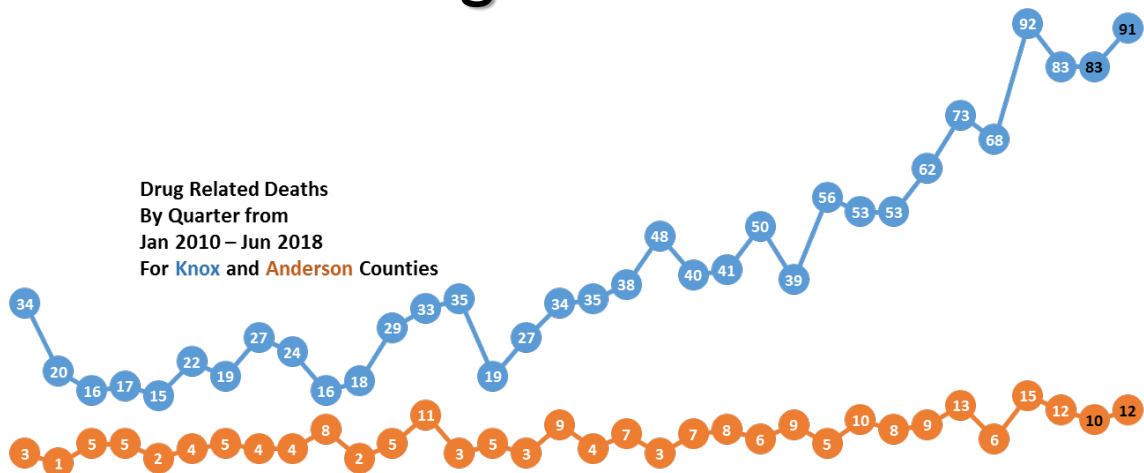




# Knox County Regional Forensic Center Drug Related Death Report 2017 for Knox and Anderson Counties August 2018



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

## **From the Desk of Medical Examiner: Sadly, Our Prediction Was Accurate – What Now?**

Many of you have heard me saying over the past two years that drug abuse mortality, in particular the casualties from the opioid epidemic, would get worse before they got better. Many community leaders, stakeholders and colleagues who are either directly or indirectly involved in the “war on drugs,” have inquired about drug related morbidity and mortality in our county and the region in comparison to the nationwide trends. As you might recall from my last year’s opinion letter, in 2014, the United States, with only 4.6% of the world population, used almost 70% of the world’s supply of opioids. Sadly, the trend has been worsening year after year. Nationwide, opioid related deaths have increase almost 30%. The latest cumulative drug induced death numbers in our county for 2017 are much worse than the dismal trend that has been gripping the nation.

My professional involvement with the “war on drugs” began 16 years ago when I joined the Regional Forensic Center in Knoxville. Throughout the years as I continued on this journey, I have met many committed and hardworking individuals who have been tirelessly engaged in the “war” on reversing drug addiction/drug abuse trends. Unquantifiable amounts of time, effort and grant money have been dedicated to winning the war; however, we have been losing one battle after another. The numbers do not lie; more people are dying from drugs now than ever before. Accidental drug deaths surpassed deaths from motor vehicle accidents long ago. We have to ask ourselves why our strategies have not worked. Why carry on the same war on drugs if the old strategies have not worked so far? What is it that we have been missing?

Based on several recent cases that our office has investigated, unsafe prescribing practices and questionable “pain clinics” continue to be a problem. As a result, polypharmacy and multidrug combinations have become ubiquitous. The majority of the decedents that come through our office died because of multiple drug toxicities that were obtained both legally and illegally. These drugs are swallowed, snorted and/or injected. As addiction progresses, the mode of use and amounts of drugs escalate. Reviews of the decedents’ medical records reveal that the majority of the victims had at least one prior emergency room visit or hospitalization for either direct drug toxicity or other drug-related diseases and conditions such as endocarditis, cardiomyopathy, necrotizing fasciitis, stroke, etc. Of course, many of these victims had been beneficiaries of previous naloxone administration on more than one occasion. Ultimately, naloxone would fail and death would ensue for a number of reasons such as a “wrong” and/or stronger drug, a combination of drugs, overridden tolerance as well as belated antidote administration, just to mention a few.

Traditional medicine, specifically the pain management discipline, has failed the patients in this country. When I was in training, opioids were considered very potent and therefore very dangerous drugs that were reserved for exceptionally painful conditions and grave, mostly terminal illnesses. Suddenly the attitudes changed in the late eighties and early nineties due to a trifecta of events. First, a couple of inadequately peer-reviewed, quasi-academic and quasi-scientific papers were published promoting unrestricted opioid-based pain management. This unsubstantiated dogma went unchallenged for many years. Second, misdirected and misguided malpractice lawsuits against physicians and other health care providers based on the alleged inadequate pain management were cropping up all over the country. As always, the healthcare providers recoiled and over-reacted by resorting to defensive medicine. They assumed a defensive attitude of “give the patients what they are asking for”. Finally, patient satisfaction surveys regarding physicians and hospitals came into effect. The subjective patient satisfaction and attitudes started driving the healthcare business model by stratifying physicians and their services based on their willingness to give



pain medications freely. The patient satisfaction surveys were based primarily on the subjective perceptions of the patients and not necessarily on the traditional objective metrics of quality of care.

At the same time, the big pharma was pushing to sell more of the expensive opioid medications regardless of the underlying diagnosis. As these new trends were evolving, medical education in the United States has been degrading and falling behind compared to other medical education systems abroad. Medical students have been taught how to take and pass licensing and board examinations and not necessarily how to engage in critical thinking or what I call “think medically”.

The ensuing lax attitude toward opioid utilization has given many unscrupulous health care workers, both physicians and mid-level providers alike, a green light to take advantage of their power to prescribe unlimited amounts of these potent drugs. While amassing wealth through the unsavory prescription practices and financial fraud, the pain clinic owners and the prescribers they employed continued to harm their patients. After a couple of decades of failure, public health advocates thought it was necessary to turn to the legislators to rein in the dangerous unsavory opioid overprescribing practices not only in our state but nationwide. In general, I do not recommend legislating practice of medicine; however, medicine in the United States hit the rock bottom. Something had to be done about the rogue prescribers.

After the last two legislative sessions, we are starting to see some results. One of the positive outcomes is that the number of pain clinics in our county has been cut in half. The remaining pain clinics are closely monitored by the Department of Health. Because of the changes in the law with respect to opioid prescriptions, we have made some progress related to the total number of issued opioid doses or prescribed morphine equivalents (PMEs). The regulatory requirements and the stricter clinic oversight have resulted in a decreased total volume of PME statewide. One of the guidelines strongly advises against the simultaneous prescription of opioids and benzodiazepines, in particular alprazolam. This in turn has led to a significant drop in oxycodone, alprazolam and oxymorphone related deaths (7<sup>th</sup>, 6<sup>th</sup> and 5<sup>th</sup> among the top ten drugs that contribute to the drug related mortality chart for 2017, respectively).

Another category that has shown a tangible improvement is neonatal abstinence syndrome (NAS). When I was in training in the eighties, NAS was exceptionally rare. In 1999, there were about 50 NAS-related hospitalizations in Tennessee. In 2015, that number jumped to about 1,000. Although the total numbers are still too high (over 343 NAS born babies in the first 6 months in 2018), this is the first year that the cumulative NAS case numbers have dropped significantly (over a hundred fewer cases compared to the first 6 months from the previous year).

Now for the bad news. As expected, the void created by the prescription opioid regulation was very quickly filled with easily accessible although frequently more dangerous street drugs, in particular designer drugs such as fentanyl analogues. There has been a considerable shift in type and source of the deadliest abused drugs with synthetic fentanyl analogues, stimulants (methamphetamine and cocaine) and heroin leading the charts. In general, illicit drugs have become purer, more plentiful and cheaper. As such, they are more desired, easier to obtain and easier to tamper with or adulterate with other substances. Extremely potent fentanyl analogs, frequently sold as “heroin” to unsuspecting customers, continue to top the overdose charts two years in a row. Furthermore, as opposed to methamphetamine of the past that was produced locally in clandestine labs, methamphetamine sold on our streets as of late is in its strongest and purest form I have ever seen. Moreover, cocaine and heroin are on the rise and continue to play important roles in the overall drug morbidity and mortality either alone or more frequently in combination with other drugs. Together with fentanyl analogs and methamphetamine, they have pushed the prescription opioids farther down on our list of the most abused and deadliest drugs.



Just for Knox County, the drug-related death toll jumped from 224 in 2016 to 316 in 2017. This is a staggering 41.7% increase just in one year. It has been even worse for the black community and other minorities. While the total number of minority individuals who died from drug intoxication does not seem remarkable, the increase from 27 to 43 represents a remarkable 87% upsurge for this community. The most affected age groups have shifted as well. It is devastating to see that two of the most productive age groups, 35 to 44 and 45 to 54, top the death charts. The 25 to 34 and 55 to 64 age groups follow in numbers and flank the other two on both sides of the mortality distribution curve. As one can tell, our County and the State of Tennessee continue to contribute significantly to the dismal national drug abuse statistics. Besides the enormous human tragedy, our societal and economic losses have been immense. At which point do we ask ourselves why we continue implementing the same failing strategies to combat drug casualties.

Sadly, the war on the fake pain clinics is not over yet. Recently, in less than a week, I had the opportunity to perform autopsies on two individuals who had traveled far across the county lines to get their pain medications. Both of these individuals were attended to by prescribers whose practices, based on my assessment of the medical records, appeared to be substandard. Both of these patients are now deceased because of the overprescribed drugs. One of them, clearly an intravenous drug abuser, had a combination of prescription opiates and illicit opioids on board, which has become a common theme. Clearly, our work with respect to opioid overprescribing and opioid abuse in general is far from being over. As a physician, I do not endorse micromanagement of other physicians' practices. Unfortunately, these two examples are a clear indication why tighter oversight is needed if some of these practices continue prescribing medications that kill patients either alone or in combination with other drugs.

Opioids are extremely powerful. The margin of error with these powerful medications is very narrow. The health care providers who prescribe these medications hold great power over their patients. The licensed professionals who continue pushing and distributing these drugs have a great responsibility not to harm their patients. If the patient dies, they should be held to the same standard and as accountable as the individuals involved in drug diversion schemes or drug dealers who sell illicit drugs for profit. The burden on health care professionals to do the right thing is heavy and includes the promotion of other pain treatment modalities, exceptionally judicial, careful and restricted opioid prescribing practices, self-monitoring or peer-oversight of the prescribing practices as well as continuing education on dangers of drug dependency and medication abuse.

Whether it was French philosopher Voltaire or Marvel character Ben Parker who said it, the quote still hold true: "With great power comes great responsibility."

Your Medical Examiner

  
Darinka Mileusnic-Polchan, MD, PhD



# 2017 Trends

The Knox County Regional Forensic Center's Drug Related Death (DRD) Report for 2017 provides one piece of the picture for Knox and Anderson Counties' drug problem. This report indicates an upward trend of drug related death cases and the number/types of drugs associated with drug related deaths. Illicit drugs (Fentanyl and its analogues, Cocaine, Methamphetamine, and Heroin) are the drugs found most often in Drug Related Deaths for Knox and Anderson Counties. This marks a dramatic shift from prescription drugs to illicit drugs over the past 2 years of data in comparison to the previous decade. However, we continue to have a problem with prescription drug deaths.

The term "illicit" refers to the use of illegal drugs, including marijuana according to federal law, and misuse of prescription medications.

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

- From 2016 to 2017, there was a 41% increase (from 256 to 362) in Drug Related Deaths in Knox and Anderson counties.
  - There were 316 Drug Related Death Cases in Knox County.
  - There were 46 Drug Related Death Cases in Anderson County.
  - The number of Drug Related Deaths from 2010 to 2017 has increased by 258% in Knox and Anderson Counties.
- Drug Related Deaths occur more frequently in the 45 – 54 year old age category than any other age category. However, there were significant increases in four age groups (15-24, 25-34, 35-44, and 55-64) in 2017.
- Fentanyl and its analogues are the most frequently found drugs in Drug Related Deaths for 2017. Fentanyl and its analogues increased 179% from 2016 to 2017.
- The number of Drug Related Deaths in Blacks in Knox and Anderson Counties increased by 113% (from 23 to 49) in 2017.
- Polypharmacy (or multiple drugs) were involved in 60% of the Drug Related Death cases.
- Tentative 2018 figures indicate a continued increase in the number of Drug Related Death cases.
  - The number of Drug Related Death Cases continue to rise each month over the months from previous years.
  - Illicit drugs are increasing at an alarming rate in Drug Related Deaths. However, prescription drugs are still a problem.
  - While deaths in all age groups continue to increase, deaths in younger age groups continue to rise at a higher rate when compared to other age groups.



# 2017 Trends – (continued)

## FENTANYL

The combination of fentanyl (and fentanyl analogues) was the most frequent drug noted in causes of death for 2017 Drug Related Deaths. In 2017, 9 fentanyl analogues appeared in Knox/Anderson County DRD cases (acetyl fentanyl, acryl fentanyl, carfentanil, cyclopropyl fentanyl, despropionyl fentanyl/4ANPP, furanyl fentanyl, methoxy fentanyl, methoxyacetyl fentanyl, & terahydrofuran fentanyl). In 2015, only one fentanyl analog (acryl fentanyl) was noted. Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. The potency of fentanyl analogues vary, but are generally of higher potency than that of fentanyl. Identifying these analogues adds approximately \$200 - \$500 in testing costs to the autopsy whether positively identified or not.

## MARKED INCREASES IN ILLICIT DRUGS

Fentanyl and its analogues, Cocaine, Methamphetamine, and Heroin each showed significant increases in 2017 Drug Related Death cases. These four illicit drugs are now the most commonly found drugs in DRD cases.

## PRESCRIPTION OPIOIDS AND BENZODIAZEPINES REMAIN CONSTANT

The number of occurrences prescription opioids and benzodiazepines were found in DRD cases remained relatively constant from 2016 to 2017. This may be due to the changes in prescribing laws and practices.

## BUPRENORPHINE AND METHADONE

Buprenorphine and Methadone are medications used to ameliorate withdrawal and replace or substitute illicit drugs. The number of times Buprenorphine was found in Drug Related Deaths cases in 2017 decreased from 16 to 7. The number of times Methadone was found in DRD cases in 2017 increased from 15 to 16.

## DESIGNER/EMERGING DRUGS

In 2017, the RFC saw four new Fentanyl analogues appear in DRD cases (cyclopropyl fentanyl, methoxy fentanyl, methoxyacetyl fentanyl, & terahydrofuran fentanyl). In 2018, we are beginning to see the emergence of novel psychoactive substances such as Deschloro-N-ethyl Ketamine and some Benzodiazepines. Identifying these novel/emerging drugs is important in determining cause of death for public health, law enforcement, district attorneys, and community groups who must be aware of new drug trends in the community. However, testing for novel/ emerging drugs adds an additional \$60,000 - \$90,000 per year.





# 2017 Concerns

The Regional Forensic Center is concerned that the 8 year trend of increasing Drug Related Deaths will continue at a rate of 30% or higher growth each year. Our concerns have been validated by a shift from prescription drugs being the leading cause of death to non-pharmaceutical (or illicit) and emerging, designer drugs being the leading cause of death in Drug Related Deaths. Even though there have been many actions to reduce over-prescribing practices, there will continue to be a high incidence of prescription drug deaths.

Based on the 2017 data and preliminary 2018 data, we expect to see a continuing increase in Drug Related Deaths in the younger age groups. In addition, we expect to see the numbers of deaths in the 45 -54 and 55 – 64 year age groups to increase due to co-morbidities and a transition from prescription opioids to illicit drugs.

While there are many national, state, and local initiatives to reduce Drug Related Deaths, there needs to be increased attention focused on these:

1. Increased funding for detection of emerging, designer drugs.
2. Education and training focused on prevention.
3. Treatment for those addicted who desire to stop the addiction.

From the Medical Examiner's perspective, abstinence should be at the forefront of treatment. As with Alcoholics Anonymous, people should strive to be free from the addiction. Expecting to be saved by Naloxone after each overdose or taking an addiction fighting drug, such as Methadone or Suboxone®, is not the answer. Methadone and Suboxone®, if used, should be only of a short duration. However, we see these drugs being utilized as bridges between drug usage.

Our concern is that unless there is a focused effort with proven, effective, and measurable outcomes; we will continue to see dramatic increases in Drug Related Deaths especially with emerging, designer drugs.





# 2017 Concerns – (continued)

In 2017, illicit drugs became the most predominant drugs found in Drug Related Deaths. However, prescription drugs continue to contribute to a large number of Drug Related Deaths. The combination of new law, changes in provider prescriber practices, education, and the reduction of available prescription drugs have caused several issues:

1. The reduction of the availability of prescription drugs has caused those who are addicted to seek illicit drugs as evidenced by the large increase in the amounts of illicit drugs being found in Medical Examiner cases.
2. The illicit drugs being used are more lethal due to unknown makeup and potency.
3. Not only are the total numbers of Drug Related Deaths increasing but the increases in the younger age groups are growing at an alarming rate.
4. Polypharmacy, or the existence of more than one drug being found in the system, continues to be in about two-thirds of the Drug Related Death cases.
5. There are few treatment facilities or options for the large number of people who are addicted to prescription drugs and no longer get that prescription due to the changes in practice and law.
6. Methadone and Suboxone® are being utilized as bridges between drug usage and in some cases only substitute as a legal drug addiction. This causes these drugs to have a high illicit market value and become a drug of abuse.
7. Methadone, Suboxone®, and other addiction treating drugs are not on the Controlled Substance Monitoring Database (CSMD). This causes issues for prescribers and Medical Examiners who do not know their patients are on these maintenance drugs.
8. Rural counties are under reporting drug deaths due to a lack of medico-legal death investigation, autopsies, and appropriate toxicology testing being performed on suspected drug overdose deaths.



# 2017 Concerns – (continued)

9. Naloxone use is causing increased risky behaviors and normalizing drug use. Reports indicate that drug users get together and alternate turns taking drugs in order to be able to administer Naloxone to the other person in case of a severe adverse reaction or death.
10. The cost of conducting a forensic autopsy in order to find out the specific drugs continue to increase due to the cost of testing for new/emerging drugs. It is imperative that we test for these drugs so that law enforcement, the Attorney General's office, and community groups know the drugs entering our community in order to address the issues.
11. There is an undercurrent in some arenas trying to influence legislation to allow legislators or judges to determine Manner of Death. This would cause additional issues in under reporting of Drug Related Deaths and possibly Suicides in general.
12. There is an increase in the amounts and types of drugs being found in cases that are not classified as Drug Related Deaths. For example, the types of cases may include:
  - Motor Vehicle Accident – the person dies in a vehicle accident and has drugs in their system.
  - Suicide – the person dies by shooting, hanging, or other means of self-harm and has drugs in their system.
  - Homicide – someone is killed by another person and the decedent has drugs in their system.

## LEGISLATIVE AND COMMUNITY ACTIONS ARE NOT WORKING

Over the past several years, there have been several legislative changes, large sums of money spent, prescriber practice changes, and many other actions at the federal, state, and local levels focused on the reduction of drug activities and Drug Related Deaths. However, the number of Drug Related Deaths and the level of drug activity continues to rise at alarming rates. At the Regional Forensic Center, we have gone from 1 out of 9 cases in 2010 to 1 out of 3 cases in 2017 being Drug Related Deaths. Clearly, there needs to be an evaluation of current activities and a shift in our approach to this problem.

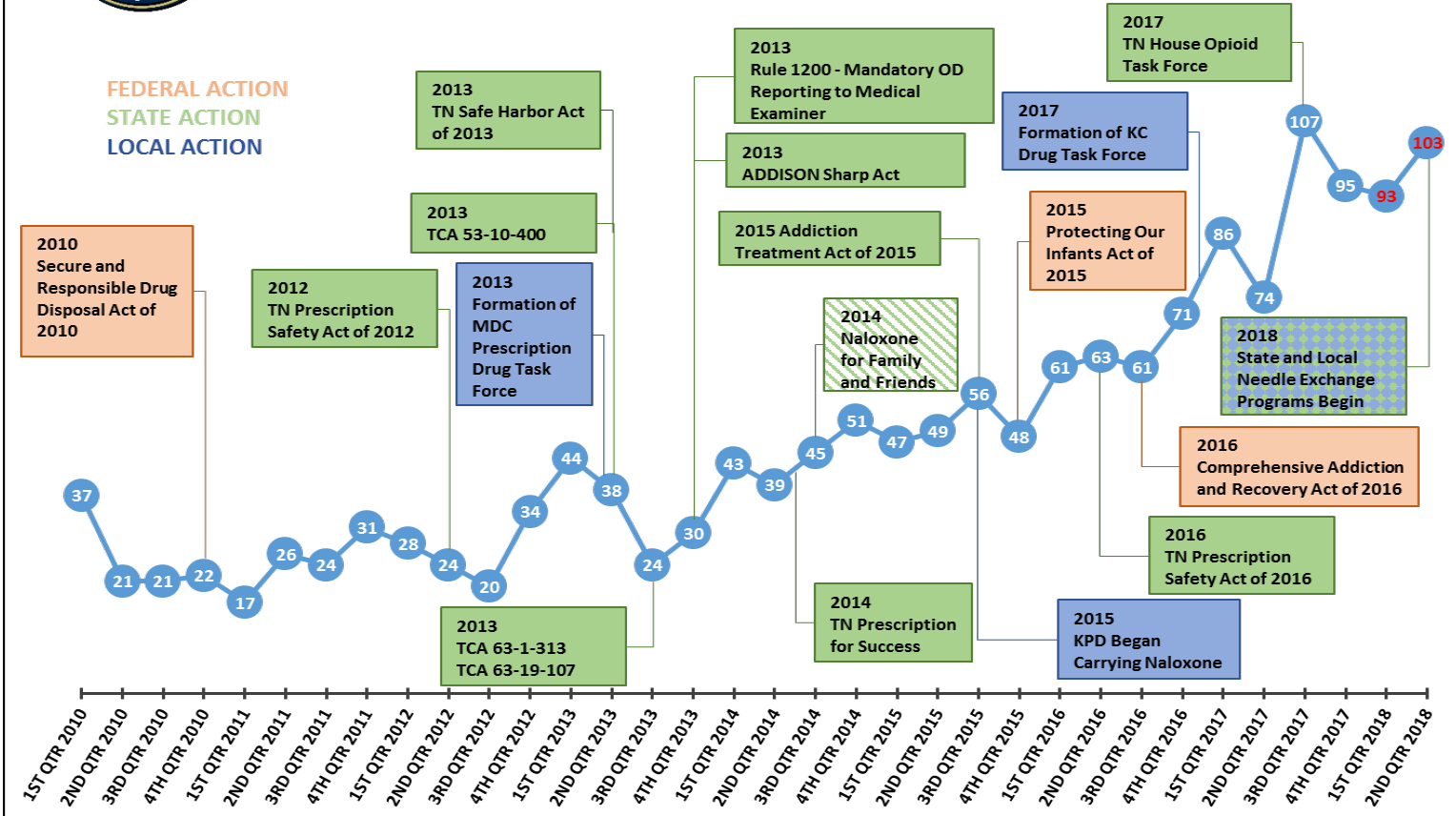
From the Medical Examiner's perspective, we must focus our efforts on legislation and actions that reduce not promote drug use/abuse and that does not normalize drug use.

The following two pages highlight some of the local, state, and federal actions over the past 8 years as the number of Drug Related Deaths in Knox and Anderson counties continue to rise.





### Knox and Anderson Counties Distribution of Drug Related Death Cases by Quarter and Policies/Actions Impacting Drug Related Deaths 2010 - 2018



See the next page for more detail on the policies and actions listed in the chart. 2018 numbers are tentative data only.



## **POLICIES/ACTIONS IMPACTING DRUG RELATED DEATHS**

Below are some of the federal, state of Tennessee, and local policies and actions from 2010 to 2018 designed to have an impact on Drug Related Deaths (not an all inclusive list):

### **Federal actions:**

2016 – Comprehensive Addiction and Recovery Act of 2016: to authorize the Attorney General and Secretary of Health and Human Services to award grants to address the prescription opioid abuse and heroin use crisis, and for other purposes

2015 – Protecting Our Infants Act of 2015: to address problems related to prenatal opioid use

2010 – Secure and Responsible Drug Disposal Act of 2010: to amend the Controlled Substances Act to provide for take-back disposal of controlled substances in certain instances

### **State actions:**

2018 – Law allowing needle exchange programs administered by non-profits

2017 – House Opioid Task Force: task force recommendations on prevention, treatment and policy on opioid abuse

2016 – Prescription Safety Act of 2016 (T.C.A. §53-10-310): made the 2012 law's changes permanent, expanded the CSMD requirements to mental health hospitals, and allowed the U.S. Attorney's office access to the CSMD.

2015 – Addiction Treatment Act of 2015: limits doctors' ability to prescribe the semi-synthetic opioid maintenance drug, including limits on dosages, establishes protections for an individual seeking emergency medical assistance in the event of a drug overdose from certain criminal drug charges

2014 – Naloxone for family and friends: allows physicians to write a prescription for Naloxone for family and friends

2014 – TN Prescription for success: a strategic plan developed by the Tennessee Department of Mental Health and Substance Abuse Services in collaboration with sister agencies impacted by the prescription drug epidemic

2013 – The ADDISON Sharp Act (T.C.A. § 53-11-308): set a limit on the amount of Schedule II and III drugs being prescribed or dispensed to a 30-day supply

2013 – Rule 1200-36-01 for Medical Examiners: The rules set forth protocol for uniform investigations of deaths resulting from opiate, illegal or illicit drug overdose.

2013 – (T.C.A. § 63-1-313): dispensing of controlled substances by pain management clinics is prohibited

2013 – (T.C.A. § 63-19-107): Physicians supervising physician assistants must follow additional specific guidelines for prescribing Schedule II substances

2013 – Safe Harbor Act of 2013: encourages and expands drug addiction treatment for pregnant women

2013 – (T.C.A. § 53-10-400): all practitioners in Tennessee are required to use tamper-resistant paper for all prescriptions written or printed. Each prescriber should be aware of the requirements specific to their practice

2012 – Prescription Safety Act of 2012 (T.C.A. §53-10-300): made comprehensive changes to providers' prescribing and dispensing practices for prescription pain medicines

### **Local actions:**

2018 – Knox County non-profits distributing syringes

2017 – Formation of Drug Overdose Task Force (Attorney General, RFC, KPD, KCSO, HIDTA, DEA)

2015 – KPD began carrying naloxone in September 2015.

2013 – Formation of Metro Drug Coalition Prescription Drug Task Force



# KNOX COUNTY

## Drug Overdose Task Force

In 2017, the Knox County Regional Forensic Center (Knox County Medical Examiner's Office) continued to work with members of the task force to efficiently collect and share data among the member agencies to ensure intelligent prosecutions and actions to reduce drug related activities. The members of the Task Force are:

Knox County Regional Forensic Center  
Knox County Office of the District Attorney – 6<sup>th</sup> Judicial District  
Knoxville Police Department  
Knox County Sheriff's Office  
Drug Enforcement Administration  
Appalachia High-Intensity Drug Trafficking Area

The information provided by the Regional Forensic Center provides possible drug related death cases<sup>1</sup> to the District Attorney's Office, Knoxville Police Department and Knox County Sheriff's Office on a daily basis in order to facilitate possible drug related case investigation. The RFC's medico-legal death investigators work with other task force investigators to collect and share case data. The RFC Forensic Pathologists work with task force investigators and prosecutors to assist with medical determinations and other medical related questions.

Through this collaborative effort, there have been convictions for cases which would not have been considered a suspicious death warranting a homicide investigation. In addition, efforts have been focused on reducing the availability of illicit and illegal drug sale and use.

(Note 1: The cases reported exhibit characteristics of a drug related case but have not been determined to be a drug death. This alert provides the District Attorney and law enforcement a quicker reaction time to save evidence and take appropriate actions.)



6<sup>th</sup> Judicial  
District



## FBI Prescription Drug Task Force

The Knox County Regional Forensic Center works in collaboration with the FBI Prescription Drug Task Force in East Tennessee. RFC staff provides information about questionable prescribing practices associated with Medical Examiner cases to the FBI for their investigation.



# 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 investigations and 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 2018, the office 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 30 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, 7 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 either Associate or Assistant Professors with the University of Tennessee Graduate School of Medicine and other universities.

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.

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





Death Investigator Manager is a Fellow with ABMDI. Four of our Medicolegal Death Investigators are Diplomats with ABMDI. And, three 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 can be 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 their local authorities.



# Reporting Deaths and Tennessee Medical Examiner Statutes

The Medical Examiner system in Tennessee is a County Based system. There are 5 independent, nationally accredited Regional Forensic Centers by NAME which provide autopsy and autopsy related services for 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 unnatural 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 from the Knox County Regional Forensic Center. The medical 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, the National Institute of Justice (NIJ), the American Board of Medicolegal Death Investigation and the Tennessee Code Annotated. Medical death investigators are considered the on-scene eyes and ears of the forensic pathologist or medical examiner. 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, review of records, and ancillary studies including 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, the presence or absence of evidence of drug paraphernalia or other drug use, including: opioid and other scheduled medications, needles, spoons, cut straws, crushed tablets, pill crushers, 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 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 24/7/365 coverage in Knox and Anderson counties. In addition, they are registered fellows or diplomats through the ABMDI 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) MDILog database and Death Certificates certified by RFC Forensic Pathologists for autopsies on examinations performed for Knox and Anderson counties at the Knox County Regional Forensic Center by its Forensic Pathologists from January 1, 2017 – December 31, 2017.

## Reasoning for the Selection of Knox and Anderson Counties

Dr. Mileusnic-Polchan is the Chief Medical Examiner for Knox and Anderson counties. Therefore, 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 Chief Medical Examiner and the Regional Forensic Center.

## How Data was Derived

An initial data file was pulled from the MDILog database to identify possible drug related cases for January 1, 2017 – December 31, 2017 in the Accident-Non Motor Vehicle, Suicide, and Undetermined 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 data from MDILog.

A file with specific data elements was created to assure the record was complete for each case. Once data extraction was performed from MDILog, data was reviewed



to assure accuracy and 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 the listed drug that 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 MDILog database was updated to reflect accurate information for each case.

A data file was then extracted from MDILog database to begin running statistics to 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, 2017 – December 31, 2017.
2. The data sources (Death Certificates and MDILog database) 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. 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 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.



4. 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 an acute toxicity drug related case.
5. 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 accounted for.
  - 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.
6. The National Association of Medical Examiners (NAME) standard says the Forensic Pathologist shall perform a forensic autopsy when: the death is by apparent intoxication by alcohol, drugs, or poison, unless a significant interval has passed, and the medical findings and absence of trauma are well documented.
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 the 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 many deaths are caused by more than one drug
  - c. Often it is difficult to identify which drug is the primary cause of death when multiple drugs are present
  - d. CDC Death Certificate data is coded and grouped into drug class
9. **Since Drug Related Deaths may involve more than one substance, counts of deaths related to specific substances do not sum to the total number of deaths in this report.**



# 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. The community cannot devise meaningful strategies to combat drug proliferation and drug deaths when all individual stakeholders are not aware of the trends.
2. Increased funding of drug treatment programs supporting Abstinence.
3. Methadone, Suboxone®, and other drugs used to treat addictions have to be entered in the Controlled Substance Monitoring Database (CSMD). In order for prescribers and Medical Examiners to understand what drugs have been prescribed to the individual in order to make a good clinical interpretive decision, addiction treatment drugs and drugs of addiction must be listed in the CSMD.
4. Continued funding for multi-agency collaborative efforts such as the Knox County Drug Overdose Task Force.
5. Funding and training for agencies (such as the Metro Drug Coalition, and Allies for Substance Abuse Prevention in Anderson County) involved in addressing education, prevention, and drug reduction activities.
6. 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.
7. Efforts should be made to hold physicians accountable for completing the electronic Death Certificate. The completion of the Death Certificate is the last action a physician does for the patient. Physicians who do not complete Death Certificates or complete them inappropriately are preventing families from closing out their loved ones affairs and preventing the family from gaining closure.



# Recommendations (cont.)

8. Funding for an Epidemiologist at the Regional Forensic Center to assist in managing data to engage in prediction and prevention of drug overdoses and to support community partners with data.
9. Incentives to standardize basic requirements for medico-legal death investigation across the East Tennessee counties in order to generate more accurate statistics and prevention or intervention initiatives. The best way to achieve this would be through a Regional concept where each Regional Forensic Center serves its local counties by providing medico-legal death investigation. This keeps actions local in order to be more responsive to the Attorney General, law enforcement, funeral homes, and other local partner needs.

## Acknowledgements

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

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

Ms. Xingxing Lui (Graduate Research Assistant, Department of Public Health, University of Tennessee) for her assistance in reviewing and preparing the data.

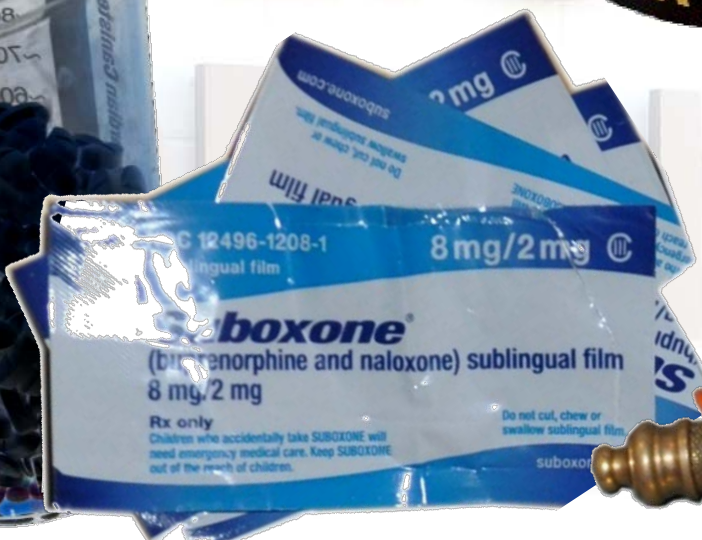
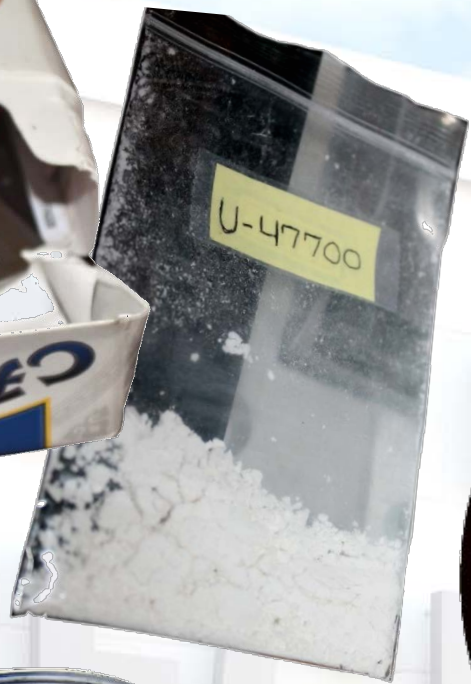
Mr. Jody Persino (Regional Forensic Center) for their review of the report.

Former Mayor Tim Burchett for his continued support in strengthening the Medical Examiner system in Knox County and the East Tennessee Region.

Mayor Terry Frank for her support in addressing Drug Related Deaths in Anderson County.

Mayor Glenn Jacobs for his support in addressing Drug Related Deaths in Knox County.







# 2017 DRUG RELATED DEATH DATA 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 in 2017.

The data was taken from the MDILog Database and Death Certificates signed by the KCRFC Forensic Pathologists.

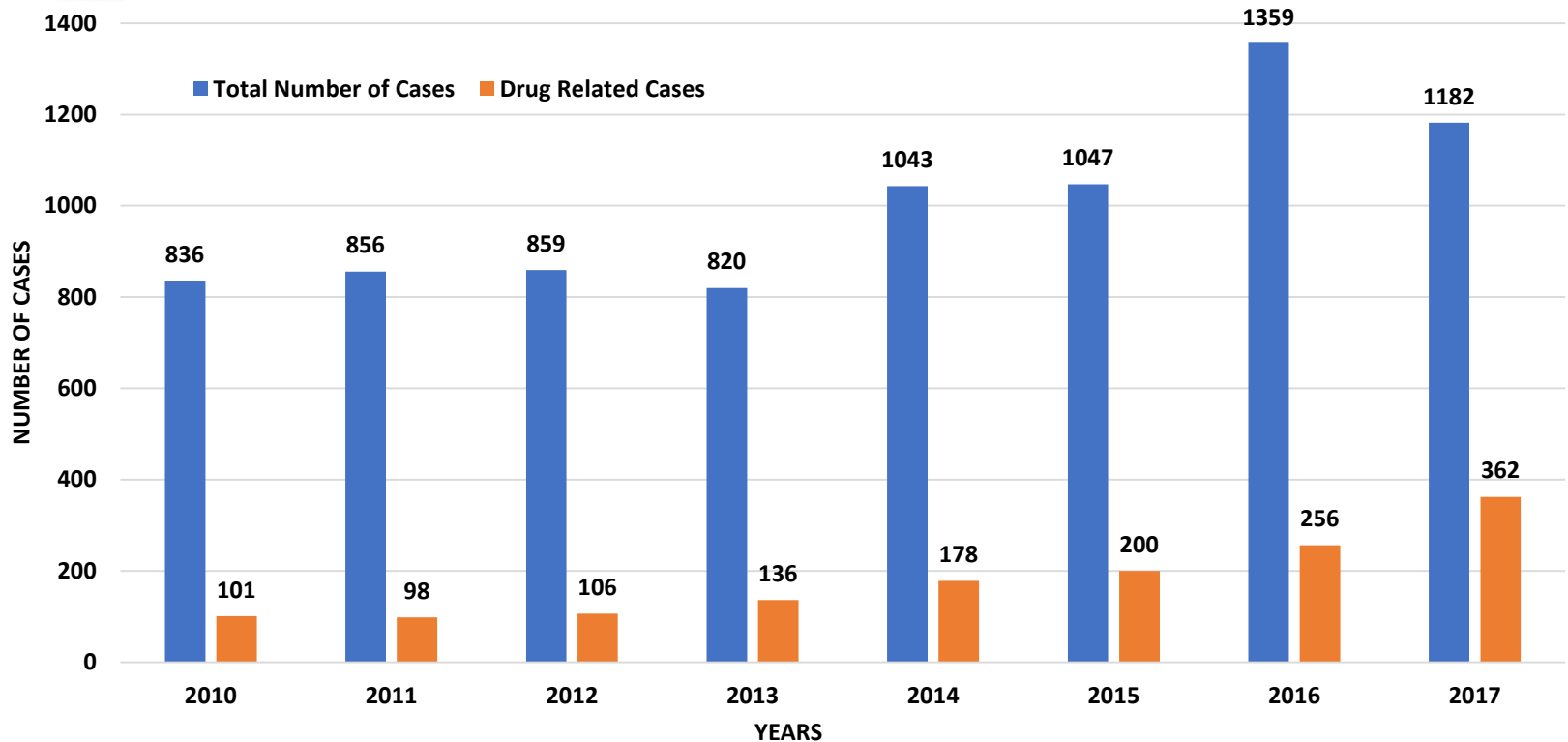
Data will be displayed for Knox and Anderson combined, Knox only, and Anderson only in order to provide actionable data for both counties.

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 Number of Cases Vs. Drug Related Death Cases 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016-2017. Knoxville, TN.

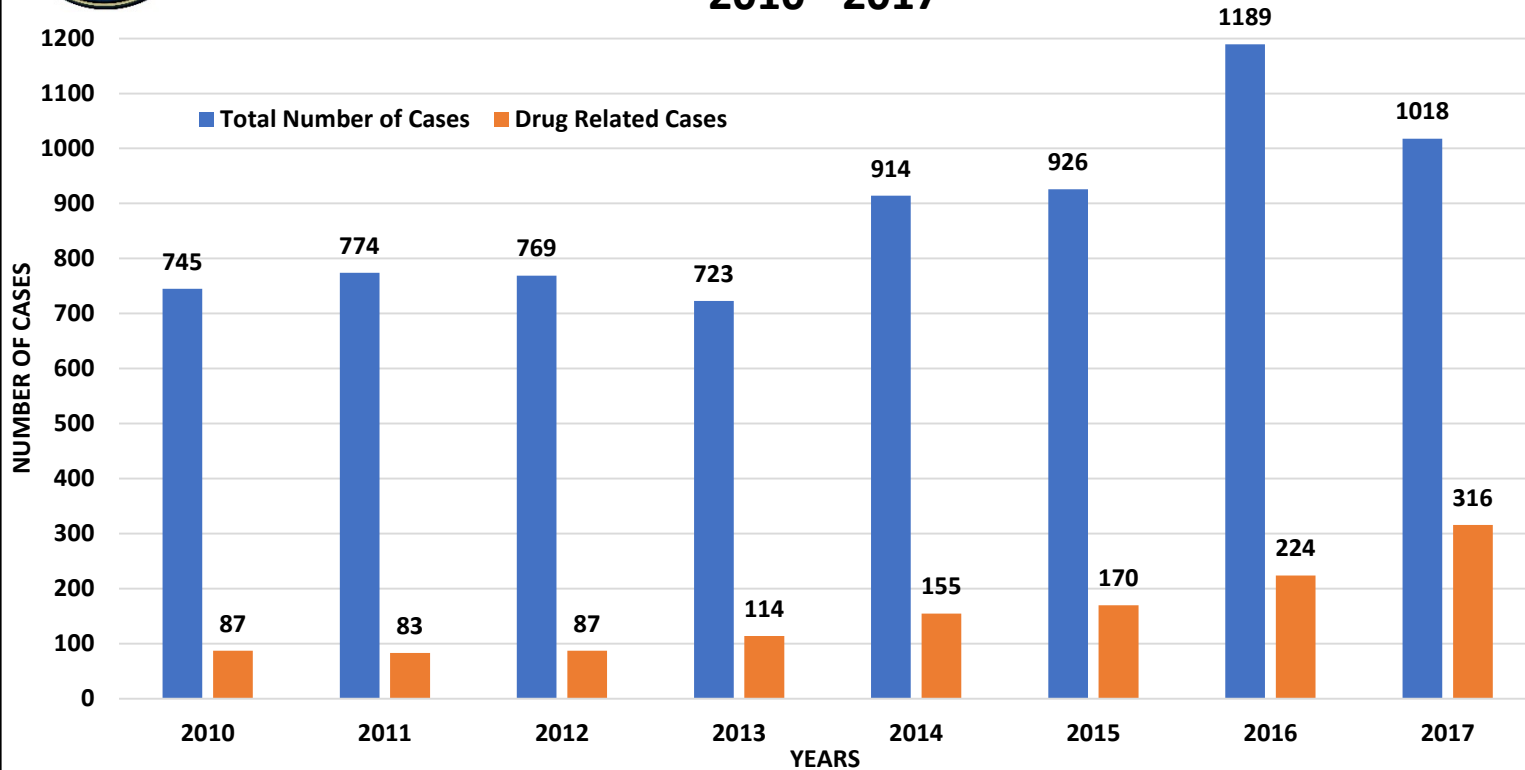
**NOTES:** 1. Total Number of Cases = Autopsies and Examinations conducted for Knox and Anderson counties

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





## Knox County Total Number of Cases Vs. Drug Related Death Cases 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016-2017. Knoxville, TN.

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

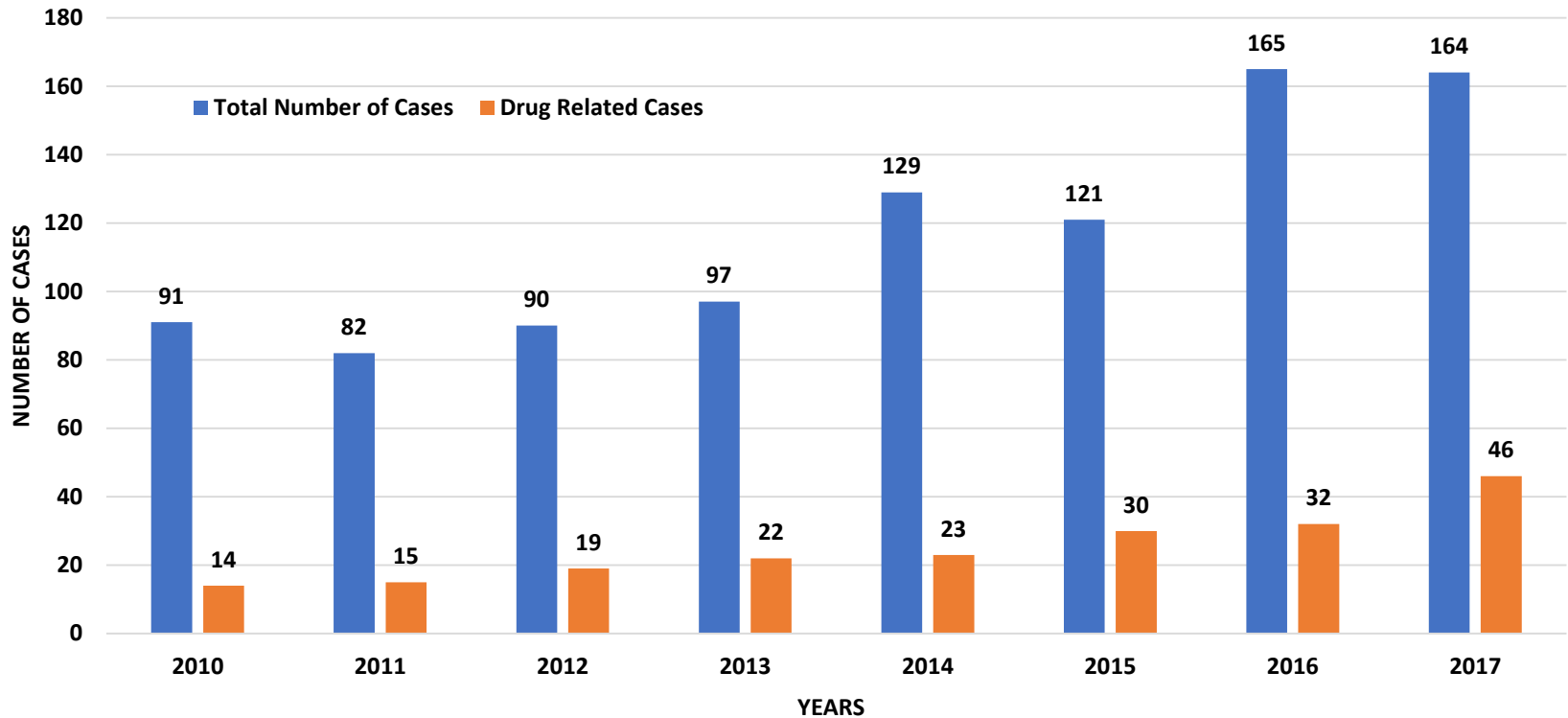
2. Drug Related Cases = Autopsies and Examinations in Knox county where the Manner of Death was Suicide, Undetermined, or Non-Motor Vehicle Accident (Non-MVA) where a drug was listed as contributing to the Cause of Death.







## Anderson County Total Number of Cases Vs. Drug Related Death Cases 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

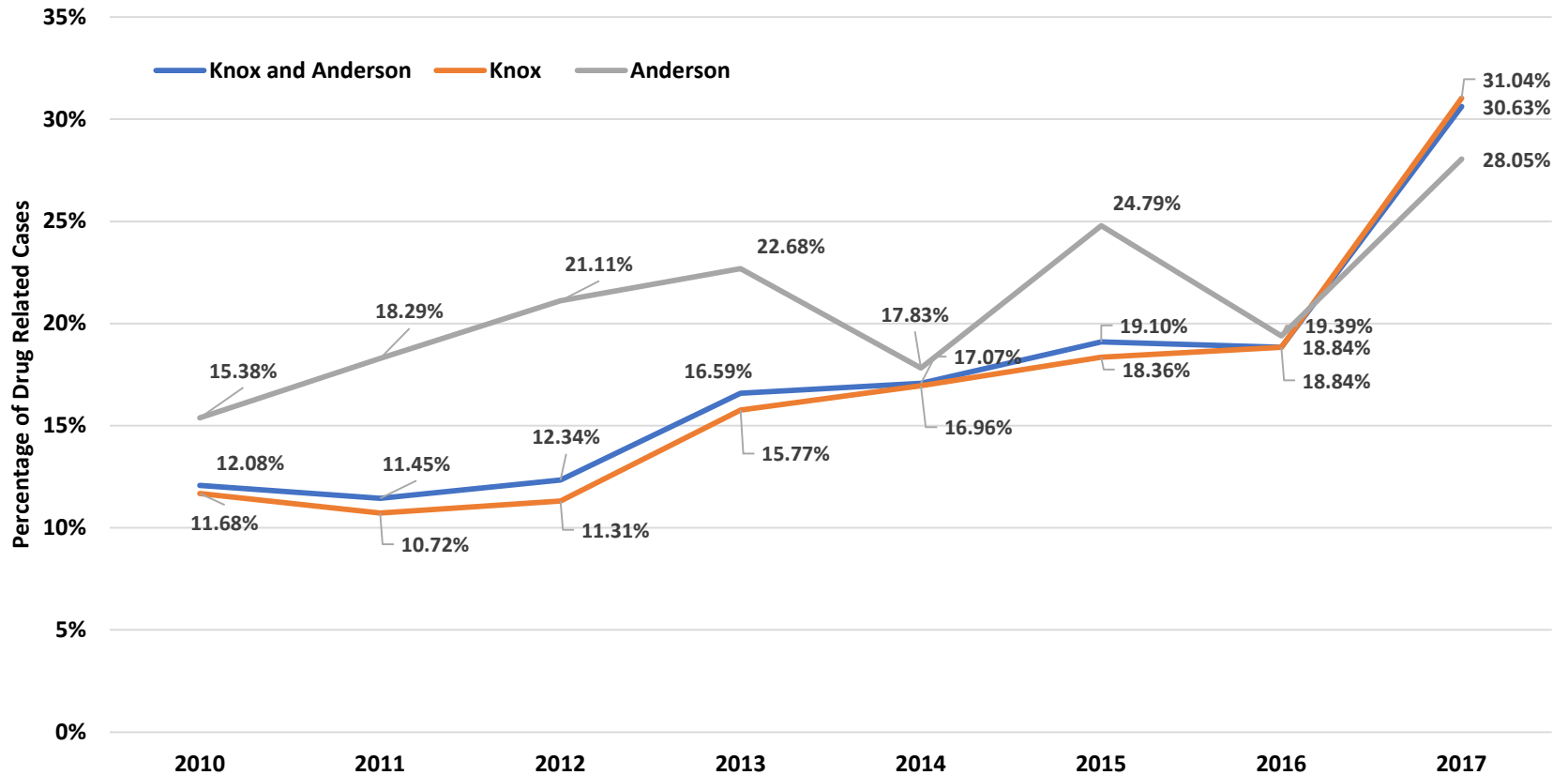
**NOTES:** 1. Total Number of Cases = Autopsies and Examinations conducted for Anderson county

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





## Knox and Anderson Counties Percentage of Drug Related Death Cases 2010 - 2017

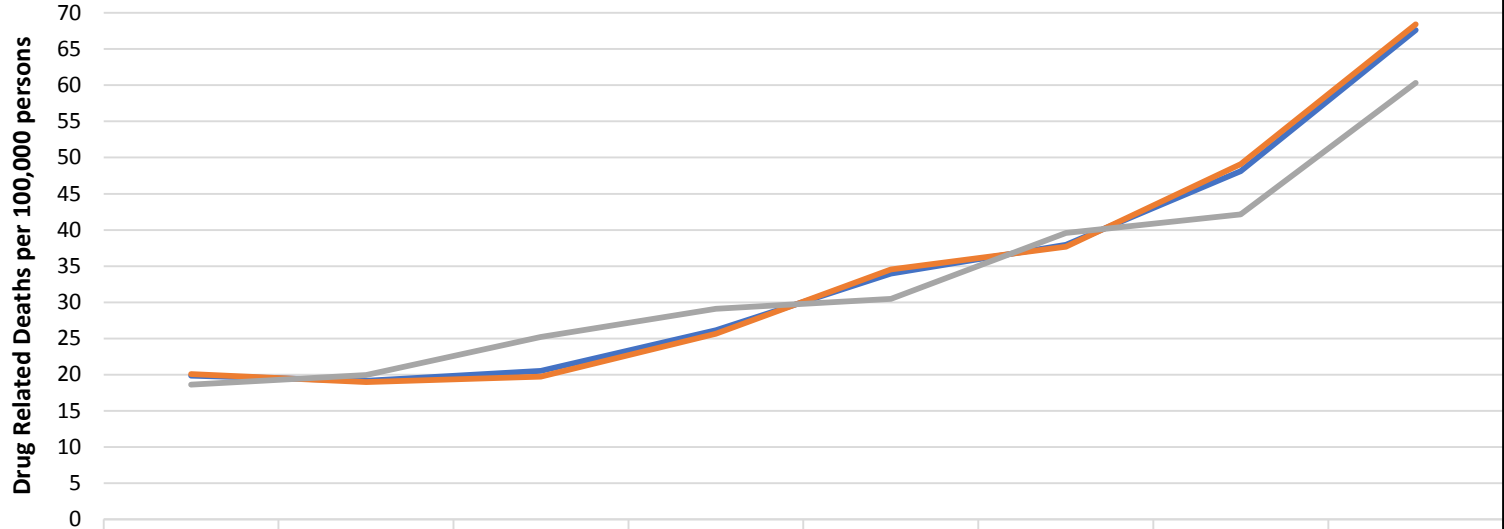


Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.





## Knox and Anderson Counties Drug Related Death Cases per 100,000 population 2010 - 2017



	2010	2011	2012	2013	2014	2015	2016	2017
<b>Total</b>	19.9	19.1	20.5	26.1	34.0	37.9	48.1	67.6
<b>Knox County</b>	20.1	19.0	19.7	25.6	34.5	37.7	49.1	68.4
<b>Anderson County</b>	18.6	19.9	25.2	29.1	30.5	39.6	42.1	60.3

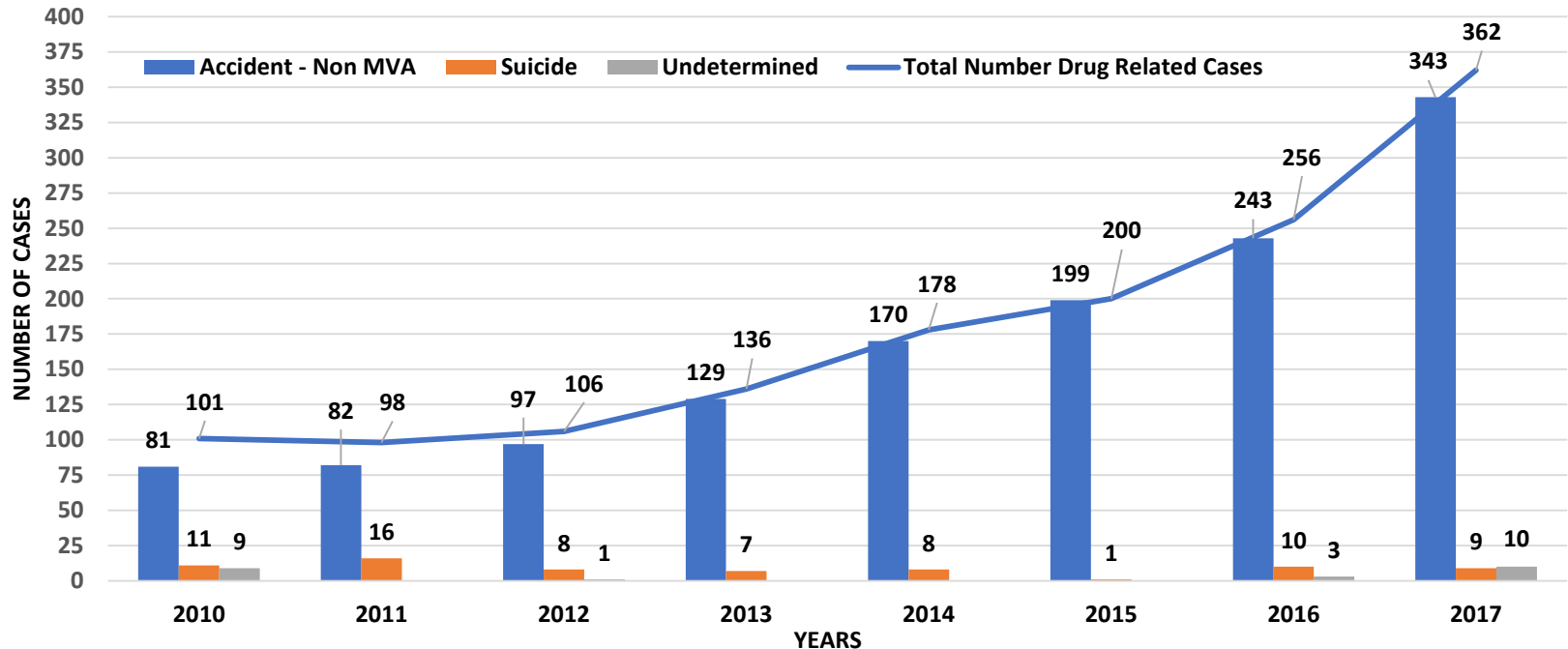
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.  
 Census population from US Census Bureau "American Fact Finder" - [http://factfinder.census.gov/faces/nav/jsf/pages/community\\_facts.xhtml](http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml).

The crude rate of Drug Related Deaths per 100,000 population has more than tripled over the last 8 years 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 Cases 2010 - 2017



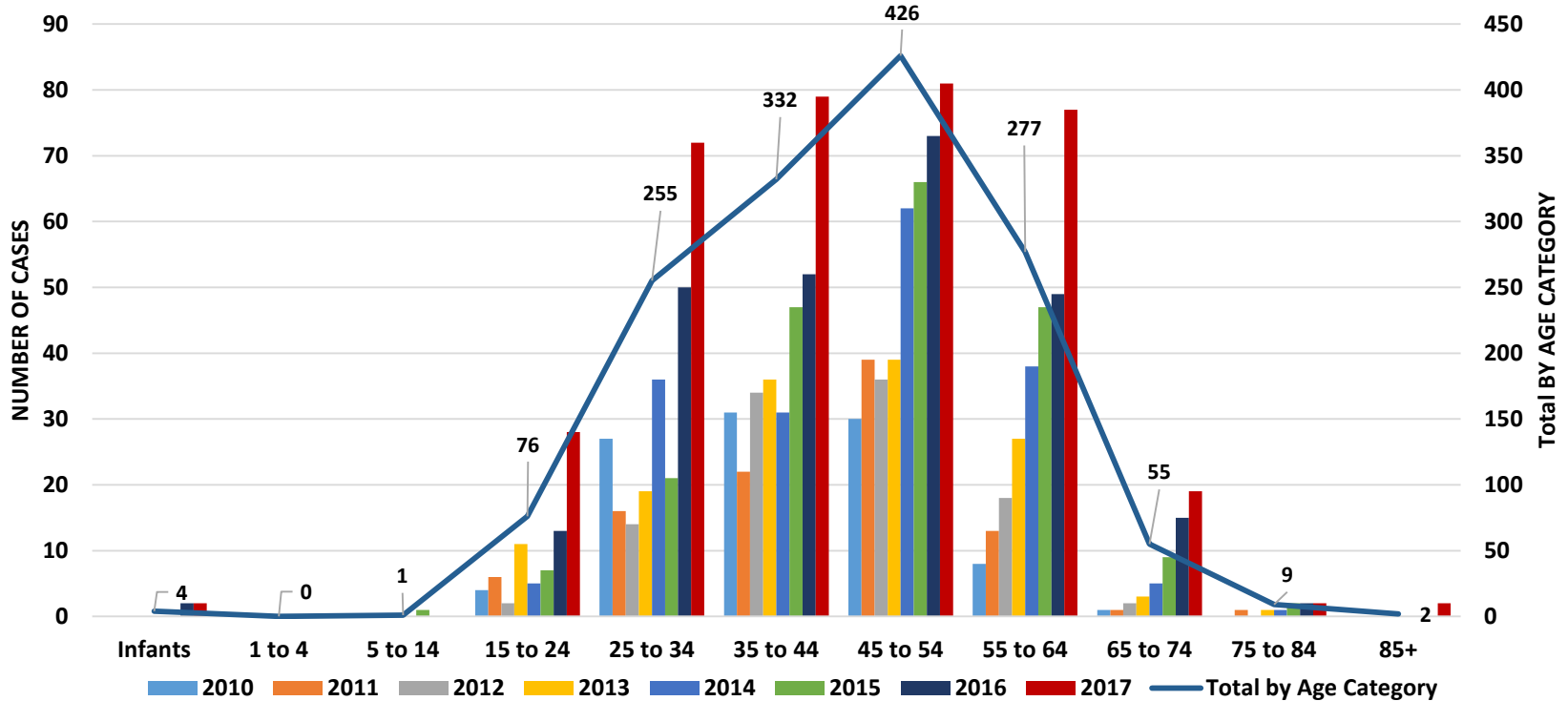
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

Drug Related Death cases have a Manner of Death classification of either Accident-Non Motor Vehicle, Suicide or Undetermined. 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 (accident), 12% suicides, and 6% undetermined.





## Knox and Anderson Counties Age Distribution for Drug Related Cases 2010 - 2017



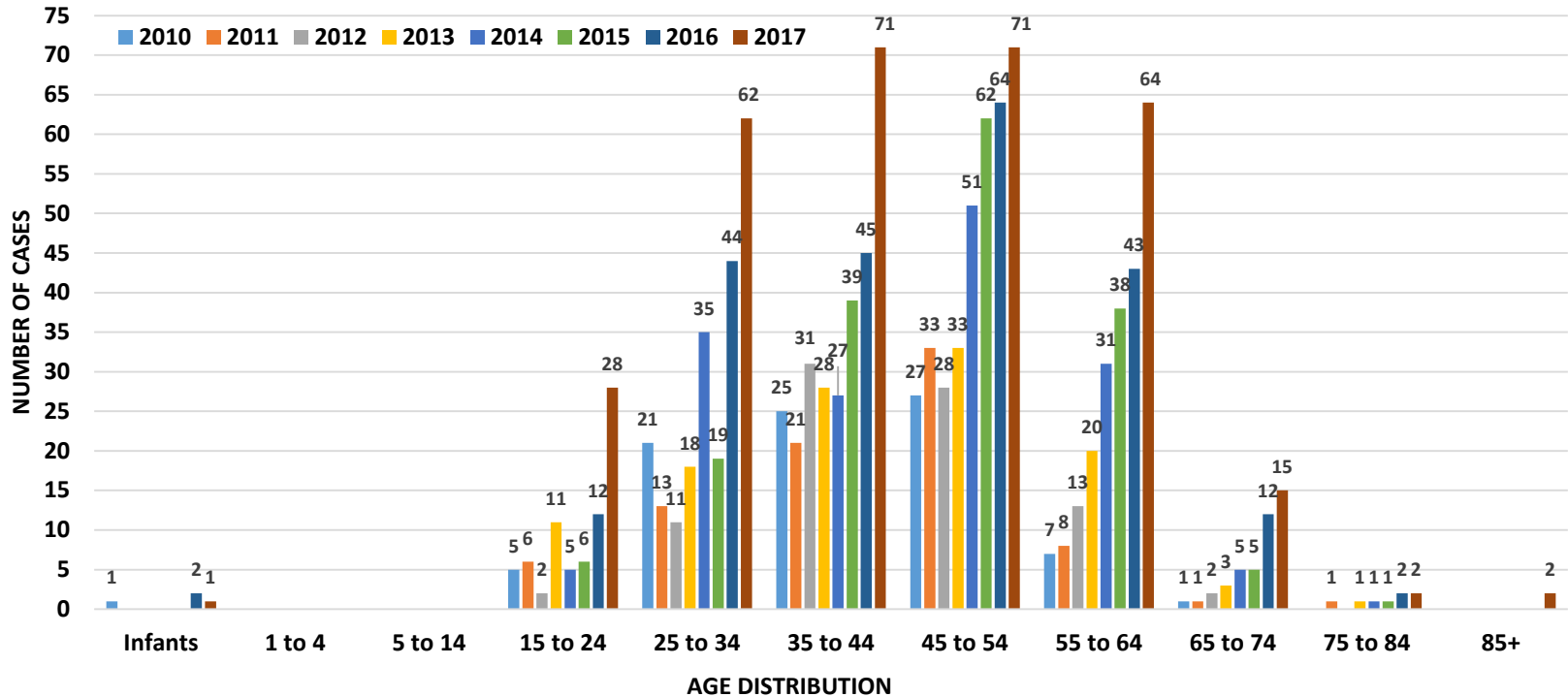
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

In 2017, there were dramatic increases in the 15-24, 35-34, and 55-64 year age groups. The 45-54 year age group was still the age group with the most drug related deaths. 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 Cases 2010 - 2017



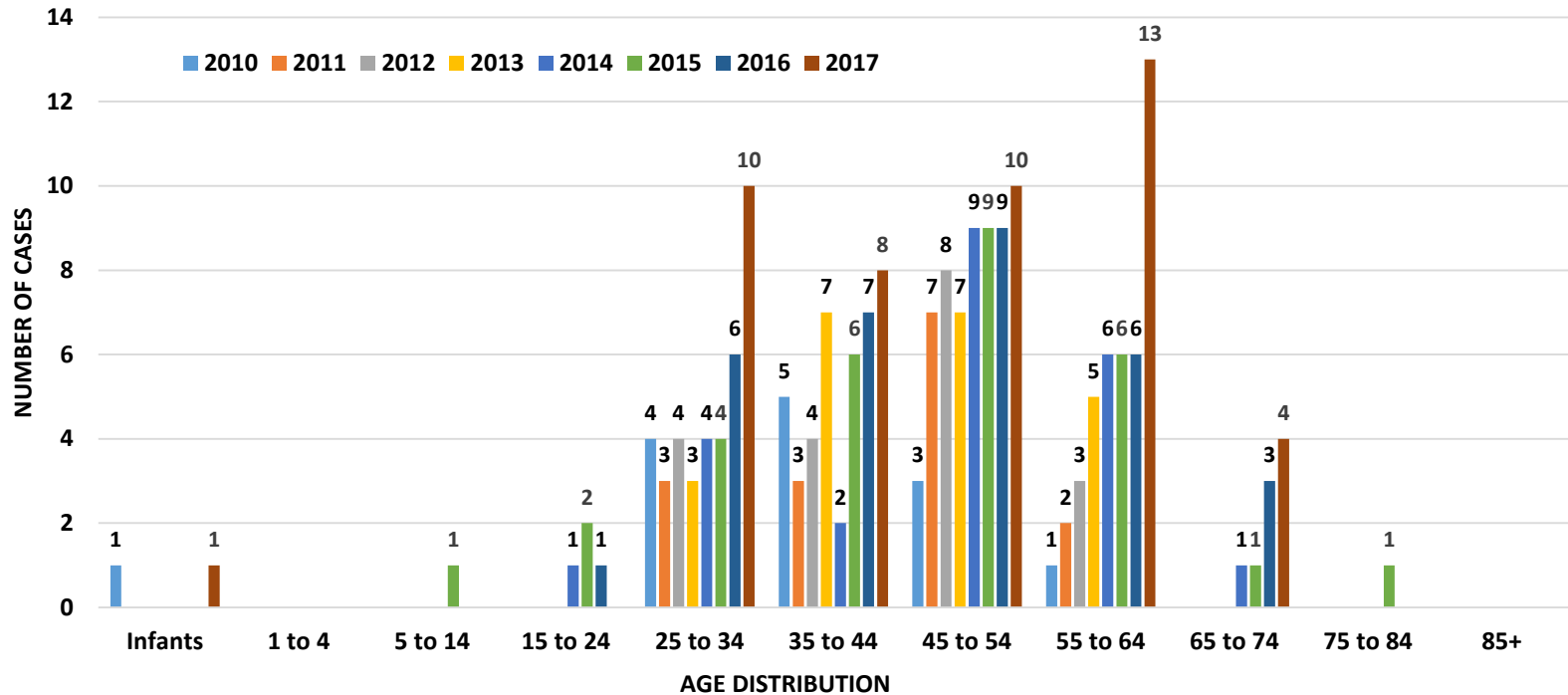
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

In Knox County, the predominant age groups for Drug Related Deaths are the 35 – 44 and 45 – 54 years of age. The 15 – 24 year age group showed nearly a two and half times increase from 2016 to 2017. The 55 – 64 age group showed approximately a one and half times increase from 2016 to 2017.





## Anderson County Age Distribution for Drug Related Cases 2010 - 2017



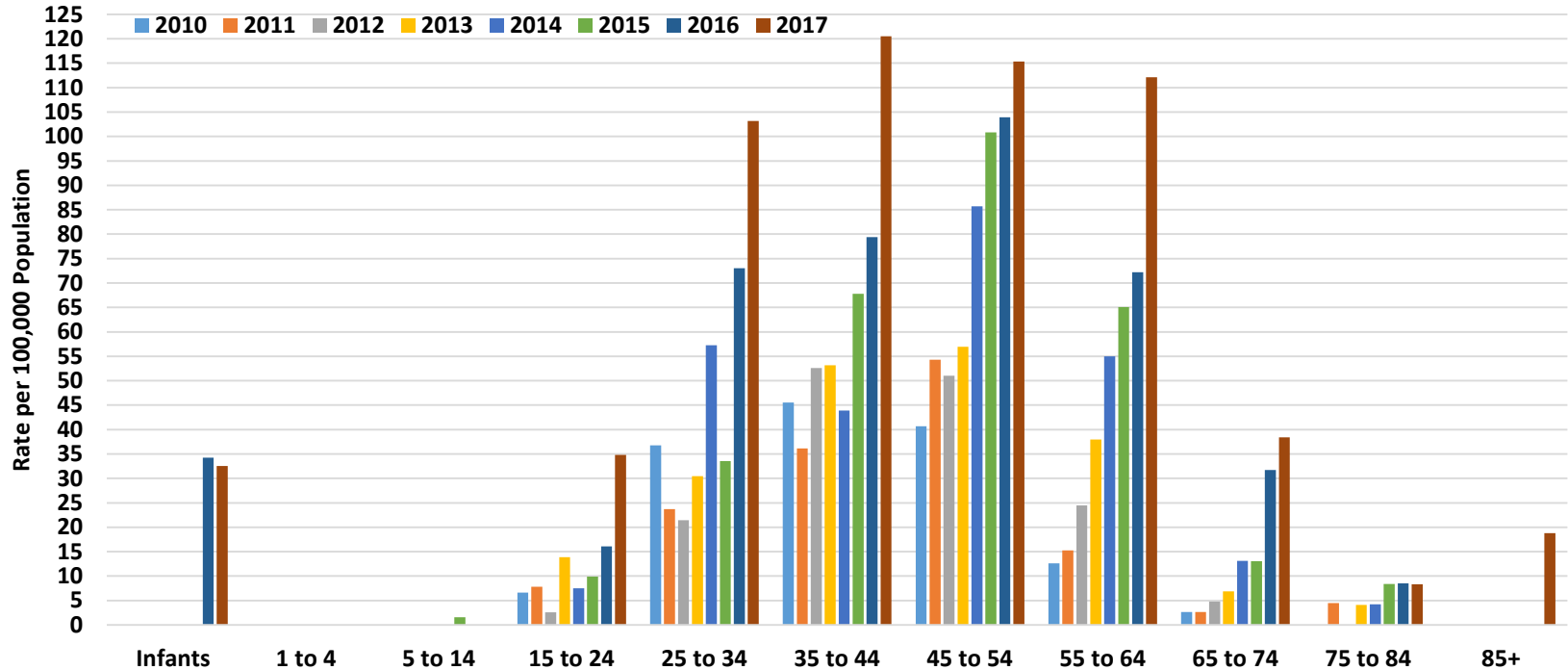
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

In Anderson County, the predominant age group for Drug Related Deaths is 55 – 64 years of age. The number of Drug Related Deaths in the 55 – 64 year age group double from 2016 to 2017. The 25 – 34 age group had a 66% increase from 2016 to 2017.





## Knox and Anderson Counties Age Adjusted Rate per 100,000 for Drug Related Cases 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

**Population Data Source:** 2016 population data estimates from American Fact Finder, U.S. Census (<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>) used to calculate 2017 Age Adjusted Rates since 2017 data unavailable.

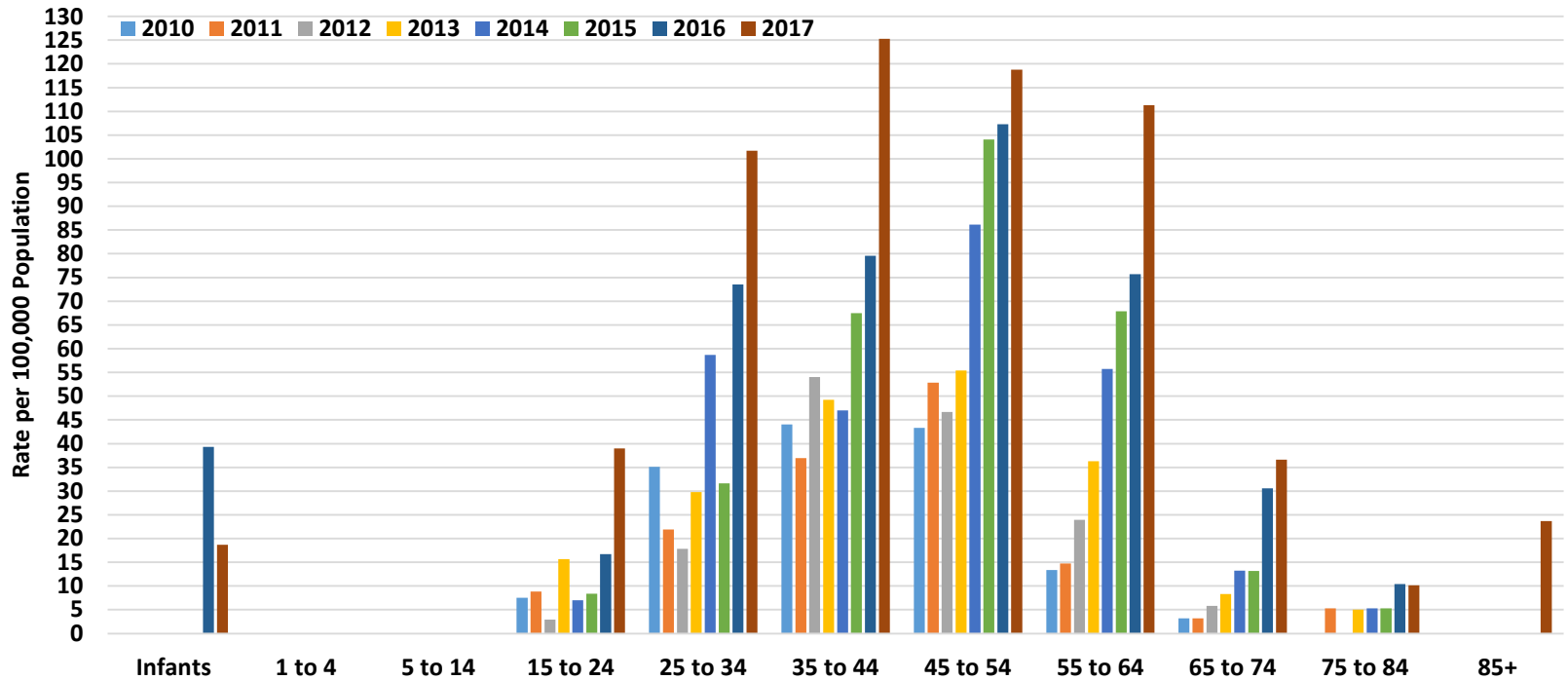
In 2017, there were significant increases in deaths in the 25 – 34, 35 – 44, and 55 – 64 year age groups which resulted in large increases in their age adjusted rates.







## Knox County Age Adjusted Rate per 100,000 for Drug Related Cases 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

**Population Data Source:** 2016 population data estimates from American Fact Finder, U.S. Census

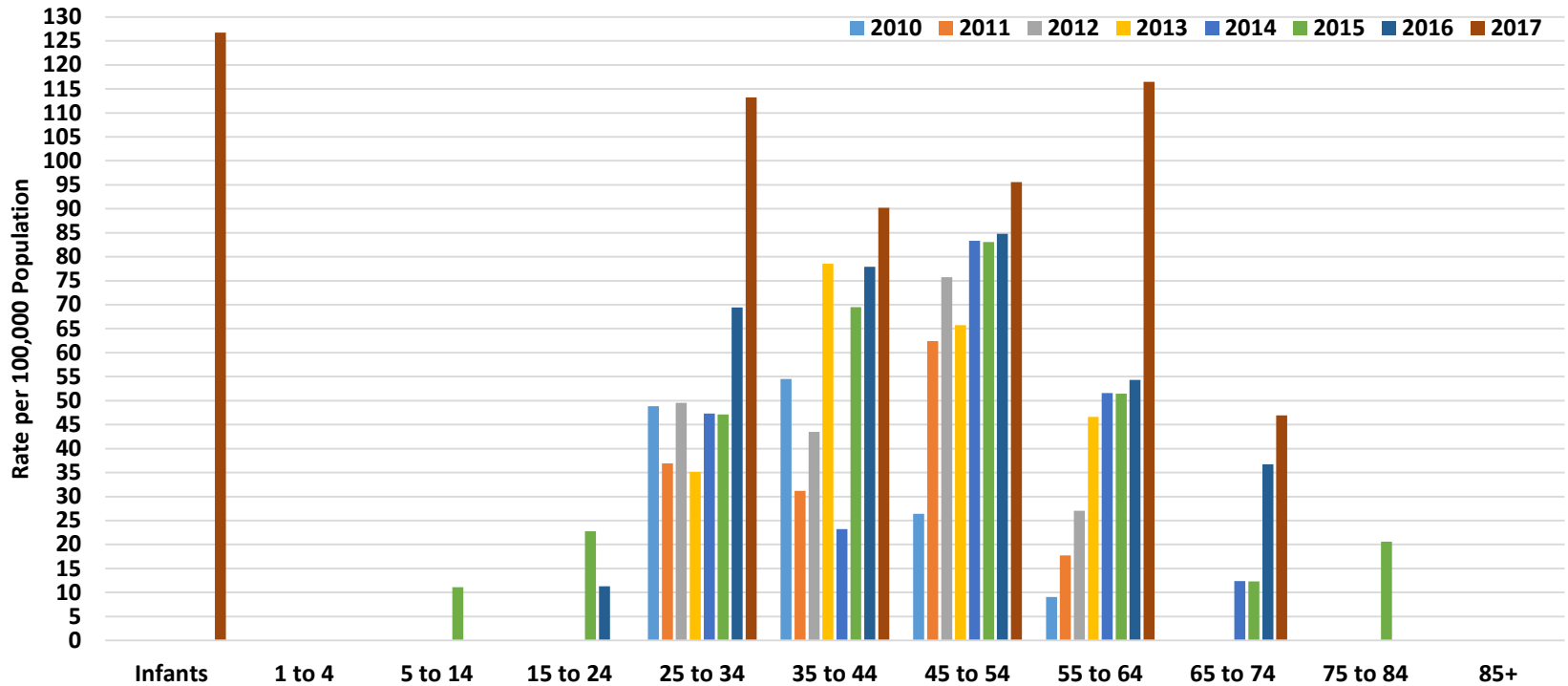
<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk> used to calculate 2017 Age Adjusted Rates since 2017 data unavailable.

In Knox County, there was a shift from the 44 – 54 year age group to the 35 – 44 year age group having the highest age specific rate. In addition in 2017, the 25 – 34 and 55 – 64 year age groups saw significant increases in their age specific Drug Related Death rates.





## Anderson County Age Adjusted Rate per 100,000 for Drug Related Cases 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

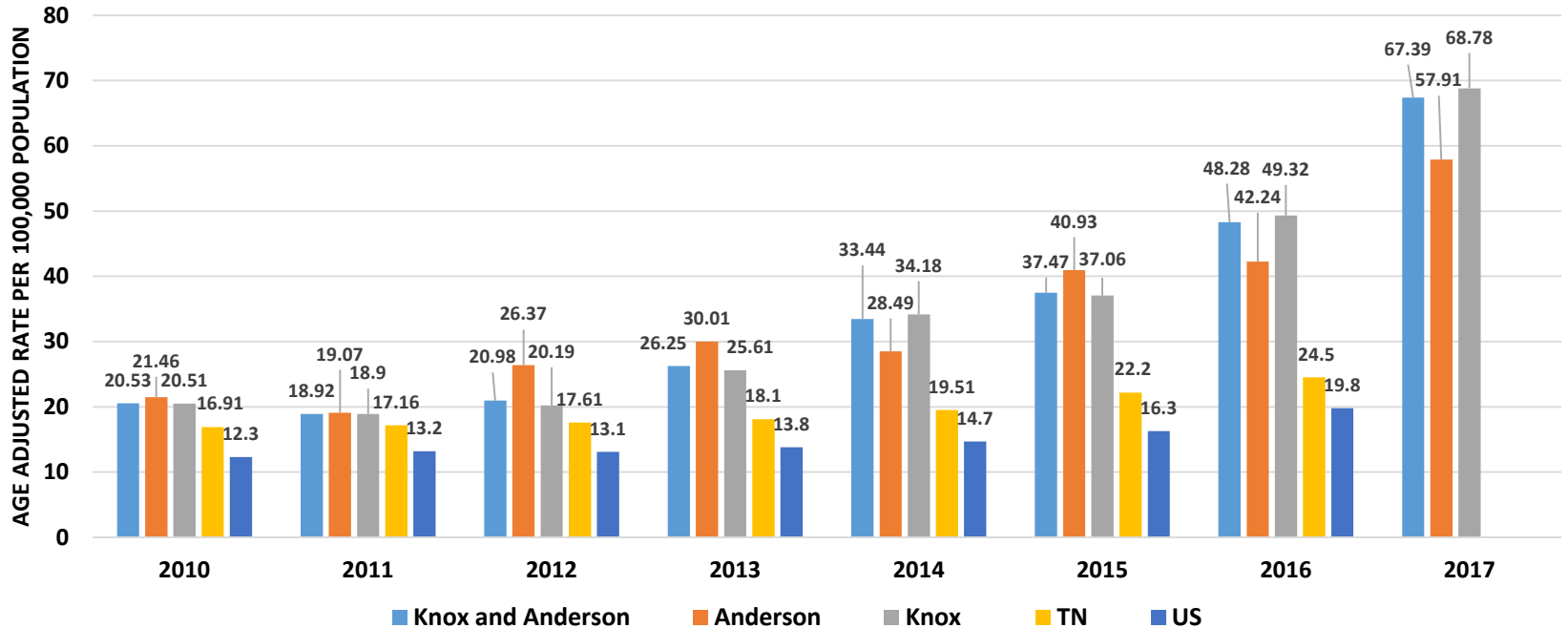
**Population Data Source:** 2016 population data estimates from American Fact Finder, U.S. Census (<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>) used to calculate 2017 Age Adjusted Rates since 2017 data unavailable.

In Anderson County, the 25 – 34 and 55 – 64 year age groups have the highest age specific rates and had significant increases. Due to the low population of the infant age group, any death causes a significant rate.





## Age Adjusted Rate per 100,000 for Drug Related Death Cases Knox vs Anderson vs TN vs US 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

**Population Data Source:** 2016 population data estimates from 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. 2017 data for TN and the US is unavailable.

As a comparison to a local, rural county, Dr. Boduch, the Roane County Medical Examiner, provided Roane County drug overdose data for Medical Examiner cases for 2015 (36 per 100,000), 2016 (58.6 per 100,000), and 2017 (53 per 100,000).



# Knox County 15-24 Year Age Group Special Look for 2017 Drug Related Deaths

In Knox County, the 15-24 year age group increased by 133% which was the largest increase of any age group from 2016 to 2017. Therefore, we have done this special section on the 15 – 24 year age group.

Manner of Death	Count
Accident-non MVA	28
Suicide	0
Undetermined	0

Gender	Count
Male	20
Female	8

Race	Count
White	22
Black	6

Top 5 Home Zip Codes	
Home Zip	Count
37923	4
37921	4
37920	2
37919	2
37918	2

Drugs Contributing to Death	Count
Fentanyl and Fentanyl Analogues	19
<i>Acetyl Fentanyl</i>	2
<i>Acryl Fentanyl</i>	4
<i>Fentanyl</i>	11
<i>Furanyl Fentanyl</i>	1
<i>Tetrahydrofuran Fentanyl</i>	1
Heroin	10
Methamphetamine	6
Oxymorphone	5
Alprazolam	5
Cocaine	4
Alcohol/Ethanol	4
Oxycodone	1
Diazepam	1
Diphenhydramine	1
Hydrocodone	1
Amitriptyline	1
Bupropion	1
Cyclobenzaprine	1
Clonazepam	1
Hydroxyzine	1
Methadone	1

Naloxone	8
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Cases Involving Marijuana by Race	
Race	Count
White	10
Black	5



# Anderson County 55-64 Year Age Group Special Look for 2017 Drug Related Deaths

In Anderson County, the 55-64 year age group increased by 117% which is the largest of any age group from 2016 to 2017. Therefore, we have done this special section on the 55 – 64 year age group.

Manner of Death	Count
Accident-non MVA	12
Suicide	1
Undetermined	0

Gender	Count
Male	8
Female	5

Race	Count
White	12
Black	1

Top 5 Home Zip Codes	
Home Zip	Count
37830	7
37769	3
37716	1
37840	1
37849	1

Drugs Contributing to Death	Count
Oxymorphone	5
Oxycodone	4
Cocaine	3
Methamphetamine	2
Alprazolam	2
Furanyl Fentanyl	1
Alcohol/Ethanol	1
Codeine	1
Dihydrocodeine	1
Hydrocodone	1
Hydromorphone	1
Metformin	1
Morphine	1

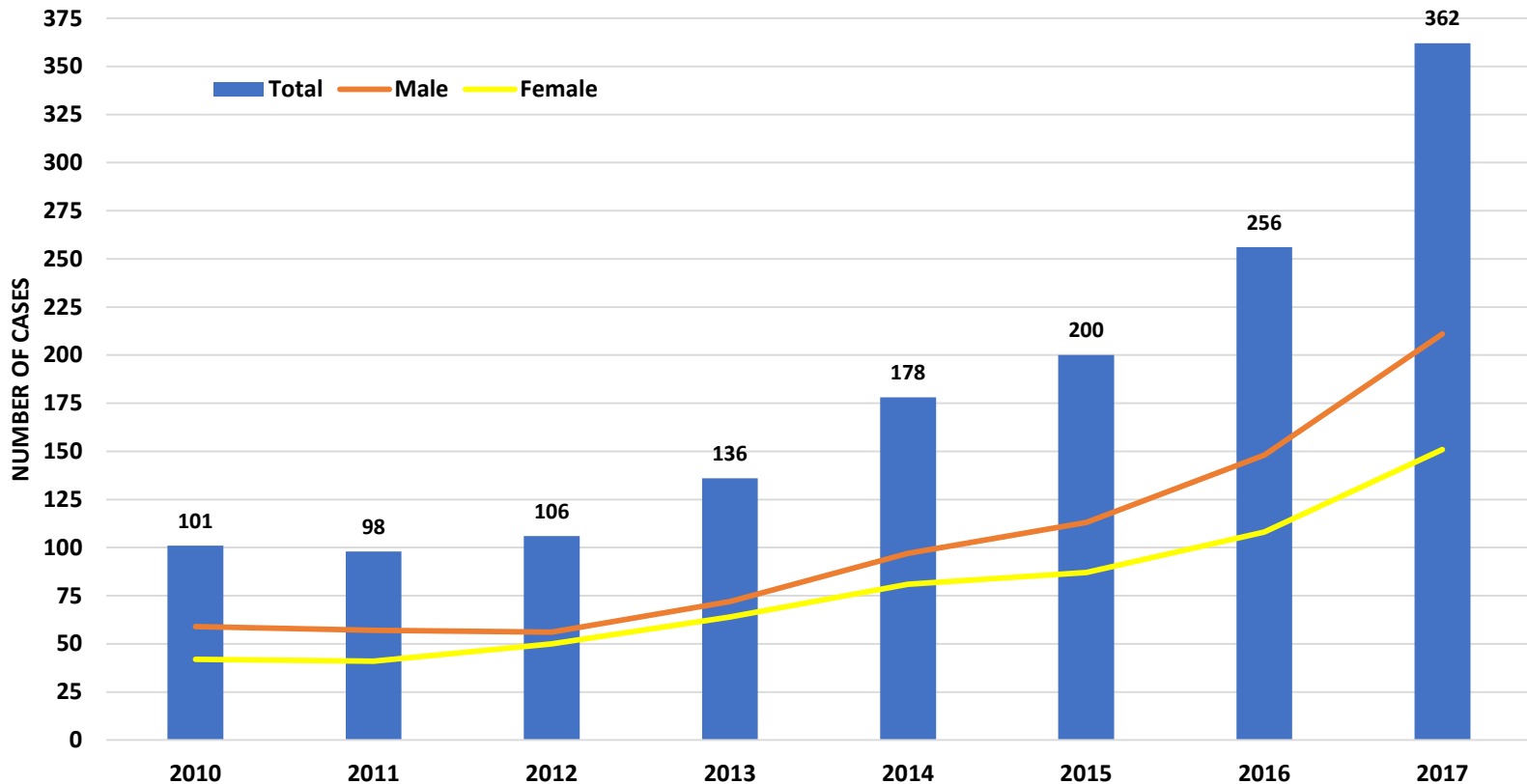
Naloxone	0
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Cases Involving Marijuana by Race	
Race	Count
White	2
Black	0





## Knox and Anderson Counties Gender Distribution for Drug Related Cases 2010 - 2017

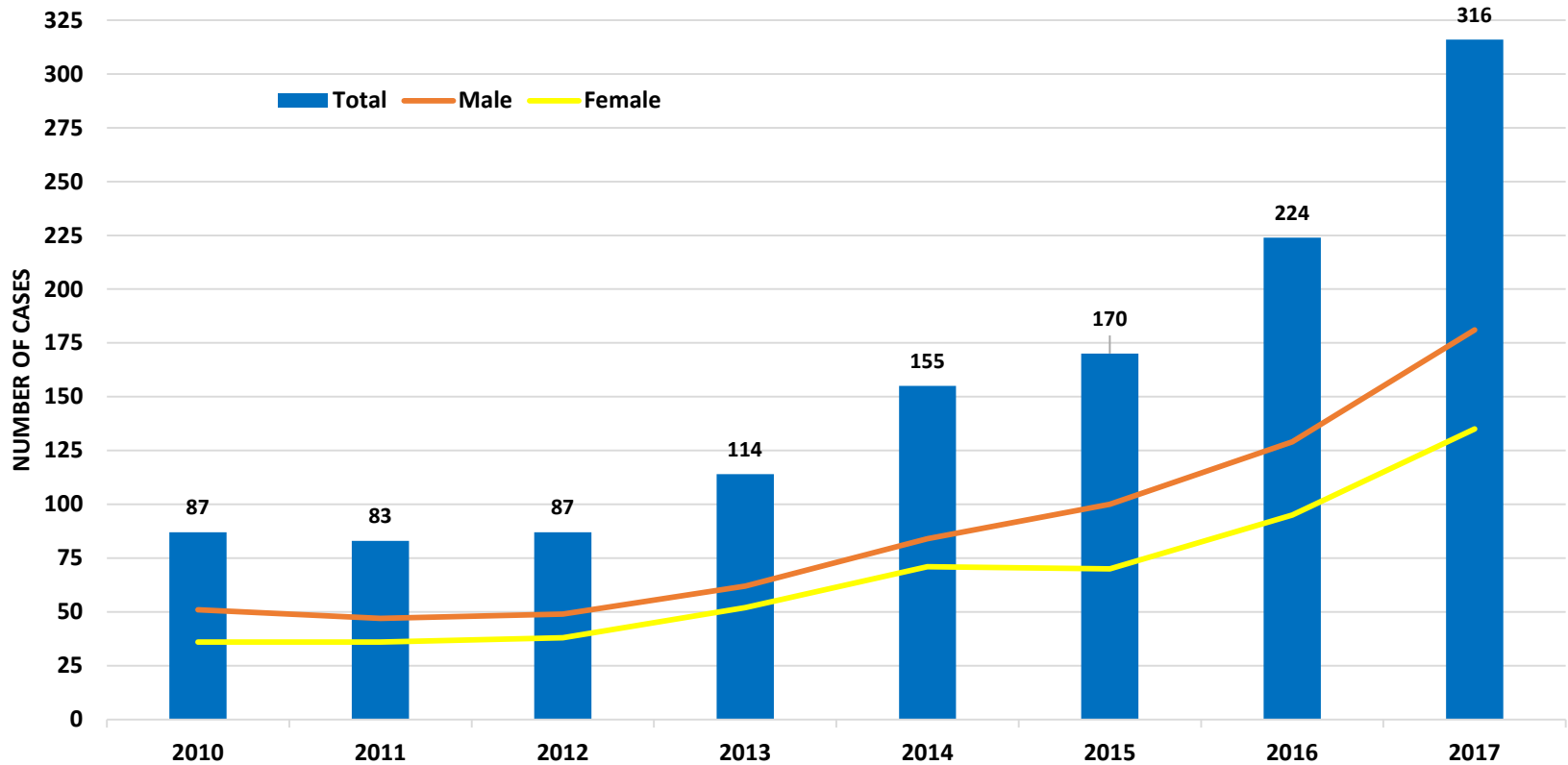


Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.





## Knox County Gender Distribution for Drug Related Cases 2010 - 2017



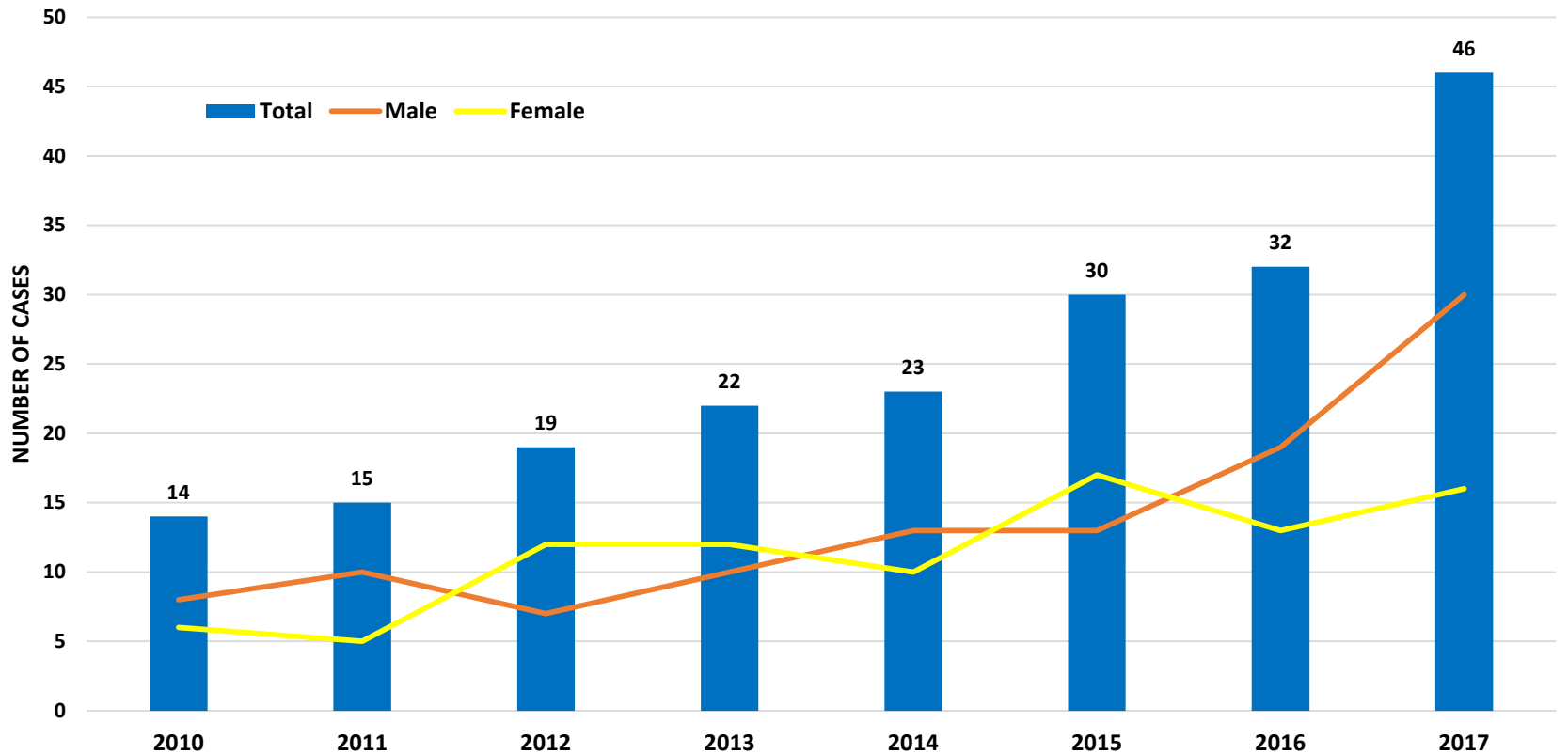
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.







## Anderson County Gender Distribution for Drug Related Cases 2010 - 2017

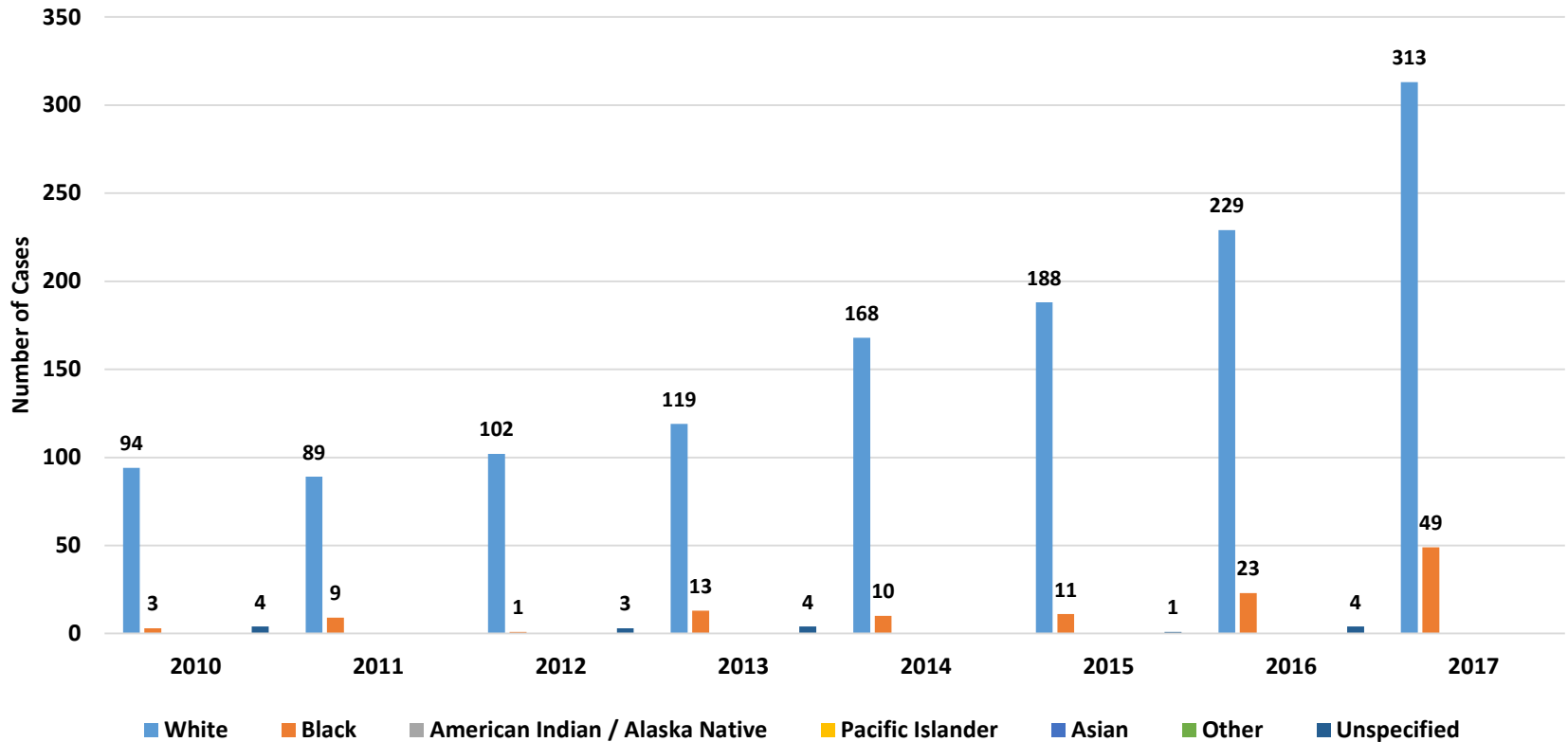


Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.





## Knox and Anderson Counties Race Distribution for Drug Related Cases 2010 - 2017

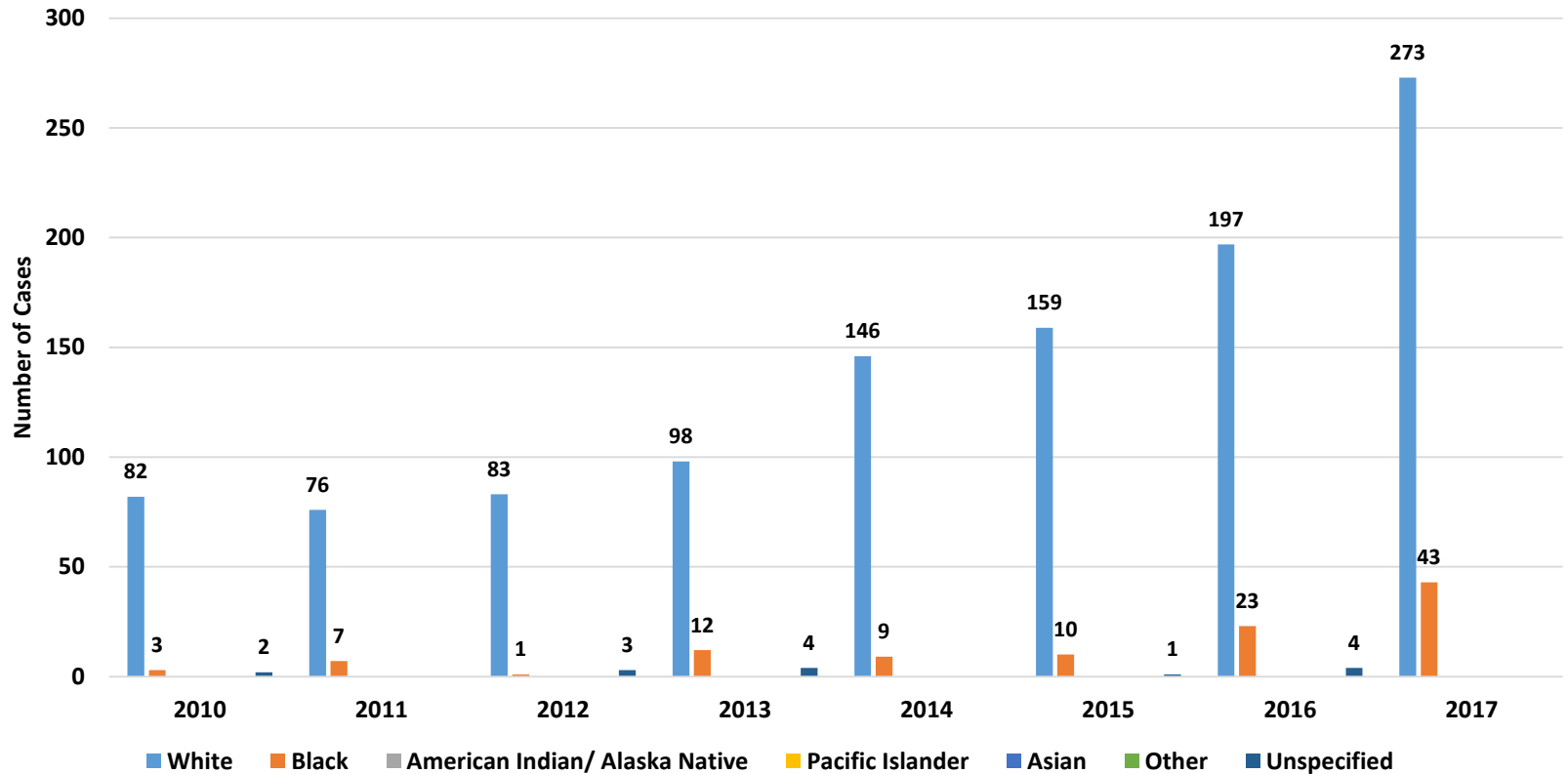


Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.





## Knox County Race Distribution for Drug Related Cases 2010 - 2017

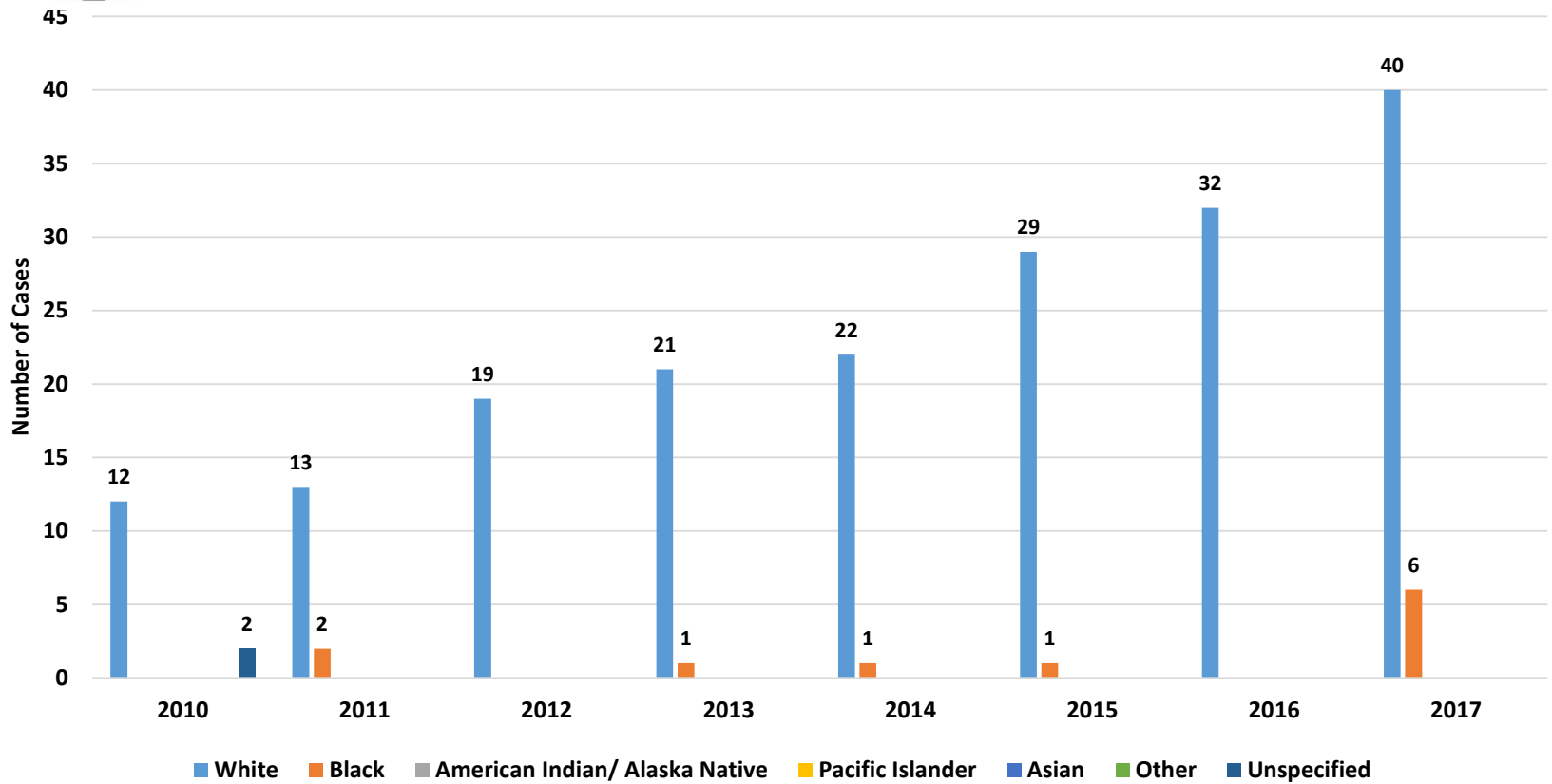


Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.





## Anderson County Race Distribution for Drug Related Cases 2010 - 2017



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. 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 in 2017 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 Clinics and school locations within Knox and Anderson counties.

**Data Source:** MDILog Database and Knox County RFC Medical Examiner Database, 2017. 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 resided.
3. The Location of Injury Address maps represent where drug related death or injury occurred.
4. School locations were added to the maps at the request of the Knox County School system.





## 10 Most Prominent Home Residence Zip Codes by Year

	2010	2011	2012	2013	2014	2015	2016	2017
<b>#1</b>	37918	37918	37917	37920	37921	37918	37920	37920
<b>#2</b>	37921	37920	37920	37917	37912	37920	37917	37917
<b>#3</b>	37919	37917	37918	37914	37920	37917	37921	37918
<b>#4</b>	37912	37912	37716	37912	37917	37912	37918	37921
<b>#5</b>	37830	37914	37830	37849	37918	37716	37919	37914
<b>#6</b>	37849	37830	37849	37921	37914	37914	37849	37830
<b>#7</b>	37914	37849	37912	37931	37922	37849	37912	37716
<b>#8</b>	37917	37924	37919	37918	37938	37938	37830	37915
<b>#9</b>	37909	37769	37921	37919	37923	37721	37716	37912
<b>#10</b>	37920	37840	37931	37923	37849	37830	37915	37919

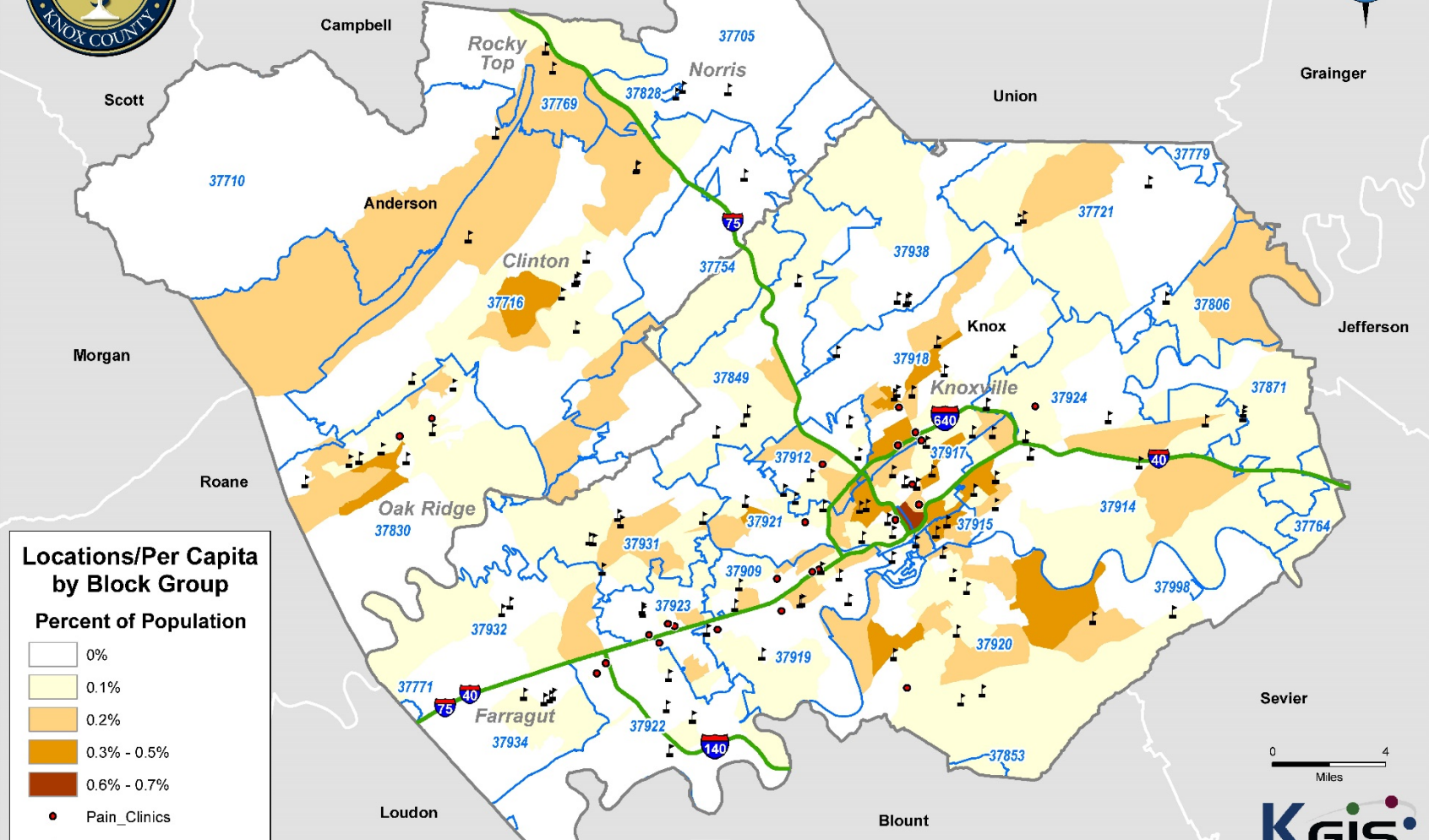
**NOTE:** Colors were added to assist in seeing patterns for Zip Codes frequently represented on the top 10 list.

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.





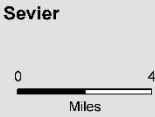
# Home Address Locations for Drug Related Deaths Knox and Anderson Counties for 2017



**Locations/Per Capita by Block Group Percent of Population**

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

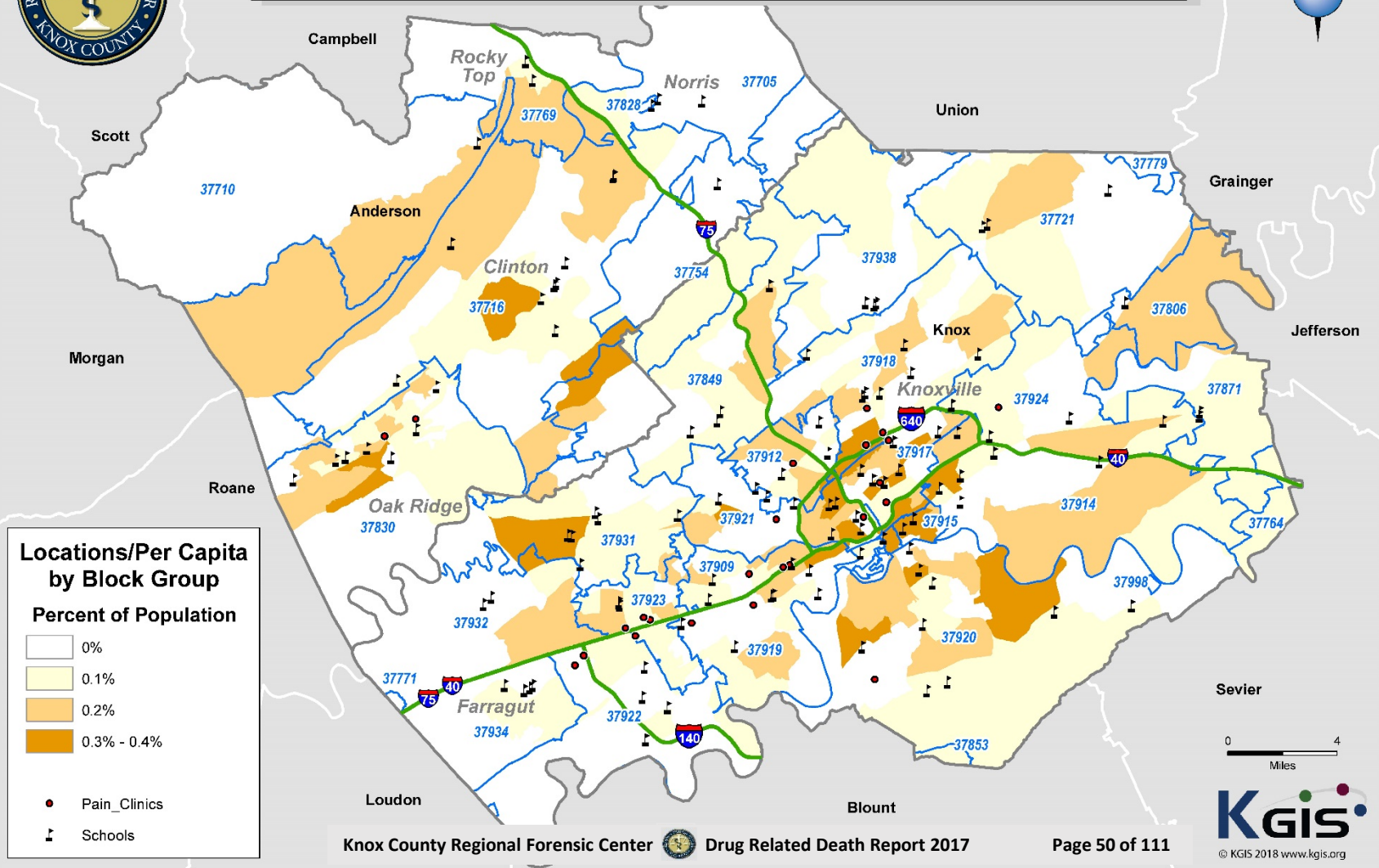
● Pain\_Clinics  
⚡ Schools





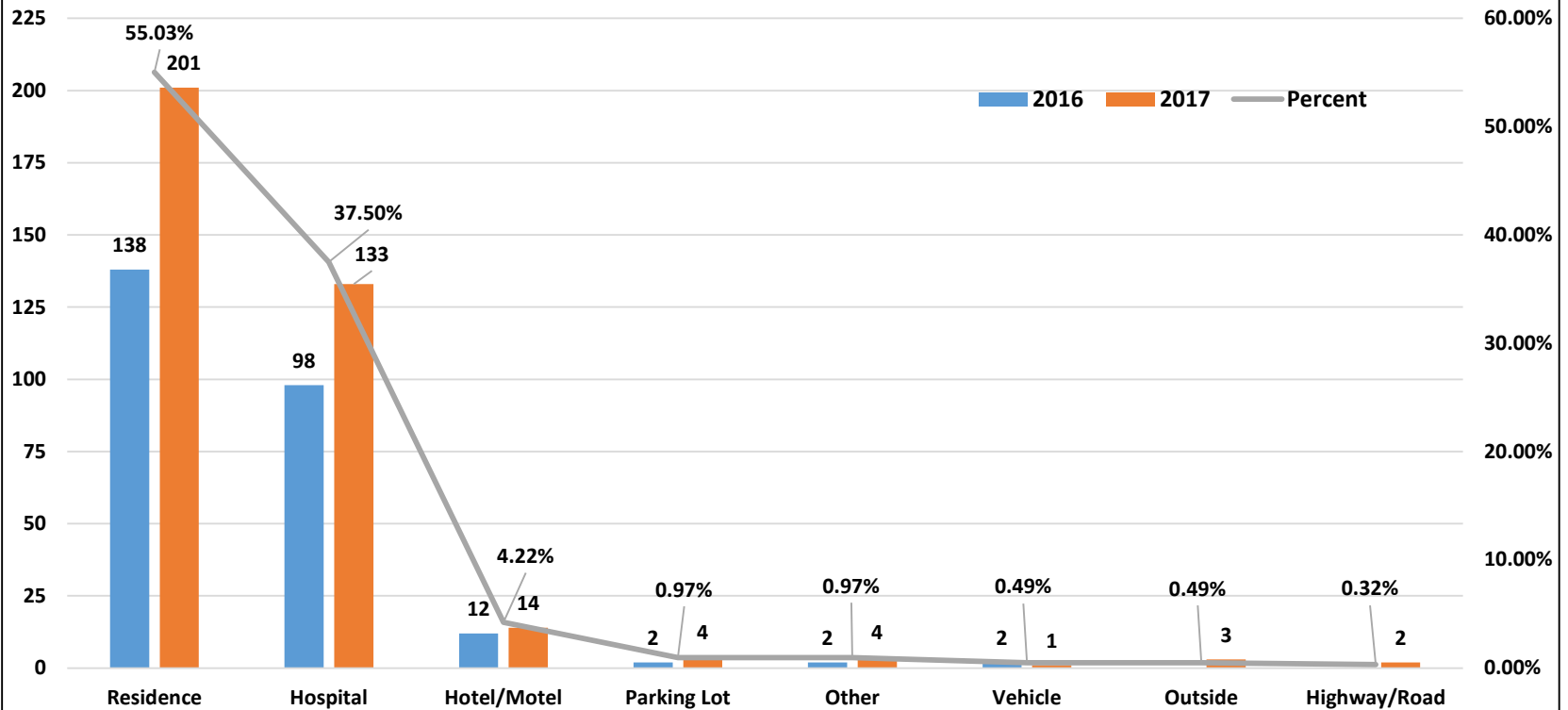


# Location of Injury for Drug Related Death Cases in Knox and Anderson Counties in 2017





## Knox and Anderson Counties Place of Death Distribution for Drug Related Cases 2016 - 2017



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

This chart provides data on the types of places where Drug Related Deaths occurred.





# Drugs Found in Drug Related Deaths

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

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

## Drug List by Year and County

The following tables list drugs found during an autopsy or examination for Drug Related Deaths for 2017 for Knox and Anderson Counties at the Knox County Regional Forensic Center. The Data Source and Notes are listed here for the following pages in order to provide more space for listing the drugs.

**Data Source:** MDILog Database, 2017. 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.





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

	2010	2011	2012	2013	2014	2015	2016	2017
#1	Oxycodone	Oxycodone	Oxycodone	Oxycodone	Oxycodone	Oxycodone	Fentanyl & Analogues	Fentanyl & Analogues*
#2	Alprazolam	Oxymorphone	Morphine	Morphine	Oxymorphone	Oxymorphone	Oxymorphone	Cocaine
#3	Morphine	Cocaine	Cocaine	Alprazolam	Alprazolam	Alprazolam	Oxycodone	Methamphetamine
#4	Methadone	Alprazolam	Oxymorphone	Cocaine	Morphine	Cocaine	Alprazolam	Heroin
#5	Oxymorphone	Morphine	Alprazolam	Oxymorphone	Cocaine	Heroin	Methamphetamine	Oxymorphone
#6	Cocaine	Methadone	Methadone	Methadone	Methadone	Morphine	Cocaine	Alprazolam
#7	Alcohol/Ethanol	Alcohol/Ethanol	Fentanyl	Hydrocodone	Fentanyl	Fentanyl	Hydrocodone	Oxycodone
#8	Hydrocodone	Hydrocodone	Hydrocodone	Alcohol/Ethanol	Hydrocodone	Hydrocodone	Morphine	Alcohol/Ethanol
#9	Diazepam	Benzodiazepine (NOS)	Alcohol/Ethanol	Opiate (NOS)	Alcohol/Ethanol	Alcohol/Ethanol	Alcohol/Ethanol	Morphine
#10	Carisoprodol	Diazepam	Diazepam	Methamphetamine	Diazepam	Methadone	Heroin	Hydrocodone
#10			Amitriptyline		Buprenorphine			
#10			Methamphetamine					

\*includes fentanyl, acetyl fentanyl, acryl fentanyl, carfentanil, **cyclopropyl fentanyl**, despropionyl fentanyl/4ANPP, furanyl fentanyl, **methoxy fentanyl**, **methoxyacetyl fentanyl**, & **terahydrofuran fentanyl** (RED indicates new drugs in 2017)

**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. 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.

Above are the Top 10 Drugs found in Drug Related Deaths by year for Knox and Anderson Counties. The following pages will present 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 page and remember the caveats stated earlier in this document.

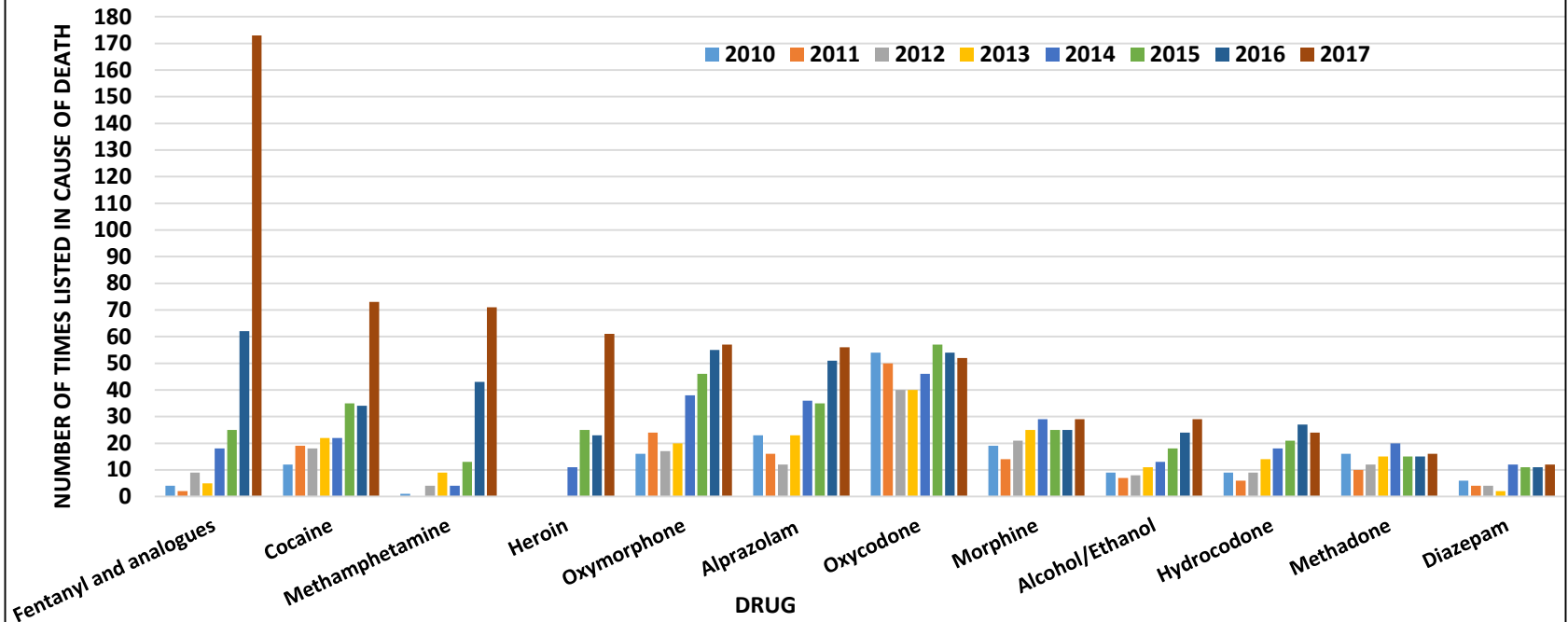
Fentanyl and its analogues have emerged as the most prominent drug found in Drug Related Deaths. In addition, illicit drugs now top the list as the most common drugs found in DRDs. However, prescriptions DRDs are still a problem.







## Knox and Anderson Counties Drug Count for Top 10 Drugs by Year for Drug Related Cases 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. 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.

Fentanyl and its analogues have become the most prevalent drugs found in Drug Related Deaths. Cocaine, Methamphetamine, and Heroin round out the top 4 drugs found in Drug Related Deaths and their rise is likely due to increased regulation of prescription drug prescribing practices. Oxymorphone, Alprazolam, and Oxycodone continue to be very prevalent prescription drugs found in Drug Related Deaths.



**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>TOTAL</b>	<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	2	8
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
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>TOTAL</b>	<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>TOTAL</b>	<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
Alcohol/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
Isopropyl 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>TOTAL</b>	<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	6	16
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
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>TOTAL</b>	<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>TOTAL</b>	<b>349</b>	<b>58</b>	<b>407</b>



Knox County Regional Forensic Center			
Drugs Found in Drug Related Deaths in 2016			
Drug	2016 (N=256)		
	Knox (N=224)	Anderson (N=32)	Total
<b>Fentanyl and Analogues</b>	56	6	62
<i>Fentanyl</i>	34	4	38
<i>Furanyl Fentanyl</i>	8	2	10
<i>Acetyl Fentanyl</i>	7	0	7
<i>Carfentanil</i>	3	0	3
<i>Despropionyl Fentanyl/4ANPP</i>	3	0	3
<i>Acryl Fentanyl</i>	1	0	1
Oxymorphone	47	8	55
Oxycodone	43	11	54
Alprazolam	45	6	51
Methamphetamine	36	7	43
Cocaine	32	2	34
Hydrocodone	21	6	27
Morphine	20	5	25
Alcohol/Ethanol	20	4	24
Heroin	21	2	23
Buprenorphine	13	3	16
Methadone	14	1	15
Diphenhydramine	9	2	11
Diazepam	11	0	11
Clonazepam	4	4	8
Cyclobenzaprine	5	3	8
Amphetamine	2	4	6
Benzodiazepine NOS	5	1	6
Citalopram	4	2	6
Hydroxyzine	4	2	6
Sertraline	6	0	6
Bupropion	4	1	5
Opiates/Opioids NOS	4	0	4
Doxepin	3	0	3
Fluoxetine	3	0	3
Lamotrigine	3	0	3
Lorazepam	2	1	3
Promethazine	2	1	3
Salicylate	2	1	3
Tramadol	3	0	3
U-47700	2	1	3
Amitriptyline	3	0	3



<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in Drug Related Deaths in 2016 (CONTINUED)</b>			
<b>Drug</b>	<b>Knox (N=224)</b>	<b>Anderson (N=32)</b>	<b>Total</b>
Acetaminophen	2	0	2
Amlodipine	2	0	2
Chlorpheniramine	2	0	2
Etizolam	1	1	2
Hydromorphone	1	1	2
Quetiapine	2	0	2
Zolpidem	1	1	2
1,1 DFE	2	0	2
Oxazepam	2	0	2
Temazepam	2	0	2
Olanzapine	2	0	2
Ace Inhibitor	1	0	1
Aripiprazole	1	0	1
Atenolol	1	0	1
Butalbital	1	0	1
Carisoprodol	1	0	1
Codeine	1	0	1
Dextro/Levo Methorphan	1	0	1
Dextromethorphan	0	1	1
Doxylamine	0	1	1
Hydrochlorothiazide	1	0	1
Levamisole	1	0	1
Lisinopril	1	0	1
Lithium (based on PMH)	1	0	1
Loperamide	1	0	1
Loxapine	0	1	1
Meprobamate	1	0	1
Metformin	1	0	1
Mirtazapine	1	0	1
Mitragynine	1	0	1
Paroxetine	1	0	1
Phentermine	1	0	1
Phenylpropanolamine	0	1	1
Pseudoephedrine	1	0	1
Seroquel	1	0	1
Topiramate	1	0	1
Trazodone	1	0	1
Venlafaxine	1	0	1
<b>TOTAL</b>	<b>491</b>	<b>91</b>	<b>582</b>



<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in Drug Related Deaths in 2017</b>			
<b>Drug</b>	<b>2017 (N=362)</b>		
<b>Drug</b>	<b>Knox (N=316)</b>	<b>Anderson (N=46)</b>	<b>Total</b>
<b>Fentanyl and Analogues</b>	161	12	173
<i>Acetyl Fentanyl</i>	9		9
<i>Acryl Fentanyl</i>	39	2	41
<i>Carfentanil</i>	4	1	5
<i>Cyclopropyl Fentanyl</i>	9	1	10
<i>Despropionyl Fentanyl/ 4ANPP</i>	1		1
<i>Fentanyl</i>	73	4	77
<i>Furanyl Fentanyl</i>	3		3
<i>Methoxy Fentanyl</i>		2	2
<i>Methoxyacetyl Fentanyl</i>	22	2	24
<i>Terahydrofuran Fentanyl</i>	1		1
Cocaine	66	7	73
Methamphetamine	70	1	71
Heroin	57	4	61
Oxymorphone	47	10	57
Alprazolam	46	10	56
Oxycodone	44	8	52
Alcohol/Ethanol	26	3	29
Morphine	23	6	29
Hydrocodone	21	3	24
Methadone	15	1	16
Methotrexate		16	16
Diphenhydramine	13	1	14
Diazepam	12		12
Buprenorphine	6	1	7
Citalopram	5	2	7
U-47700	6	1	7
Amphetamine	5	1	6
Clonazepam	5	1	6
Cyclobenzaprine	5	1	6
Flubromazolam	6		6
Gabapentin	5	1	6
Hydromorphone	4	2	6
Promethazine	4		4
Temazepam	4		4
Tramadol	3	1	4
Bupropion	3		3



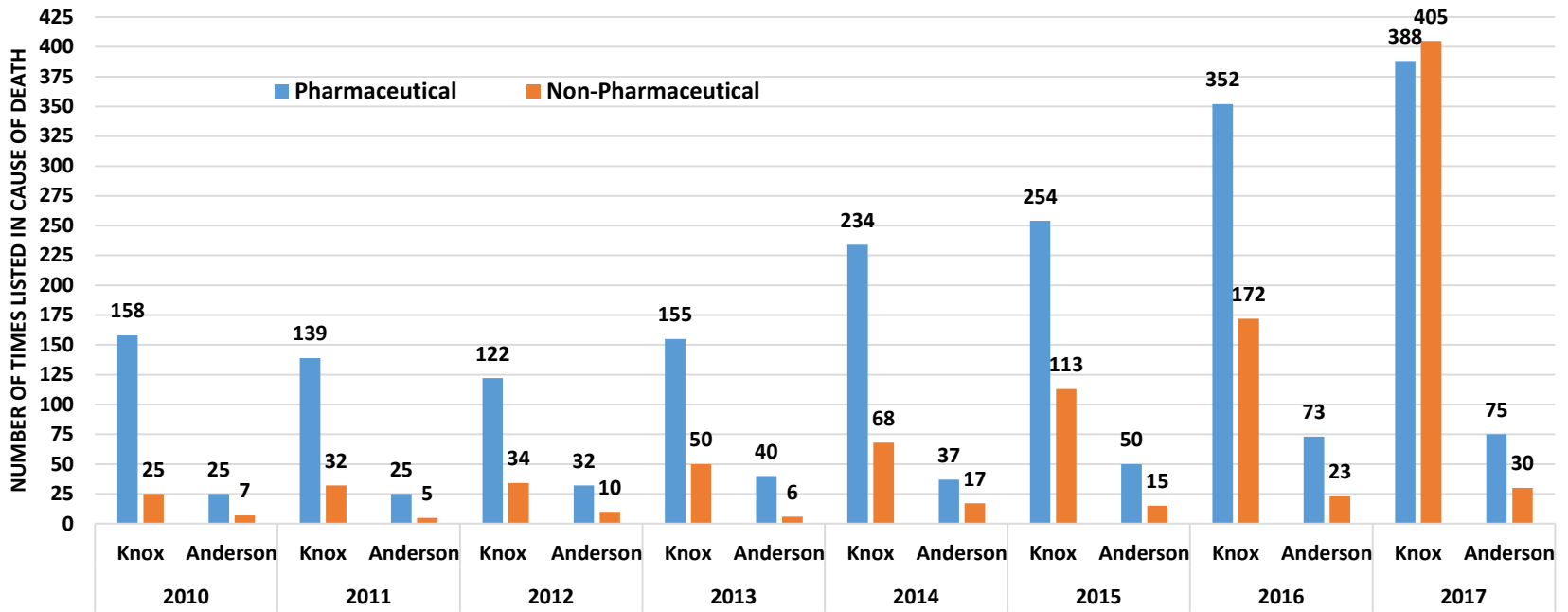
<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in Drug Related Deaths in 2017 (continued)</b>			
<b>Drug</b>	<b>Knox (N=316)</b>	<b>Anderson (N=46)</b>	<b>Total</b>
Fluoxetine	3		3
Hydroxyzine	3		3
Amitriptyline	2		2
Benzodiazepine NOS	2		2
Codeine	1	1	2
Dextromethorphan	2		2
Lorazepam	2		2
Metformin		2	2
Quetiapine	1	1	2
Salicylate	1	1	2
Sertraline	2		2
Zolpidem	2		2
1,1 DFE	1		1
Caffeine		1	1
Carbon Monoxide		1	1
Chlorpheniramine	1		1
Clonidine	1		1
Cotinine		1	1
Dextro/Levo Methorphan	1		1
Dihydrocodeine		1	1
Doxepin	1		1
Duloxetine	1		1
Loperamide	1		1
MDMA	1		1
Methocarbamol	1		1
Mitragynine	1		1
Nortriptyline	1		1
Olanzapine	1		1
Opiates	1		1
Oxazepam	1		1
Phenobarbital	1		1
Phentermine	1		1
Propranolol	1		1
Secobarbital	1		1
Trazodone	1		1
Verapamil		1	1
<b>TOTAL</b>	<b>702</b>	<b>103</b>	<b>805</b>







## Knox and Anderson Counties Pharmaceutical vs. Non-Pharmaceutical Drug Related Deaths 2010 - 2017



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2015 and MDILog Database 2016 and 2017. Knoxville, TN.

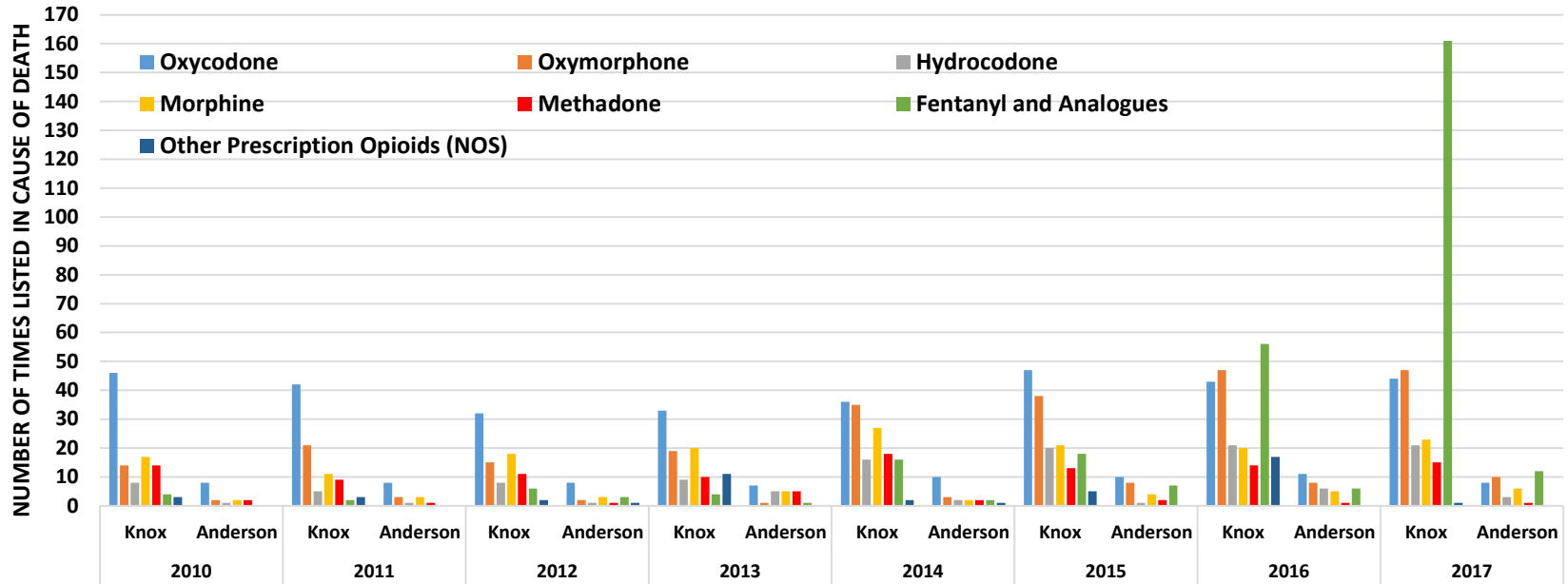
- Note:
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use 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 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 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. 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.

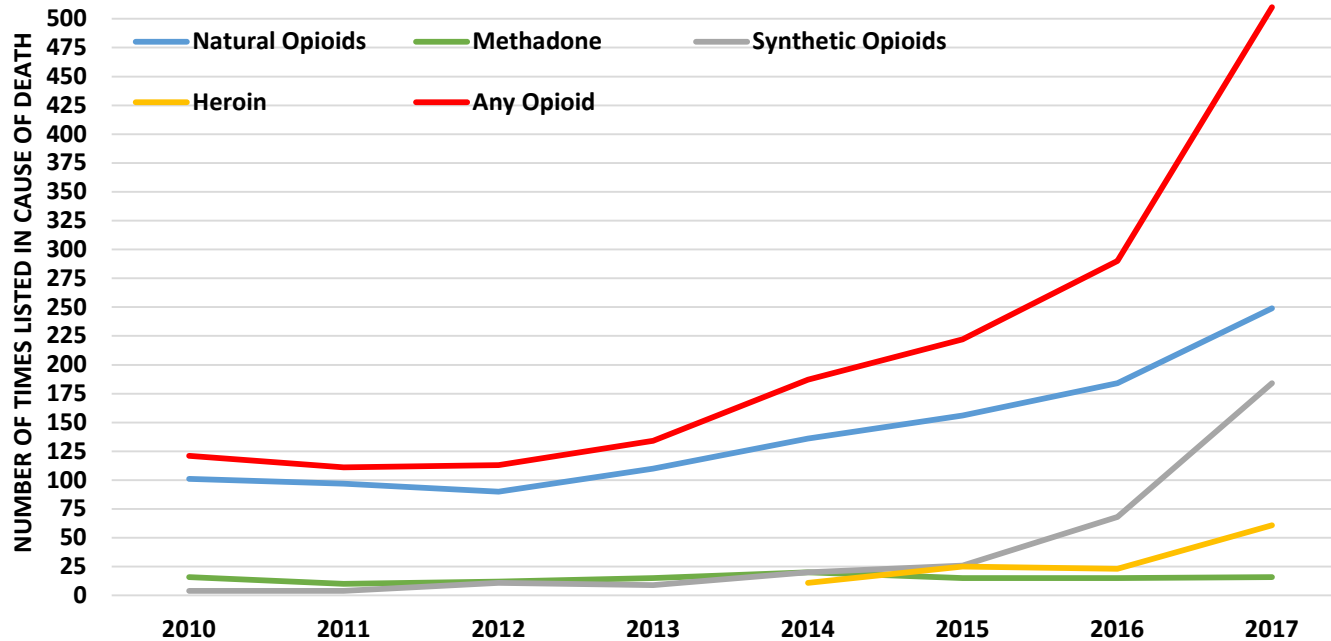
3. Drug poisoning deaths may involve more than one specific substance.

4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define drug type.





## Knox and Anderson Counties Drug Deaths Involving Opioids 2010 - 2017



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.

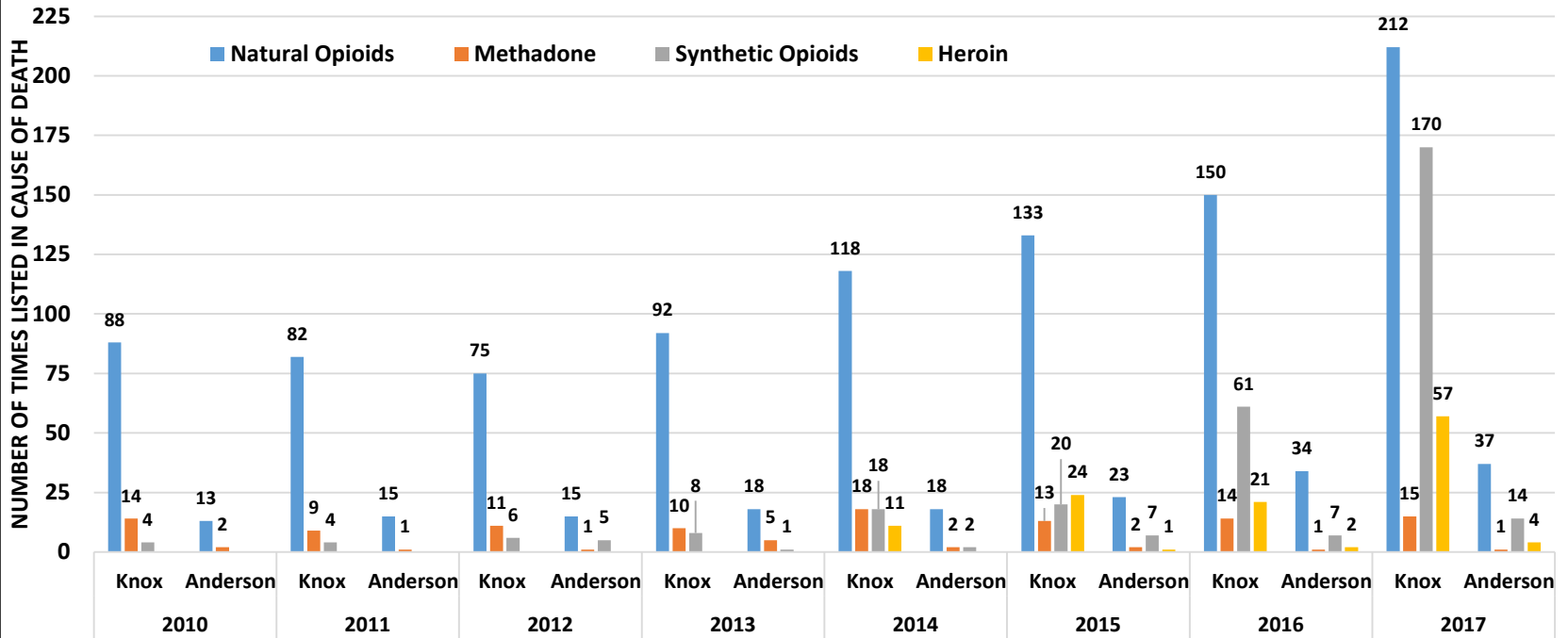
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.  
**Note:** 1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.  
 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. CDC data from 2000-2015 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 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016. Knox County MDILog Database 2016 and 2017. 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.

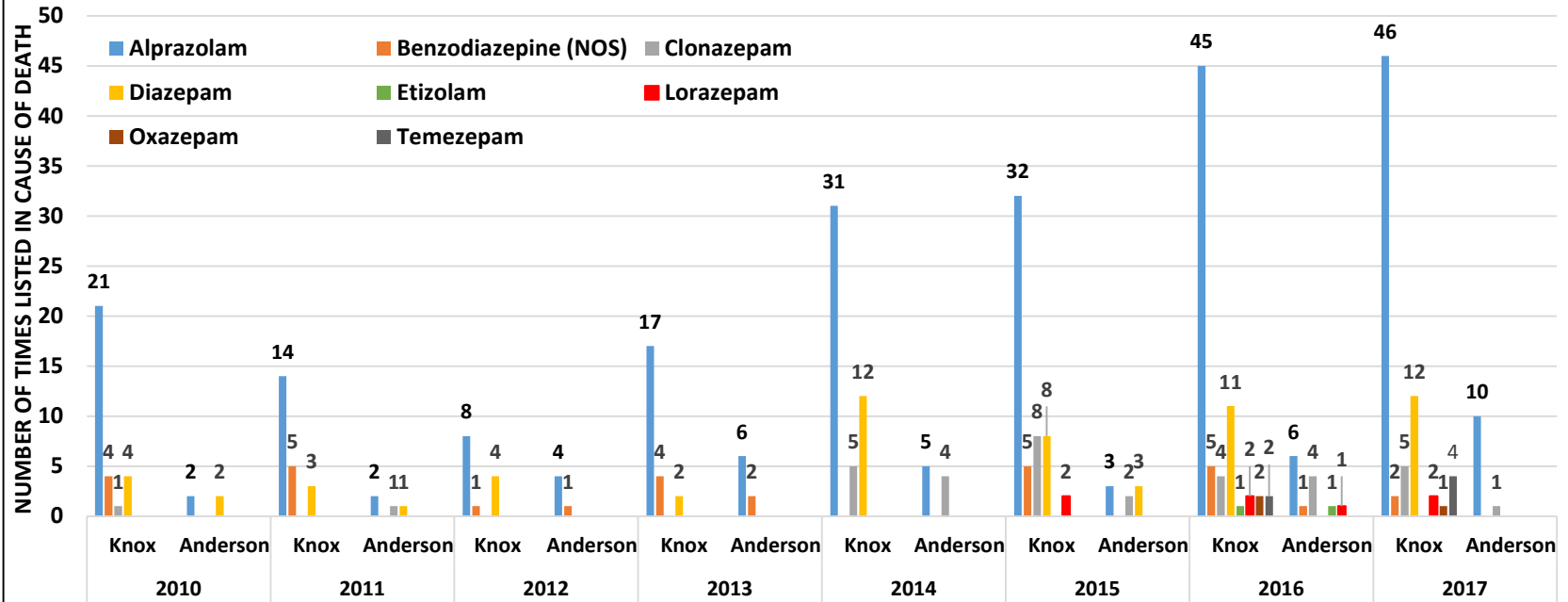
3. Drug poisoning deaths may involve more than one specific substance.

4. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define drug type.





## Knox and Anderson Counties Drug Deaths Involving Benzodiazepine 2010 - 2017



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016, and 2017 Knoxville, TN.

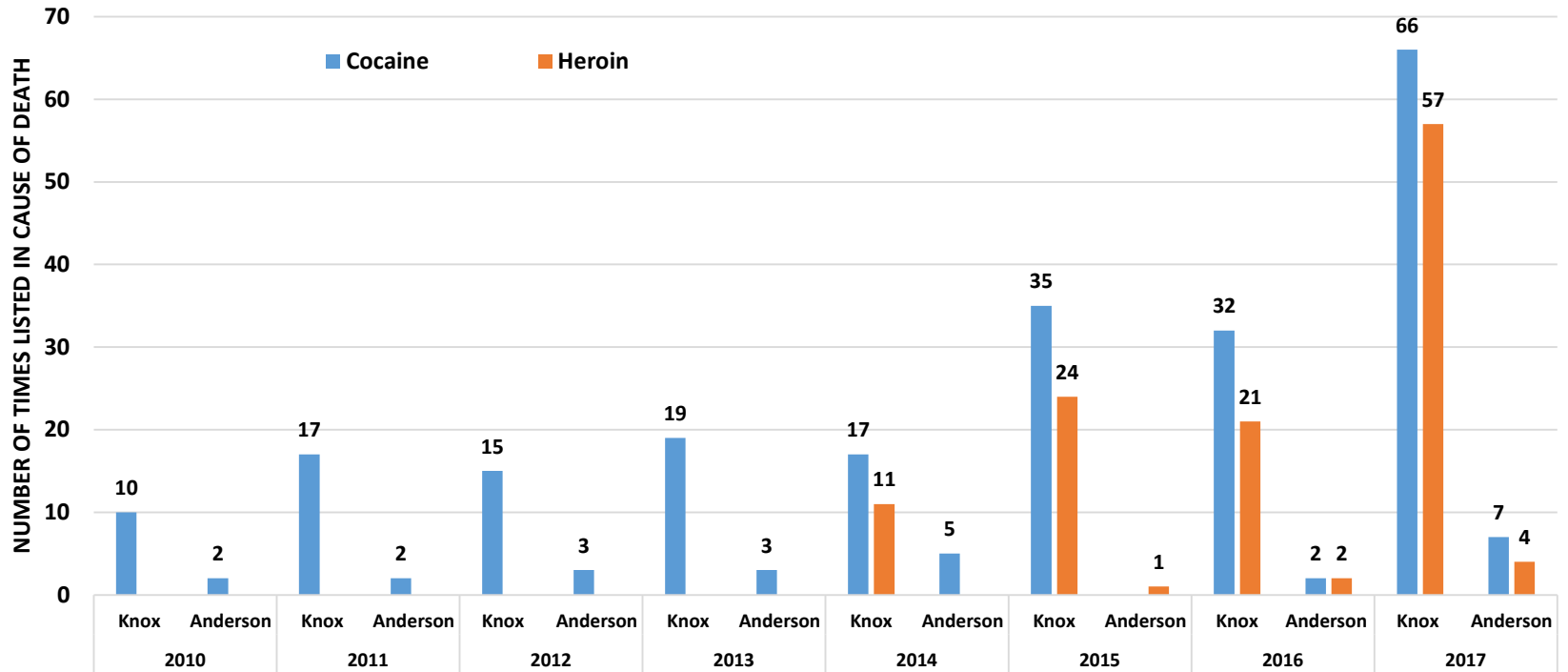
- Note:
1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical which accounts for the difference in numbers between this graph and the "Drug List" graph count.
  2. This report only notes the presence of the drug contributing to death but does not indicate the appropriate or legal use 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 8 year period. Alprazolam is the most prevalent drug in this class.





## Knox and Anderson Counties Drug Deaths Involving Cocaine and Heroin 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

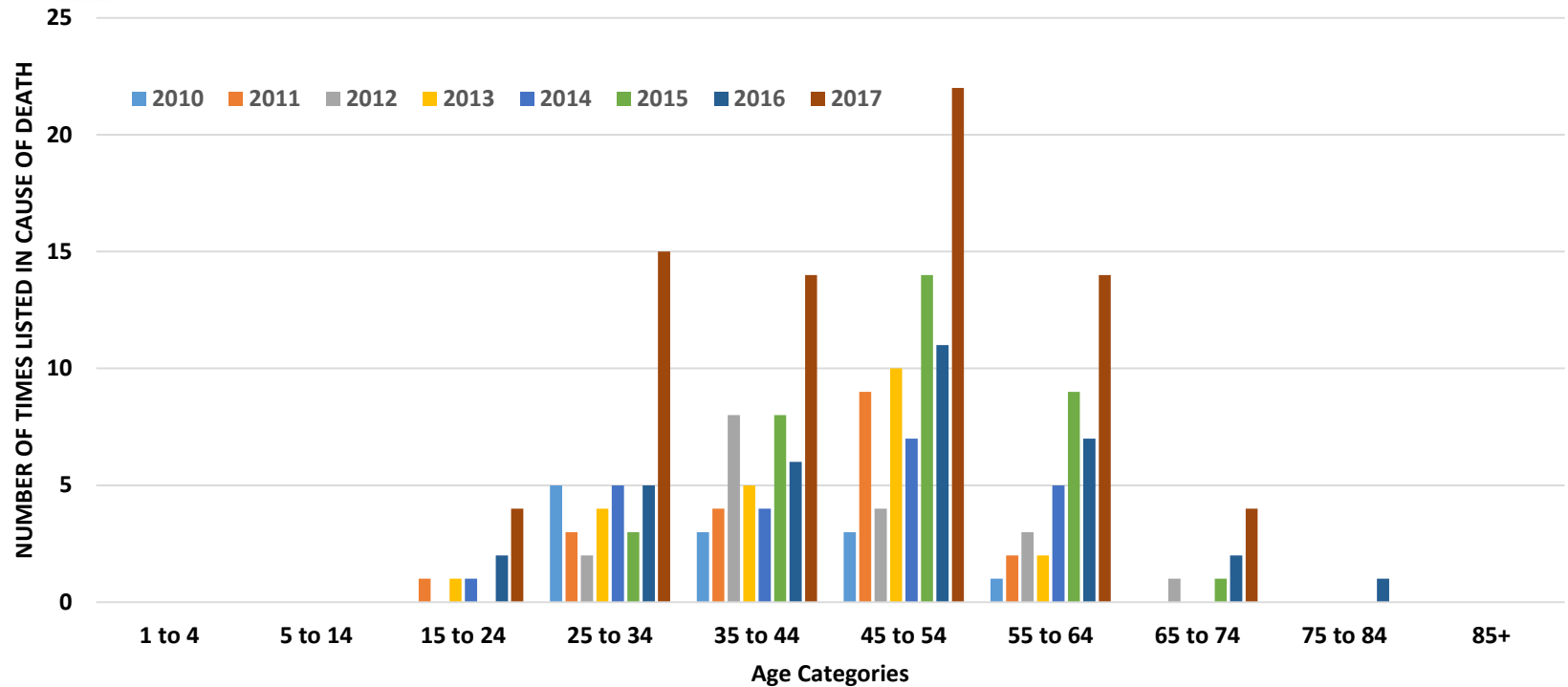
**Note:** 1. This report only notes the presence of the drug contributing to death.

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





## Knox and Anderson Counties Drug Deaths Involving Cocaine by Age Group 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

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

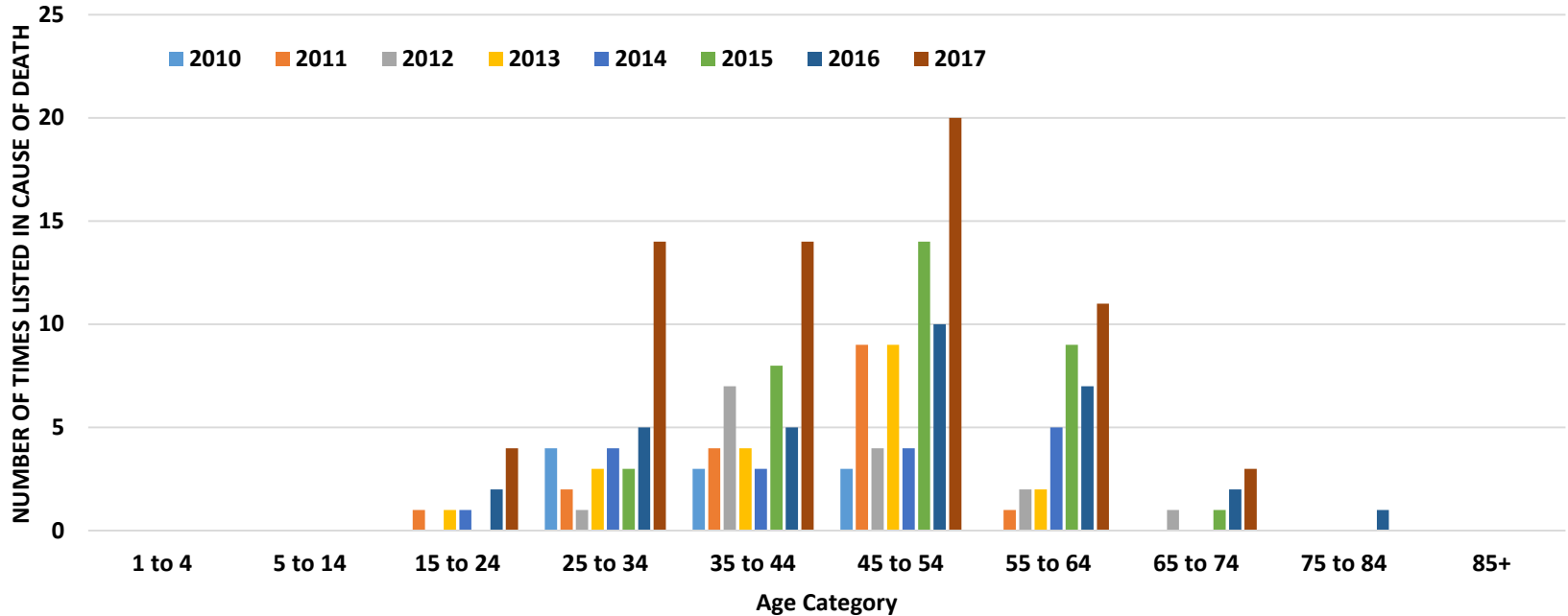
2. Drug poisoning deaths may involve more than one specific substance.

The increase in cocaine being found in Drug Related Deaths could be due to the change in prescribing habits of providers. This would cause a prescription addicted population to seek other forms of drugs.





## Knox County Drug Deaths Involving Cocaine by Age Group 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

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

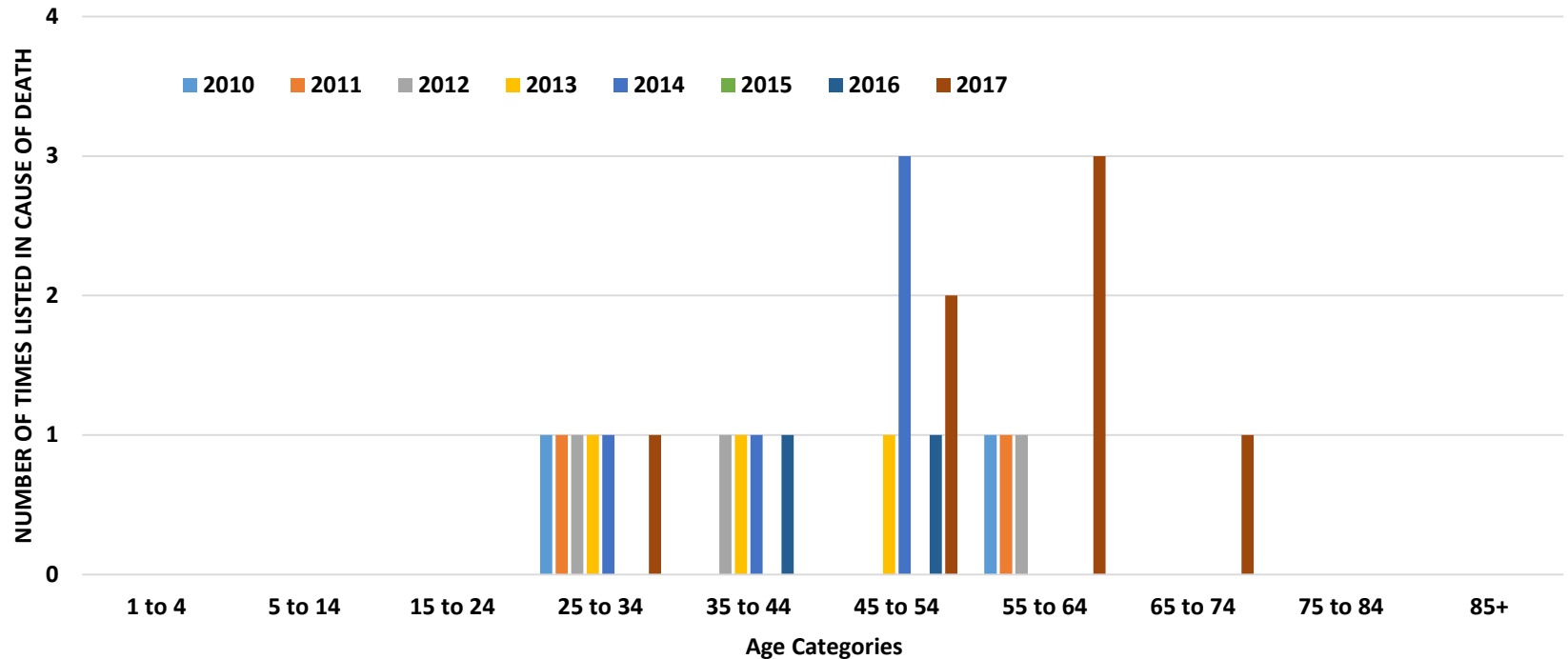
2. Drug poisoning deaths may involve more than one specific substance.







## Anderson County Drug Deaths Involving Cocaine by Age Group 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

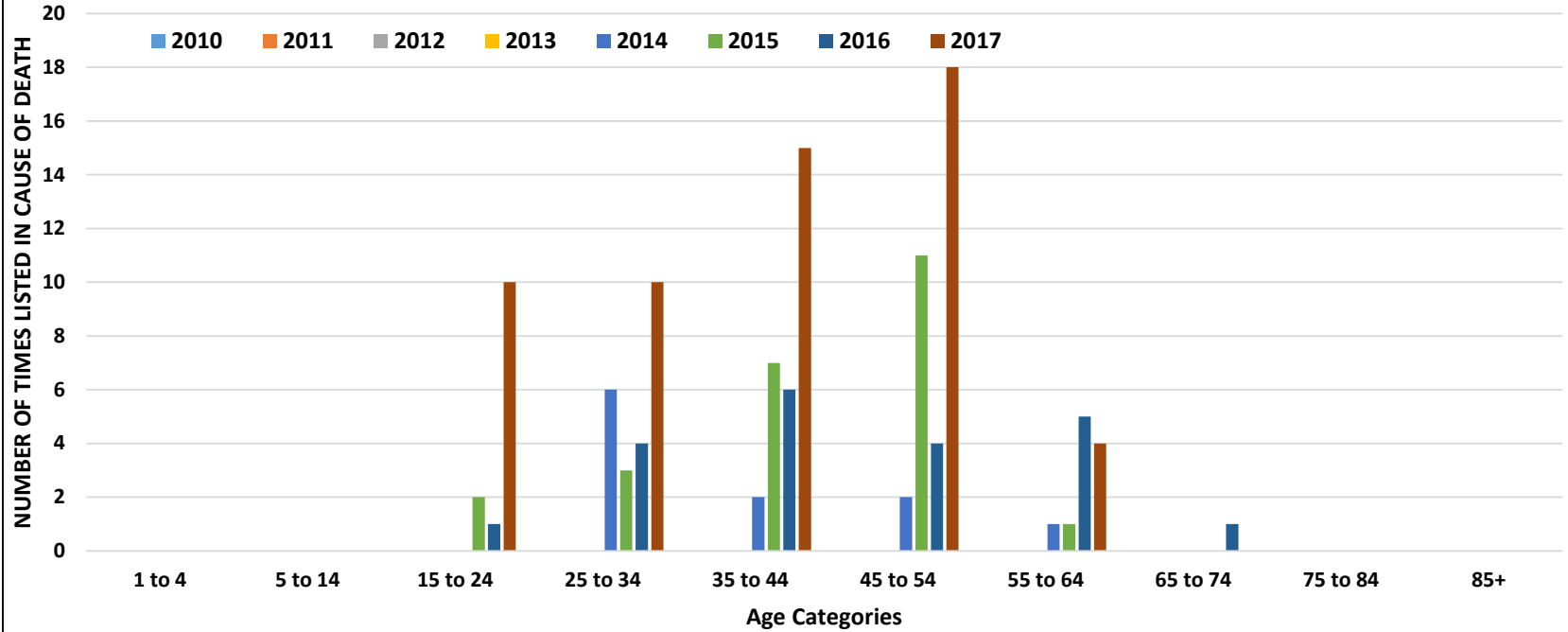
**Note:** 1. This report only notes the presence of the drug contributing to death.

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





## Knox County Drug Deaths Involving Heroin by Age 2010 - 2017



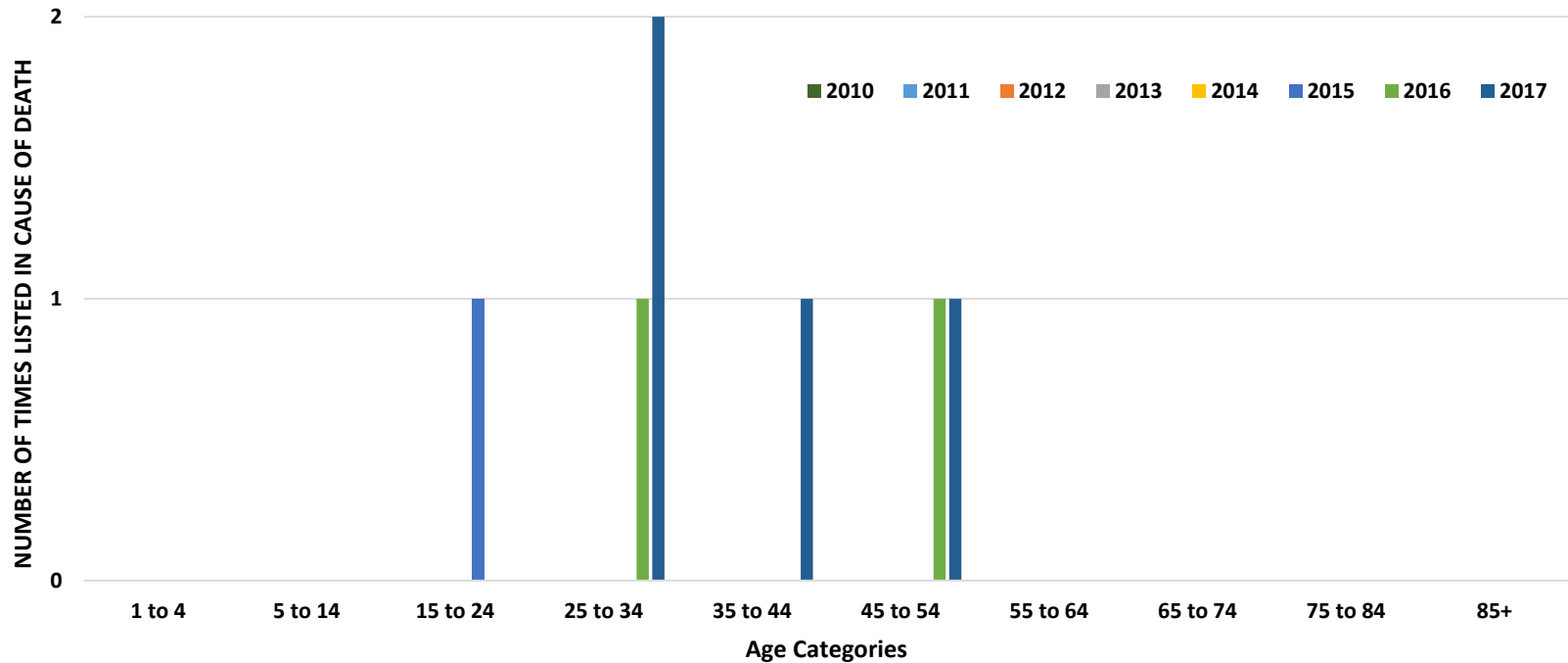
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

- 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.





## Anderson County Drug Deaths Involving Heroin by Age 2010 - 2017



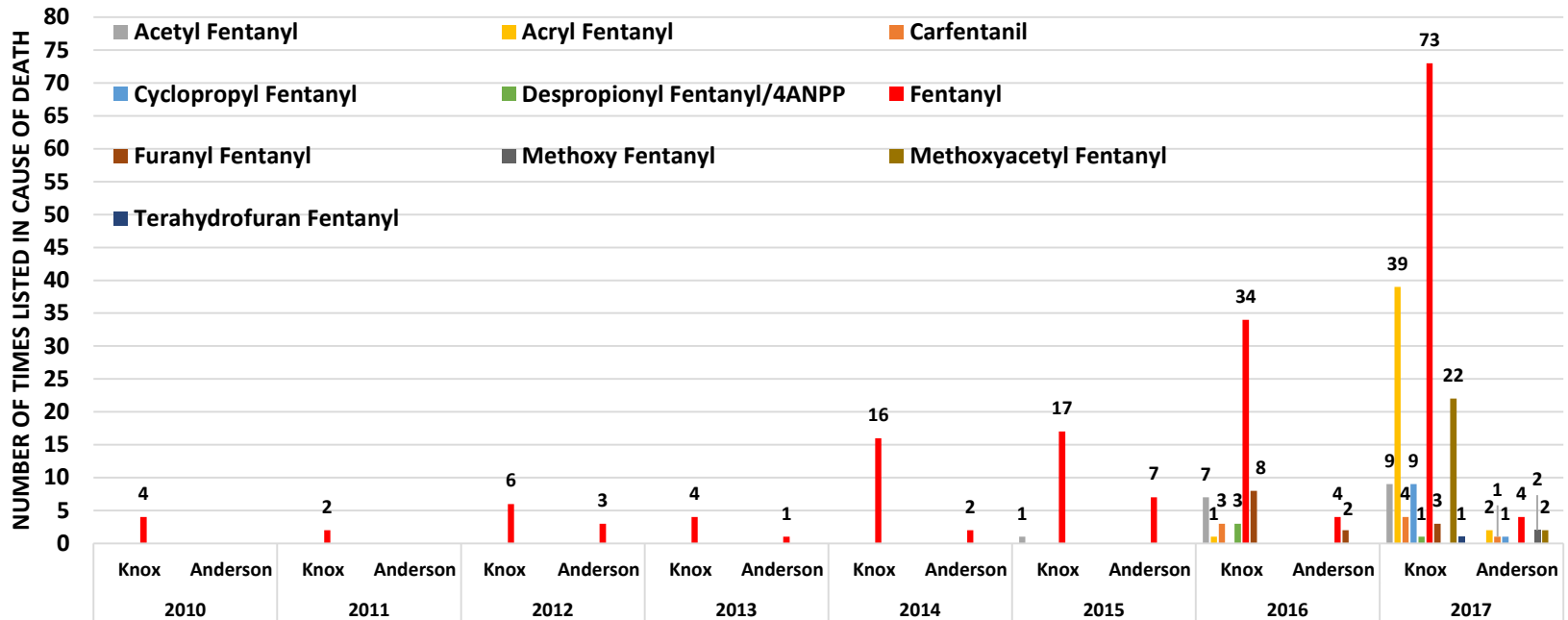
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

- 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 Fentanyl and Analogues 2010 - 2017



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

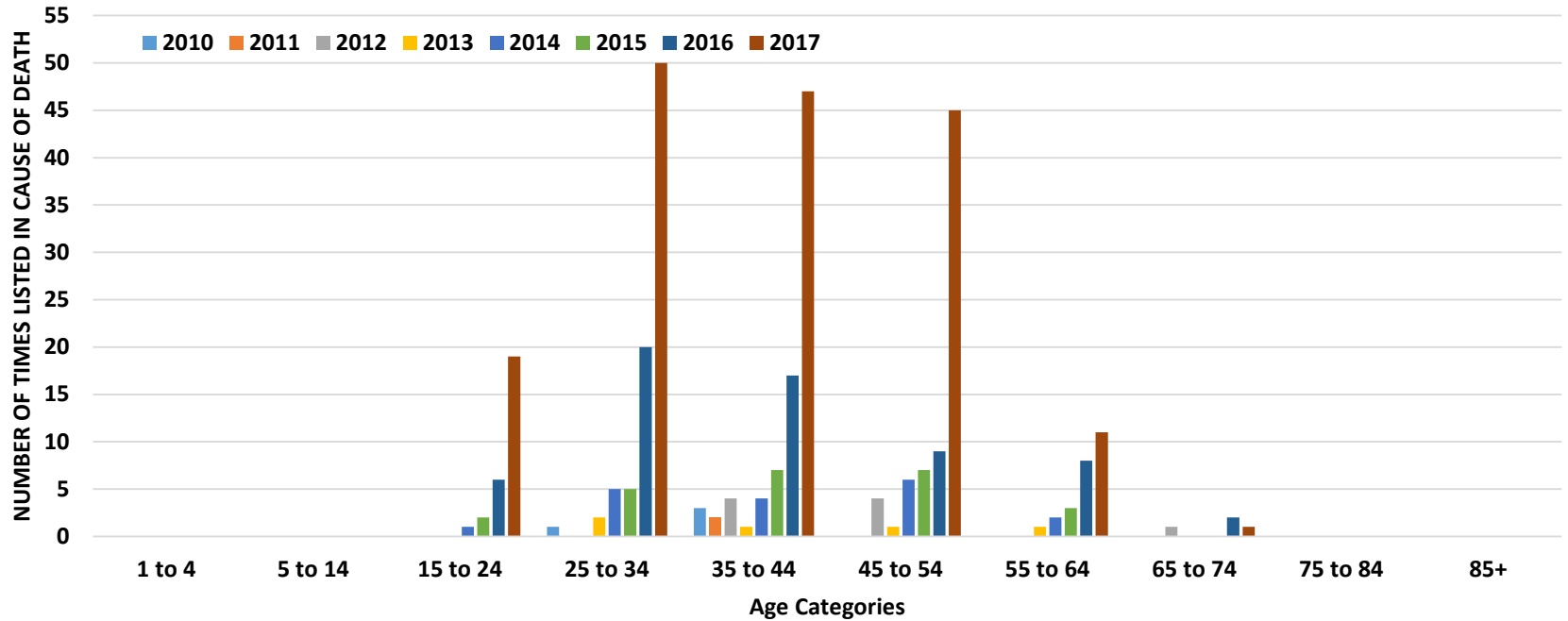
- Note: 1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical. This report only notes the presence of the drug contributing to death but does not indicate the origins of the drug. In addition, the report does not ascertain whether the drug was diverted (used by someone else or in an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

In 2016, Fentanyl and its analogues became the most predominant drug found in Drug Related Deaths in Knox and Anderson counties. Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. Analysis for fentanyl analogues has commenced recently in reference laboratories. The potency of fentanyl analogues vary, but are generally of higher potency than that of fentanyl. Identifying these analogues adds approximately \$200 - \$500 in testing costs to the autopsy whether positively identified or not.





## Knox and Anderson Counties Drug Deaths Involving Fentanyl by Age 2010 - 2017



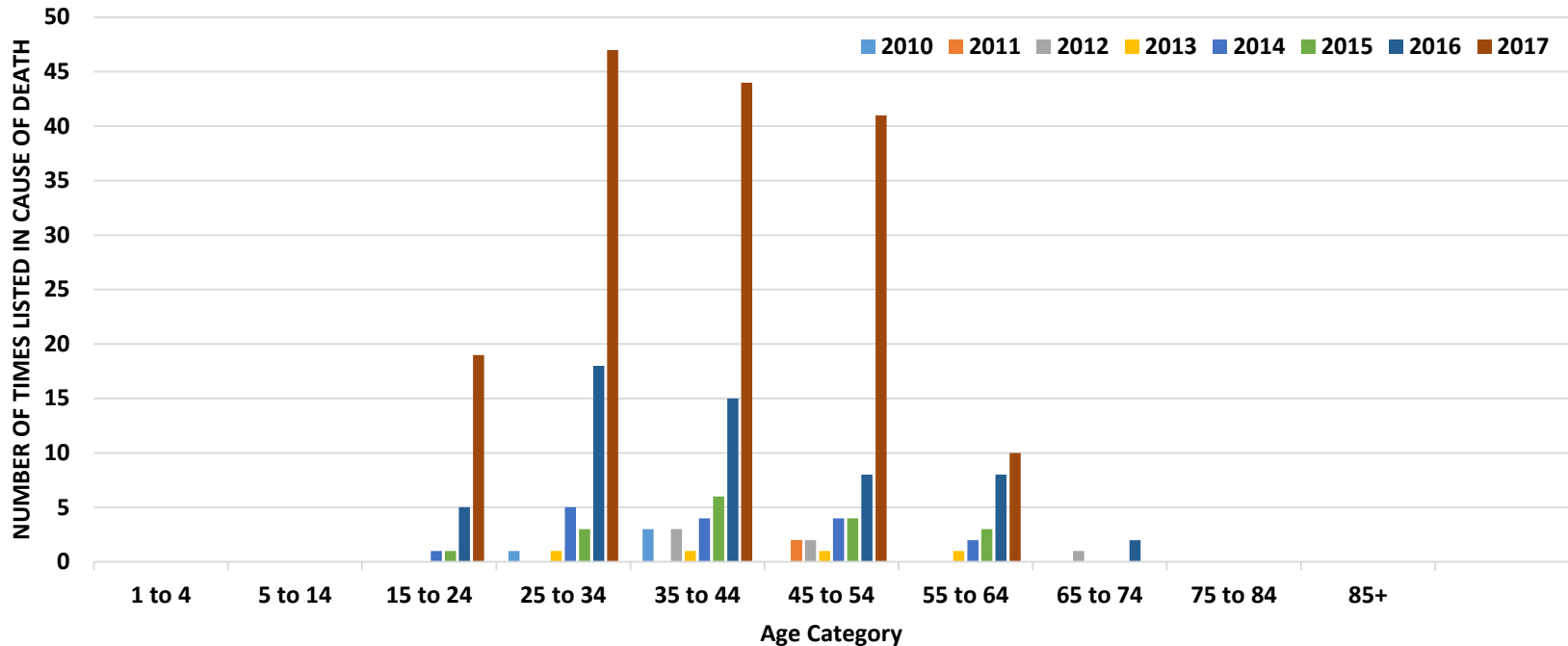
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

- 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 (used for purposes other than intended) or not.
  2. Drug poisoning deaths may involve more than one specific substance.





## Knox County Drug Deaths Involving Fentanyl by Age 2010 - 2017



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

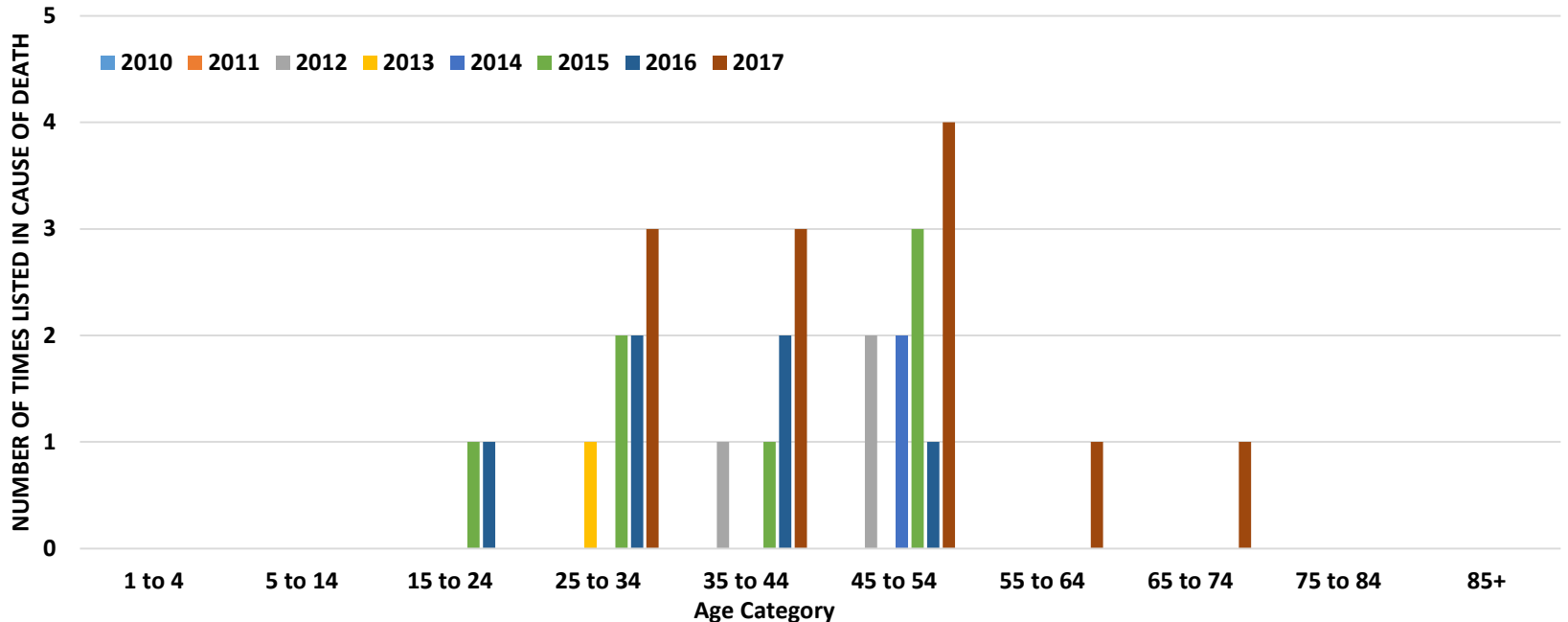
- Note: 1. Some drugs can be classified as Pharmaceutical and Non-Pharmaceutical. This report only notes the presence of the drug contributing to death but does not indicate the origins of the drug. In addition, the report does not ascertain whether the drug was diverted or not.  
2. Drug poisoning deaths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

In 2017 for Knox County, the number of times Fentanyl and its analogues were found in Drug Related Deaths increased by approximately 187%. As a reminder, polypharmacy was present in about two-thirds of the Drug Related Deaths. Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. The potency of fentanyl analogues vary, but are generally of higher potency than that of fentanyl. Identifying these analogues adds approximately \$200 - \$500 in testing costs to the autopsy whether positively identified or not.





## Anderson County Drug Deaths Involving Fentanyl by Age 2010 - 2017



**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 and 2017. 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.

In 2017 for Anderson County, the number of times Fentanyl and its analogues were found in Drug Related Deaths doubled. As a reminder, polypharmacy was present in about two-thirds of the Drug Related Deaths. Fentanyl may either be pharmaceutical fentanyl or produced in clandestine labs. The potency of fentanyl analogues vary, but are generally of higher potency than that of fentanyl. Identifying these analogues adds approximately \$200 - \$500 in testing costs to the autopsy whether positively identified or not.



# Naloxone in Drug Related Deaths in 2017

Law enforcement, fire departments, ambulance authorities, and other groups utilize Naloxone for immediate response to possible drug overdoses. There has been local, state, and federal pushes to educate people about Naloxone and make it available to a wide variety of groups. However, the number of DRD's continue to rise and little is known about the long term effects of repeated "saves" with Naloxone. In addition, this type of approach, in our opinion, tends to normalize its use which promotes continued drug use and increasing risky behaviors.

Of the 316 Drug Related Deaths in Knox and Anderson counties in 2017:

- 70 cases (or 19%) had Naloxone present
- 68 of the 316 (or 21.5%) DRD cases in Knox County had Naloxone present
- 2 of the 46 (or 4.3%) DRD cases in Anderson County had Naloxone present



The Regional Forensic Center has begun working with the Knox County Health Department to analyze Drug Related Deaths and Naloxone deployment in Knox County. The analysis should provide a gauge on the effectiveness of current policies regarding Naloxone deployment, use of treatment programs, and other factors related to reducing drug use.

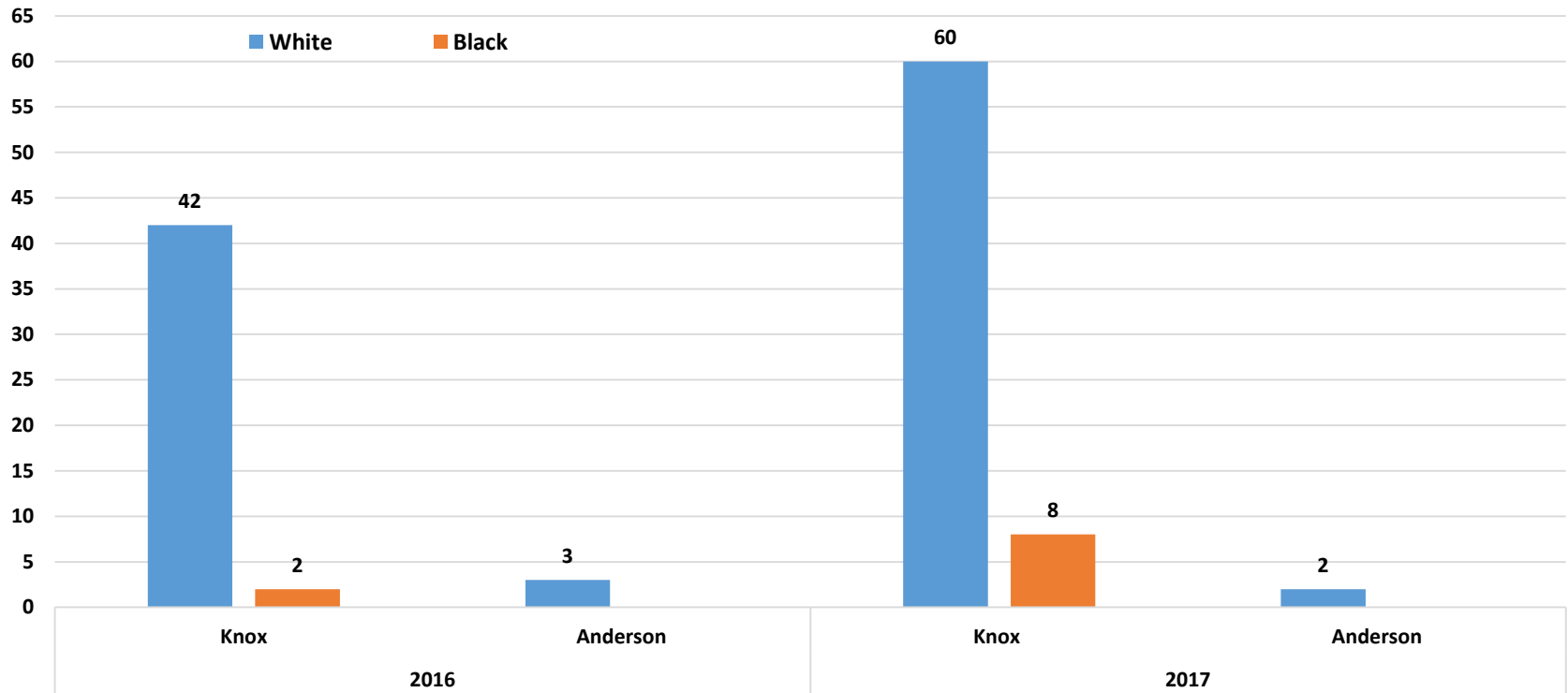
The next couple of pages will provide some detail about the Drug Related Death cases where Naloxone was found in the blood system. The information includes data displayed for total count by county and year, age groups by county and year, and race by county and year.







## Knox and Anderson Counties Drug Deaths Involving Naloxone by Race 2016 - 2017



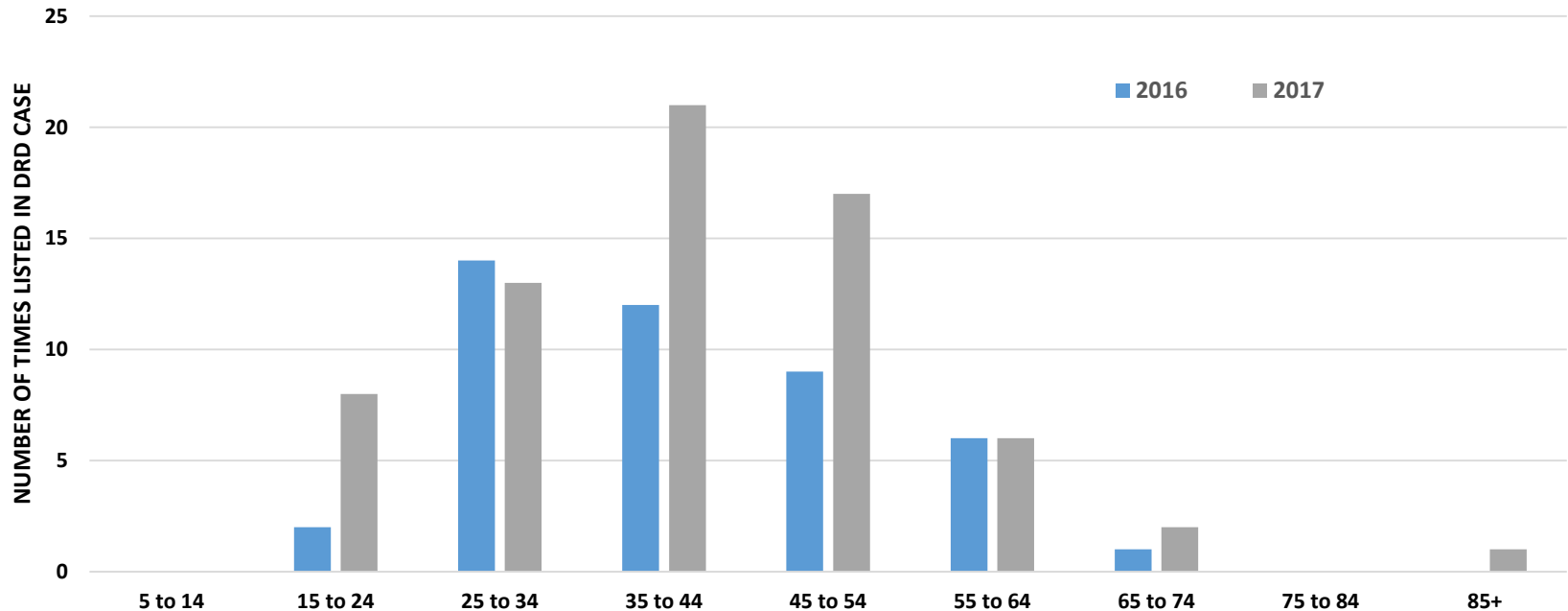
**Data Source:** Knox County RFC Medical Examiner Database, 2016 and MDILog Database 2016 and 2017. Knoxville, TN.

**Note:** 1. The presence of Naloxone was detected in the Drug Related Death case. There is no indication of how many doses of Naloxone were given.





## Knox County Drug Deaths Involving Naloxone by Age 2016 - 2017



Data Source: MDILog Database 2016 and 2017. Knoxville, TN.

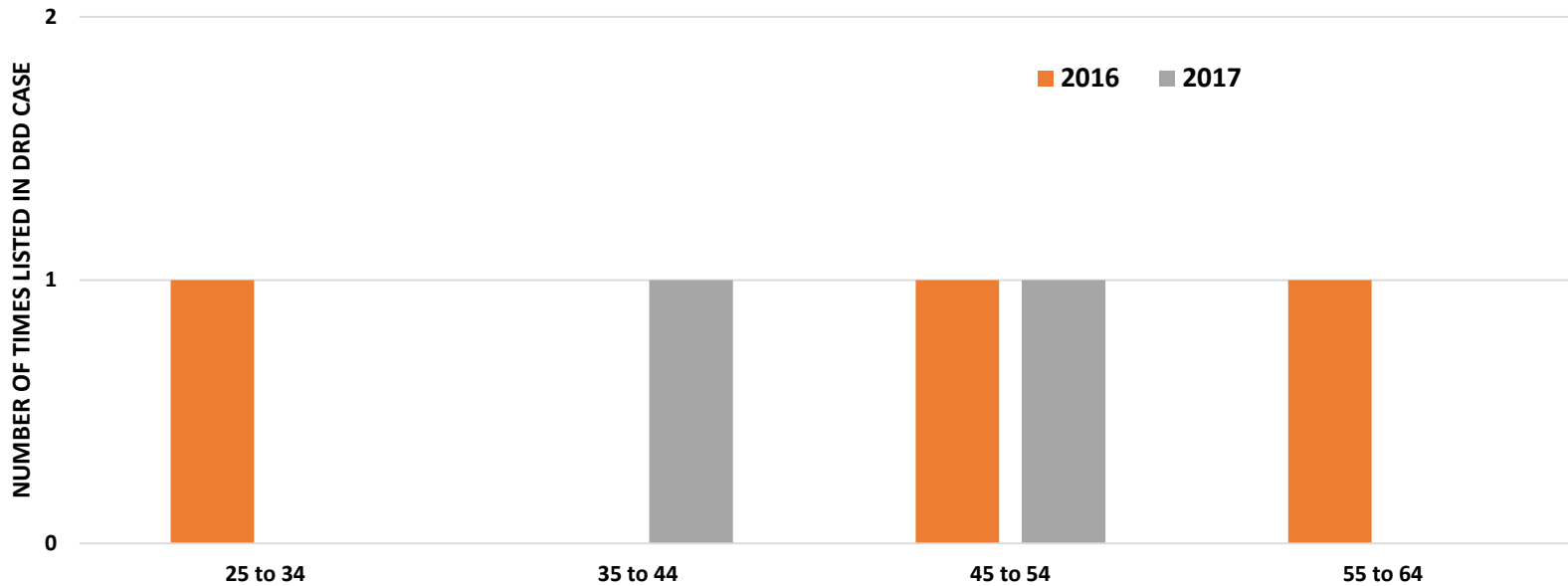
Note: The presence of Naloxone was detected in the Drug Related Death case. There is no indication of how many doses of Naloxone were given.

This graph represents Naloxone being present in the decedent's system by age categories when the death was classified as a Drug Related Death. In 2016, several groups in Knox County began administering Naloxone on scene by first responders (law enforcement, fire, ambulance authorities, etc.). In Knox County, the 25-34 year age group had more Naloxone use and was the age group that had the highest increase of illicit drug deaths in 2016.





## Anderson County Drug Deaths Involving Naloxone by Age 2016 - 2017



Data Source: MDILog Database 2016 and 2017. Knoxville, TN.

Note: The presence of Naloxone was detected in the Drug Related Death case. There is no indication of how many doses of Naloxone were given.

This graph represents Naloxone being present in the decedent's system by age categories when the death was classified as a Drug Related Death. In 2016, Anderson county began administering Naloxone on scene by first responders.



# TOXICOLOGY FINDINGS ONLY

## in ALL CASES for 2017

The following pages contain information about **TOXICOLOGY FINDINGS** for ALL CASES in Knox and Anderson County which were autopsied or examined between January 1 – December 31, 2017. This is a simple listing of toxicology results found in ALL cases not just DRD cases.

*This data provides the community with an idea of types and amounts of drugs being found in the **TOXICOLOGY FINDINGS** of decedents who are a Medical Examiner case. It is meant for informational purposes only and no conclusions are drawn. However, it assists in providing a broader picture of drugs in the community.*

The four tables below highlight some of the Toxicology Findings.

<b>Fentanyl and Fentanyl Analogues</b>	
Name	Count
4-ANPP	39
Acetyl Fentanyl	11
Acryl Fentanyl	44
Butyryl Fentanyl/Isobutyryl Fentanyl	1
Carfentanil	5
Cyclopropyl Fentanyl	11
Fentanyl	130
Furanyl Fentanyl	6
Methoxyacetylfentanyl	2
Methoxyacetylfentanyl	26
Norfentanyl	79
Terahydrofuran Fentanyl	1
	<b>355</b>

<b>Opioid Treatment Drugs</b>	
Name	Count
Methadone	21
Naltrexone	1
Buprenorphine	32
	<b>54</b>

<b>Marijuana</b>	
Name	Count
Cannabinoids	5
Delta-9 THC	144
Delta-9 Carboxy THC	182
11-Hydroxy Delta-9 THC	72
	<b>403</b>

<b>Various Illicit</b>	
Name	Count
6 - MAM (Heroin)	62
Cocaine	80
Cocaethylene	13
Methamphetamine	122
U-47700	9
	<b>286</b>



<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in TOXICOLOGY of ALL Knox and Anderson Cases in 2017</b>			
<b>DRUGS</b>	<b>Knox (N=1018)</b>	<b>Anderson (N=164)</b>	<b>Total (N=1182)</b>
<b>Fentanyl and Analogues</b>	331	24	355
4-ANPP	35	4	39
Acetyl Fentanyl	11		11
Acryl Fentanyl	41	3	44
Butyryl Fentanyl/Isobutyryl Fentanyl	1		1
Carfentanil	4	1	5
Cyclopropyl Fentanyl	10	1	11
Fentanyl	124	6	130
Furanyl Fentanyl	4	2	6
Methoxy Fentanyl		2	2
Methoxyacetylfentanyl	25	1	26
Norfentanyl	75	4	79
Terahydrofuran Fentanyl	1		1
1,1-Difluoroethane	2		2
10-Hydroxycarbazepine	3		3
11-Hydroxy Delta-9 THC	64	8	72
6-MAM	58	4	62
7-Amino Clonazepam	42	8	50
9-Hydroxyrisperidone	6		6
Acetaminophen	12	7	19
Acetone	14	10	24
Alpha-Hydroxyalprazolam	6		6
Alprazolam	104	15	119
Amitriptyline	12	2	14
Amlodipine		1	1
Amphetamine	108	19	127
Aripiprazole	5	1	6
Benzodiazepines	7	2	9
Benzoyllecgonine	85	8	93
Beta-Phenethylamine	4	1	5
Buprenorphine	24	8	32
Bupropion	13	1	14
Butalbital	2		2
Cannabinoids	4	1	5
Carbamazepine-10,11-Epoxyde	1		1
Carisoprodol	1	1	2
Chlordiazepoxide	1	1	2
Chlorpheniramine	9	2	11
Chlorpromazine		1	1
Citalopram / Escitalopram	33	7	40
Clobazam	1		1
Clonazepam	21	3	24
Clonidine	5	1	6
Cocaethylene	12	1	13
Cocaine	71	9	80
Codeine	29	3	32



<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in TOXICOLOGY of ALL Knox and Anderson Cases in 2017</b>			
<b>DRUGS</b>	<b>Knox (N=1018)</b>	<b>Anderson (N=164)</b>	<b>Total (N=1182)</b>
Cyclobenzaprine	17	3	20
Delorazepam	1		1
Delta-9 Carboxy THC	127	17	144
Delta-9 THC	161	21	182
Desmethylcitalopram		1	1
Desmethyldoxepin	2	1	3
Desmethylloperamide	1		1
Desmethylsertraline	28	5	33
Dextro / Levo Methorphan	10		10
Dextrorphan / Levorphanol	1		1
Dextromethorphan	2		2
Diazepam	29	5	34
Dicyclomine	1	1	2
Dihydrocodeine / Hydrocodol	34	9	43
Diltiazem	5		5
Diphenhydramine	53	10	63
Donepezil	2		2
Doxepin	2	1	3
Doxylamine	3	1	4
Duloxetine	9	1	10
EDDP	13	1	14
Ephedrine	4		4
Eszopiclone / Zopiclone	1		1
Ethanol	159	22	181
Etomidate	6		6
Flubromazolam	6		6
Fluoxetine	19	3	22
Fluvoxamine	1		1
Gabapentin	12	5	17
Glipizide	4		4
Guaifenesin	2		2
Hydrocodone	61	14	75
Hydromorphone	27	8	35
Hydroxybupropion	12		12
Hydroxyethylflurazepam	1	1	2
Hydroxyzine	19	2	21
Isopropanol	3	2	5
Ketamine	6		6
Lamotrigine	12	4	16
Levamisole	5		5
Levetiracetam	6	3	9
Lidocaine	13	1	14
Loperamide	1	1	2
Lorazepam	25	3	28



<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in TOXICOLOGY of ALL Knox and Anderson Cases in 2017</b>			
<b>DRUGS</b>	<b>Knox (N=1018)</b>	<b>Anderson (N=164)</b>	<b>Total (N=1182)</b>
Maprotiline	3		3
mCPP	6	3	9
MDA	1		1
MDEA	2		2
MDMA	1		1
Memantine	2		2
Meperidine	1		1
Meprobamate	3	1	4
Metformin		2	2
Methadone	19	2	21
Methamphetamine	103	19	122
Methodrone	1		1
Methocarbamol	3		3
Methotrexate		16	16
Methylecgonine	1	1	2
Metoclopramide	2		2
Metoprolol	1		1
Midazolam	30	2	32
Mirtazapine	13	4	17
Mitragynine	3		3
Monoethylglycinexylidide (MEGX)	4		4
Morphine	139	18	157
Naltrexone	1		1
N-Desmethylsildenafil	1	1	2
Nalbuphine	1		1
Nifedipine	2		2
Norbuprenorphine	23	8	31
Nordiazepam	36	7	43
Norfluoxetine	19	4	23
Norhydroxyzine	1		1
Norketamine	5		5
Norpropoxyphene	1	1	2
Norpseudoephedrine	6	1	7
Nortriptyline	18	3	21
O-Desmethyltramadol	12	2	14
O-Desmethylvenlafaxine	8	2	10
Olanzapine	9		9
Opiates	12	1	13
Oxazepam	4		4
Oxycodone	108	24	132
Oxymorphone	109	24	133
Paroxetine	10	1	11
Phentermine		1	1
Phenazepam	1		1



<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in TOXICOLOGY of ALL Knox and Anderson Cases in 2017</b>			
<b>DRUGS</b>	<b>Knox (N=1018)</b>	<b>Anderson (N=164)</b>	<b>Total (N=1182)</b>
Phenobarbital	4		4
Phentermine	7		7
Phenylpropanolamine	10	1	11
Phenytoin	2	1	3
Prochlorperazine	2		2
Promethazine	34	7	41
Propoxyphene	1	1	2
Propranolol	1		1
Propylene Glycol	1		1
Pseudoephedrine	7	2	9
Quetiapine	14	5	19
Quinine	6		6
Salicylate	3	1	4
Risperidone	4		4
Risperidone and 9-Hydroxyrisperidone	6		6
Secobarbital	1		1
Sertraline	24	4	28
Sildenafil	1	1	2
Tadalafil	3		3
Tapentadol	1		1
Temazepam	14		14
Theobromine	1		1
Topiramate	2		2
Tramadol	12	3	15
Trazodone	13	5	18
Trihexyphenidyl	1		1
U-47700	8	1	9
Venlafaxine	8		8
Verapamil	3	1	4
Yohimbine		1	1
Zolpidem	2	2	4
	<b>2917</b>	<b>479</b>	<b>3396</b>

Naloxone	<b>88</b>	<b>5</b>	<b>93</b>
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# TENTATIVE DRUG RELATED DEATH DATA January 1 – June 30, 2018 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 1 – June 30, 2018.

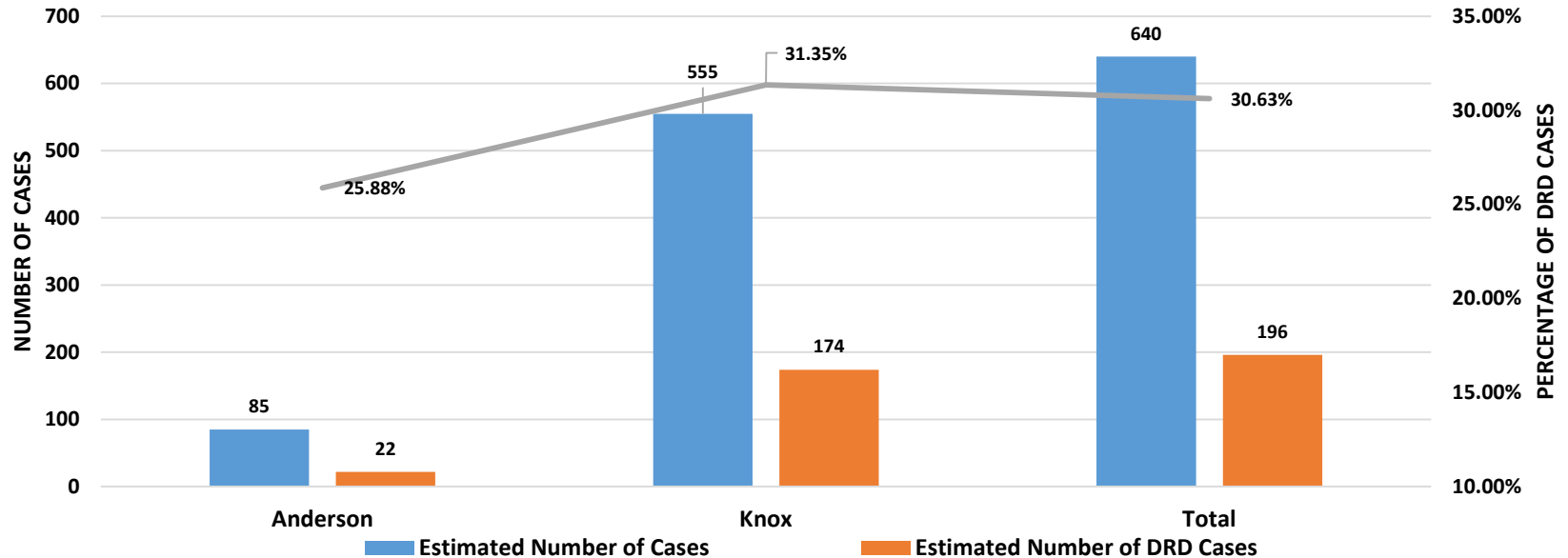
The data was taken from the KCRFC MDILog Database and should be considered **tentative** since there are still open cases which have not had the final determination for Manner and Cause of Death or involvement of drugs. The final report numbers will change. This is meant to provide our partners with 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, 2018 **(THIS IS AN ESTIMATE ONLY)**



Data Source: Knox County MDILog Database, 2018. 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 90 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.

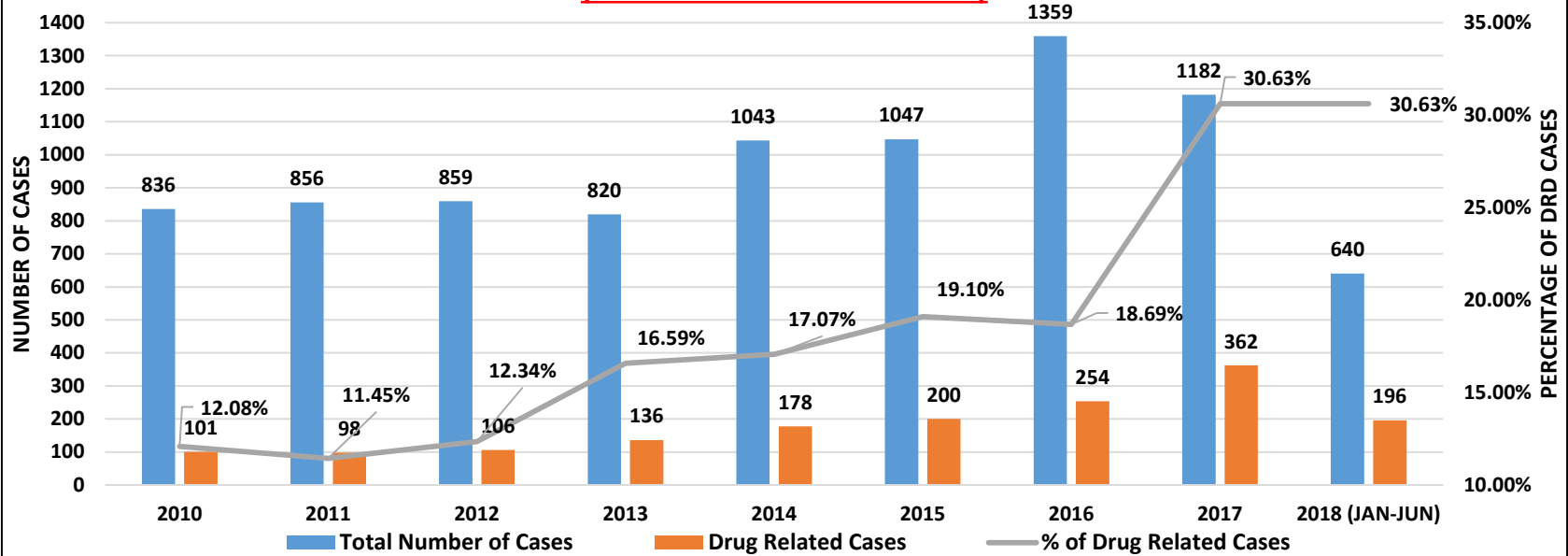
**THIS IS ONLY AN ESTIMATE.** While we have a case count, not all of the cases have been finalized. This means that there are approximately 90 cases which do not have all of their results documented. However, the current estimate does put us on a path to have more Drug Related Deaths this year than in 2017.





## 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, 2018

**(THIS IS AN ESTIMATE ONLY)**



Data Source: Knox County MDILog Database, 2018. 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 90 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 90 cases which do not have all of their results documented. As was the case in 2017, the number of DRD cases is about 1 out of every 3 in 2018.



## Knox and Anderson Counties Manner of Death for All Cases (Estimated 2018)

MANNER OF DEATH	Knox	Anderson
Natural	204	43
Accident-Motor Vehicle Accident	53	3
Accident - Non Motor Vehicle Accident	155	22
Suicide	54	10
Homicide	24	1
Undetermined	10	
Pending	55	6
<b>TOTAL</b>	<b>555</b>	<b>85</b>

As of June 30, 2018, there were 640 Knox and Anderson County cases where an autopsy or examination was performed. Of those, 196 were Drug Related Death Cases with 174 from Knox and 22 from Anderson. This is only an **ESTIMATE** since not all cases during that time frame have been completed/entered.

Cases can be assigned a Manner of Death pending toxicology or other study results. After the case is finalized, the Manner of Death and Cause of Death is placed on the Death Certificate. This makes the Death Certificate a valuable research tool for Death Statistics. The following definitions provide a general explanation of the Manner of Death categories:

Natural – death caused solely by disease or natural process

Accident MVA – unnatural death resulting from an inadvertent chance happening where the death was from the unintentional death of a driver, passenger, or pedestrian involving a motor vehicle

Accident NMVA – unnatural death resulting from an inadvertent chance happening where the person died from a drug death, fall, blunt force trauma, industrial accident, or other accidental means.

Suicide – death from self-inflicted injury with evidence of intent to die

Homicide – death resulting from the action of one person directly causing the death of another with intent to harm

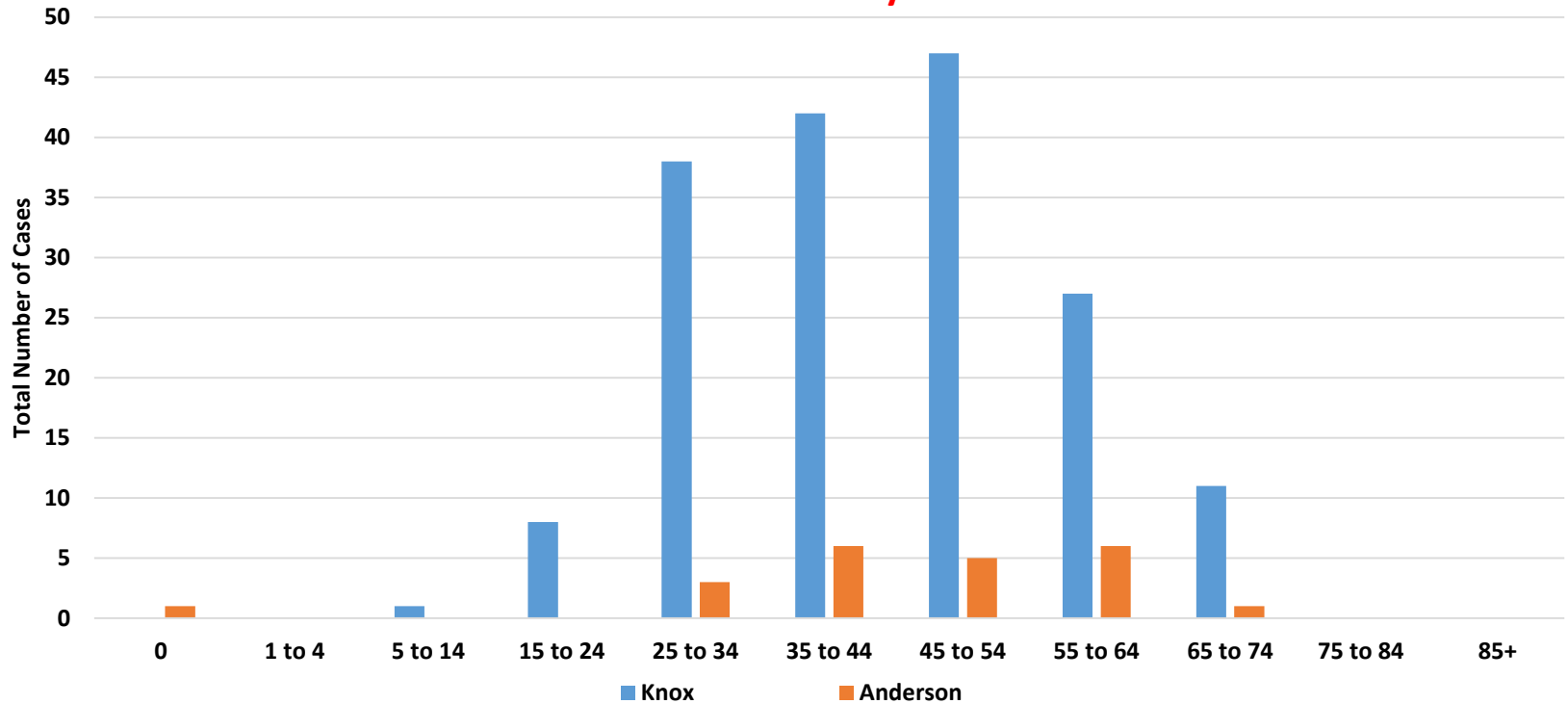
Undetermined – for cases that have very little available information about the circumstances surrounding death (e.g., partial skeletal remains) or where known information equally supports, or conflicts with, more than one manner of death

Pending – may be listed temporarily on the death certificate for cause and/or manner when additional investigation, information and/or test results are required for certification





## Knox and Anderson Counties Age Distribution for Drug Related Cases January - June, 2018 **Estimate Only**



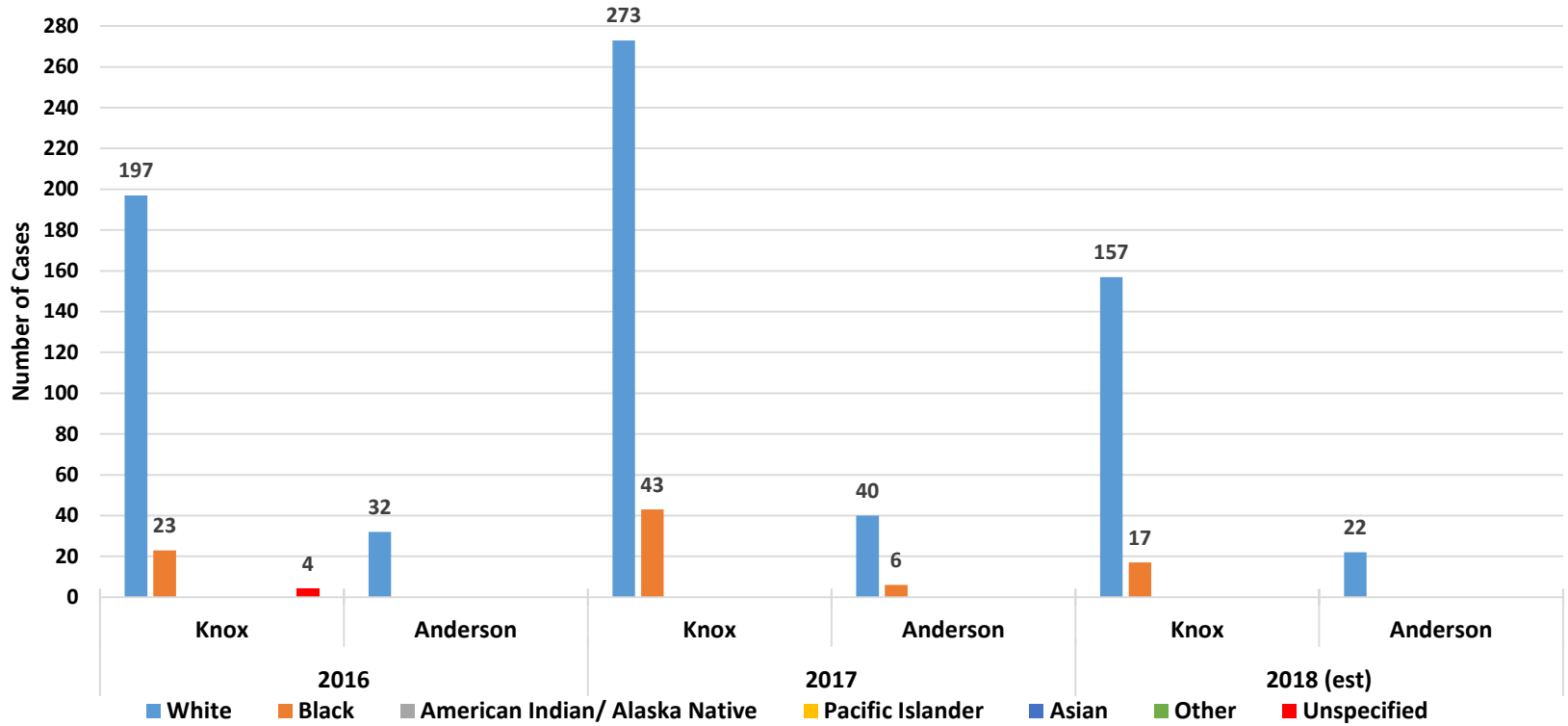
Data Source: Knox County RFC Database 2018. Knoxville, TN.

As of June 30, 2018, there were 196 Drug Related Death Cases with 174 from Knox and 22 from Anderson. This is only an **ESTIMATE** since not all cases during that time frame have been completed.





## Knox and Anderson Counties Race Distribution for Drug Related Cases 2016 - (June 2018 EST)



Data Source: Knox County RFC Medical Examiner Database, 2016 and MDILog Database 2016-2018. Knoxville, TN. 2018 is estimate only.

The 2018 DRD case distribution for race is only an **estimate** as of June 30, 2018.





## Top 10 Home Residence Zip Codes for 2018 (Estimated)

10 Most Prominent Home Residence Zip Codes by Year

	2010	2011	2012	2013	2014	2015	2016	2017	2018
#1	37918	37918	37917	37920	37921	37918	37920	37920	37917
#2	37921	37920	37920	37917	37912	37920	37917	37917	37918
#3	37919	37917	37918	37914	37920	37917	37921	37918	37921
#4	37912	37912	37716	37912	37917	37912	37918	37921	37920
#5	37830	37914	37830	37849	37918	37716	37919	37914	37923
#6	37849	37830	37849	37921	37914	37914	37849	37830	37830
#7	37914	37849	37912	37931	37922	37849	37912	37716	37912
#8	37917	37924	37919	37918	37938	37938	37830	37915	37716
#9	37909	37769	37921	37919	37923	37721	37716	37912	37931
#10	37920	37840	37931	37923	37849	37830	37915	37919	37919

**NOTE:** Color coded Zip Codes represent Zip Codes that made the top 10 list all 8 years.

2018 is an estimate as of June 30, 2018

As of June 30, 2018, there were 196 Drug Related Death Cases with 174 from Knox and 22 from Anderson. This is only an **ESTIMATE** since not all cases during that time frame have been completed.



# **TOXICOLOGY FINDINGS**

## **for 2018**

### **AUTOPSIES AND EXAMS**

### **PERFORMED FOR**

## **KNOX AND ANDERSON COUNTIES**

Please take note that the following pages are only the **TOXICOLOGY FINDINGS** in Knox and Anderson Counties where the RFC conducted an autopsy or exam. The report does not provide a listing of specific drugs which caused death in Drug Related Death cases for 2018.

This is meant for informational purposes only to provide you with an awareness of the types of drugs being seen in both Drug Related Death Cases and Non-Drug Related Death Cases.

It is important that the reader understands the difference between “Drugs Found in Drug Related Death Cases”, “TOXICOLOGY FINDINGS in Drug Related Cases” and “TOXICOLOGY FINDINGS in ALL Cases”.

Drugs Found in Drug Related Death Cases – These are drugs which contributed to the cause of death. This determination is made by the Forensic Pathologist after reviewing the medical death investigation, completing the autopsy/exam, and reviewing the laboratory or other results. The death occurred because of these drugs.

TOXICOLOGY FINDINGS in Drug Related Cases – This is a simple listing of toxicology results found in cases where the cause of death **IS** determined by the Forensic Pathologist to be a to drug overdose. It is a Drug Related Death case but specific drugs causing the death are not being identified as the cause.

TOXICOLOGY FINDINGS in ALL Cases – This is a simple listing of toxicology results found in ALL cases (autopsies and exams) for Knox and Anderson counties performed by the RFC.





ESTIMATE ONLY			
Knox County Regional Forensic Center			
Drugs Found in <b>TOXICOLOGY</b> of Drug Related Deaths in Jan 1 - Jun 30, 2018			
DRUG	2018 (N=196)		
	Knox (N=174)	Anderson (N=22)	Total
<b>Fentanyl and Analogues</b>	186	6	192
<i>4-ANPP</i>	14		14
<i>Cyclopropyl Fentanyl</i>	2		2
<i>Fentanyl</i>	85	4	89
<i>Norfentanyl</i>	62	2	64
<i>Methoxyacetylfentanyl</i>	8		
<i>Acetyl Fentanyl</i>	13		13
<i>Carfentanil</i>	2		2
Methamphetamine	56	8	64
Amphetamine	55	8	63
Morphine	58	5	63
Delta-9 THC	40	4	44
Ethanol	38	3	41
Oxymorphone	34	7	41
Benzoylcegonine	36		36
Alprazolam	32	3	35
Oxycodone	27	7	34
6-MAM	28	2	30
Delta-9 Carboxy THC	26	4	30
Diphenhydramine	19	4	23
Cocaine	20		20
Buprenorphine	12	4	16
Norbuprenorphine	12	4	16
Promethazine	13	1	14
11-Hydroxy Delta-9 THC	12	2	14
Opiates	11	2	13
7-Amino Clonazepam	11	1	12
Acetaminophen	11		11
Citalopram / Escitalopram	10		10
Hydrocodone	9	1	10
Norfluoxetine	7	3	10
Fluoxetine	6	3	9
Lidocaine	8	1	9
Codeine	7	1	8
Methadone	9	1	10
Benzodiazepines	7	1	8



**ESTIMATE ONLY - (CONTINUED)**

**Knox County Regional Forensic Center**

**Drugs Found in TOXICOLOGY of Drug Related Deaths in Jan 1 - Jun 30, 2018**

DRUG	2018 (N=196)		
	Knox (N=174)	Anderson (N=22)	Total
Clonazepam	7		7
Hydroxyzine	4	3	7
Dextro / Levo Methorphan	5	2	7
Dextrorphan / Levorphanol	5	2	7
U-47700	7		7
Nordiazepam	5	1	6
Quetiapine	4	2	6
Trazodone	6		6
Cannabinoids	5	1	6
Quinine	6		6
Cyclobenzaprine	4	1	5
Desmethylsertraline	5		5
Diazepam	5		5
EDDP	4	1	5
Hydromorphone	4	1	5
Alpha-Hydroxyalprazolam	5		5
Dihydrocodeine / Hydrocodol	5		5
Sertraline	5		5
Zolpidem	4	1	5
Acetone	4		4
Gabapentin	3	1	4
Desmethyldoxepin	4		4
Doxepin	4		4
Duloxetine	3	1	4
Nortriptyline	3	1	4
Temazepam	4		4
Lorazepam	4		4
mCPP	4		4
Mirtazapine	4		4
O-Desmethylvenlafaxine	4		4
Tramadol	3	1	4
Venlafaxine	4		4



<b>ESTIMATE ONLY - (CONTINUED)</b>			
<b>Knox County Regional Forensic Center</b>			
<b>Drugs Found in <b>TOXICOLOGY</b> of Drug Related Deaths in Jan 1 - Jun 30, 2018</b>			
<b>DRUG</b>	<b>2018 (N=196)</b>		
	<b>Knox (N=174)</b>	<b>Anderson (N=22)</b>	<b>Total</b>
Bupropion	1	2	3
Meprobamate	2	1	3
Amitriptyline	2	1	3
Carisoprodol	2	1	3
Ziprasidone	3		3
Levetiracetam	3		3
Levamisole	3		3
Maprotiline	2	1	3
Mitragynine	2	1	3
O-Desmethyltramadol	2	1	3
Paroxetine	2	1	3
Phenylpropanolamine	3		3
Topiramate	2	1	3
Hydroxybupropion	1	1	2
Aripiprazole	2		2
Chlorpheniramine	2		2
Clonidine	2		2
Cocaethylene	2		2
Flubromazolam	2		2
Monoethylglycinexylidide (MEGX)	2		2
Midazolam	2		2
Olanzapine	2		2
Pseudoephedrine	2		2
Doxylamine	1		1
Ketamine	1		1
Beta-Phenethylamine		1	1
Lacosamide	1		1
Lamotrigine	1		1
MDA	1		1
MDMA	1		1
Carbamazepine	1		1
Oxazepam	1		1
Phenobarbital	1		1
Primidone	1		1
Norclozapine	1		1
Ondansetron	1		1
Suvorexant	1		1
Theobromine	1		1
Triazolam		1	1
	1005	118	1123
Naloxone	40	4	44



# TOXICOLOGY FINDINGS ONLY

## in ALL CASES for

### Jan 1 – Jun 30, 2018

The following pages contain information about **TOXICOLOGY FINDINGS** for ALL CASES in Knox and Anderson County which were autopsied or examined between January 1 – June 30, 2018. This is a simple listing of toxicology results found in cases. This is only **TENTATIVE** data but provides the community with an idea of drugs being found in the **TOXICOLOGY FINDINGS** of decedents who are a Medical Examiner case. It is meant for informational purposes only and no conclusions are drawn.

The four tables below highlight some of the Toxicology Findings.

Fentanyl and Fentanyl Analogues	
Name	Count
Fentanyl	90
Fentanyl / Metabolite	11
Norfentanyl	67
4-ANPP	15
Cyclopropyl Fentanyl	2
Acetyl Fentanyl	13
Carfentanil	2
Methoxyacetylfentanyl	8
	208

Opioid Treatment Drugs	
Name	Count
Methadone	15
Naltrexone	1
Buprenorphine	19
	35

Marijuana	
Name	Count
Cannabinoids	6
Delta-9 THC	95
Delta-9 Carboxy THC	67
11-Hydroxy Delta-9 THC	39
	207

Various Illicit	
Name	Count
6 - MAM (Heroin)	31
Cocaine	21
Cocaine / Metabolites	6
Cocaethylene	7
Methamphetamine	64
U-47700	6
	135



**TENTATIVE DATA (Total Cases = 640)****Drugs Found in Decedents for All Cases****Jan 1 - Jun 30, 2018**

<b>Name</b>	<b>Count</b>	<b>Name</b>	<b>Count</b>
10-Hydroxycarbazepine	1	Cotinine	126
11-Hydroxy Delta-9 THC	39	Cyclobenzaprine	11
4-ANPP	15	Cyclohexanone	1
6-MAM - Free	31	Cyclopropyl Fentanyl	2
7-Amino Clonazepam	21	Delta-9 Carboxy THC	67
9-Hydroxyrisperidone	1	Delta-9 THC	95
Acetaminophen	13	Desmethyldoxepin	3
Acetone	18	Desmethylloperamide	2
Acetyl Fentanyl	13	Desmethylsertraline	15
Alpha-Hydroxyalprazolam	5	Dextro / Levo Methorphan	9
Alprazolam	48	Dextrorphan / Levorphanol	9
Amitriptyline	10	Diazepam	14
Amphetamine(s)	75	Dicyclomine	1
Antimony	1	Dihydrocodeine / Hydrocodol - Free	14
Aripiprazole	3	Diltiazem	1
Benzodiazepines	9	Diphenhydramine	30
Benzoylecgonine	43	Donepezil	3
Benztropine	1	Doxepin	3
Beta-Phenethylamine	1	Doxylamine	1
Buprenorphine - Free	19	Duloxetine	6
Bupropion	7	EDDP	11
Butalbital	4	Ethanol	100
Butorphanol - Free	2	Etomidate	1
Caffeine	219	Fentanyl	90
Cannabinoids	6	Fentanyl / Metabolite	11
Carbamazepine	1	Flubromazolam	2
Carfentanil	2	Fluoxetine	13
Carisoprodol	4	Gabapentin	5
Chlordiazepoxide	2	Haloperidol	1
Chlorpheniramine	3	Hydrocodone - Free	30
Citalopram / Escitalopram	17	Hydromorphone - Free	11
Clonazepam	9	Hydroxybupropion	4
Clonidine	3	Hydroxyzine	12
Clozapine	1	Ibuprofen	2
Cocaehtylene	7	Isopropanol	2
Cocaine	21	Lacosamide	1
Cocaine / Metabolites	6	Lamotrigine	2
Codeine - Free	11	Levamisole	3



**TENTATIVE DATA (Total Cases = 640) - CONTINUED**

**Drugs Found in Decedents for All Cases**

**Jan 1 - Jun 30, 2018**

Name	Count	Name	Count
Levetiracetam	9	Oxycodone - Free	57
Lidocaine	8	Oxycodone / Oxymorphone	5
Lorazepam	10	Oxymorphone - Free	42
Maprotiline	3	Paroxetine	7
mCPP	5	Phenobarbital	4
MDA	1	Phenylethylmalonamide (PEMA)	2
MDMA	1	Phenylpropanolamine	3
Memantine	1	Phenytoin	2
Meprobamate	4	Primidone	2
Methadone	15	Promethazine	22
Methamphetamine	64	Pseudoephedrine	1
Methoxyacetyl fentanyl	8	Quetiapine	7
Metoclopramide	2	Quinidine	1
Mexiletine	1	Quinine	6
Midazolam	11	Risperidone	1
Mirtazapine	5	Risperidone and 9-Hydroxyrisperidone	1
Mitragynine	3	Sertraline	13
Monoethylglycinexylidide (MEGX)	2	Suvorexant	1
Morphine - Free	76	Temazepam	6
Naloxone	47	TFMPP (or "Molly")	1
Naltrexone - Free	1	Theobromine	1
Nicotine	15	Theophylline	1
Nifedipine	1	Topiramate	5
Nitrous Oxide	1	Tramadol	7
Norbuprenorphine - Free	19	Trazodone	8
Norclozapine	1	Triazolam	1
Nordiazepam	19	U-47700	6
Norfentanyl	67	Venlafaxine	6
Norfluoxetine	14	Warfarin	4
Nortriptyline	12	Ziprasidone	3
O-Desmethyltramadol	6	Zolpidem	10
O-Desmethylvenlafaxine	6	Theophylline	1
Olanzapine	3	Topiramate	1
Ondansetron	1	Verapamil	1
Ondansetron	1	Ziprasidone	1
Opiates	15	Zonisamide	1
Oxazepam	1		



## **Controlled Substances Act (CSA) Scheduled Drugs**

Drugs, substances, and certain chemicals used to make drugs are classified into five (5) distinct categories or schedules depending upon the drug's acceptable medical use and the drug's abuse or dependency potential. These lists are intended as general references and are not comprehensive listings of all controlled substances. A controlled substance analogue is a substance which is intended for human consumption and is structurally or pharmacologically similar to, or is represented as being similar to, a Schedule I or Schedule II substance and is not an approved medication in the United States.

### **Schedule I**

Schedule I drugs, substances, or chemicals are defined as drugs with no currently accepted medical use and a high potential for abuse. Some examples of Schedule I drugs are:

heroin, lysergic acid diethylamide (LSD), marijuana (cannabis), 3,4-methylenedioxymethamphetamine (ecstasy), methaqualone, and peyote

### **Schedule II**

Schedule II drugs, substances, or chemicals are defined as drugs with a high potential for abuse, with use potentially leading to severe psychological or physical dependence. These drugs are also considered dangerous. Some examples of Schedule II drugs are:

Combination products with less than 15 milligrams of hydrocodone per dosage unit (Vicodin), cocaine, methamphetamine, methadone, hydromorphone (Dilaudid), meperidine (Demerol), oxycodone (OxyContin), fentanyl and its analogues, Dexedrine, Adderall, and Ritalin

### **Schedule III**

Schedule III drugs, substances, or chemicals are defined as drugs with a moderate to low potential for physical and psychological dependence. Schedule III drugs abuse potential is less than Schedule I and Schedule II drugs but more than Schedule IV. Some examples of Schedule III drugs are:

Products containing less than 90 milligrams of codeine per dosage unit (Tylenol with codeine), ketamine, anabolic steroids, testosterone

### **Schedule IV**

Schedule IV drugs, substances, or chemicals are defined as drugs with a low potential for abuse and low risk of dependence. Some examples of Schedule IV drugs are:

Xanax, Soma, Darvon, Darvocet, Valium, Ativan, Talwin, Ambien, Tramadol

### **Schedule V**

Schedule V drugs, substances, or chemicals are defined as drugs with lower potential for abuse than Schedule IV and consist of preparations containing limited quantities of certain narcotics. Schedule V drugs are generally used for antidiarrheal, antitussive, and analgesic purposes. Some examples of Schedule V drugs are:

cough preparations with less than 200 milligrams of codeine or per 100 milliliters (Robitussin AC), Lomotil, Motofen, Lyrica, Parepectolin

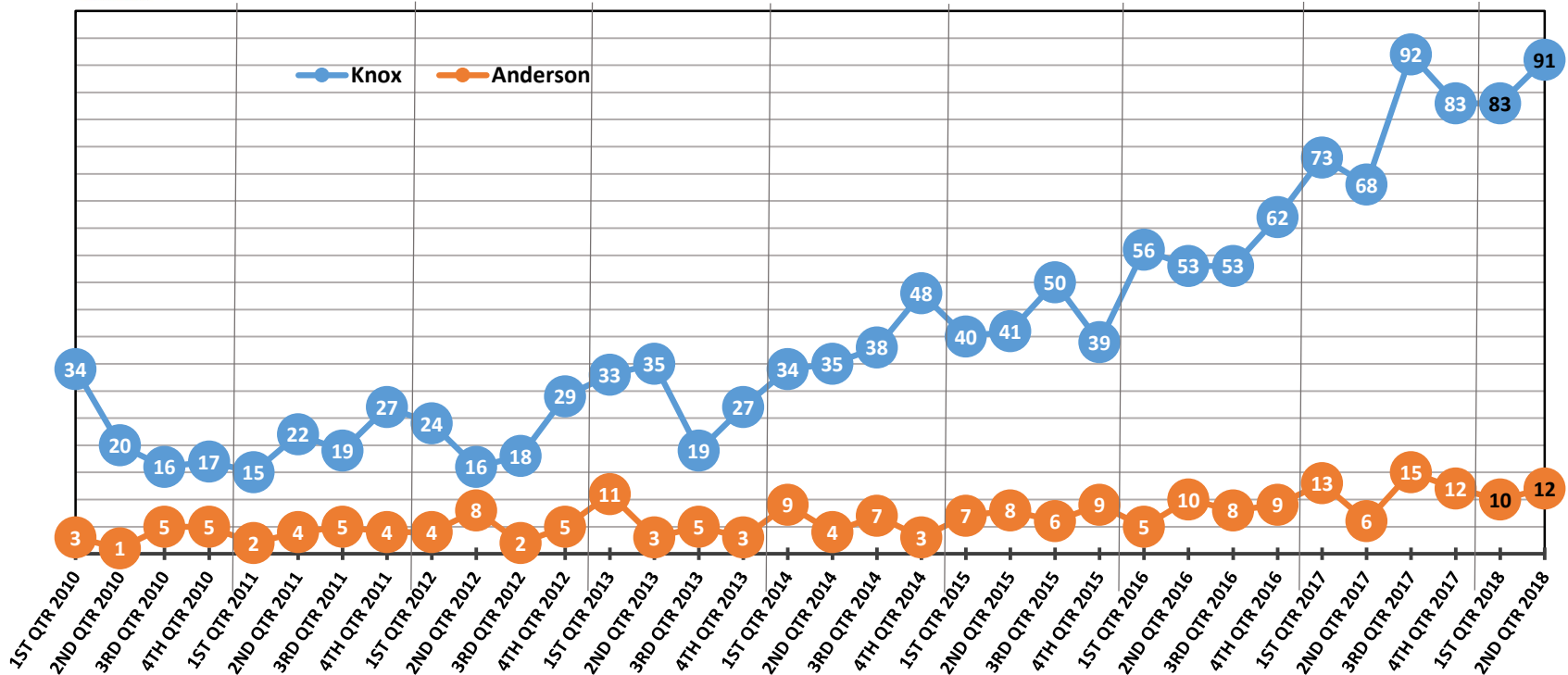
[Alphabetical listing](#) of Controlled Substances can be found at

[https://www.deadiversion.usdoj.gov/schedules/orangebook/c\\_cs\\_alpha.pdf](https://www.deadiversion.usdoj.gov/schedules/orangebook/c_cs_alpha.pdf)





### Knox and Anderson Counties Distribution of Drug Related Death Cases by Quarter 2010 - 2018 (2018 estimate only)



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 to 2018. Knoxville, TN

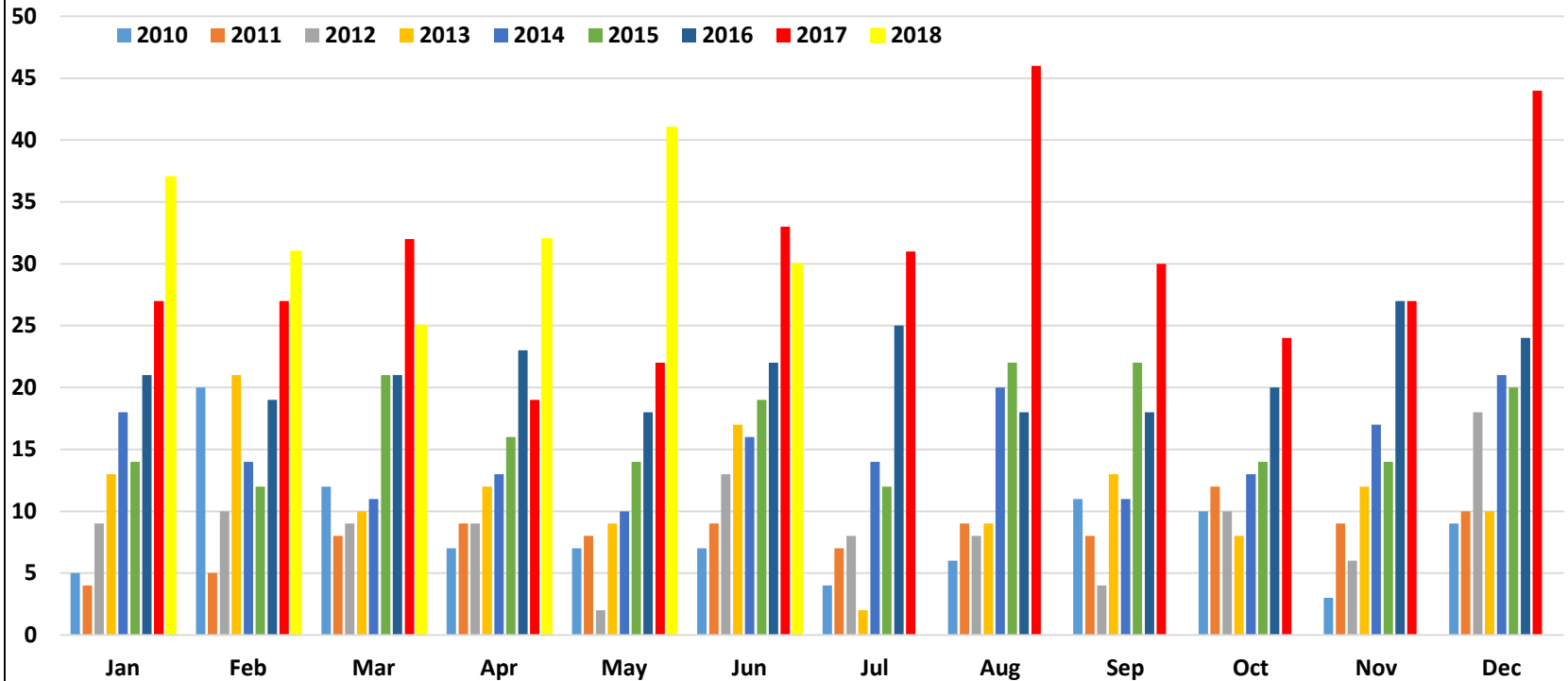
This chart depicts the number of Drug Related Death cases occurring in Knox and Anderson counties each quarter by year from January 2010 – June 2018. As a reminder, 2018 data is **TENTATIVE** and may change.







## Knox and Anderson Counties Distribution of Drug Related Cases by Month and Year (2018 estimate only)



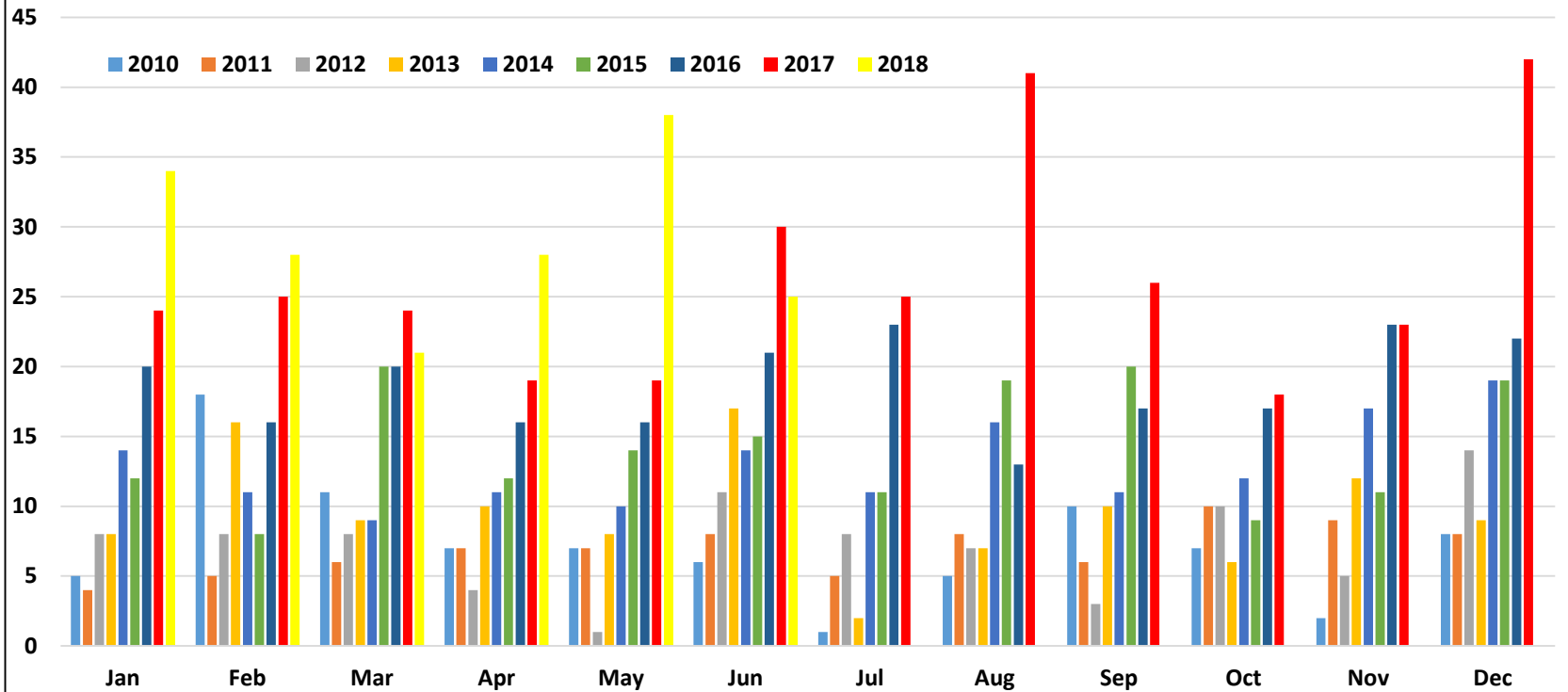
**Data Source:** Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 to 2018. Knoxville, TN.

This chart depicts the number of Drug Related Death cases occurring in Knox and Anderson counties each month by year from January 2010 – June 2018. As a reminder, 2018 data is **TENTATIVE** and may change.





## Knox County Distribution of Drug Related Cases by Month and Year (2018 estimate only)



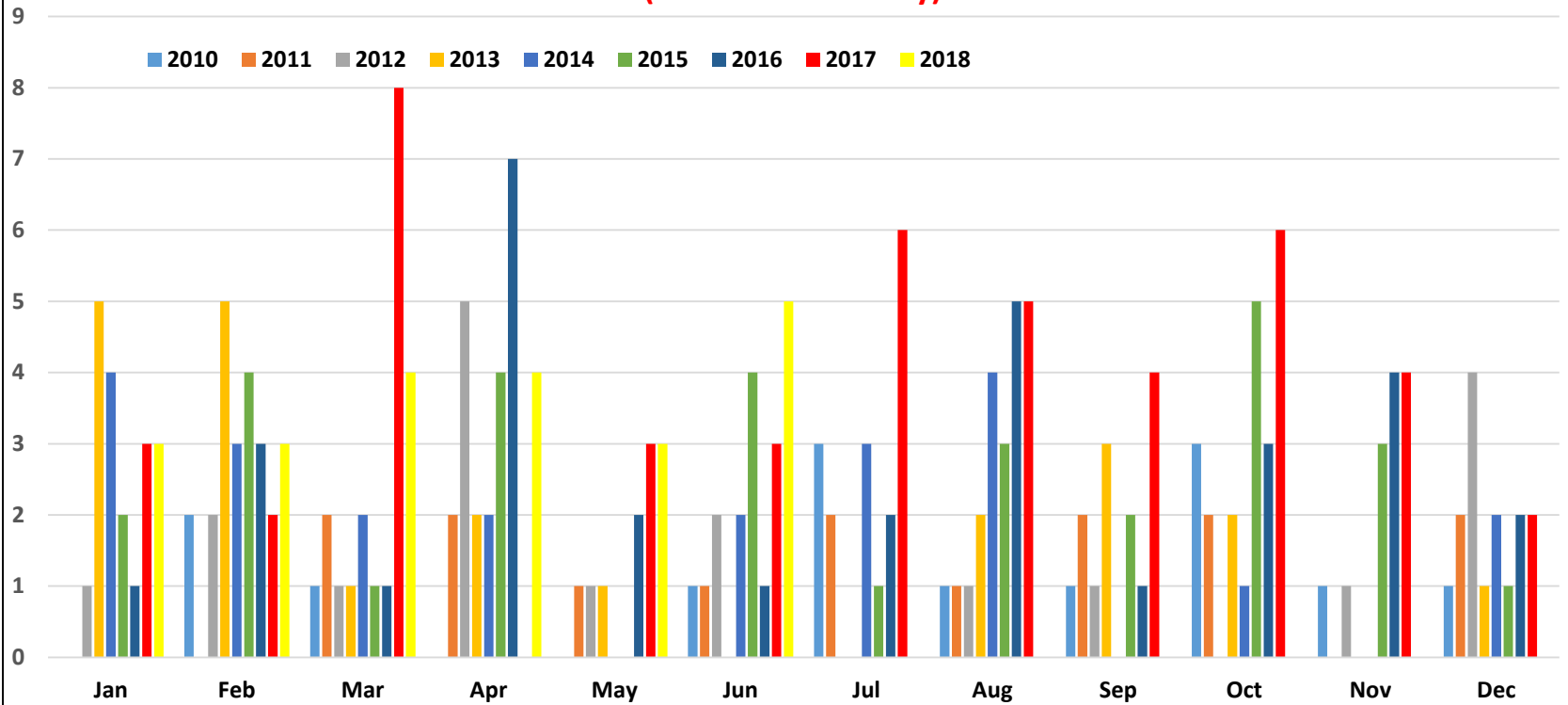
Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 to 2018. Knoxville, TN.

This chart depicts the number of Drug Related Death cases occurring in Knox County each month by year from January 2010 – June 2018. As a reminder, 2018 data is **TENTATIVE** and may change.





### Anderson County Distribution of Drug Related Cases by Month and Year (2018 estimate only)



Data Source: Knox County RFC Medical Examiner Database, 2010 to 2016 and MDILog Database 2016 to 2018. Knoxville, TN.

This chart depicts the number of Drug Related Death cases occurring in Anderson County each month by year from January 2010 – June 2018. As a reminder, 2018 data is **TENTATIVE** and may change.



## Current 2018 Concerns

Based on the first 6 months of estimated data, the number of Drug Related Deaths are increasing over the 2017 numbers. Currently, the number of Drug Related Deaths account for 1 out of 3 of our cases and we do not expect that ratio to decrease anytime soon.

The cost for identifying and classifying emerging, designer drugs continues to rise. This presents a budgetary concern in balancing whether to test or not test for emerging, designer drugs when you already have evidence necessary to classify the case as a Drug Related Death case.

The number of Drug Related Deaths in the 25 – 34 year age group appears to be continuing to increase as it did in 2017. We expect this age group will continue to increase its utilization of illicit drugs in the form of fentanyl (and its analogues) and methamphetamine. This group may become the age group most often dying from Drug Related Deaths. We expect the number of Drug Related Deaths in blacks to increase for the third year in a row.

The Tennessee Department of Health – Vital Statistics electronic Death Certificate system is not fully functional. If this system were fully functional, it could provide real time data for all counties on the Cause and Manner of ALL deaths including Drug Related Deaths. This is important since not all Medical Examiner cases are reported to the Medical Examiner. And, treating physicians are legally responsible for completing Death Certificates for cases not under Medical Examiner jurisdiction.

Rural counties need to develop good medico-legal death investigation practices which includes sending for autopsy suspected drug overdose cases. Only through proper investigation and an autopsy which includes toxicology from a laboratory capable of identifying new, emerging drugs will help us properly identify Drug Related Deaths.



## Current 2018 Concerns (continued)

Currently, prescribers and Medical Examiners are blind to what drugs are being prescribed to drug addiction treatment patients. This creates a huge knowledge deficit for other treating physicians and the Medical Examiner and promotes drug abuse/diversion within the addicted community. Drugs used to treat addiction must be put on the Controlled Substance Monitoring Database (CSMD) in order to mitigate this issue.

In addition, Ketamine treatment facilities need to be properly monitored and those drugs entered into the CSMD. This report does show Ketamine being found for the first time in our 2017 All Drugs for All Cases in the Toxicology Report. With the opening of Ketamine Treatment Clinics, there needs to be clear guidelines and monitoring of the operations.

This report was meant to highlight 2017 DRD data, provide an overview of DRD data since 2010, and highlight some of the tentative 2018 DRD data. As with most all reports, the goal with this report is to inform, begin conversations, and support community activities. While the Regional Forensic Center cannot answer all questions related to Drug Related Deaths, we work with our community partners to broaden the understanding of the issues and support work to reduce drug use/dependency, addiction, and deaths.

In closing, the Knox County Regional Forensic Center will continue to evaluate and report data to our partners and the community. Our desire is that community groups are able to utilize the data to take action to decrease Drug Related Deaths and improve the safety of our citizens through education and prevention.





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

This report is also available online at <http://www.knoxcounty.org/rfc/reports.php>.

Knox County Regional Forensic Center  
2761 Sullins Street  
Knoxville, TN 37919-4672  
865-215-8000





# 2017 KNOX COUNTY REGIONAL FORENSIC CENTER DRUG RELATED DEATH REPORT

