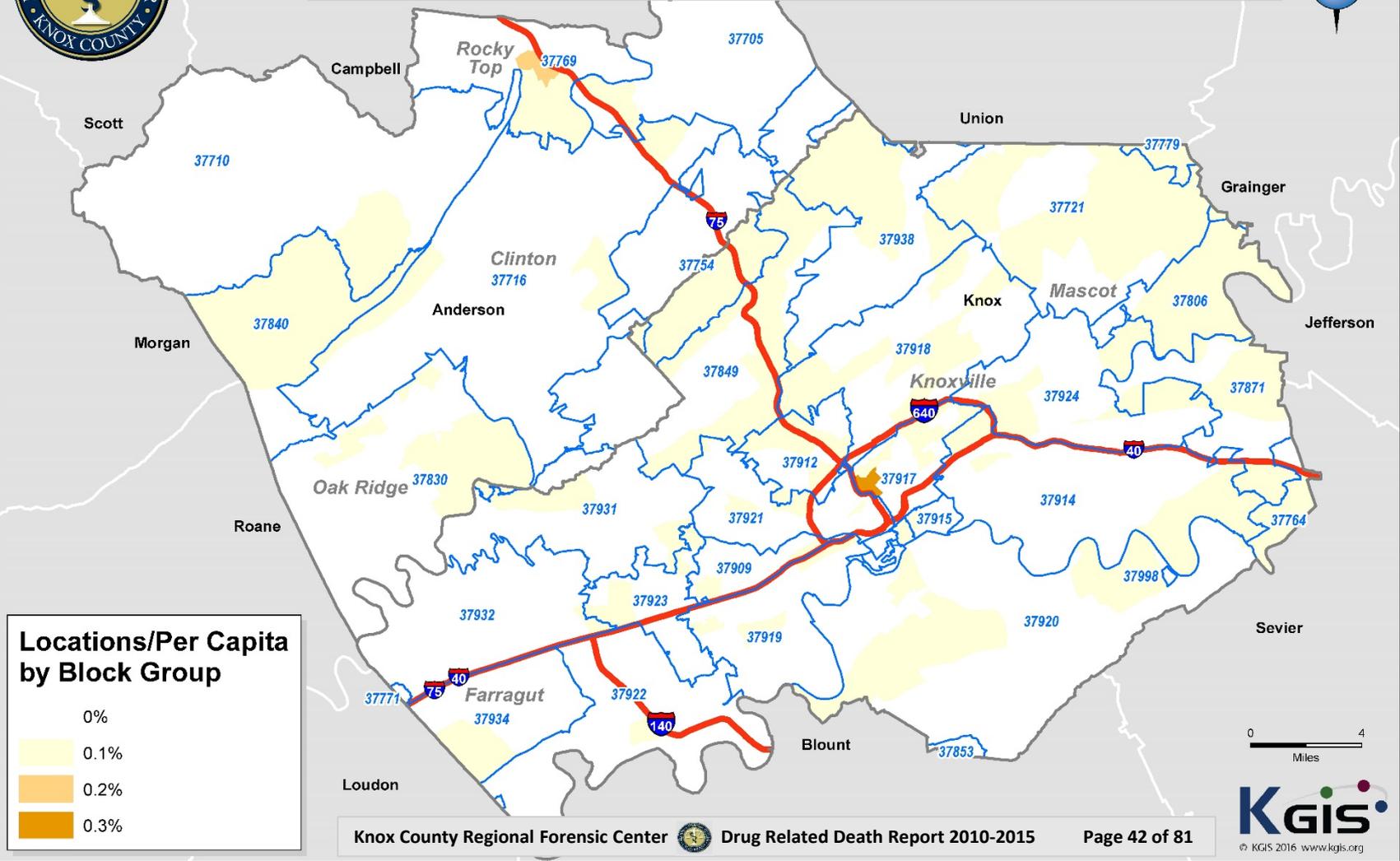


# Location of Injury Addresses for Drug Related Death Cases in Knox and Anderson Counties for 2010



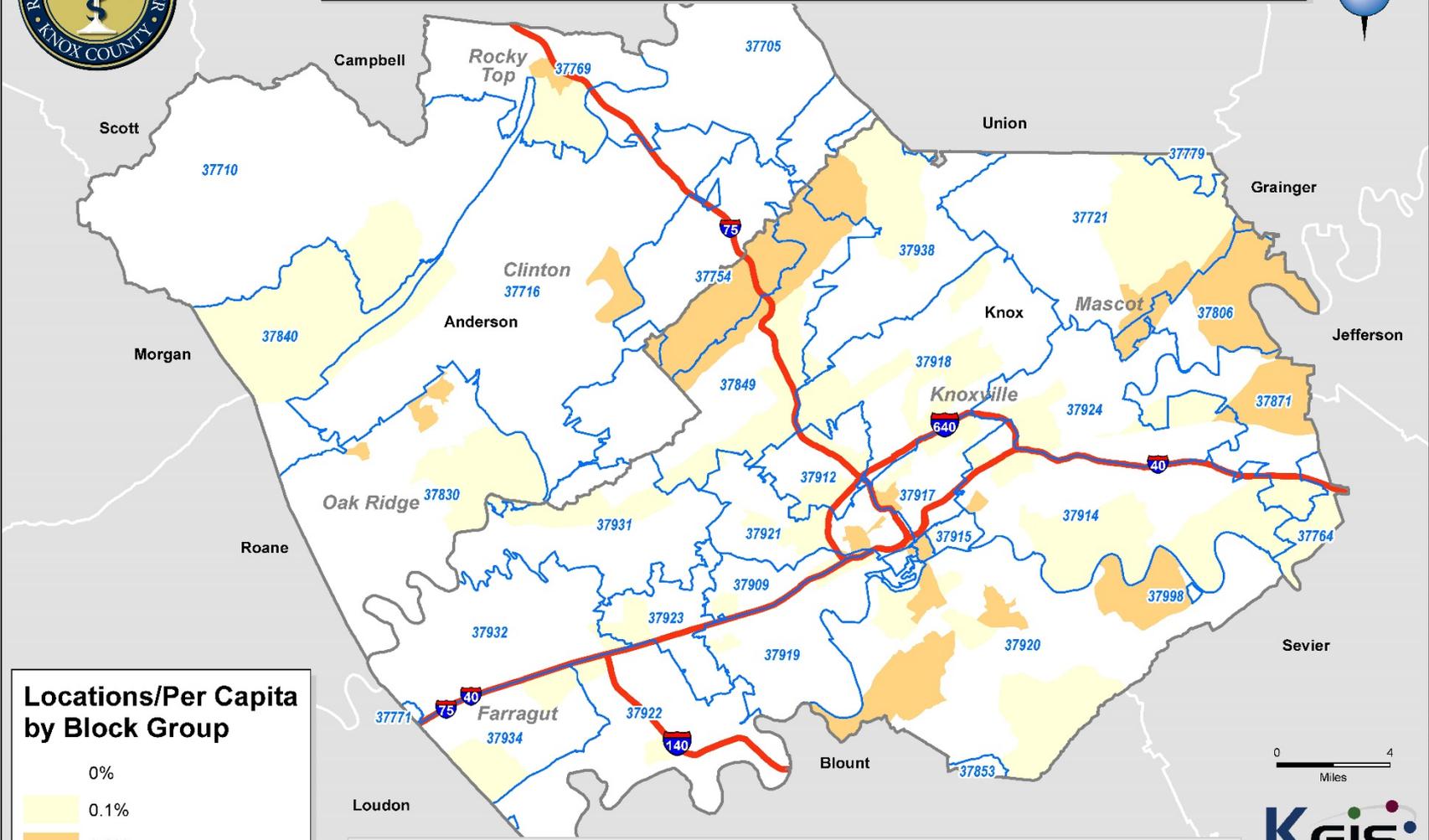


# Home Address Locations for Drug Related Death Cases in Knox and Anderson Counties for 2011





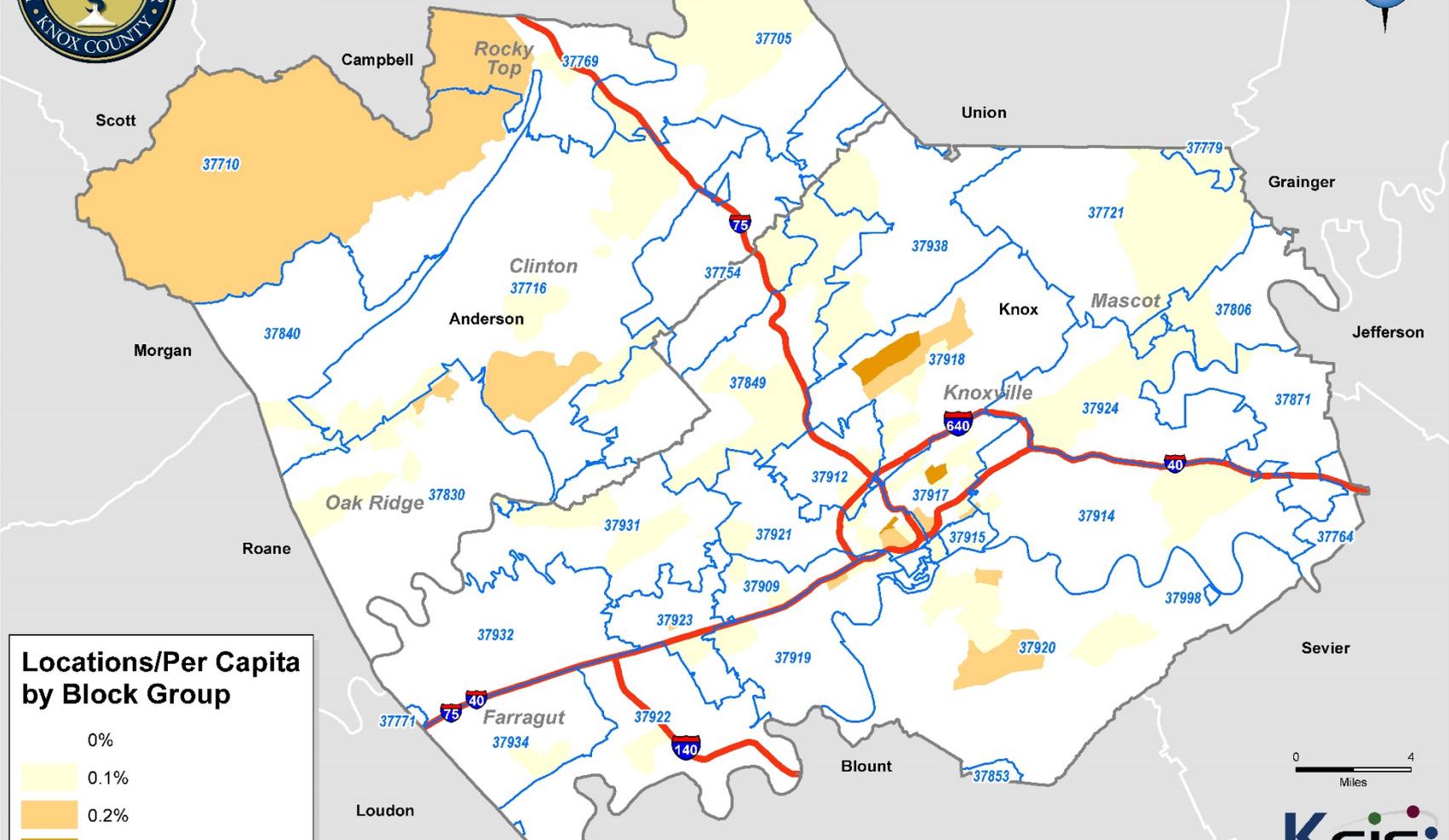
# Location of Injury Addresses for Drug Related Death Cases in Knox and Anderson Counties for 2011





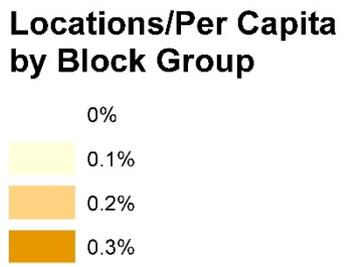
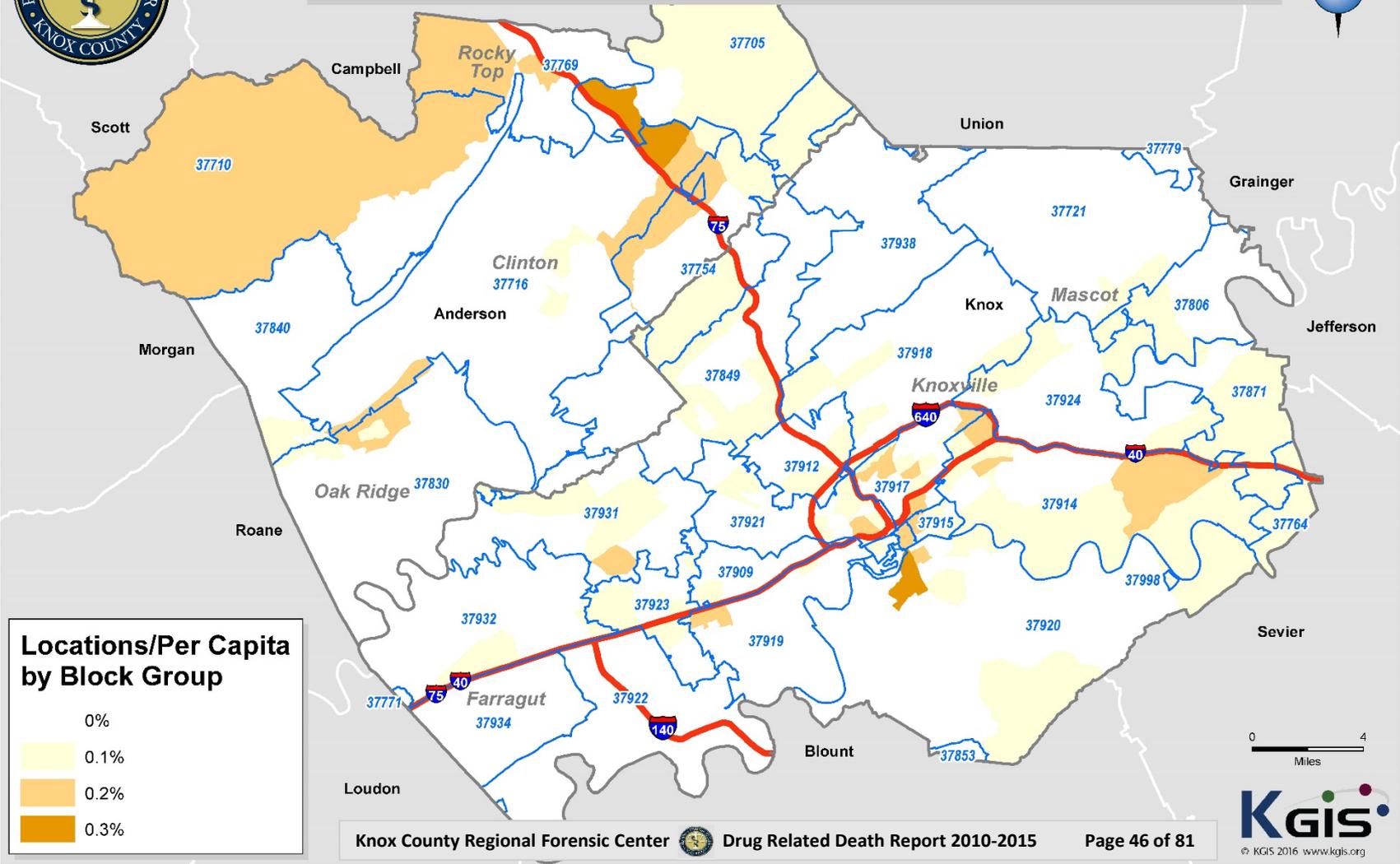


# Location of Injury Addresses for Drug Related Death Cases in Knox and Anderson Counties for 2012



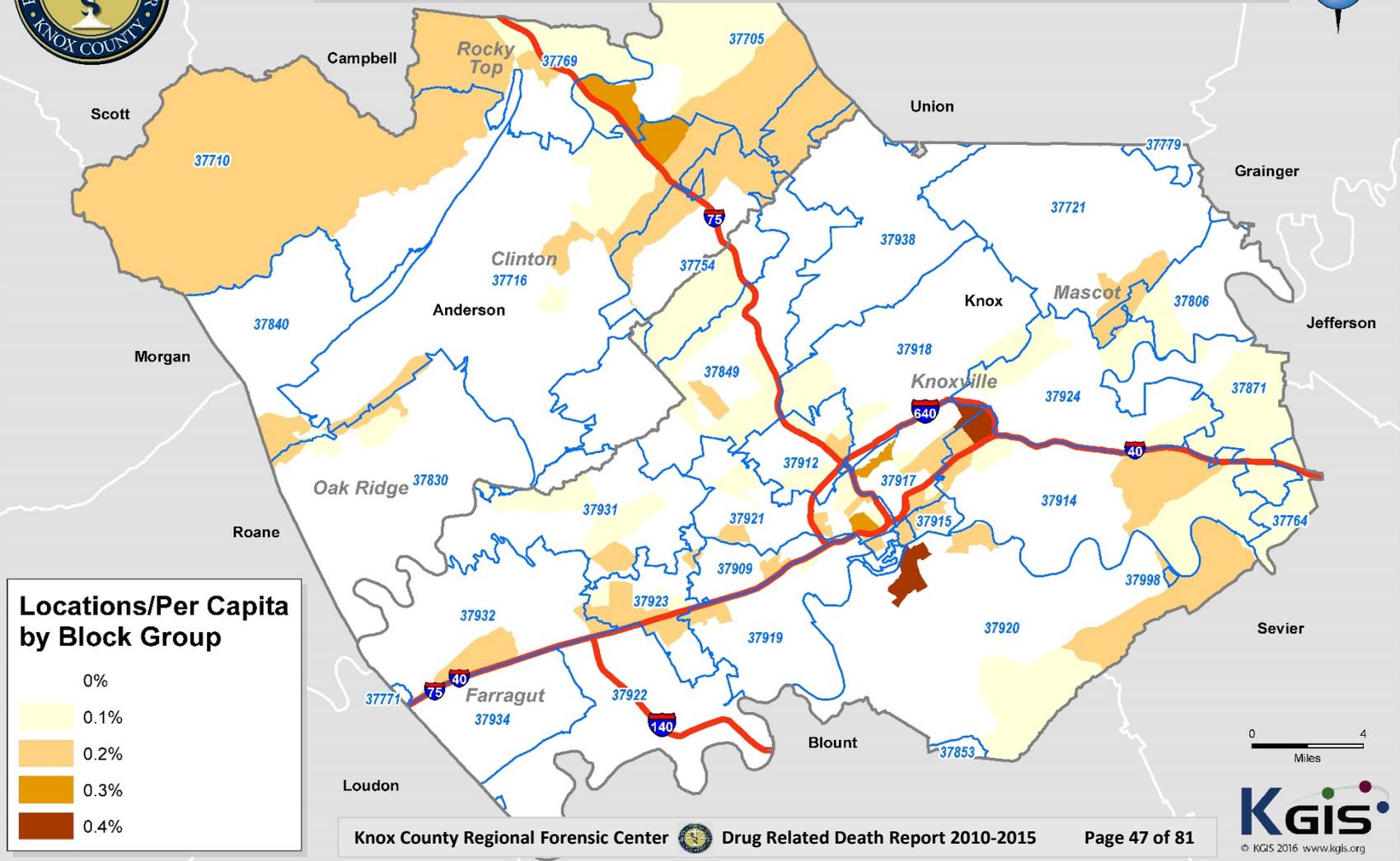


# Home Address Locations for Drug Related Death Cases in Knox and Anderson Counties for 2013



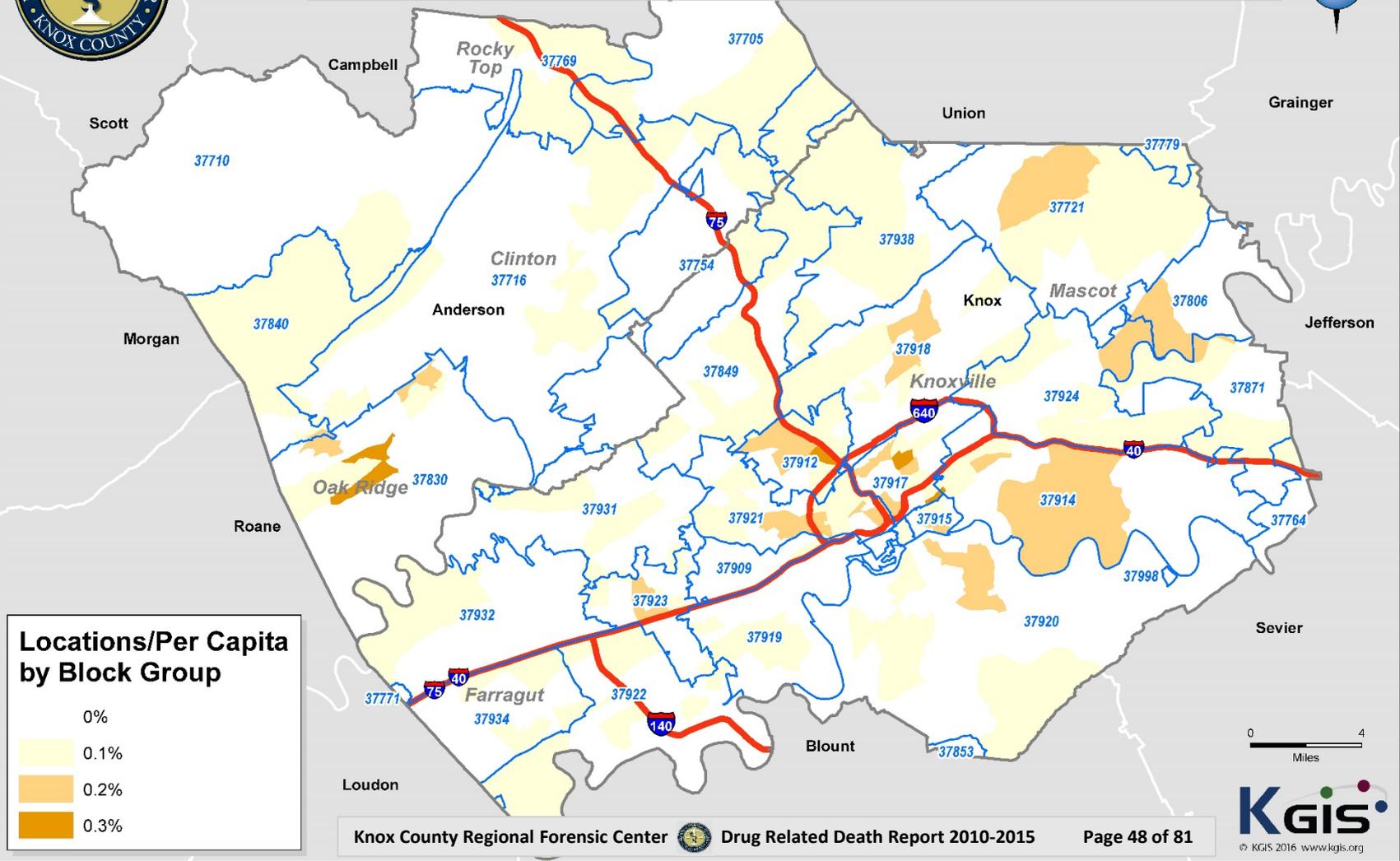


# Location of Injury Addresses for Drug Related Death Cases in Knox and Anderson Counties for 2013



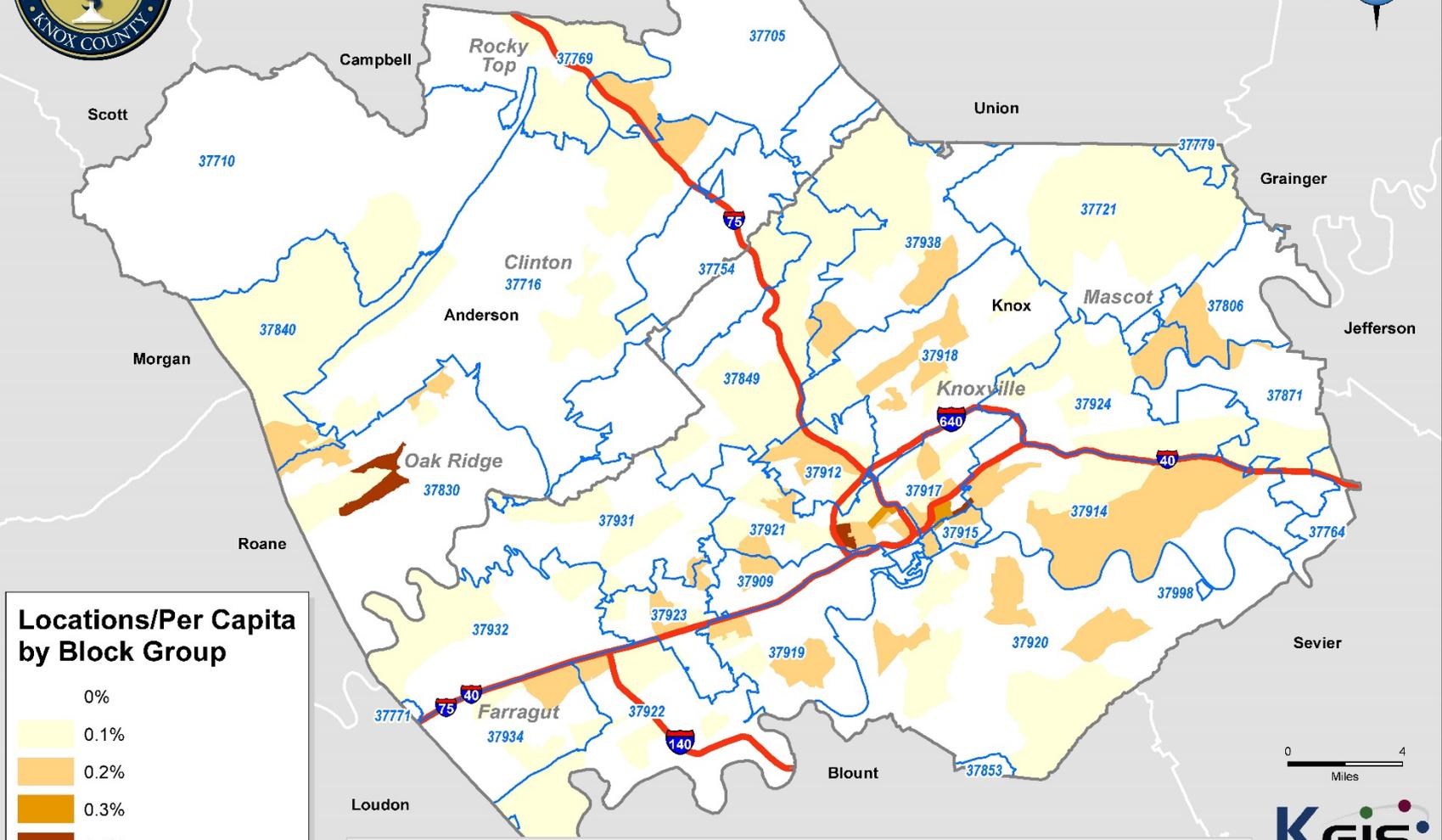


# Home Address Locations for Drug Related Death Cases in Knox and Anderson Counties for 2014



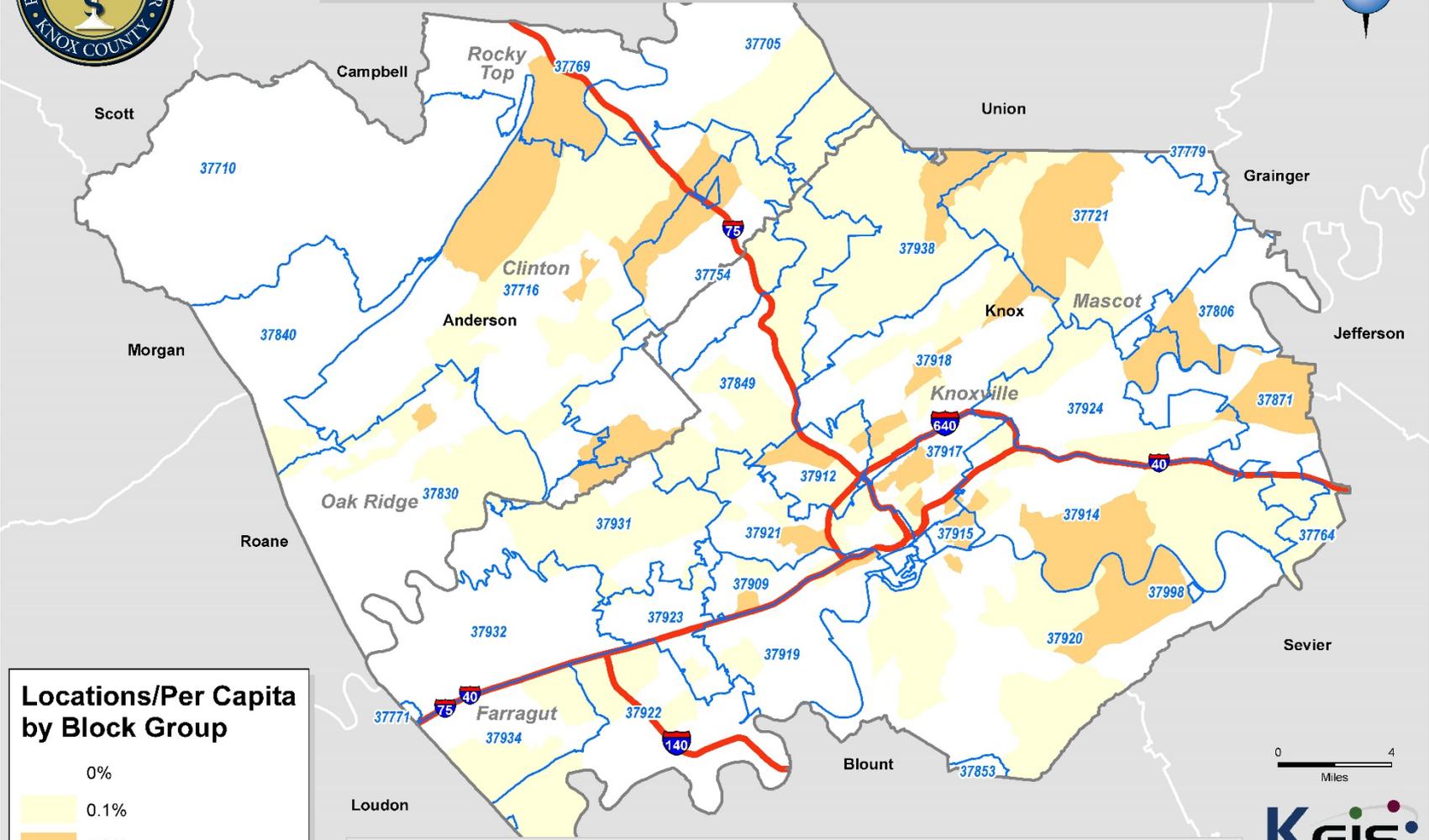


# Location of Injury Addresses for Drug Related Death Cases in Knox and Anderson Counties for 2014





# Home Address Locations for Drug Related Death Cases in Knox and Anderson Counties for 2015



**Locations/Per Capita by Block Group**

- 0%
- 0.1%
- 0.2%





# Drugs Found in Drug Related Deaths

The following 23 pages will list the specific drugs found in drug related deaths. The data will be displayed in various forms in order to provide different viewpoints. You will see:

1. Drug List by Year and County
2. Top 10 Drugs Found by Year
3. Pharmaceutical vs Non-Pharmaceutical
4. Deaths Involving Opioids
5. Deaths Involving Benzodiazepines
6. Deaths Involving Cocaine and Heroin
7. Deaths Involving Fentanyl

## Drug List by Year and County

The following tables list drugs found during an autopsy or examination for Drug Related Deaths for 2010 – 2015 for Knox and Anderson Counties at the Knox County Regional Forensic Center. The Data Source and Notes are listed here for the next 6 pages in order to provide more space for listing the drugs.

**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

### **Notes:**

1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between some graphs and the "Drug List" graph count.
2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
3. Drug poisoning deaths may involve more than one specific substance.
4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define the drug type.



**Knox County Regional Forensic Center  
Drugs Found in Drug Related Deaths in 2010**

Drug	Total Cases (N=101)		
	Knox (N=87)	Anderson (N=14)	Total
Oxycodone	46	8	54
Alprazolam	21	2	23
Morphine	17	2	19
Methadone	14	2	16
Oxymorphone	14	2	16
Cocaine	10	2	12
Alcohol/Ethanol	7	2	9
Hydrocodone	8	1	9
Diazepam	4	2	6
Carisoprodol	5		5
Benzodiazepine (NOS)	4		4
Fentanyl	4		4
Fluoxetine	2	1	3
Amitriptyline	2		2
Amphetamine	2		2
Citalopram	1	1	2
Diphenhydramine	1	1	2
Promethazine	2		2
Propoxyphene	2		2
Quetiapine	2		2
1,1 DFE	1		1
Bupropion	1		1
Clonazepam	1		1
Dextro Methorphan		1	1
Doxepin		1	1
Insulin	1		1
Lamotrigine	1		1
Levetiracetam		1	1
Meprobamate	1		1
Methamphetamine		1	1
Opiates (NOS)	1		1
Paroxetine	1		1
Sertraline	1		1
Topiramate		1	1
Zolpidem		1	1
	<b>177</b>	<b>32</b>	<b>209</b>



**Knox County Regional Forensic Center  
Drugs Found in Drug Related Deaths in 2011**

Drug	Total Cases (N=98)		
	Knox (N=83)	Anderson (N=15)	Total
Oxycodone	42	8	50
Oxymorphone	21	3	24
Cocaine	17	2	19
Alprazolam	14	2	16
Morphine	11	3	14
Methadone	9	1	10
Alcohol/Ethanol	6	1	7
Hydrocodone	5	1	6
Benzodiazepine (NOS)	5		5
Diazepam	3	1	4
Citalopram	3		3
Sertraline	3		3
Amitriptyline	1	1	2
Carisoprodol	2		2
Diphenhydramine	2		2
Fentanyl	2		2
Fluoxetine	1	1	2
Hydroxyzine	1	1	2
Opiates (NOS)	2		2
Quetiapine	2		2
Salicylate	1	1	2
Tramadol	2		2
Zolpidem	1	1	2
Acetaminophen	1		1
Clonazepam		1	1
Cyclobenzaprine	1		1
Dextro Methorphan	1		1
Diltiazem	1		1
Doxepin	1		1
Duloxetine	1		1
Ethanol		1	1
Isopropanol	1		1
Metformin	1		1
Metoprolol		1	1
Mirtazapine	1		1
Norbuprenorphine	1		1
Norfluoxetine	1		1
Olanzapine	1		1
Promethazine	1		1
	<b>169</b>	<b>30</b>	<b>199</b>



**Knox County Regional Forensic Center  
Drugs Found in Drug Related Deaths in 2012**

Drug	Total Cases (N=106)		
	Knox (N=87)	Anderson (N=19)	Total
Oxycodone	32	8	40
Morphine	18	3	21
Cocaine	15	3	18
Oxymorphone	15	2	17
Alprazolam	8	4	12
Methadone	11	1	12
Fentanyl	6	3	9
Hydrocodone	8	1	9
Alcohol/Ethanol	7	1	8
Amitriptyline	3	1	4
Diazepam	4		4
Methamphetamine	2	2	4
Fluoxetine	3		3
Sertraline	3		3
Amphetamine	1	1	2
Benzodiazepine (NOS)	1	1	2
Buprenorphine	1	1	2
Opiates (NOS)	2	1	3
Paroxetine	2		2
Tramadol		2	2
1,1 DFE	1		1
Benzotropine	1		1
Bupropion		1	1
Cyclobenzaprine		1	1
Doxepin	1		1
Duloxetine	1		1
Nortriptyline		1	1
Quetiapine	1		1
Salicylate	1		1
Venlafaxine	1		1
	<b>149</b>	<b>38</b>	<b>187</b>



**Knox County Regional Forensic Center  
Drugs Found in Drug Related Deaths in 2013**

Drug	Total Cases (N=136)		
	Knox (N=114)	Anderson (N=22)	Total
Oxycodone	33	7	40
Morphine	20	5	25
Alprazolam	17	6	23
Cocaine	20	2	22
Oxymorphone	19	1	20
Methadone	10	5	15
Hydrocodone	9	5	14
Ethanol	11		11
Opiates (NOS)	11		11
Methamphetamine	7	2	9
Benzodiazepine (NOS)	4	2	6
Fentanyl	4	1	5
Cyclobenzaprine	4		4
Tramadol	4		4
Buprenorphine	3		3
Citalopram	2	1	3
Bupropion		2	2
Diazepam	2		2
Mirtazapine	2		2
Quetiapine	1	1	2
Acetaminophen	1		1
Acetone	1		1
Amitriptyline	1		1
Butane	1		1
Donepezil		1	1
Doxepin	1		1
Doxylamine		1	1
Fluoxetine		1	1
Isopropanol	1		1
Isoprpyl Alcohol	1		1
Methotrexate		1	1
Methylone	1		1
Metoprolol	1		1
Paroxetine	1		1
Promethazine	1		1
Propane	1		1
Propofol	1		1
Salicylate	1		1
Sertraline		1	1
Sevoflurane	1		1
Toluene	1		1
Venlafaxine	1		1
Verapamil	1		1
Zolpidem	1		1
	<b>202</b>	<b>45</b>	<b>247</b>



**Knox County Regional Forensic Center  
Drugs Found in Drug Related Deaths in 2014**

Drug	Total Cases (N=178)		
	Knox (N=155)	Anderson (N=23)	Total
Oxycodone	36	10	46
Oxymorphone	35	3	38
Alprazolam	31	5	36
Morphine	27	2	29
Cocaine	17	5	22
Methadone	18	2	20
Fentanyl	16	2	18
Hydrocodone	16	2	18
Alcohol/Ethanol	10	3	13
Buprenorphine	10	2	12
Diazepam	12		12
Heroin	11		11
Clonazepam	5	4	9
1,1 DFE	4		4
Diphenhydramine	3	1	4
Methamphetamine	3	1	4
Cyclobenzaprine	3		3
Ethanol		3	3
Norbuprenorphine	2	1	3
Acetaminophen		2	2
Amitriptyline	2		2
Amphetamine	2		2
Butalbital	1	1	2
Citalopram	2		2
Codeine	2		2
Fluoxetine	1	1	2
Nortriptyline	2		2
Tramadol	2		2
Venlafaxine	1	1	2
Bupropion	1		1
Doxepin		1	1
Duloxetine	1		1
Gabapentin	1		1
Hydroxyzine	1		1
Methyl ethanol	1		1
Mirtazapine	1		1
Paroxetine	1		1
Sertraline	1		1
Verapamil	1		1
Zolpidem	1		1
	<b>284</b>	<b>52</b>	<b>336</b>



**Knox County Regional Forensic Center  
Drugs Found in Drug Related Deaths in 2015**

Drug	Total Cases (N=200)		
	Knox (N=170)	Anderson (N=30)	Total
Oxycodone	47	10	57
Oxymorphone	38	8	46
Alprazolam	32	3	35
Cocaine	35		35
Heroin	24	1	25
Morphine	21	4	25
Fentanyl	17	7	24
Hydrocodone	20	1	21
Alcohol/Ethanol	17	1	18
Methadone	13	2	15
Methamphetamine	9	4	13
Diazepam	8	3	11
Buprenorphine	8	2	10
Clonazepam	8	2	10
Cyclobenzaprine	8		8
Benzodiazepine (NOS)	5		5
Opiates (NOS)	5		5
Diphenhydramine	4		4
Duloxetine	2	1	3
Promethazine	1	2	3
Zolpidem	3		3
Bupropion	1	1	2
Fluoxetine	2		2
Lorazepam	2		2
Tramadol	2		2
Venlafaxine	2		2
1,1 DFE	1		1
Acetaminophen	1		1
Acetyl fentanyl	1		1
Amitriptyline	1		1
Amphetamine	1		1
Chlorpheniramine	1		1
Citalopram		1	1
Codeine	1		1
Donepezil		1	1
Hydroxyzine		1	1
Isopropanol		1	1
Methylphenidate		1	1
Mirtazapine		1	1
Olanzapine	1		1
Paroxetine	1		1
Phentermine	1		1
Quetiapine	1		1
Risperidone	1		1
Salicylate	1		1
Sertraline	1		1
Topiramate	1		1
	<b>349</b>	<b>58</b>	<b>407</b>





## TOP 10 DRUGS FOUND IN DRUG RELATED DEATHS BY YEAR FOR KNOX AND ANDERSON COUNTIES

	2010	2011	2012	2013	2014	2015
#1	Oxycodone	Oxycodone	Oxycodone	Oxycodone	Oxycodone	Oxycodone
#2	Alprazolam	Oxymorphone	Morphine	Morphine	Oxymorphone	Oxymorphone
#3	Morphine	Cocaine	Cocaine	Alprazolam	Alprazolam	Alprazolam
#4	Methadone	Alprazolam	Oxymorphone	Cocaine	Morphine	Cocaine
#5	Oxymorphone	Morphine	Alprazolam	Oxymorphone	Cocaine	Heroin
#6	Cocaine	Methadone	Methadone	Methadone	Methadone	Morphine
#7	Alcohol/Ethanol	Alcohol/Ethanol	Fentanyl	Hydrocodone	Fentanyl	Fentanyl
#8	Hydrocodone	Hydrocodone	Hydrocodone	Ethanol	Hydrocodone	Hydrocodone
#9	Diazepam	Benzodiazepine (NOS)	Alcohol/Ethanol	Opiates (NOS)	Alcohol/Ethanol	Alcohol/Ethanol
#10	Carisoprodol	Diazepam	Diazepam	Methamphetamine	Diazepam	Methadone
#10			Amitriptyline		Buprenorphine	
#10			Methamphetamine			

**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

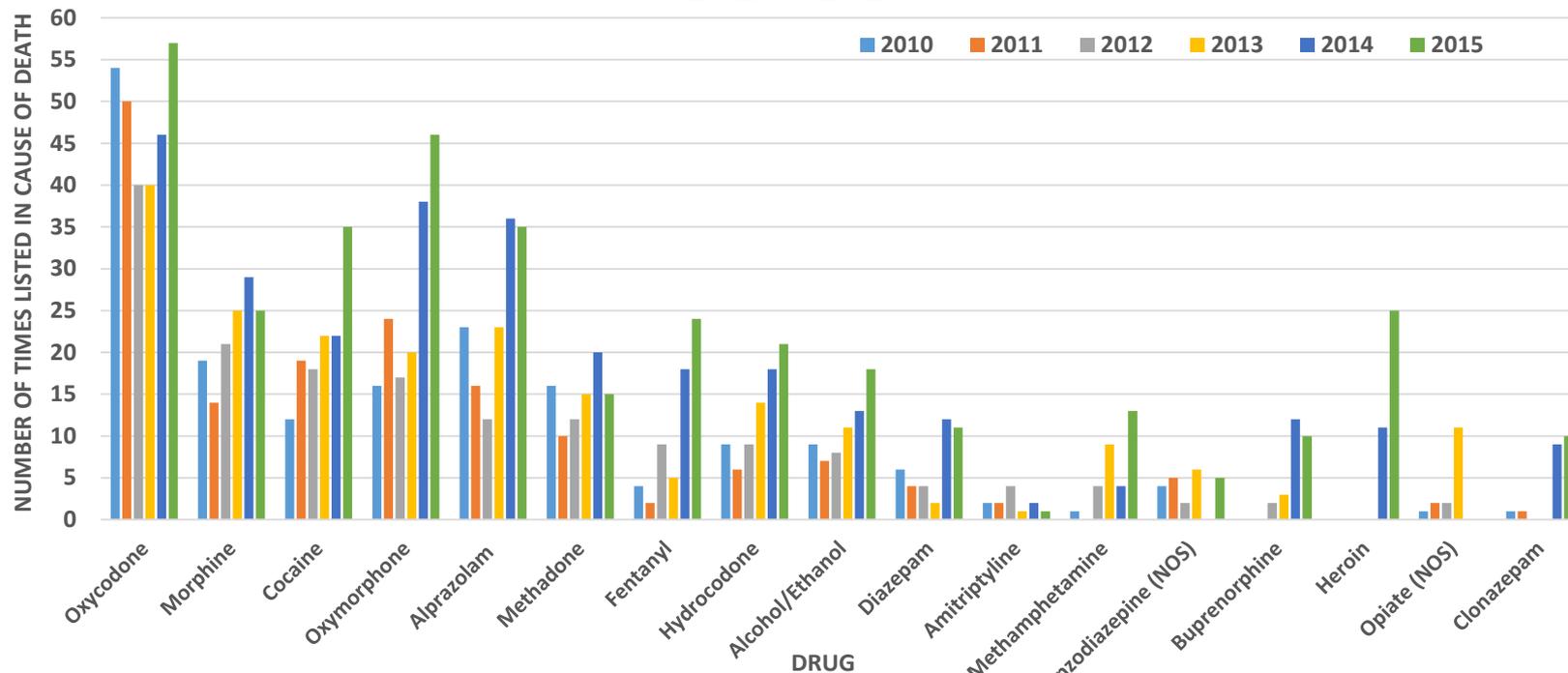
- Notes:**
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
  3. Drug poisoning deaths may involve more than one specific substance.
  4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define drug type.
  5. If there were ties in the number of times a drug was found within the Top 10 list, the drug was included. (I.e., there were 3 number 10s)

Above are the Top 10 Drugs found in Drug Related Deaths by year for Knox and Anderson Counties. The following pages will take several different views of the Drugs found in the Drug Related Deaths reported by the Regional Forensic Center. Please be sure to look at the notes with each slide and remember the caveats stated earlier in this document.





## Knox and Anderson Counties Drug Count for Top 10 Drugs by Year for Drug Related Cases 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

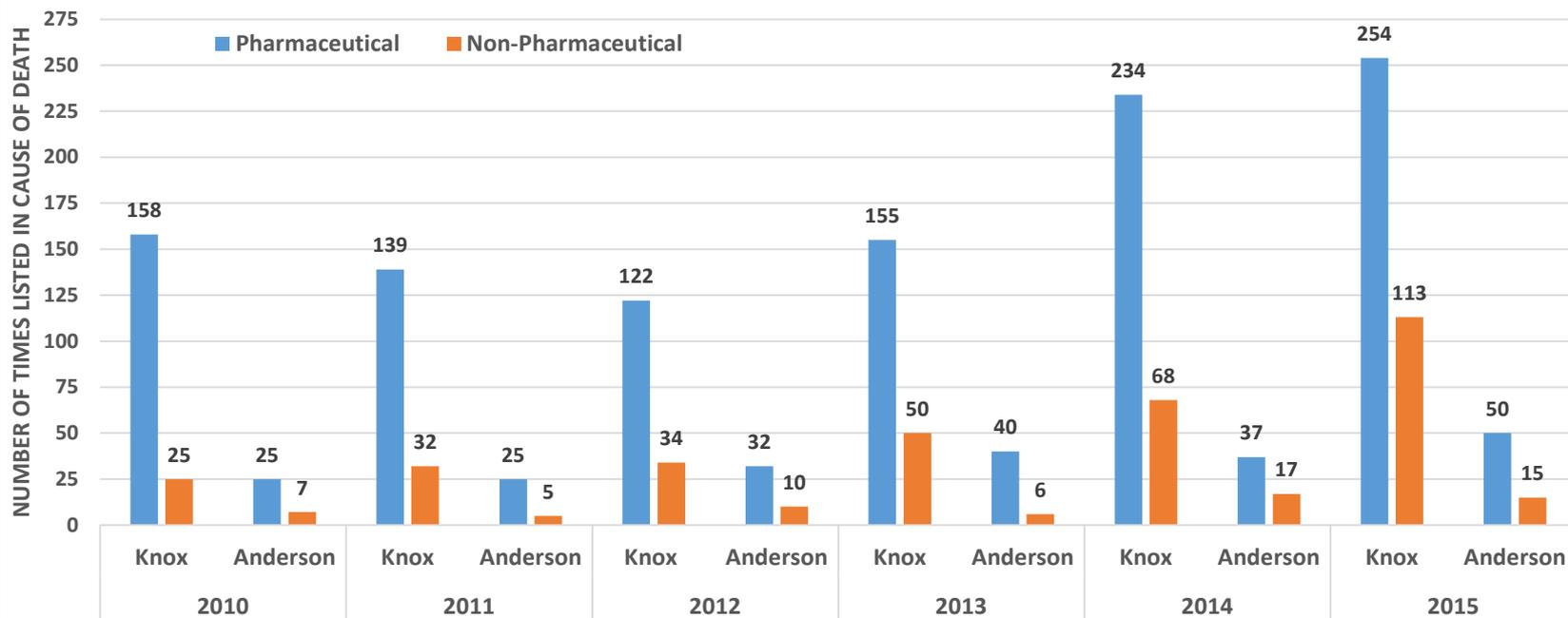
- Note:**
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
  3. Drug poisoning deaths may involve more than one specific substance.
  4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define drug type.

Oxycodone is the most prevalent drug found in Drug Related Deaths for 6 straight years. In 2014 and 2015, you see the increase of several drugs such as Oxymorphone, Alprazolam, Cocaine, Fentanyl and others. In addition, you see the dominance of prescription drugs as the leading cause of death in Drug Related Deaths.





## Knox and Anderson Counties Pharmaceutical vs Non-Pharmaceutical Drug Related Deaths 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

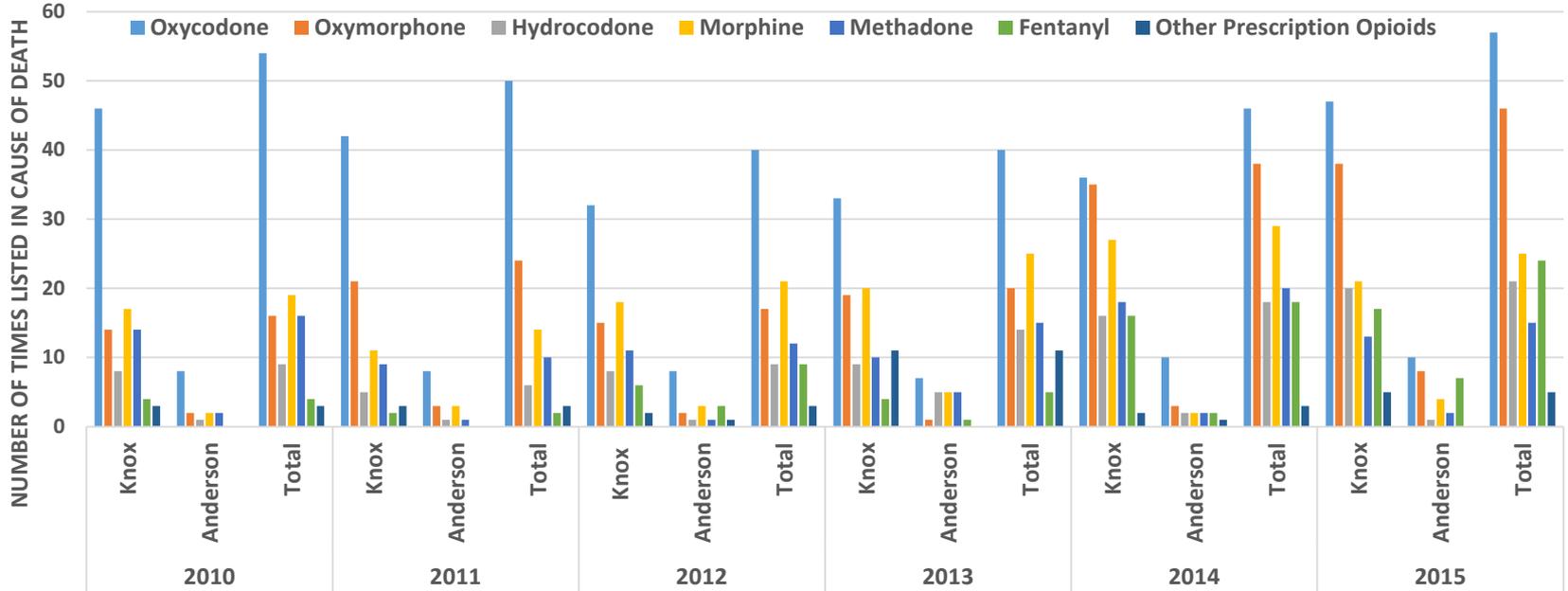
- Note:**
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
  3. Drug poisoning deaths may involve more than one specific substance.

In Knox and Anderson counties, pharmaceutical (or prescription) drugs are the predominant cause of death in Drug Related Death cases. The RFC staff does utilize Tennessee's Controlled Substance Monitoring Database (CSMD) to check each decedent's dispensed medications but we cannot verify if the medications were used appropriately.





## Knox and Anderson Counties Drug Deaths Involving Opioids 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**Note:** 1. Prescription Opioid deaths drive the increase in drug overdose deaths in Knox and Anderson counties and in the US according to CDC data (<http://www.cdc.gov/drugoverdose/data/index.html>).

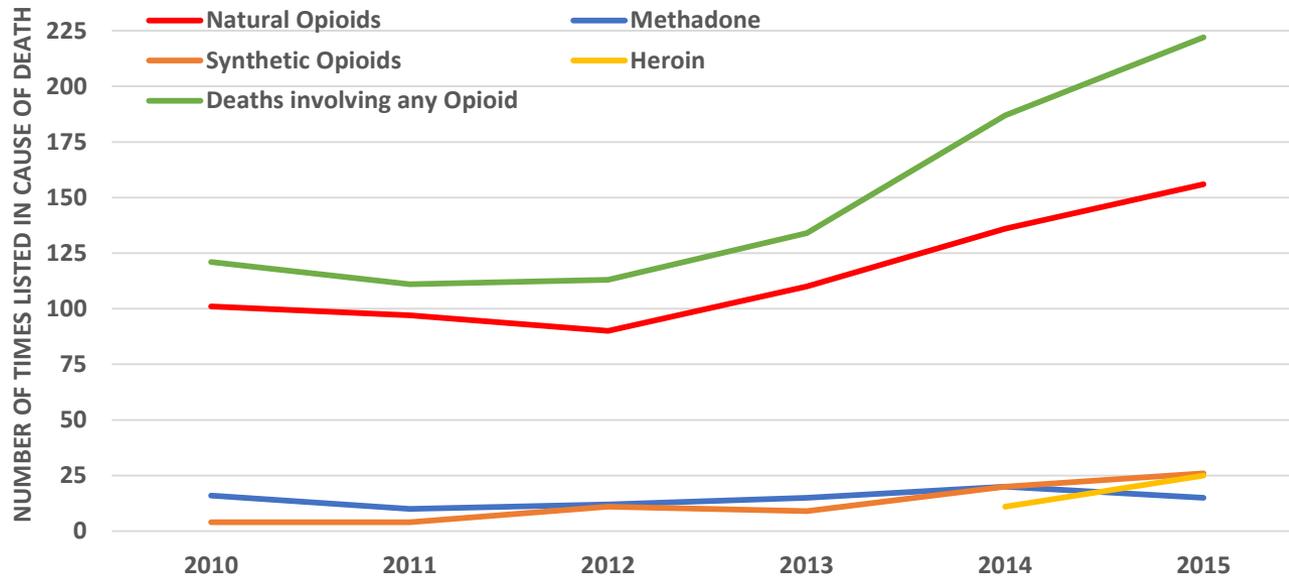
- 2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
- 3. Drug poisoning deaths may involve more than one specific substance.

Within the Opioid classification, Oxycodone is the drug found most often in Drug Related Death cases.





## Knox and Anderson Counties Drug Deaths Involving Opioids 2010 - 2015



The CDC looks at four categories of opioids:

- 1) Natural opioid analgesics**, including morphine and codeine, and **semi-synthetic opioid analgesics**, including drugs such as oxycodone, hydrocodone, hydromorphone, and oxymorphone;
- 2) Methadone**, a synthetic opioid;
- 3) Synthetic opioid analgesics** other than methadone, including drugs such as tramadol and fentanyl; and
- 4) Heroin**, an illicit (illegally-made) opioid synthesized from morphine that can be a white or brown powder, or a black sticky substance.

**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

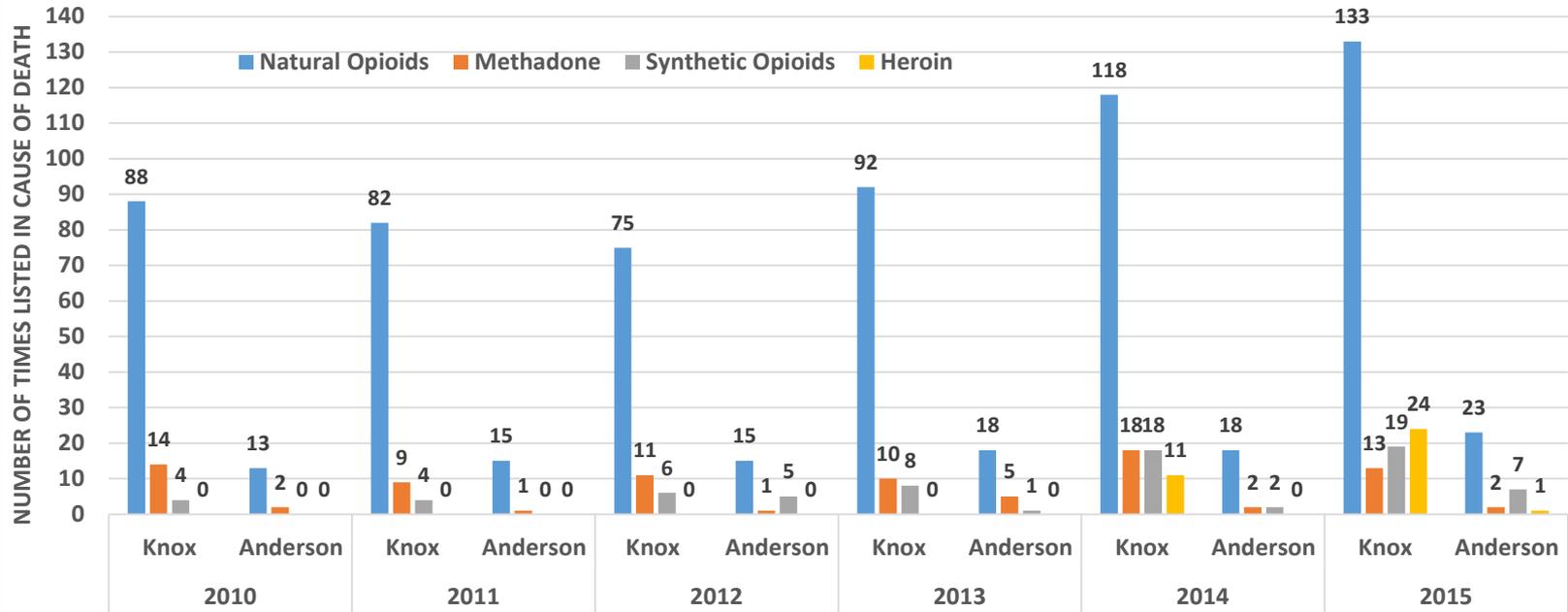
- Note:**
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
  3. Drug poisoning deaths may involve more than one specific substance.
  4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define drug type.

In looking at the chart above, Knox and Anderson counties show the same type of data results as those being seen across the nation for Drug Related Deaths. However, Knox and Anderson counties have a much greater prescription Drug Related Death issue. CDC data from 2000-2014 indicated that Opioid overdoses were driving the increase in drug overdoses overall. In addition, CDC data indicated that prescription Opioids lead the Opioid category.





## Knox and Anderson Counties Drug Deaths Involving Opioids by County 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

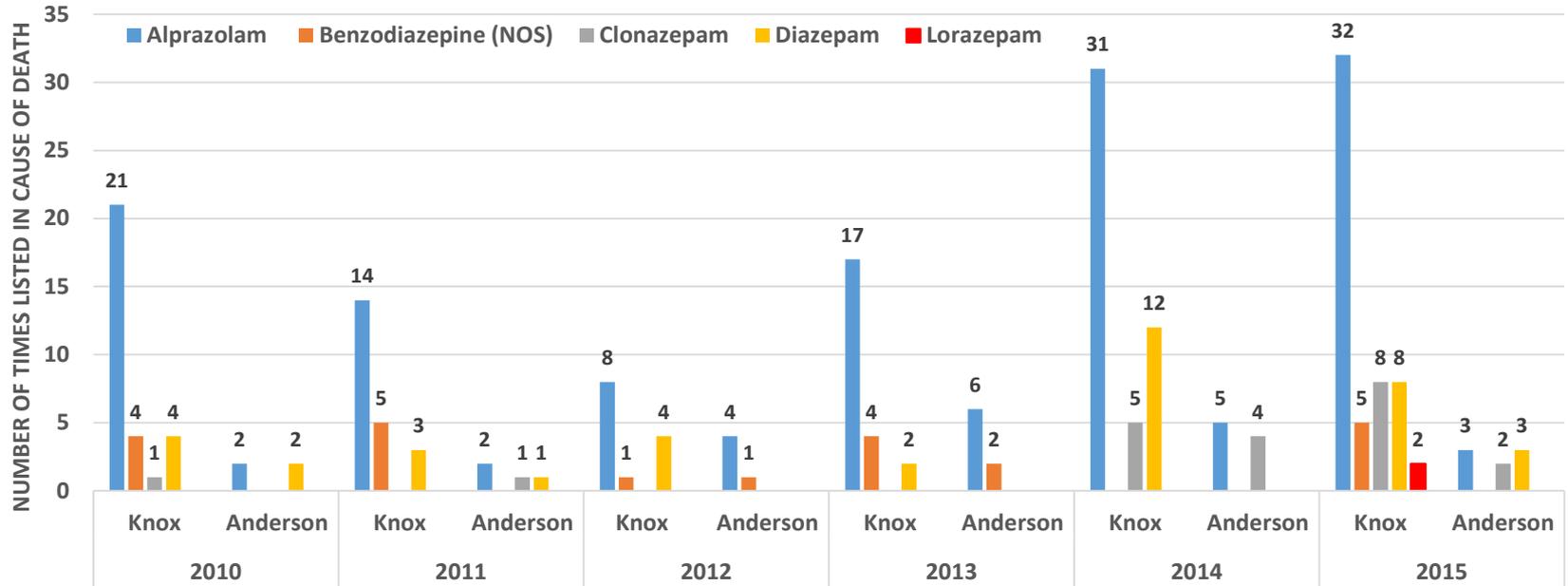
- Note:**
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
  3. Drug poisoning deaths may involve more than one specific substance.
  4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define drug type.

The above graph keeps the CDC classification for Opioids and provides a breakdown for Knox and Anderson counties.





## Knox and Anderson Counties Drug Deaths Involving Benzodiazepines 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

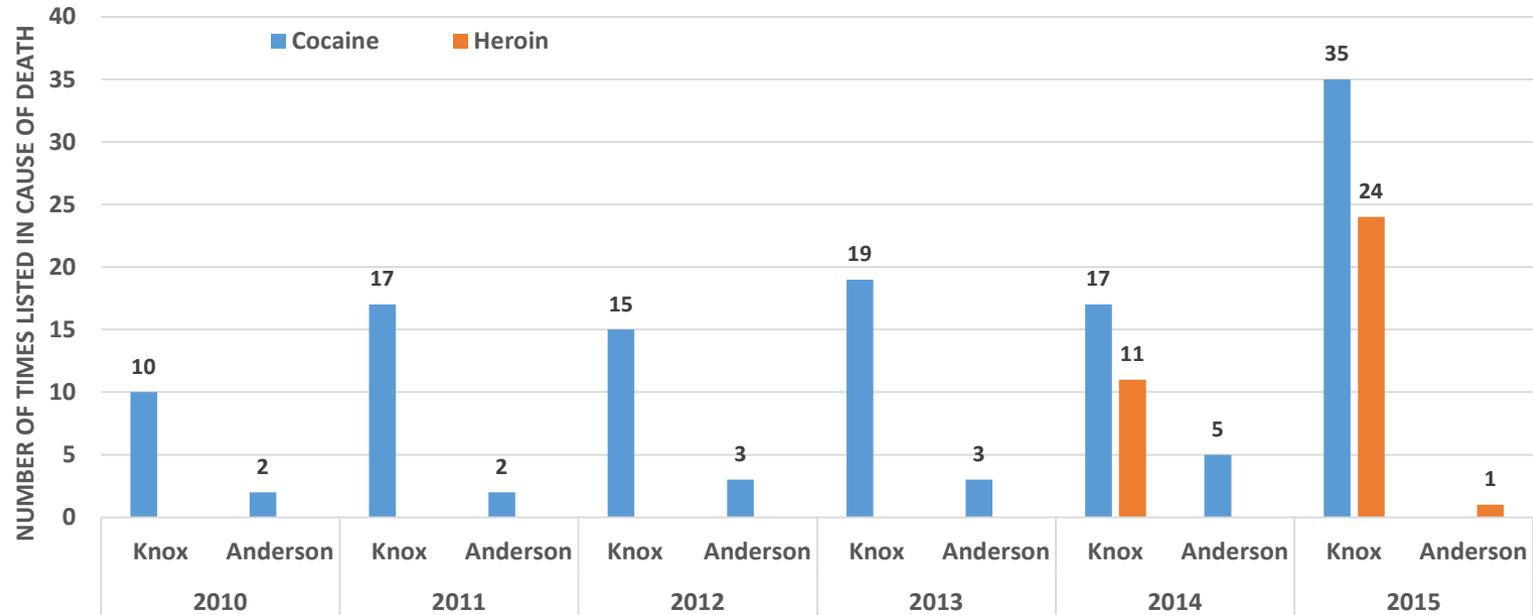
- Note:**
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use of a drug.
  3. Drug poisoning deaths may involve more than one specific substance.
  4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define drug type.

Benzodiazepines are another class of drugs involved in Drug Related Deaths. Their presence has increased over the past 6 year period.





## Knox and Anderson Counties Drug Deaths Involving Cocaine and Heroin 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**Note:** 1. This report only notes the presence of the drug contributing to death.

2. Drug poisoning deaths may involve more than one specific substance.

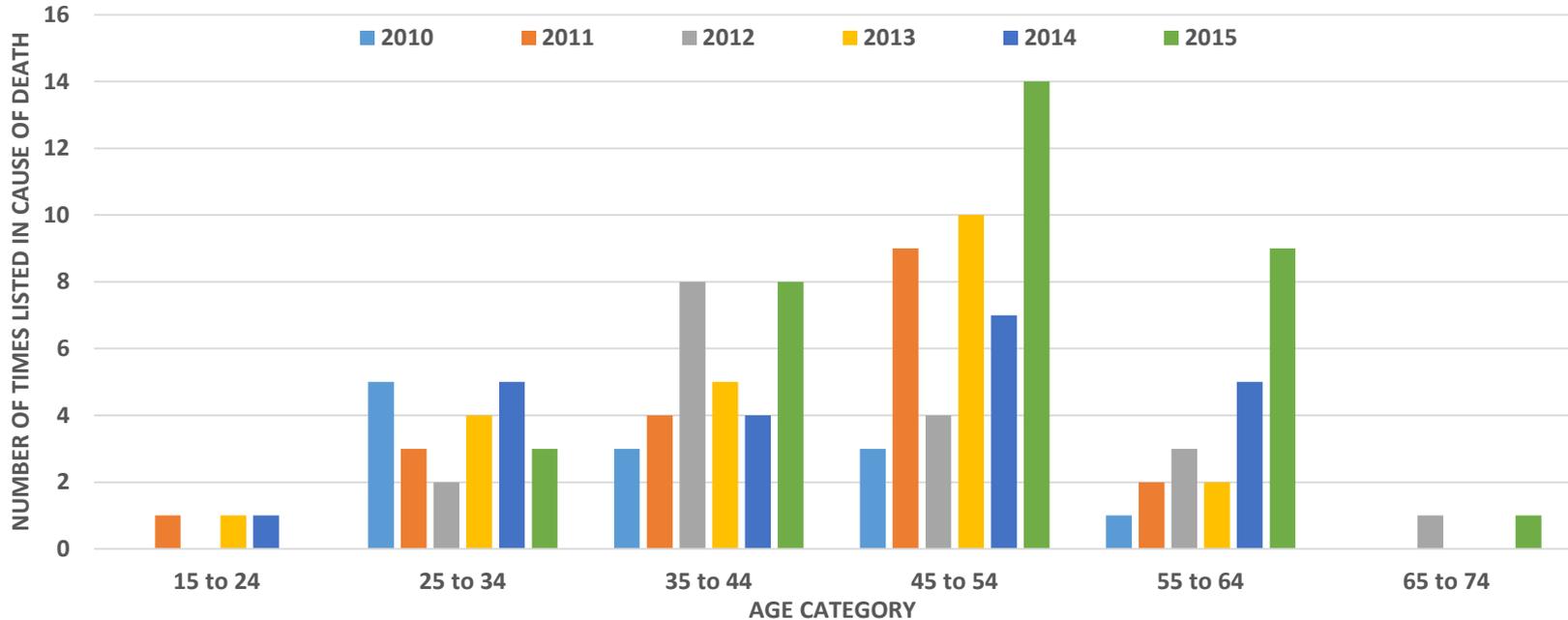
Deaths involving Heroin and Cocaine have increased since 2010.

In 2014, RFC Medical Examiners detected the presence of Heroin in Drug Related Death cases. It does not mean that Heroin was not present in Drug Related Deaths prior to this time. Due to the rapid metabolism of heroin, blood analysis will not always yield supporting evidence of heroin use. Urine and vitreous humor often must be tested for the heroin metabolite 6-monoacetylmorphine (6-MAM), since 6-MAM persists longer in these specimens.





## Knox and Anderson Counties Drug Deaths Involving Cocaine by Age Group 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

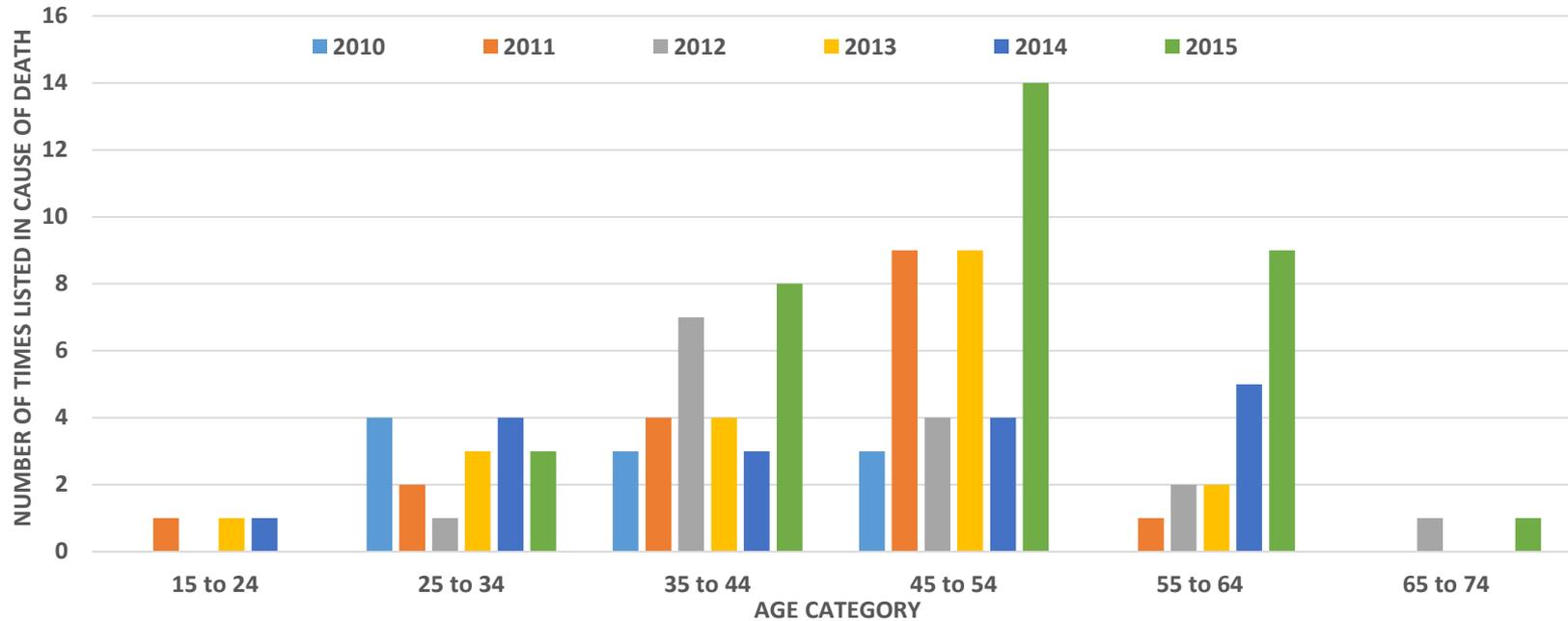
- Note:**
1. This report only notes the presence of the drug contributing to death.
  2. Drug poisoning deaths may involve more than one specific substance.

Cocaine related deaths have increased over the past 6 years. In addition, Cocaine related deaths are more prevalent in the 45 – 54 year old age group.





## Knox County Drug Deaths Involving Cocaine by Age Group 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

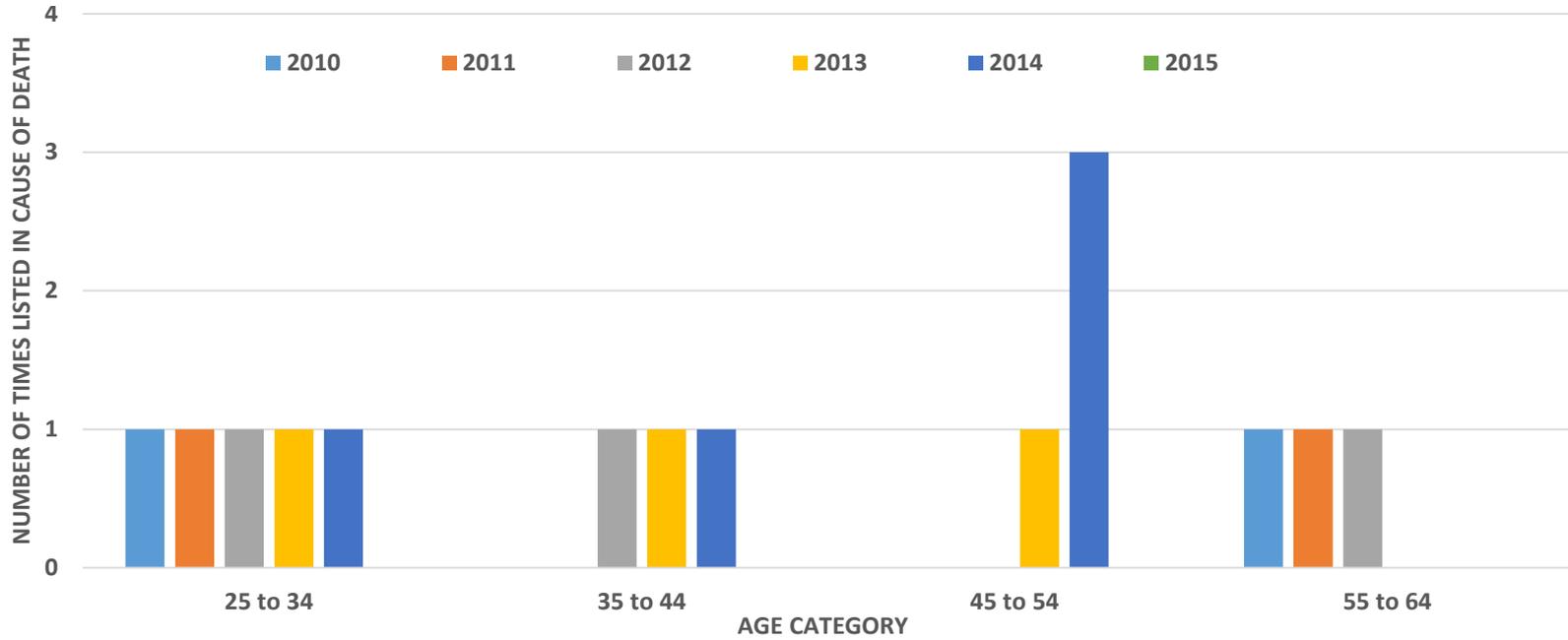
- Note:**
1. This report only notes the presence of the drug contributing to death.
  2. Drug poisoning deaths may involve more than one specific substance.

In Knox County, Cocaine related deaths have increased over the past 6 years. In addition, Cocaine related deaths are more prevalent in the 45 – 54 year old age group.





## Anderson County Drug Deaths Involving Cocaine by Age Group 2010 - 2015



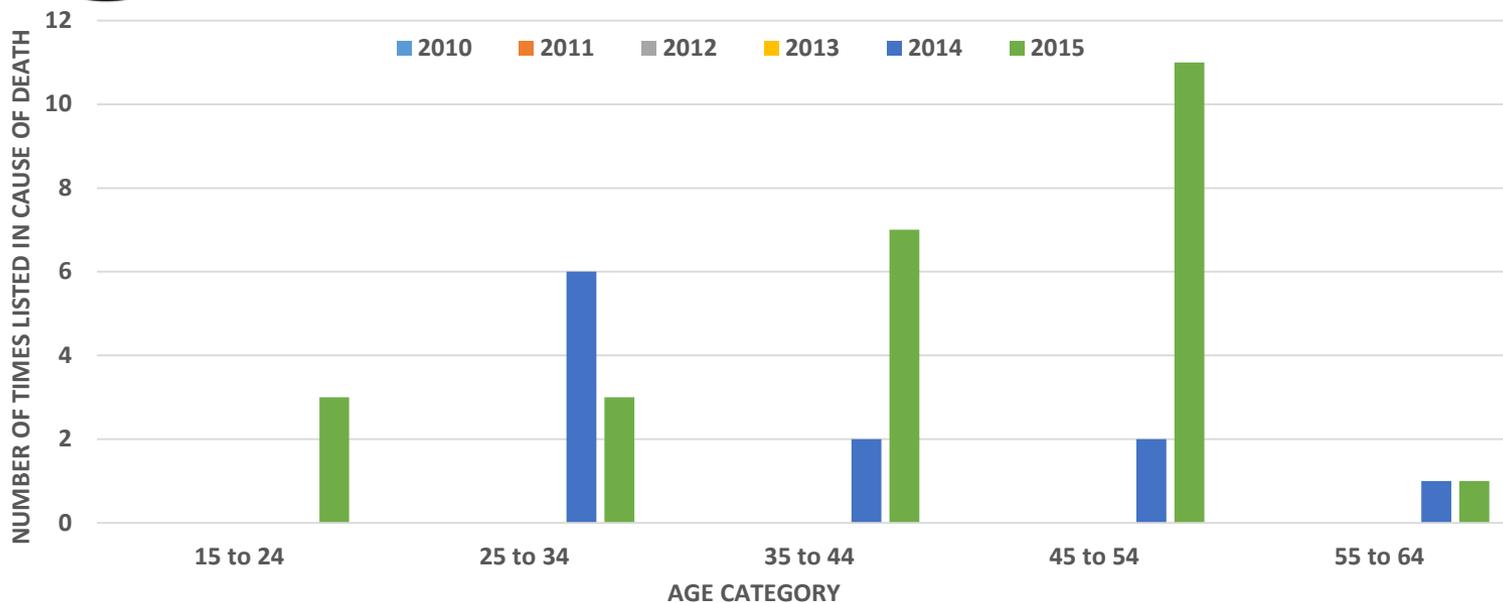
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

- Note:** 1. This report only notes the presence of the drug contributing to death.  
2. Drug poisoning deaths may involve more than one specific substance.





## Knox and Anderson Counties Drug Deaths Involving Heroin by Age 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

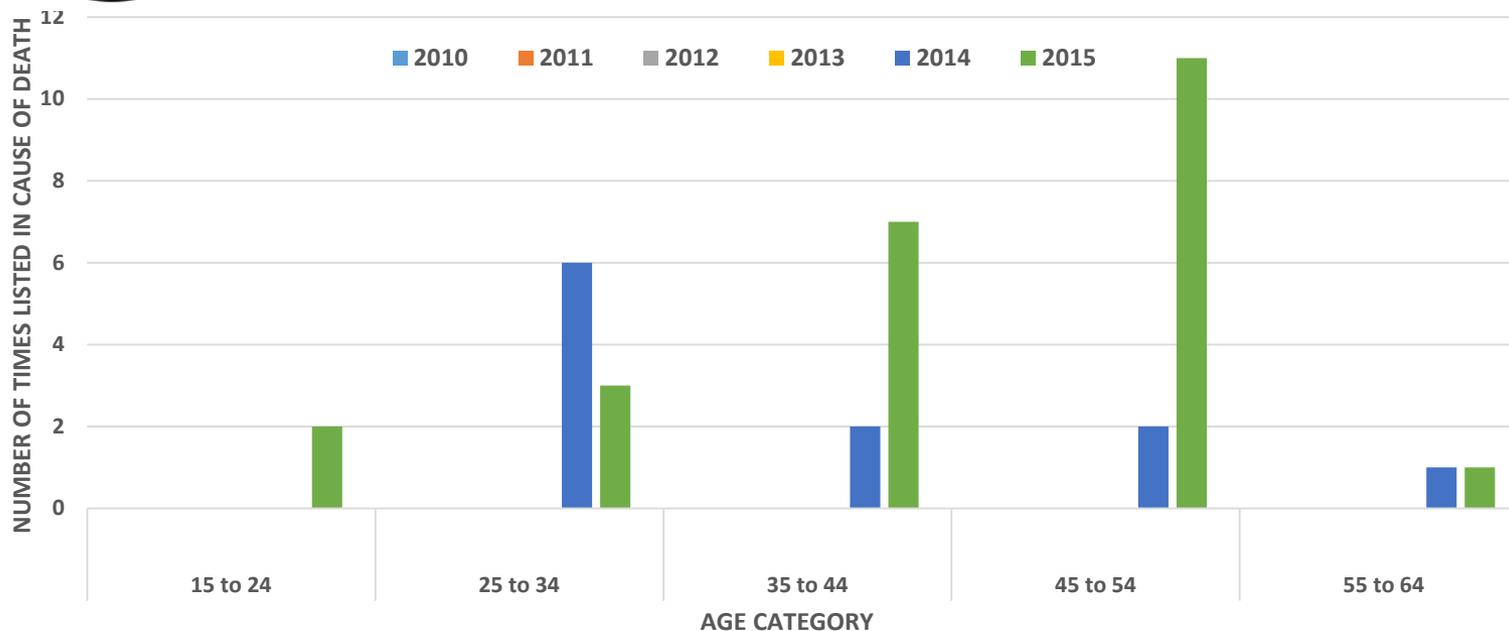
- Note:**
1. This report only notes the presence of the drug contributing to death.
  2. Drug poisoning deaths may involve more than one specific substance.

In 2014, we detected the presence of Heroin in Drug Related Death cases. It does not mean that Heroin was not present in Drug Related Deaths prior to this time. Due to the rapid metabolism of heroin, blood analysis will not always yield supporting evidence of heroin use. Urine and vitreous humor often must be tested for the heroin metabolite 6-monoacetylmorphine (6-MAM), since 6-MAM persists longer in these specimens.





## Knox County Drug Deaths Involving Heroin by Age 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

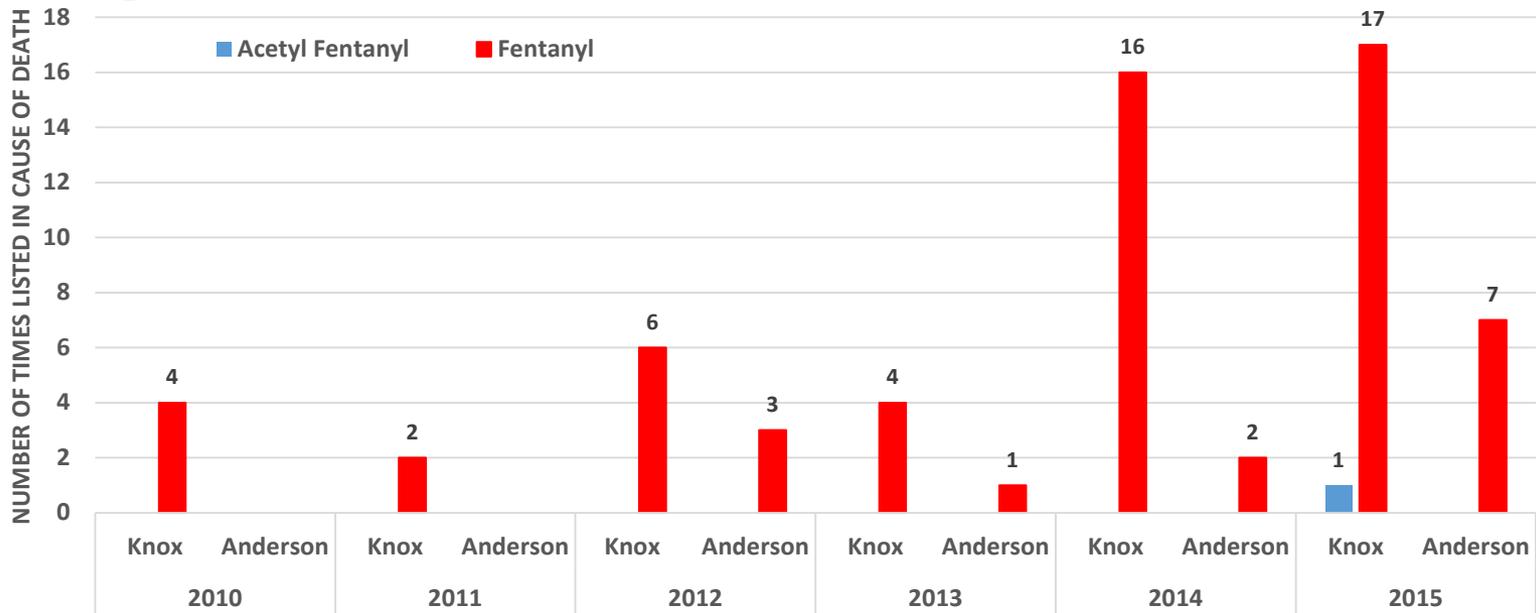
- Note:**
1. This report only notes the presence of the drug contributing to death.
  2. Drug poisoning deaths may involve more than one specific substance.

In 2014, we detected the presence of Heroin in Drug Related Death cases. It does not mean that Heroin was not present in Drug Related Deaths prior to this time. Due to the rapid metabolism of heroin, blood analysis will not always yield supporting evidence of heroin use. Urine and vitreous humor often must be tested for the heroin metabolite 6-monoacetylmorphine (6-MAM), since 6-MAM persists longer in these specimens.





## Knox and Anderson Counties Drug Deaths Involving Fentanyl 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**Note:** 1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical. This report only notes the presence of the drug contributing to death but does not indicate the origins of the drug. In addition, the report does not ascertain whether the drug was diverted or not.

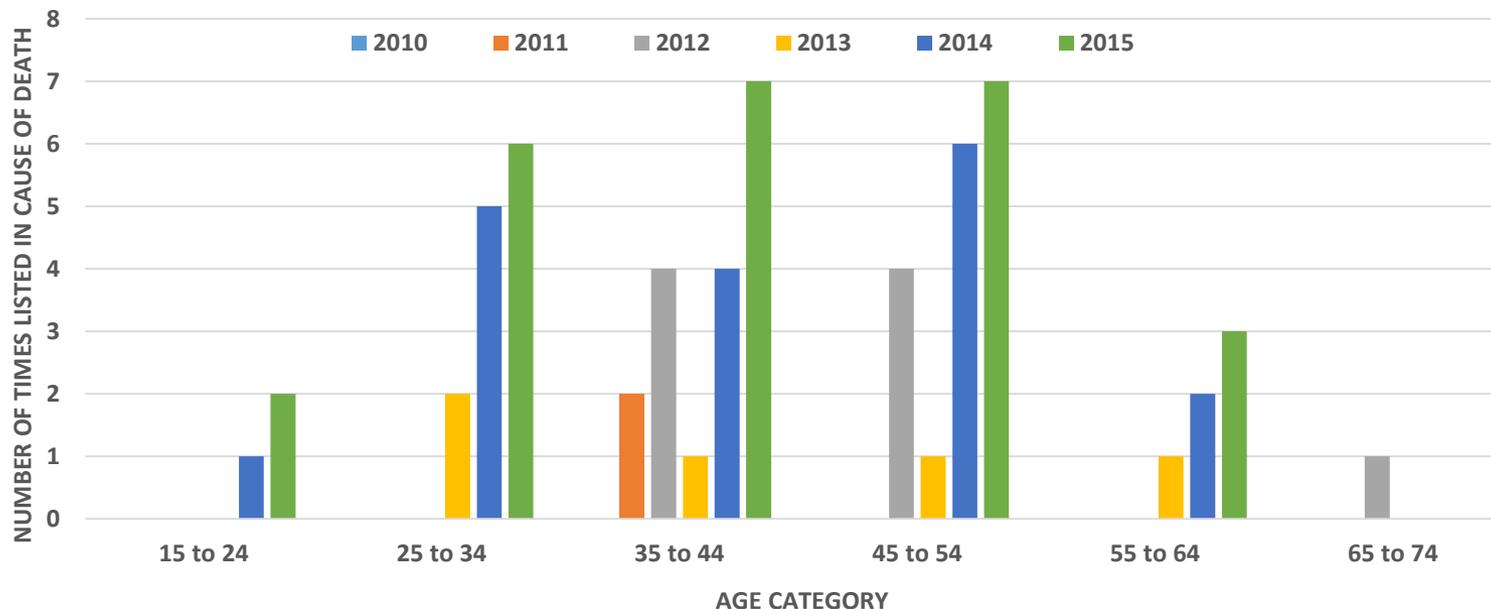
2. Drug poisoning deaths may involve more than one specific substance.

We have seen an increase in Fentanyl Related Death cases over the past 6 years. Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. Analysis for fentanyl analogs (acetylfentanyl, furanylfentanyl, butryfentanyl) has commenced recently in reference laboratories. The potency of fentanyl analogs varies, but are generally of higher potency than that of fentanyl.





## Knox and Anderson Counties Drug Deaths Involving Fentanyl by Age 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**Note:** 1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical. This report only notes the presence of the drug contributing to death but does not indicate the origins of the drug. In addition, the report does not ascertain whether the drug was diverted or not.

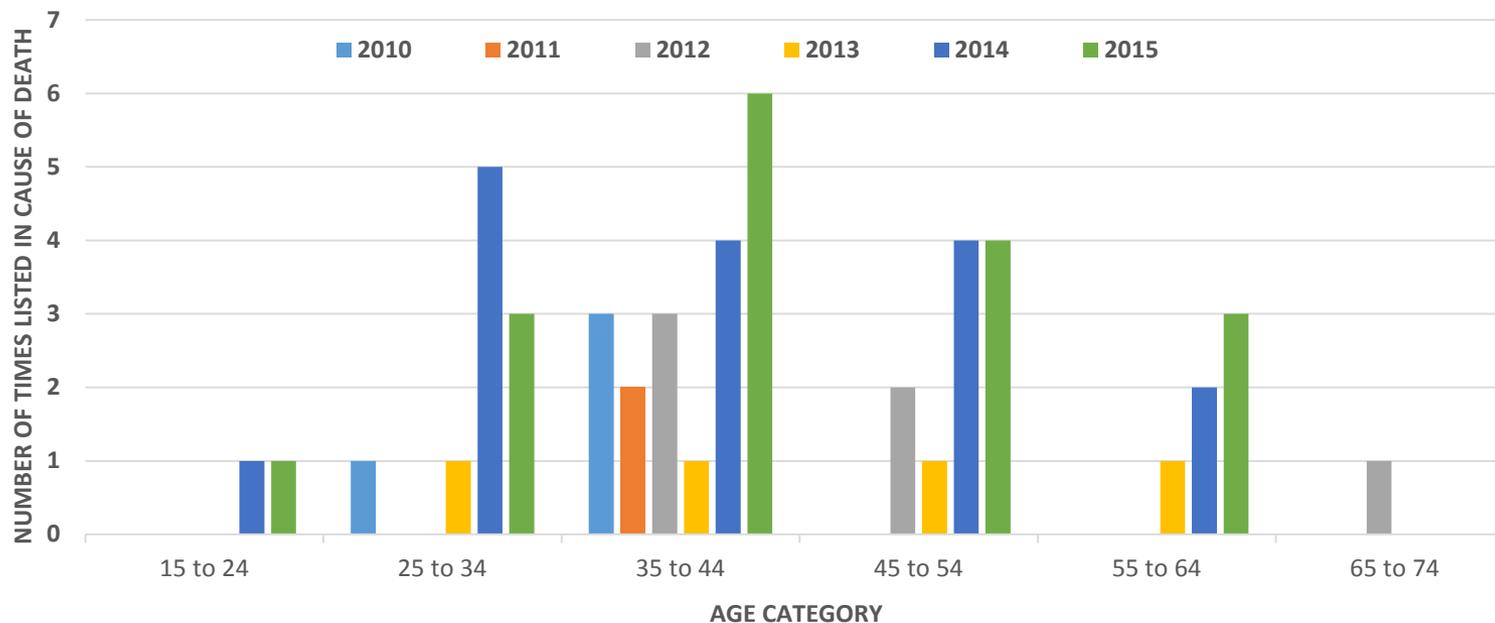
2. Drug poisoning deaths may involve more than one specific substance.

Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. Analysis for fentanyl analogs (acetylfentanyl, furanylfentanyl, butyrylfentanyl) has commenced recently in reference laboratories. The potency of fentanyl analogs varies, but are generally of higher potency than that of fentanyl.





## Knox County Drug Deaths Involving Fentanyl by Age 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

**Note:** 1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical. This report only notes the presence of the drug contributing to death but does not indicate the origins of the drug. In addition, the report does not ascertain whether the drug was diverted or not.

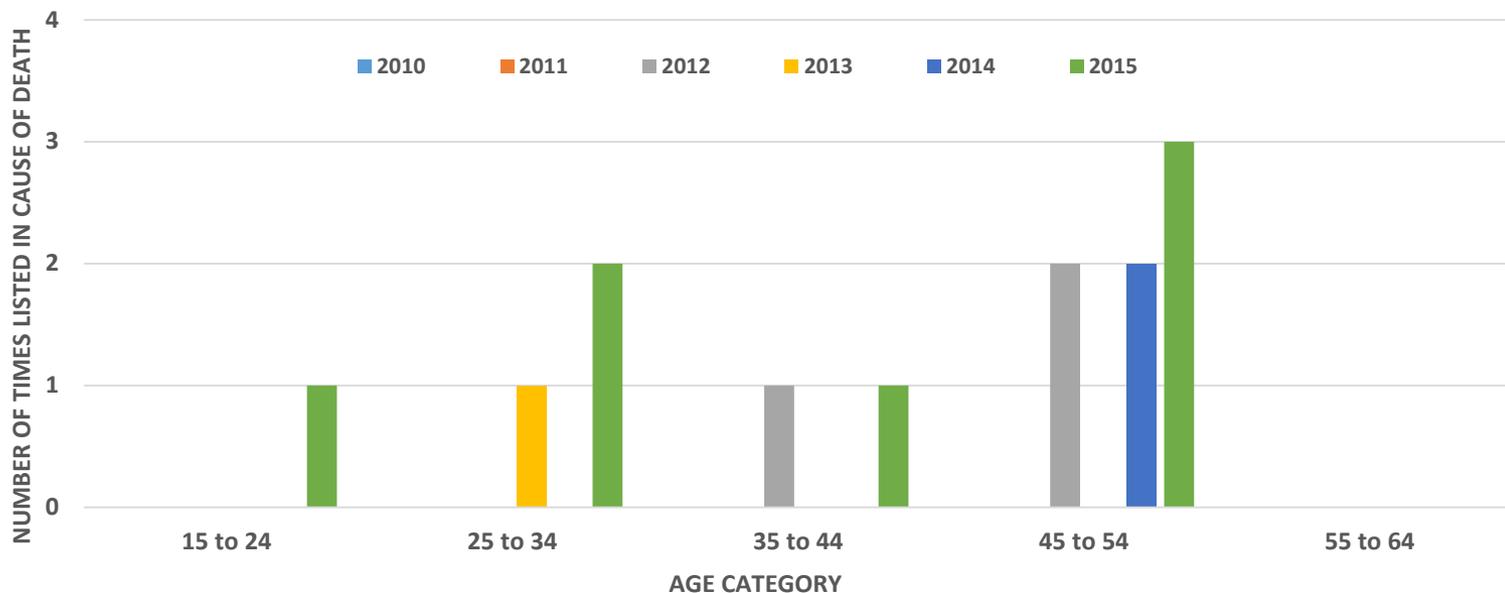
2. Drug poisoning deaths may involve more than one specific substance.

Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. Analysis for fentanyl analogs (acetylfentanyl, furanylfentanyl, butyrylfentanyl) has commenced recently in reference laboratories. The potency of fentanyl analogs varies, but are generally of higher potency than that of fentanyl.





## Anderson County Drug Deaths Involving Fentanyl by Age 2010 - 2015



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2015. Knoxville, TN.

- Note:** 1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical. This report only notes the presence of the drug contributing to death but does not indicate the origins of the drug. In addition, the report does not ascertain whether the drug was diverted or not.
2. Drug poisoning deaths may involve more than one specific substance.

Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. Analysis for fentanyl analogs (acetylfentanyl, furanylfentanyl, butryfentanyl) has commenced recently in reference laboratories. The potency of fentanyl analogs varies, but are generally of higher potency than that of fentanyl.



# TENTATIVE DRUG RELATED DEATH DATA Jan – Jun, 2016 for KNOX and ANDERSON COUNTIES

The following graphs represent Knox County Regional Forensic Center data from Autopsies and External Examinations performed for Knox and Anderson Counties between January – June, 2016.

The data was taken from the KCRFC Medical Examiner Database and should be considered **tentative** since there are still open cases which have not had the final determination for Manner and Cause of Death or involvement of drugs. The final report numbers will change. This is meant to provide our partners with a view of how the year's case data related to Drug Related Deaths is progressing.

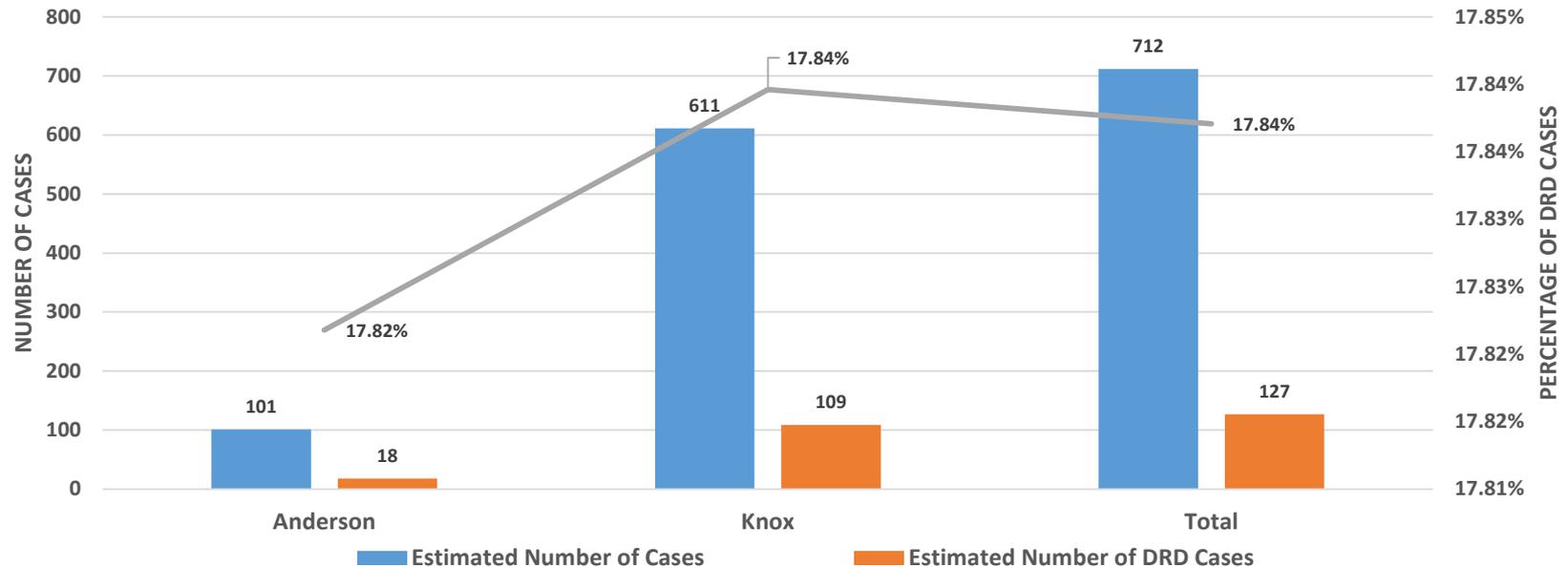
The reader should remember the caveats and limitations to the data as expressed within this report and/or on the graphs/tables.





## Knox and Anderson Counties Total Number of Cases Vs Drug Related Death Cases January 1 - June 30, 2016

**(THIS IS AN ESTIMATE ONLY)**



**Data Source:** Knox County RFC Medical Examiner Database, 2016. Knoxville, TN.

**NOTES: 1. This is only an estimate and is not to be considered the end results.**

**2. While we have a case count, not all of the cases have been finalized. This means that there are up to 100 cases which do not have all of their results documented.**

3. Total Number of Cases = Autopsies and Examinations conducted for Knox and Anderson counties

4. Drug Related Cases = Autopsies and Examinations in Knox and Anderson counties where the Manner of Death was Suicide or Non-Motor Vehicle Accident (Non-MVA) where a drug was listed as contributing to the Cause of Death.

**THIS IS ONLY AN ESTIMATE.** While we have a case count, not all of the cases have been finalized. This means that there are approximately 100 cases which do not have all of their results documented.

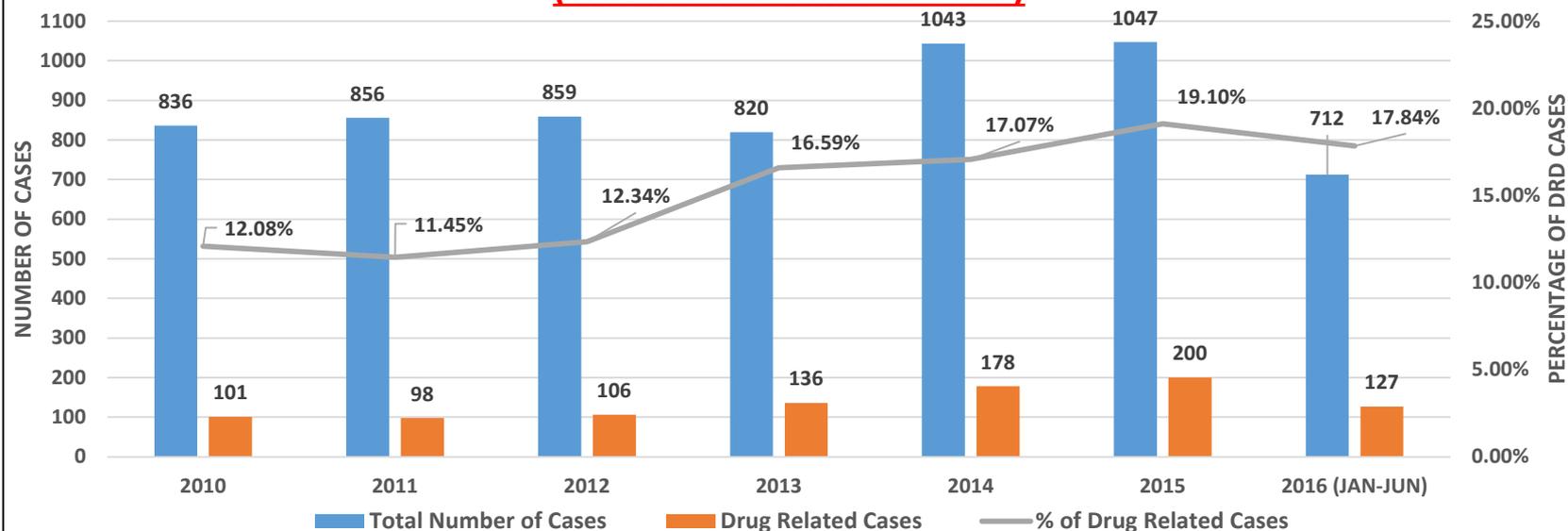
However, the current estimate does put us on a path to have more Drug Related Deaths this year than in 2015.





## Knox and Anderson Counties Total Number of Cases Vs Drug Related Death Cases and Percentage of Drug Related Death Cases JANUARY 1, 2010 - JUNE 30, 2016

**(THIS IS AN ESTIMATE ONLY)**



Data Source: Knox County RFC Medical Examiner Database, 2016. Knoxville, TN.

NOTES: 1. This is only an estimate and is not to be considered the end results.

2. While we have a case count, not all of the cases have been finalized. This means that there are up to 100 cases which do not have all of their results documented.

3. Total Number of Cases = Autopsies and Examinations conducted for Knox and Anderson counties

4. Drug Related Cases = Autopsies and Examinations in Knox and Anderson counties where the Manner of Death was Suicide or Non-Motor Vehicle Accident (Non-MVA) where a drug was listed as contributing to the Cause of Death.

**THIS IS ONLY AN ESTIMATE.** While we have a case count, not all of the cases have been finalized. This means that there are approximately 100 cases which do not have all of their results documented.

However, the current estimate does put us on a path to have more Drug Related Deaths this year than in 2015.



**ESTIMATE ONLY****Knox County Regional Forensic Center  
Drugs Found in Drug Related Deaths in 2016 (JAN-JUN)**

Drug	Estimated Total Cases (N = 127)		
	Knox (N = 109)	Anderson (N = 18)	Total
Oxymorphone	23	7	30
Oxycodone	21	8	29
Hydrocodone	16	4	20
Alprazolam	15	4	19
Fentanyl	16	3	19
Morphine	15	4	19
Alcohol/Ethanol	15	1	16
Methamphetamine	12	3	15
Methadone	12		12
Cocaine	11		11
Heroin	7	2	9
Buprenorphine	7	1	8
Acetyl fentanyl	5		5
Amphetamine	1	4	5
Benzodiazepine (NOS)	4	1	5
Cyclobenzaprine	3	1	4
Diazepam	4		4
Lorazepam	3	1	4
Opiates (NOS)	3	1	4
Fluoxetine	3		3
Hydroxyzine	2	1	3
Sertraline	3		3
Bupropion	2		2
Citalopram	1	1	2
Diphenhydramine	2		2
Promethazine	1	1	2
Zolpidem	2		2
1,1 DFE	1		1
Acetaminophen	1		1
Chlorpheniramine	1		1
Clonazepam		1	1
Topiramate	1		1
Venlafaxine	1		1
	<b>214</b>	<b>49</b>	<b>263</b>



## Current 2016 Concerns

Based on the first 6 months of estimated data, the number of Drug Related Deaths is increasing. While we continue to see a high incidence of pharmaceutical related deaths, we are starting to see an increase in non-pharmaceutical (or illicit) and emerging designer drug related deaths.

Real time monitoring and reporting are a deficit across the country. Currently there is not an organization or coalition capable of monitoring, reporting, and coordinating efforts to reduce Drug Related Deaths or Drug Use. Staff at the Regional Forensic Center have put together a plan to address the issue of real time monitoring, reporting, and coordination of efforts to reduce Drug Related Deaths or Drug Use. The plan has been presented at the Office of the National Drug Control Policy and is being presented to other federal agencies in an attempt to gain funding to start and sustain a Regional coalition, lead by the Regional Forensic Center, capable of monitoring, reporting, and coordinating efforts to combat drug related issues.

The Knox County Regional Forensic Center has some concerns on Drug Related Deaths:

- Increased number and costs of Drug Related Cases and Testing
- Lack of proper death reporting by physicians, hospitals, and other agencies
- Real-time data and report sharing (with appropriate protections) is needed on the local/regional level
- Lack of a plan to address the fallout of pain management protocol changes, changes in legislation of pain clinics, and a diversion to illicit drugs by the user
- Better identification and surveillance of drug overdose deaths, combined with a multidisciplinary harm mitigation approach, will help reduce deaths from unscrupulous prescribers
- Lack of a statewide electronic Death Certificate system in order to collect data on all deaths and share in real time





To discuss this report, please contact Mr. John Lott at the Knox County Regional Forensic Center. Mr. Lott is the preparer of the report.

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865-215-8000

