



# 2021



**KNOX COUNTY**  
**REGIONAL FORENSIC CENTER**

## **DRUG-RELATED DEATH REPORT** **Knox County and Anderson County, Tennessee**

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[WWW.KNOXCOUNTY.ORG/RFC/](http://WWW.KNOXCOUNTY.ORG/RFC/)

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## From the Desk of **The Chief Medical Examiner** of Knox and Anderson Counties

When the Knox County Regional Forensic Center (RFC) originally began reporting on drug overdose deaths, the Chief Medical Examiner would summarize or editorialize important statistics from its two main jurisdictions. Since adopting a data processing and tracking program in 2016, the RFC has been tracking drug-related deaths more closely. The data has been used by several non-profit groups, governmental agencies, and the public. The resulting report helps highlight the perils of overprescribing and alerts the authorities to the distribution patterns of some of the deadliest synthetic opioids ever seen in our region and the state. Reporting efforts finally paid off in 2019 as the overdose deaths began to decline. Unfortunately, the Coronavirus pandemic of 2020 and 2021 and the unintended consequences of the measures to curb the spread of virus reversed the trend.

In 2021, Knox County overdose deaths increased by “just” 29% compared to the 41% increase in 2020. Anderson County fared much worse since overdose deaths increased “just” 67% compared to the 82% increase the previously year. Unfortunately, mixed drug intoxications continue to be the leading cause of death and fentanyl, fentanyl analogues, and some of the novel (new) synthetic opioids continue to be the most abused drugs. Methamphetamine remains the stimulant drug of choice, frequently used in combination with opioids. Alcohol continues to be among the top five most frequently abused substances leading to sudden unexpected death or death without medical attendance. Sadly, raw data collected during the first quarter of 2022 projects a continued surge in drug-related deaths. More information about the RFC’s participation with the DEA in researching fentanyl-related deaths can be found [here](#).

In both Knox and Anderson counties, young- and middle-aged men in the 35 to 44 age group continued to be disproportionately affected by drug overdose compared to women (60% men versus 40% women in Knox County and 61 men versus 39% women in Anderson County). In more urban areas (like the City of Knoxville), the ratio of black to white overdose deaths continued to be about 1:9, which is reflective of the community’s demographic composition.

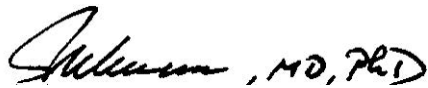
Last year, I elaborated on novel drugs with tongue-twisting names. There are more of them on the market this year and they are deadlier than ever when used alone or in combination with other drugs. Snorting and/or intravenous drug abuse continues to be the predominate modes of intake in drug-related deaths. As mentioned in last year’s report, the combination of stronger drugs and direct modes of administration (like injections directly into the blood stream), make naloxone frequently ineffective. It was incredibly disheartening to see many of the deceased individuals investigated by the RFC had records of completion (or multiple visits to) different drug rehabilitation programs and facilities prior to death. With that in mind, it may be time to reevaluate many of the programs and measures that have been instituted to combat this problem including medication-assisted treatments, availability of naloxone, and needle exchange programs, just to name a few.

# 2021 Drug-Related Death Report

Deadly accidents, especially motor vehicle accidents and homicides, are a tragic secondary effect of illicit drug use. That specific data can be found in our [annual report](#).

The answer to why the opioid problem plagues us might be as diverse as the number of victims. They could include the breakdown of nuclear family structure, peer pressure, negative influence of entertainment culture, loss of motivation and/or zest for creative and/or productive life, loss of moral values, loss of faith, sequelae of adverse childhood events or abuse; the list is unending.

The call for preventative action should be universal and it starts in our homes and our schools.



Darinka Mileusnic-Polchan, MD, PhD



# 2021 Drug-Related Death Report

## 2021 Key Findings

The overdose epidemic in Knox County, mirrors the rest of the nation, growing in magnitude but also changing in character. (NIHCM 2021) Last year, 533 people died from drug overdoses in Knox County compared to 413 in 2020, and 85 people died in Anderson County compared to 51 in 2020. Preliminary data for drug-deaths in 2022 indicates an even more upward trend for drug-related death cases in Knox County. Drug overdose deaths increasingly involve synthetic opioids (fentanyl and fentanyl analogs) with decreasing numbers of prescription opioids (oxycodone, oxycodone, oxycodone, etc.).

## 2021 Report Highlights for Knox and Anderson Counties:

- Knox County had a 29% increase in drug-related deaths from 2020 to 2021.
- Anderson County had a 67% increase in drug-related deaths from 2020 to 2021.
- Fentanyl and fentanyl analogues (synthetic opioids) were the most frequently identified drugs in drug-related deaths in 2021.
- Polypharmacy, which is when more than one drug is responsible for death, was involved in 76% of drug-related deaths Knox County and Anderson County, separately.
- The five most common drugs identified in drug-related deaths in 2020 were synthetic opioids, methamphetamine, diphenhydramine, alcohol/ethanol, and cocaine.
- Prescription opioid-related deaths continue to decrease in our jurisdictions.
- People 35 to 40-years-old experienced the most drug deaths in Knox County, but the sharpest increase was in individuals age 55 to 64-years-old.
- The presence of anxiety, anti-depressant, and anti-psychotic medication was found in 30% of all drug deaths in Knox County and 38% of all drug deaths in Anderson County

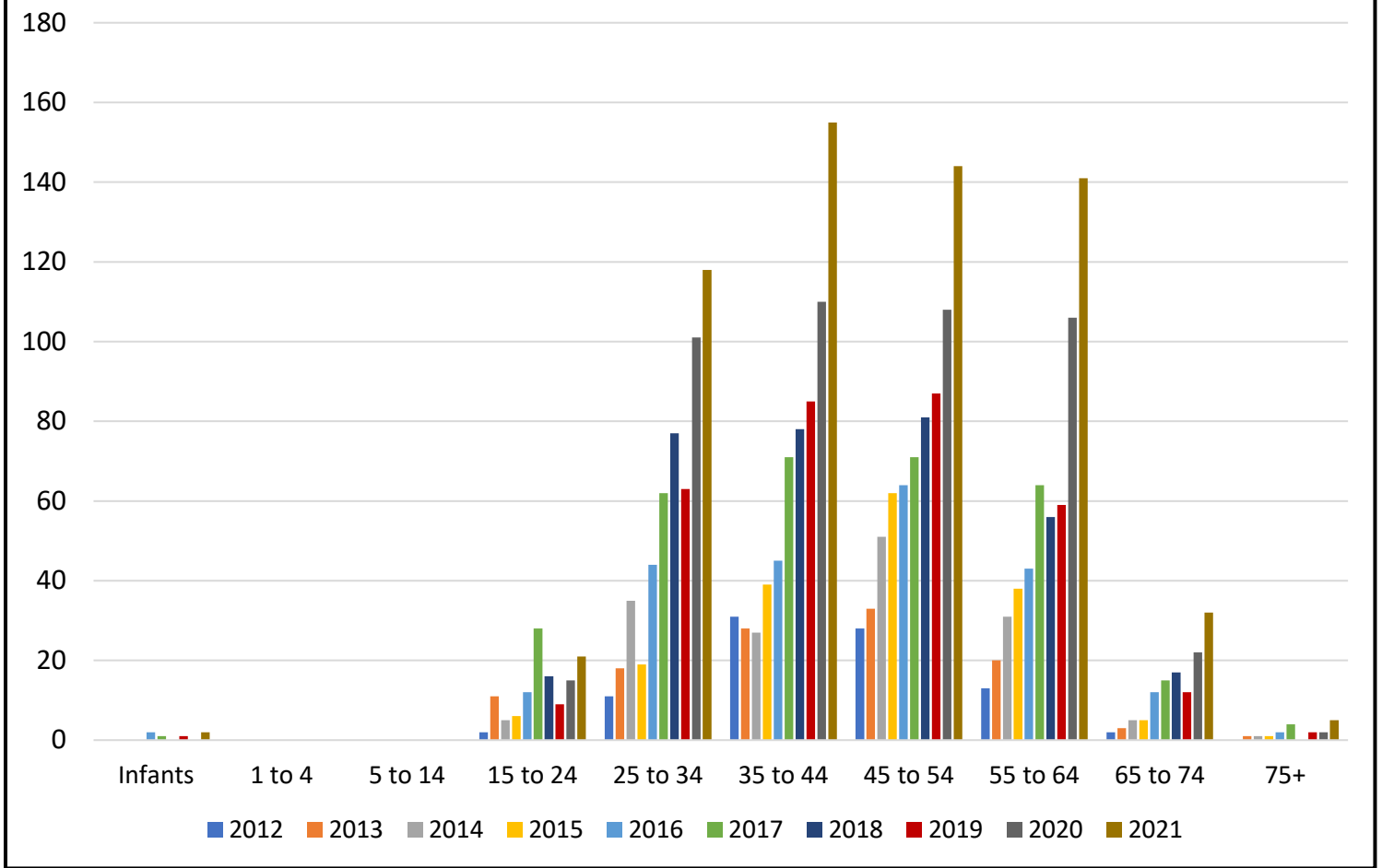
## Data and Methods

The Knox and Anderson County Medical Examiner database (MDILog) was queried for possible drug-related causes of death for cases accepted under medical examiner jurisdiction for Jan. 1, 2021, through Dec. 31, 2021. The initial query included non-motor vehicle accidents, undetermined, and suicide manners of death. The initial data set was examined to ensure all included cases were drug-related deaths (as determined by the forensic pathologist of record). Causes of death related to chronic effects of drugs and alcohol (bacterial endocarditis, chronic ethanol use, etc.) were excluded from the dataset.

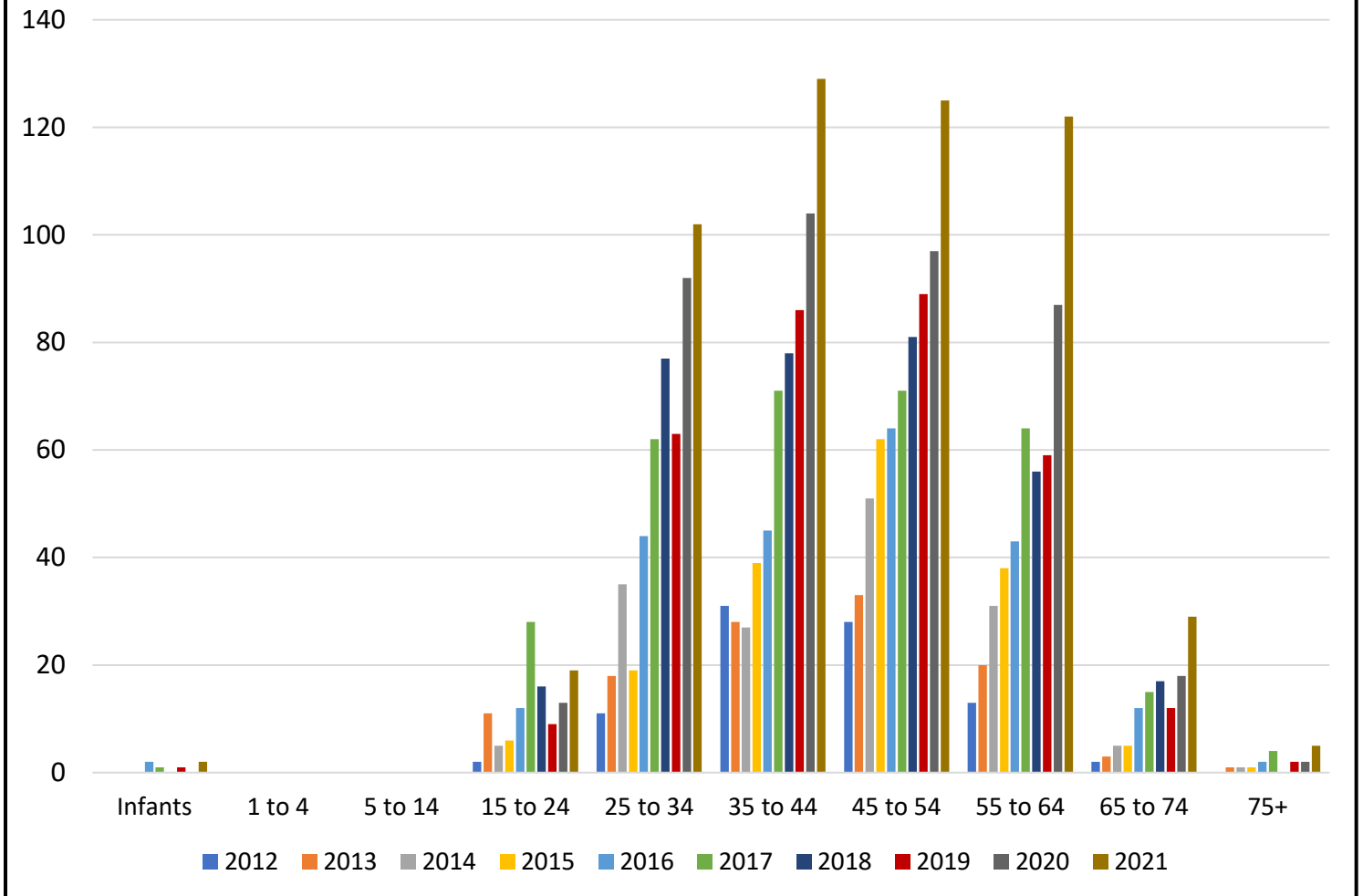
NIHCM 2021 <https://nihcm.org/publications/the-evolution-of-the-opioid-crisis-2000-2018>



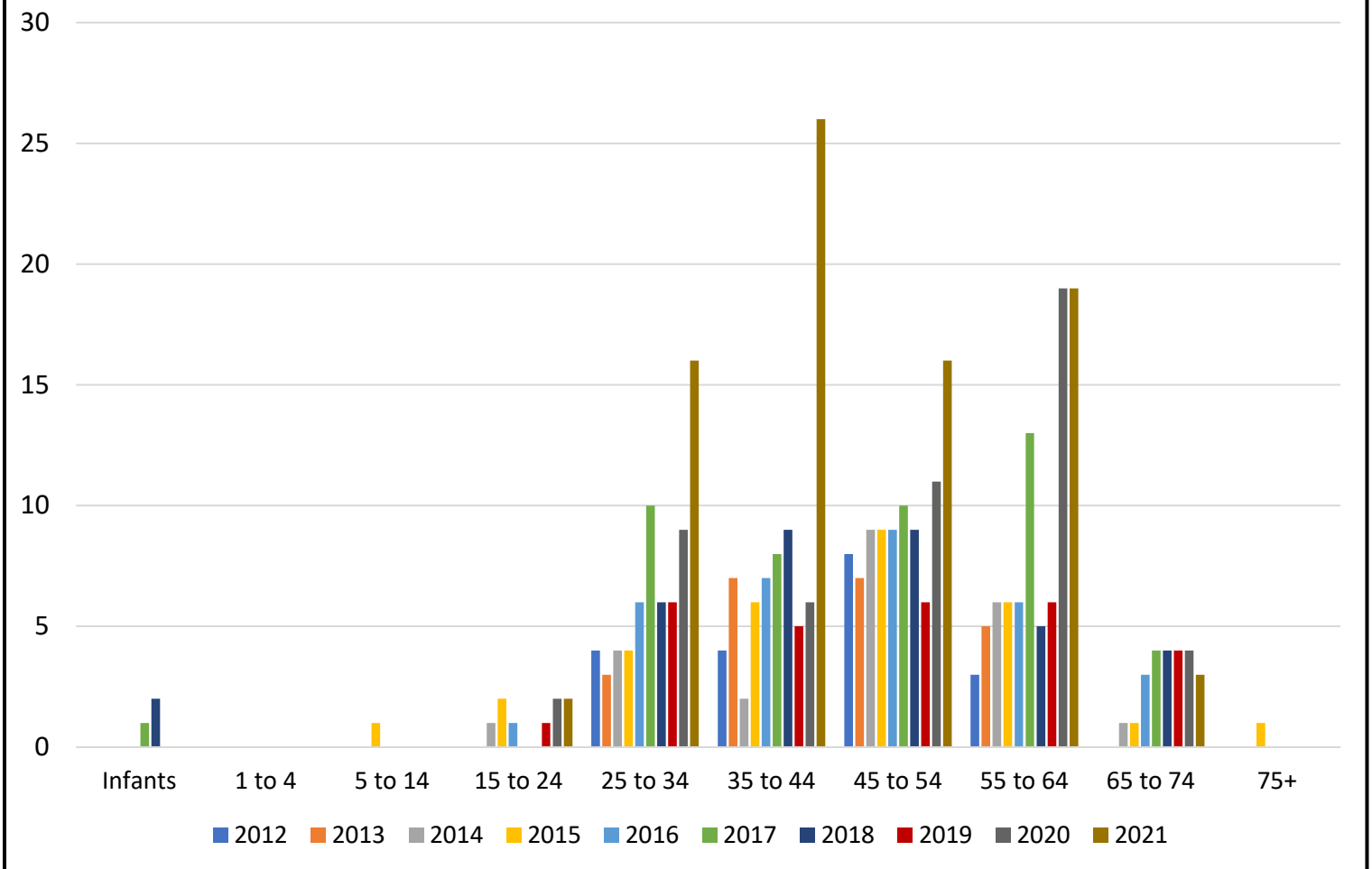
## Knox and Anderson Counties Age Distribution for Drug-Related Cases 2012-2021



**Knox County  
Age Distribution for Drug-Related Cases  
2012-2021**

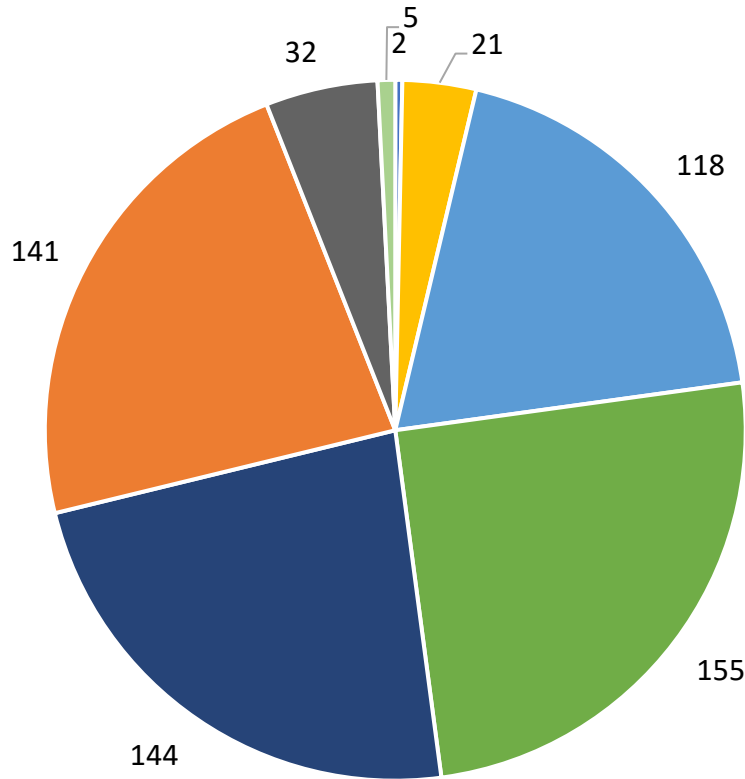


**Anderson County  
Age Distribution for Drug-Related Cases  
2012-2021**





## Knox and Anderson Counties 2021 Drug-Related Deaths by Age Distribution

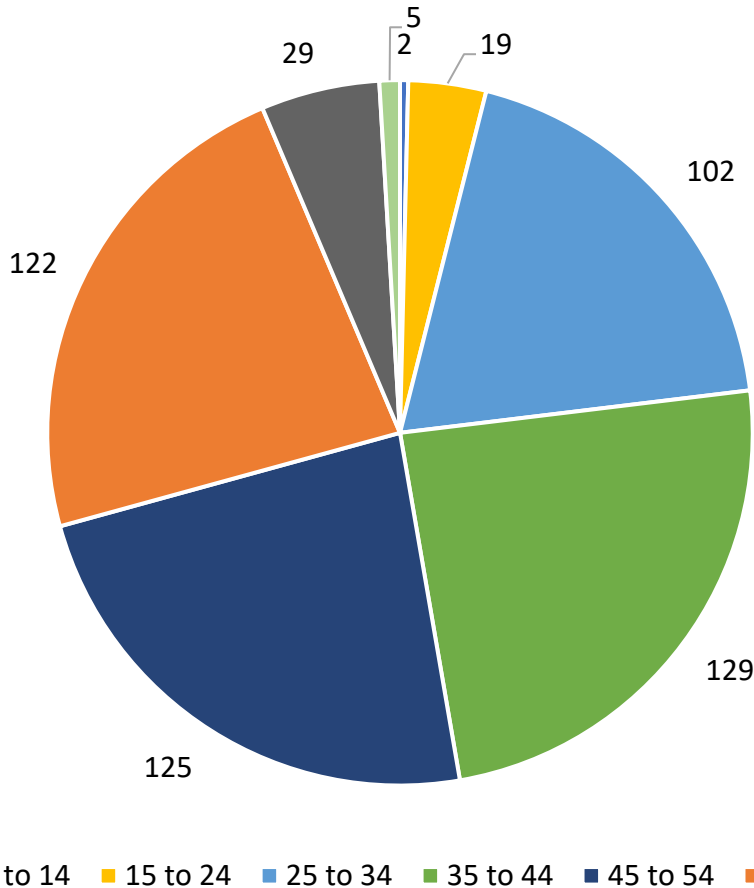


■ Infants ■ 1 to 4 ■ 5 to 14 ■ 15 to 24 ■ 25 to 34 ■ 35 to 44 ■ 45 to 54 ■ 55 to 64 ■ 65 to 74 ■ 75+

### Knox and Anderson Counties 2021 Drug-Related Deaths by Age Distribution and the Percentage of Increase

Age Group	1 to 4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75+
Infants	0%	0%	4%	17%	41%	33%	33%	45%	150%

**Knox County  
2021 Drug-Related Deaths  
by Age Distribution**

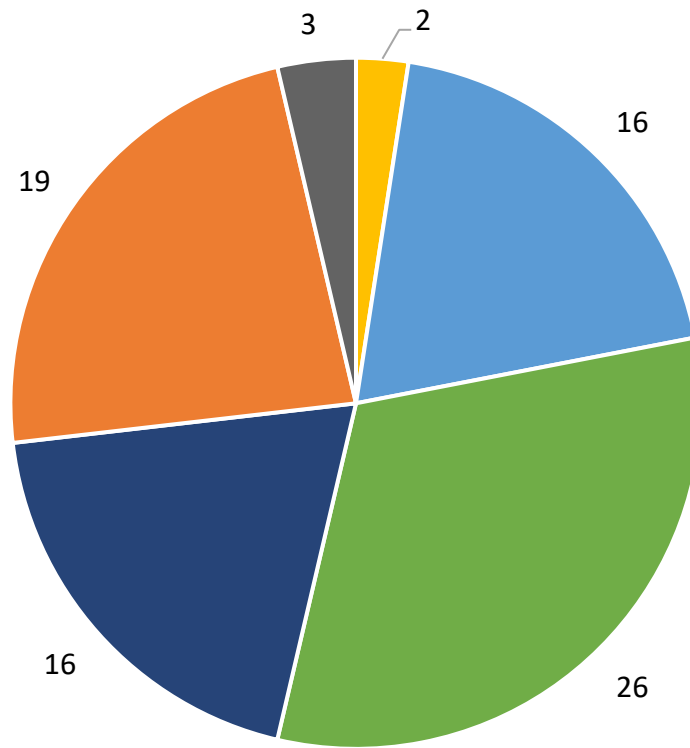


■ Infants ■ 1 to 4 ■ 5 to 14 ■ 15 to 24 ■ 25 to 34 ■ 35 to 44 ■ 45 to 54 ■ 55 to 64 ■ 65 to 74 ■ 75+

**Knox County 2021 Drug-Related Deaths  
by Age Distribution and the Percentage of Increase**

Age Group	1 to 4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75+
Infants	0%	0%	46%	11%	24%	29%	40%	61%	150%

**Anderson County  
2021 Drug-Related Deaths  
by Age Distribution**

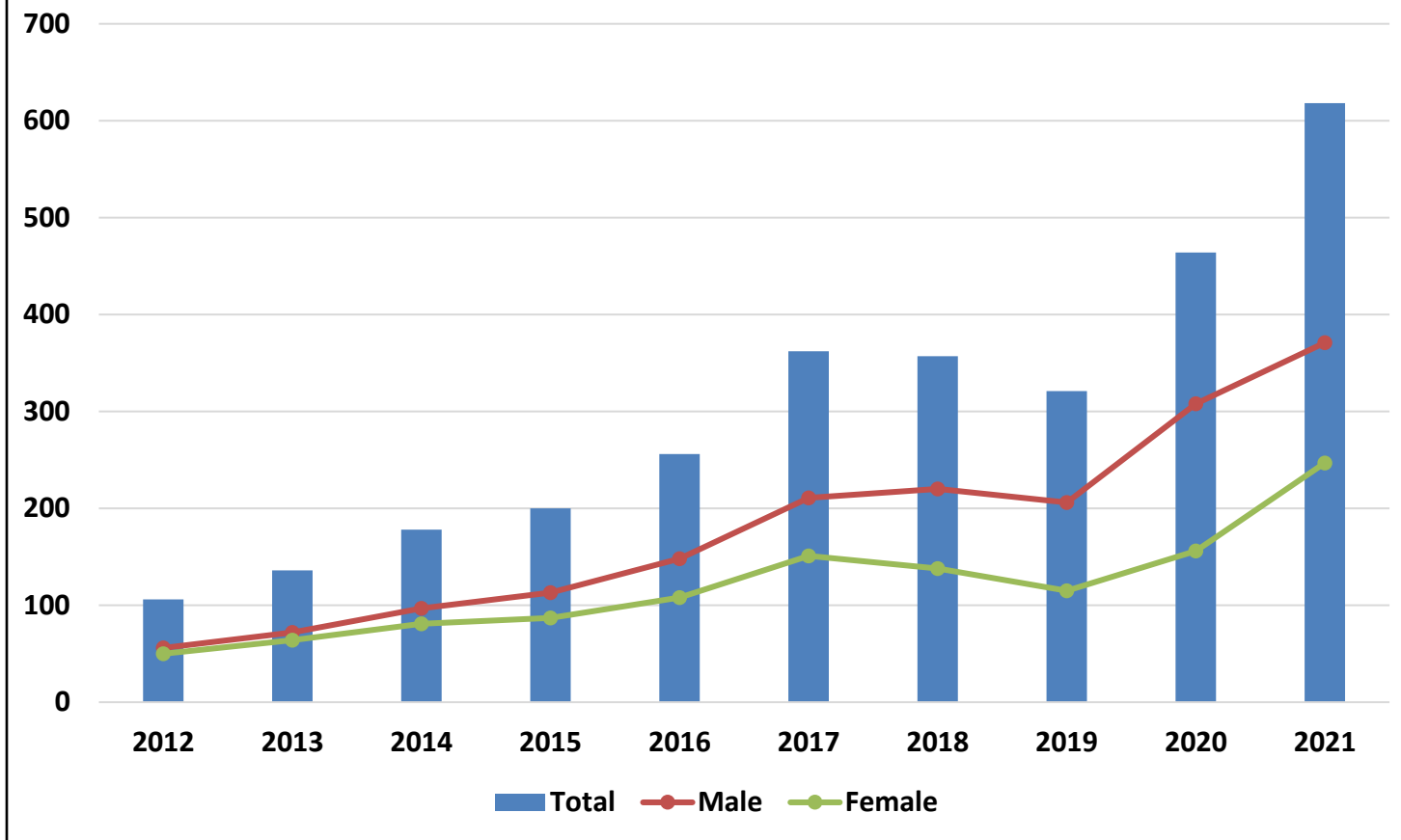


■ Infants ■ 1 to 4 ■ 5 to 14 ■ 15 to 24 ■ 25 to 34 ■ 35 to 44 ■ 45 to 54 ■ 55 to 64 ■ 65 to 74 ■ 75+

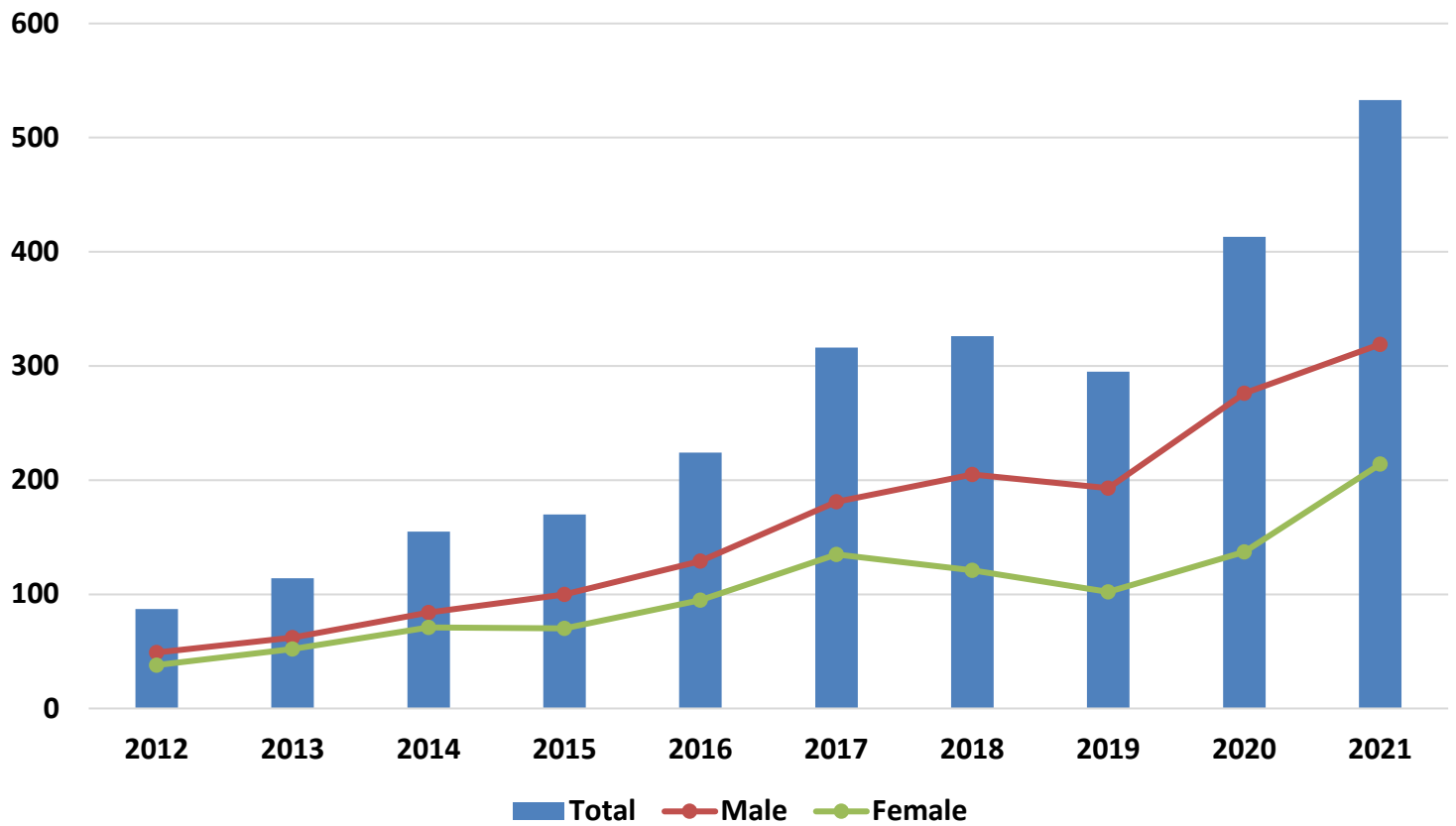
**Anderson County 2021 Drug-Related Deaths  
by Age Distribution and the Percentage of Increase**

Infants	1 to 4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75+
0%	0%	0%	0%	78%	333%	73%	0%	25%	0%

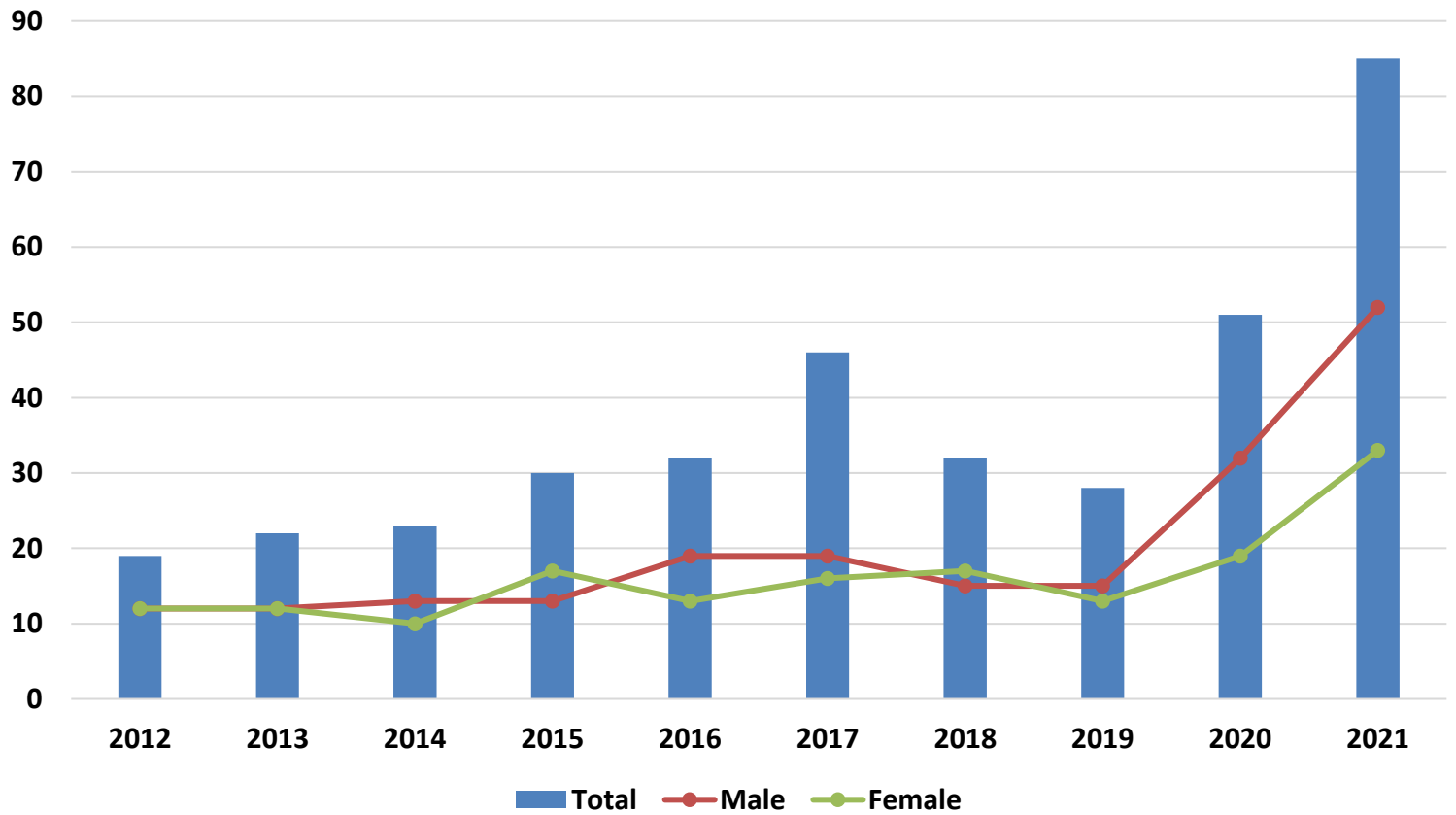
## Knox and Anderson Counties Drug-Related Death Distribution by Gender 2012-2021



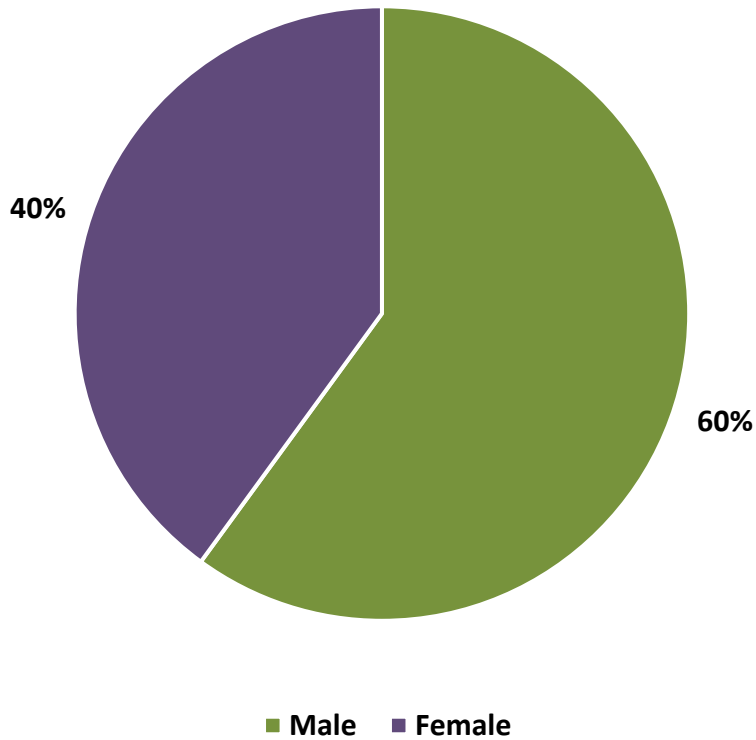
## Knox County Drug-Related Death Distribution by Gender 2012-2021



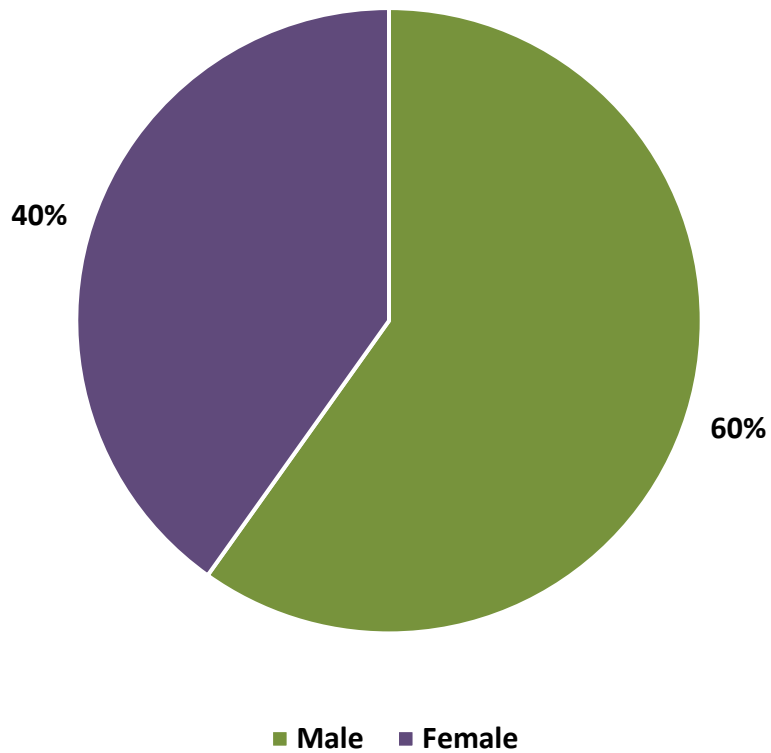
## Anderson County Drug-Related Death Distribution by Gender 2012-2021



**Knox and Anderson Counties  
2021 Drug-Related Death  
Distribution By Gender**

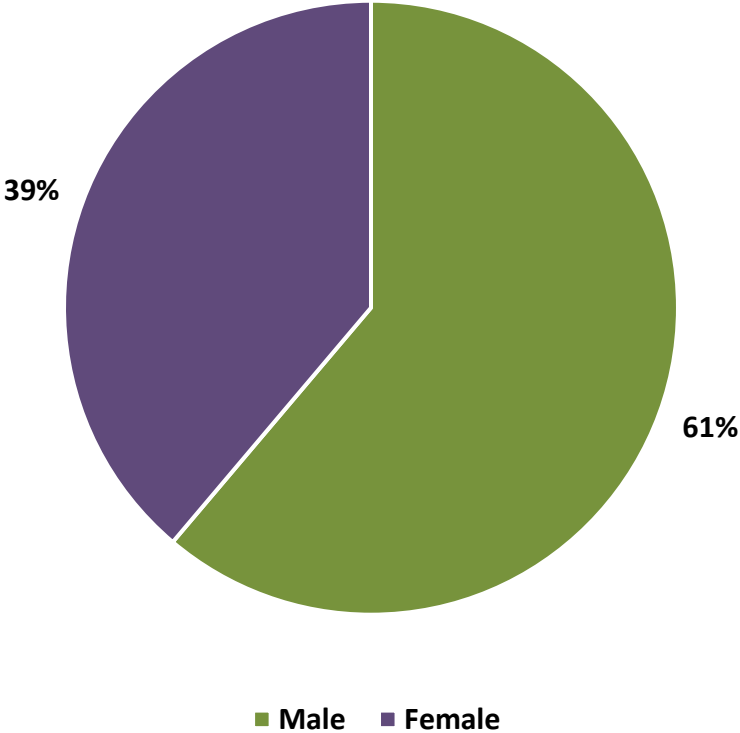


**Knox County  
2021 Drug-Related Death  
Distribution By Gender**

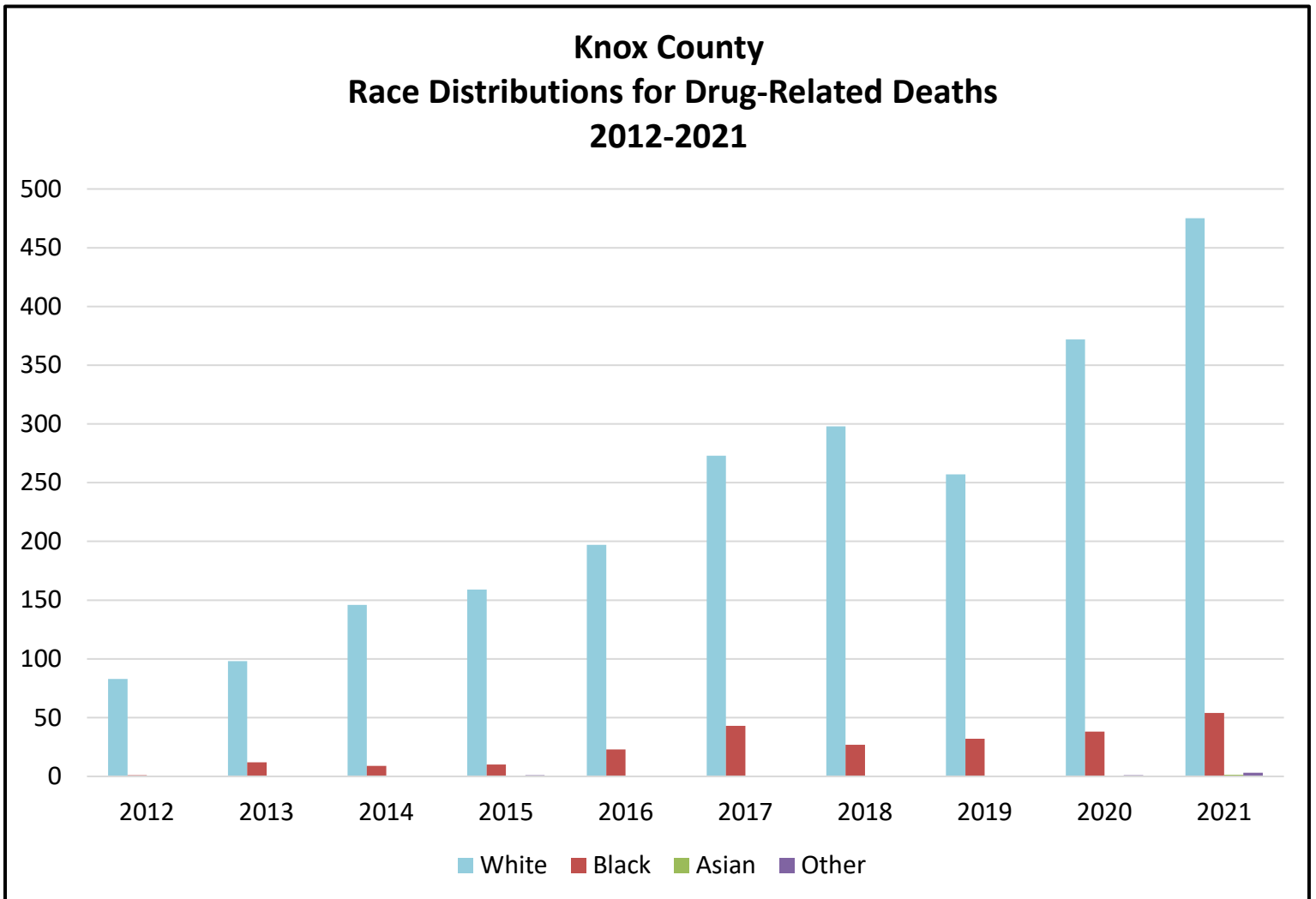




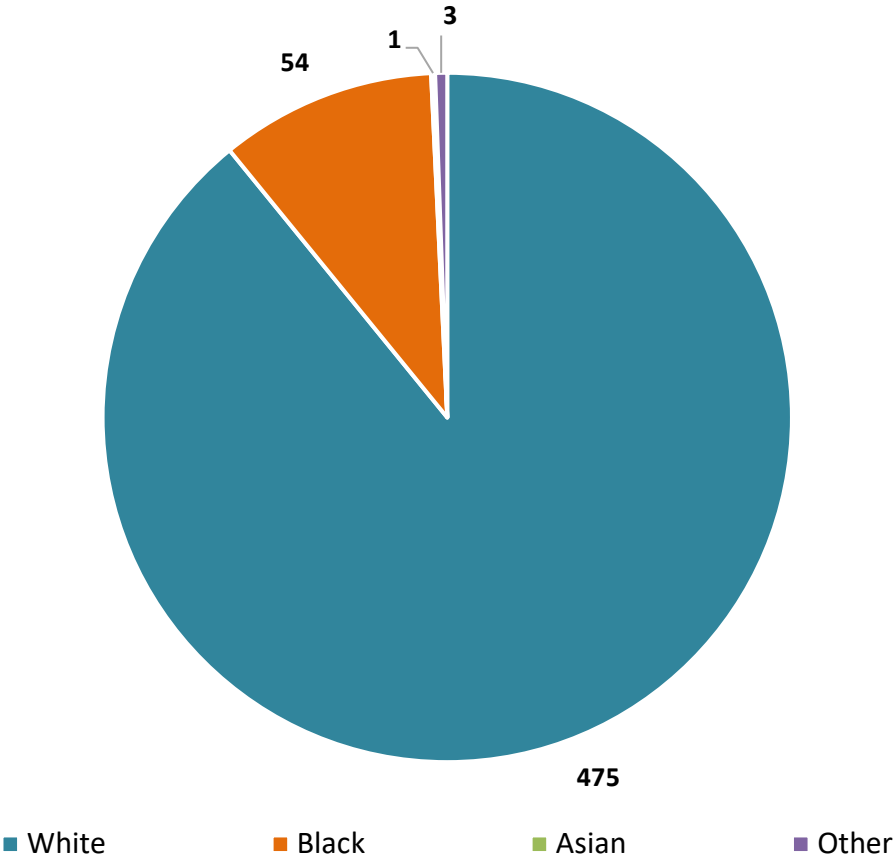
Anderson County  
2021 Drug-Related Death  
Distribution by Gender



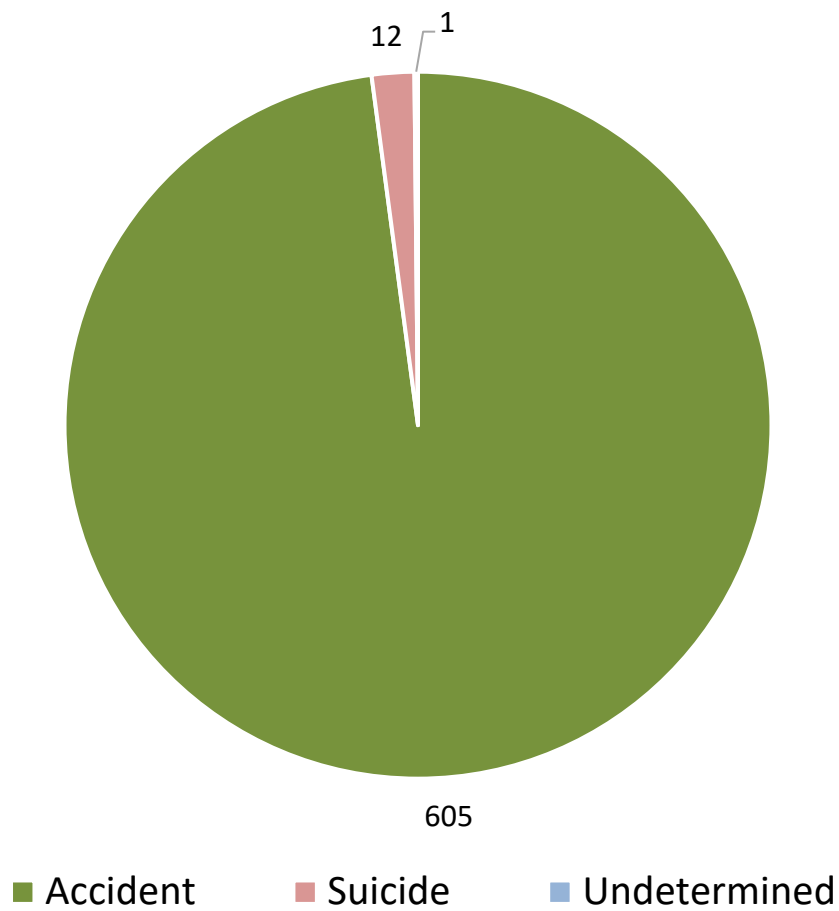
## Knox County Race Distributions for Drug-Related Deaths 2012-2021



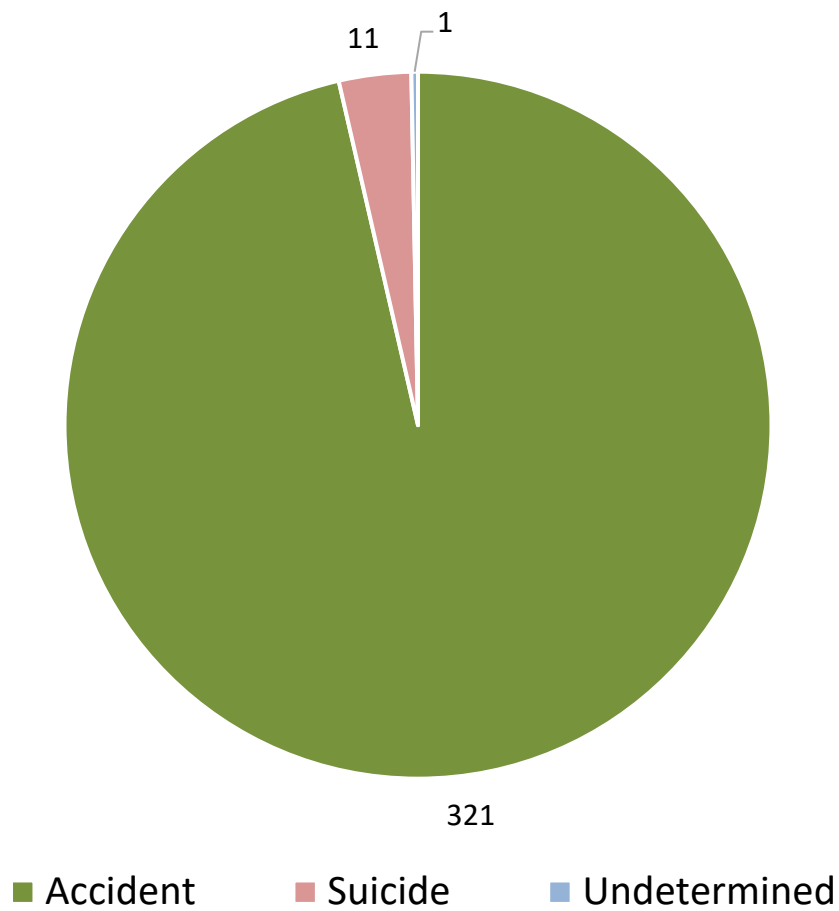
**Knox County  
2021 Drug-Related Death  
Distribution by Race**



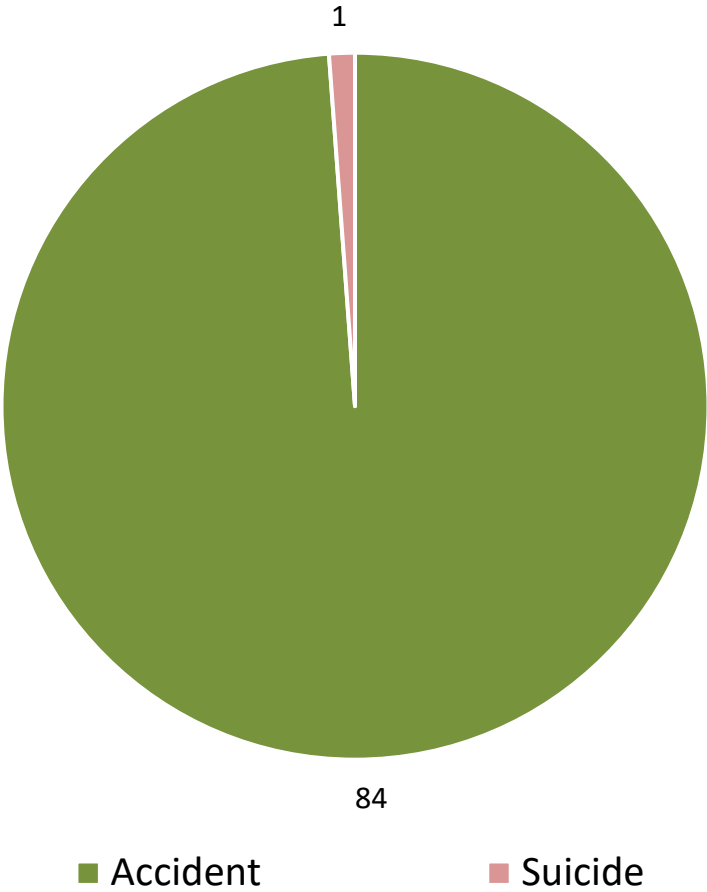
**Knox and Anderson Counties  
2021 Drug-Related Deaths  
by Manner of Death**



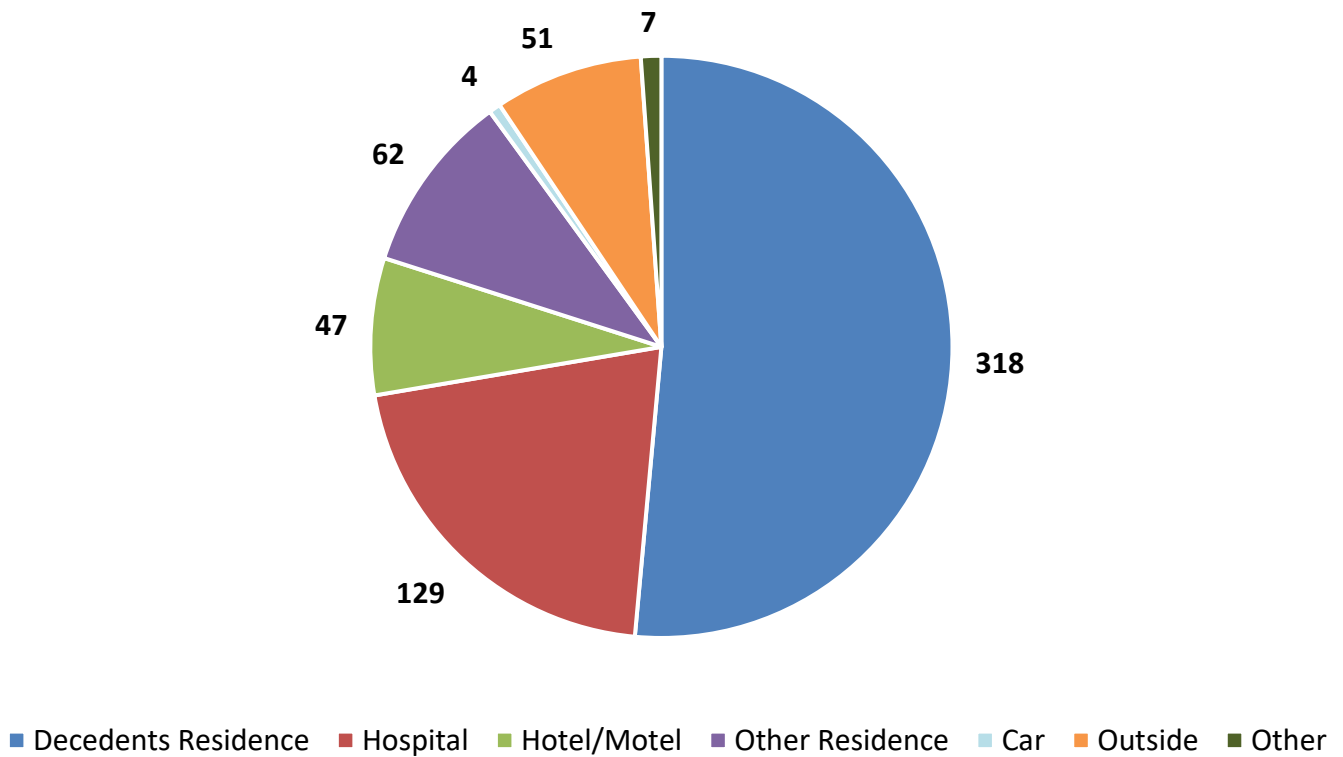
## Knox County 2021 Drug-Related Deaths by Manner of Death



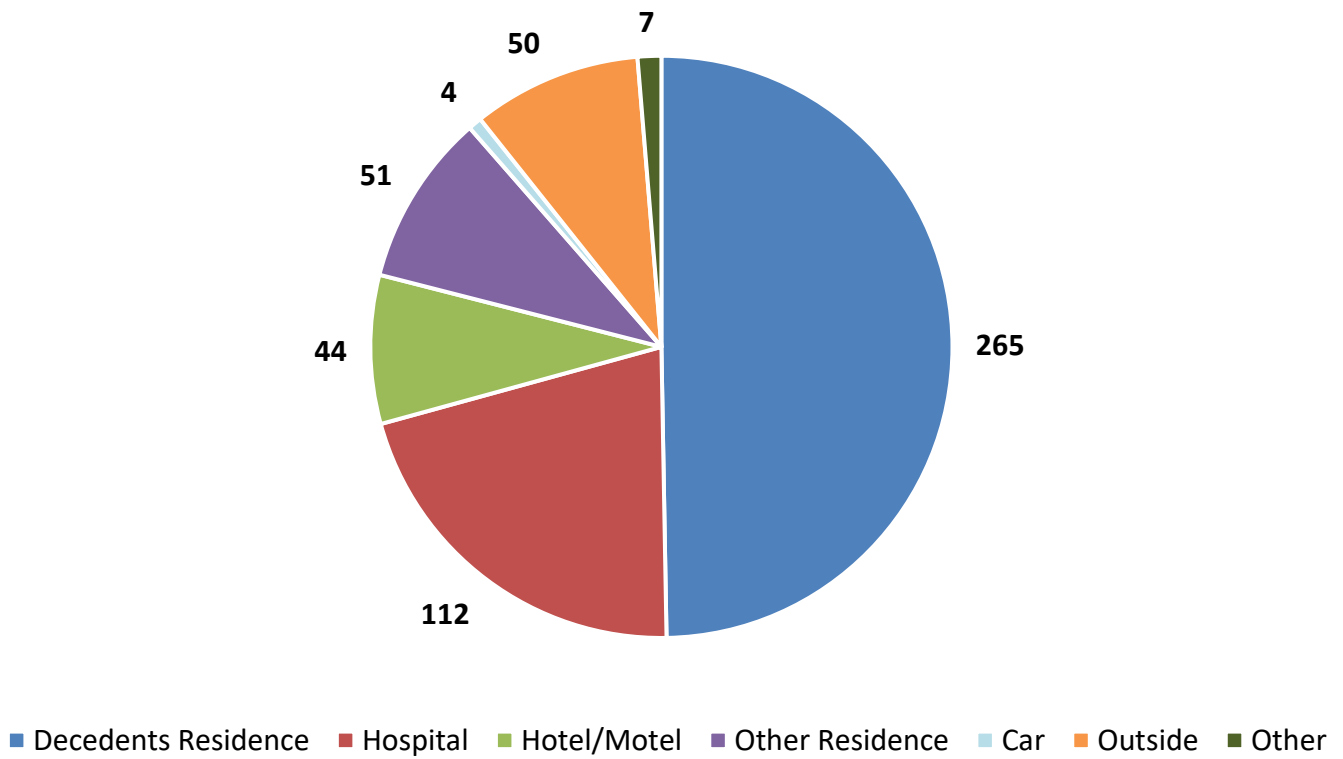
**Anderson County  
2021 Drug-Related Deaths  
by Manner of Death**



## Knox and Anderson Counties Location Types Where 2021 Drug-Related Deaths Occurred

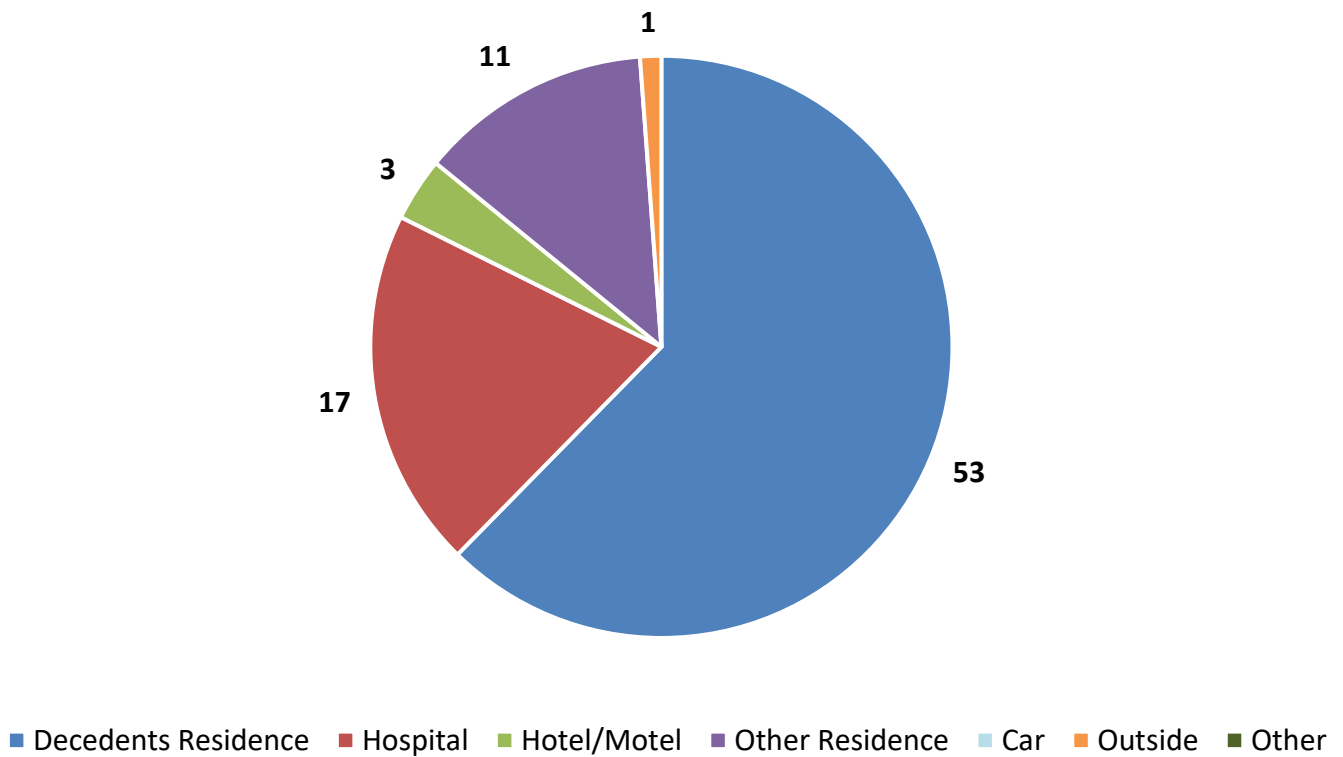


**Knox County  
Location Types  
Where 2021 Drug-Related Deaths Occurred**





## Anderson County Location Types Where 2021 Drug-Related Deaths Occurred



# 2021 Drug-Related Death Report

## Zip Code Distribution and Heat Maps by Year and County

The following zip code data represents home addresses, location of injury, and death locations for drug-related deaths that had an autopsy or examination in 2021 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.

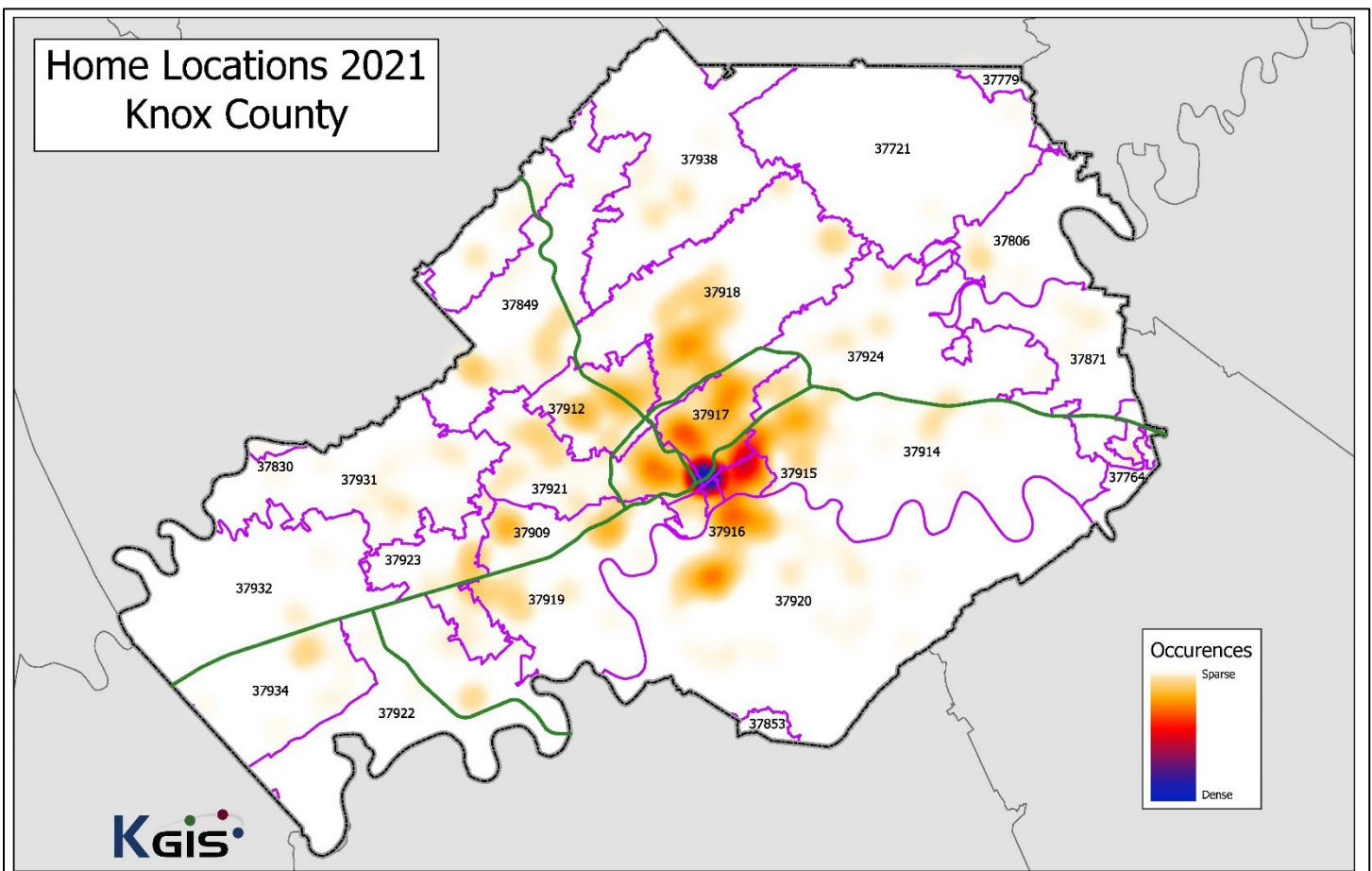
KGIS assisted by creating heat maps. The heat maps represent drug-related deaths based on home address, location of injury, and location of death.

### DATA SOURCE:

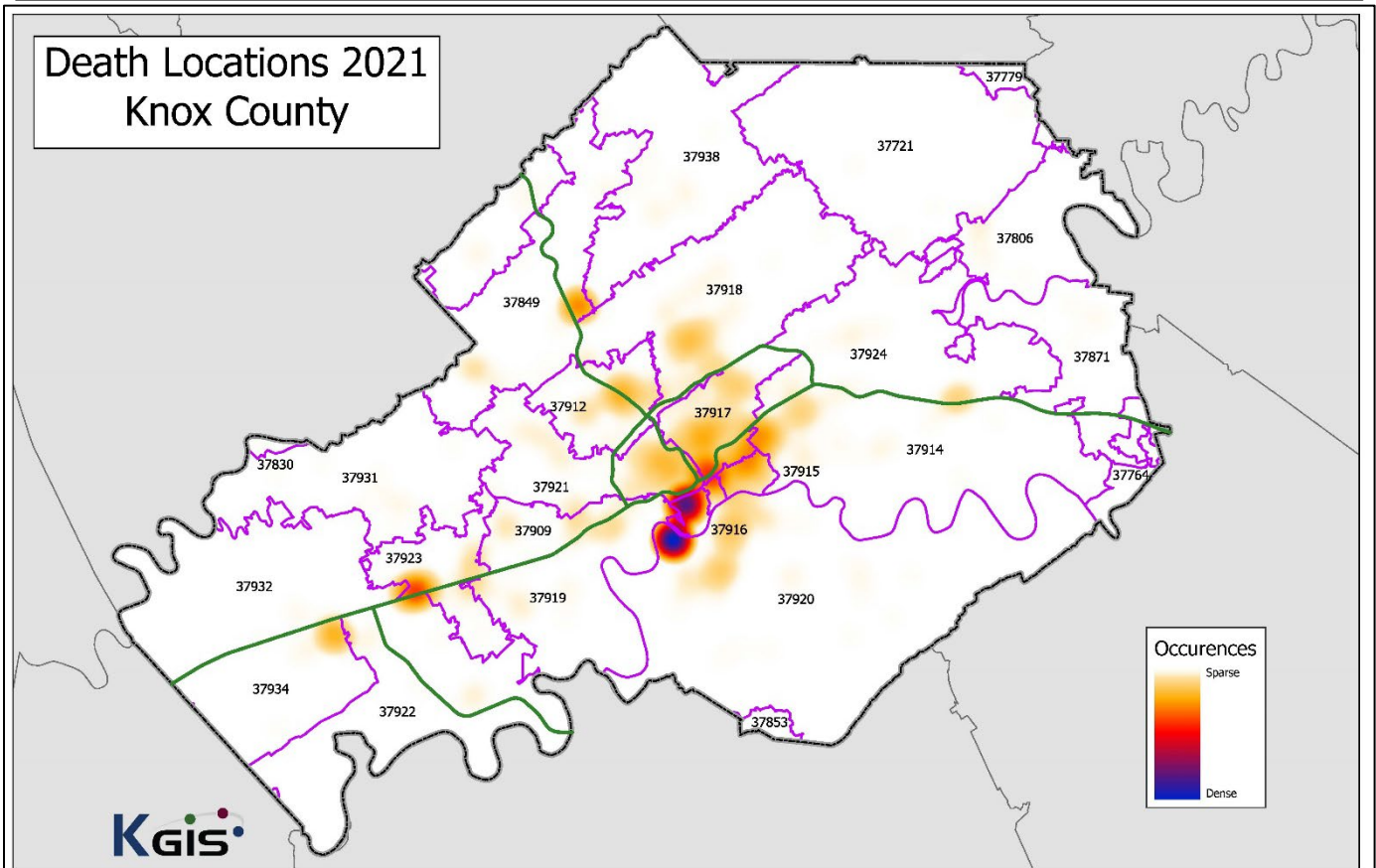
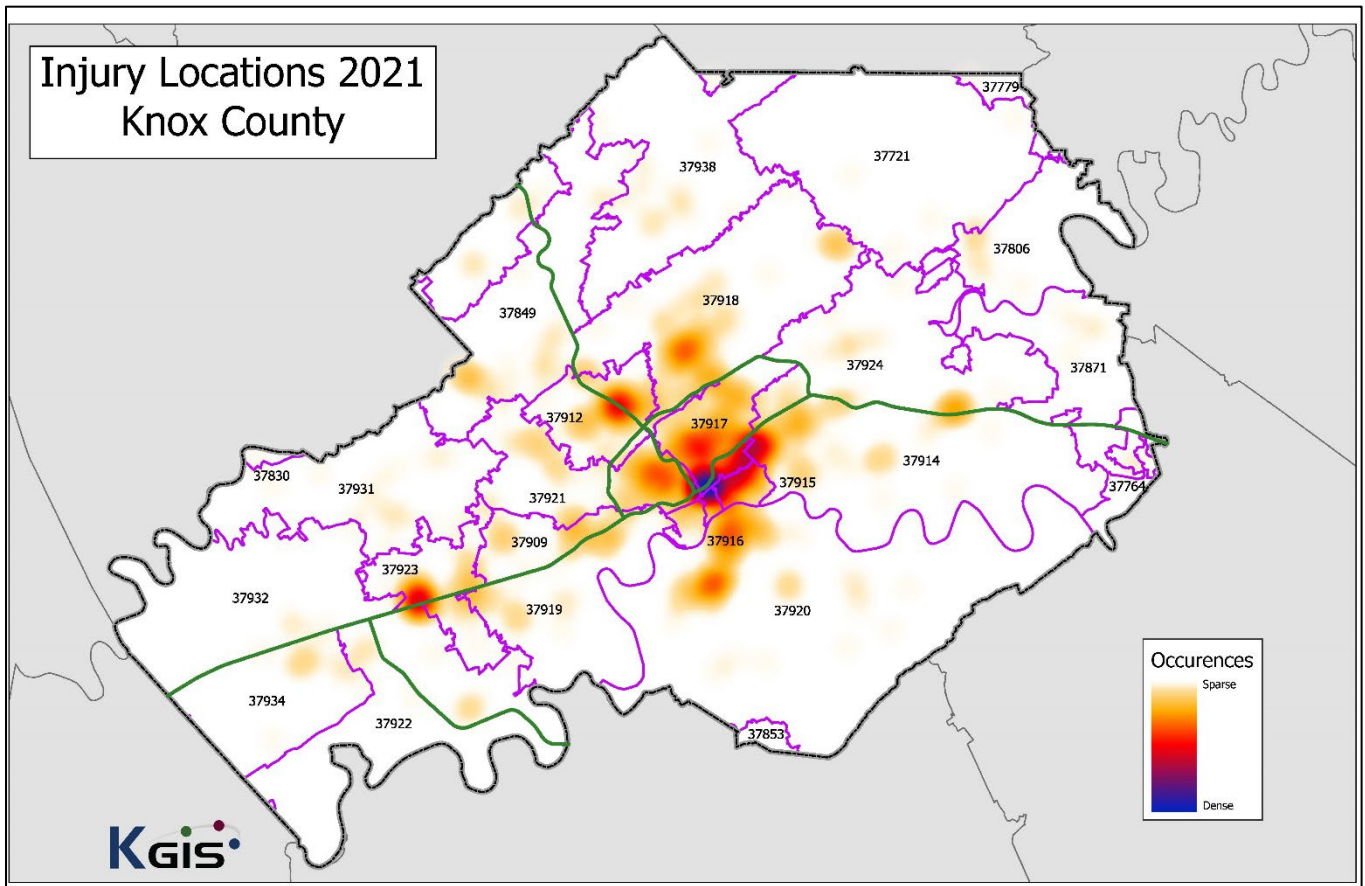
2021 Maps: MDILog Database and Knox County RFC Medical Examiner Database, 2021. Knoxville, TN.

### NOTES:

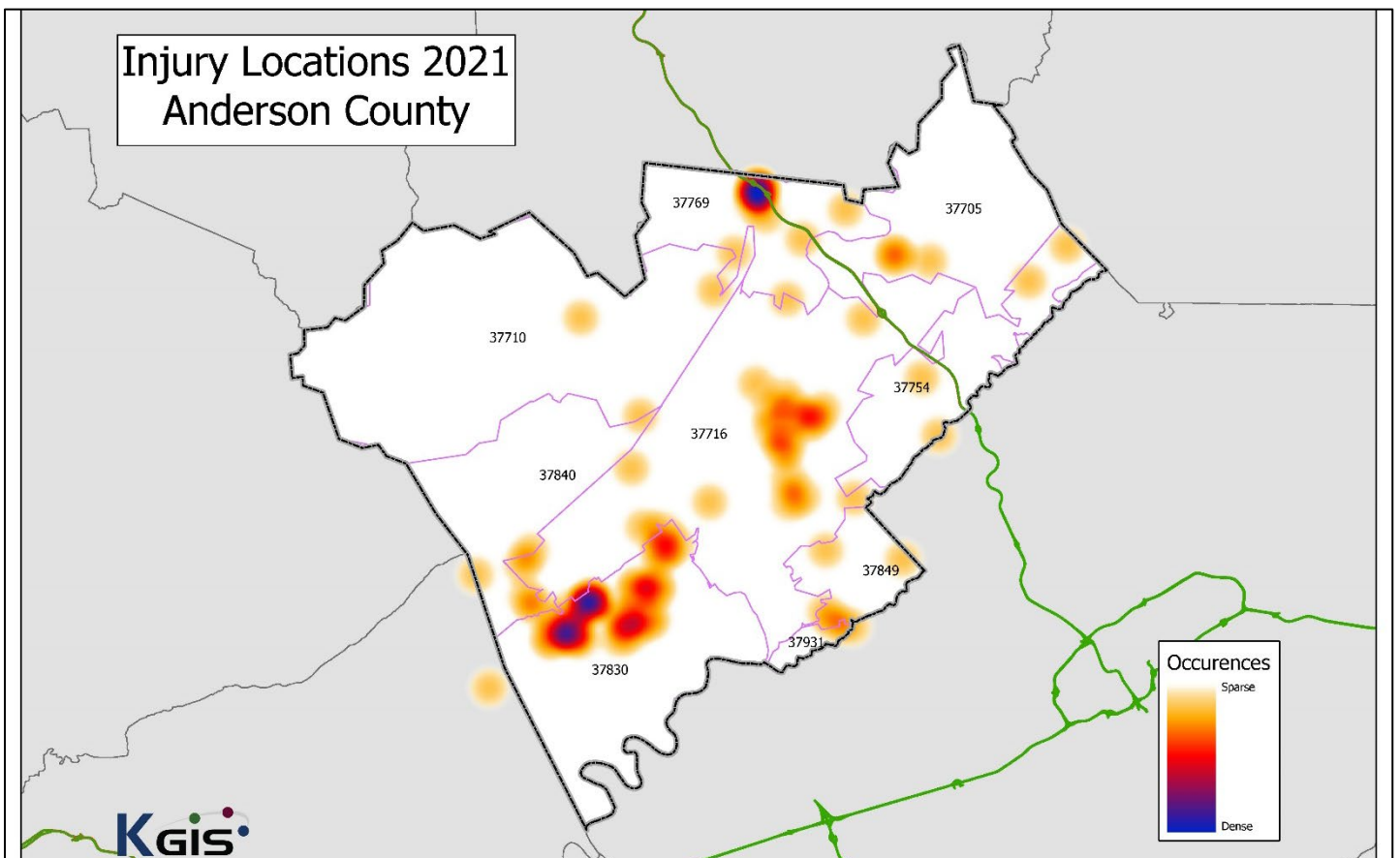
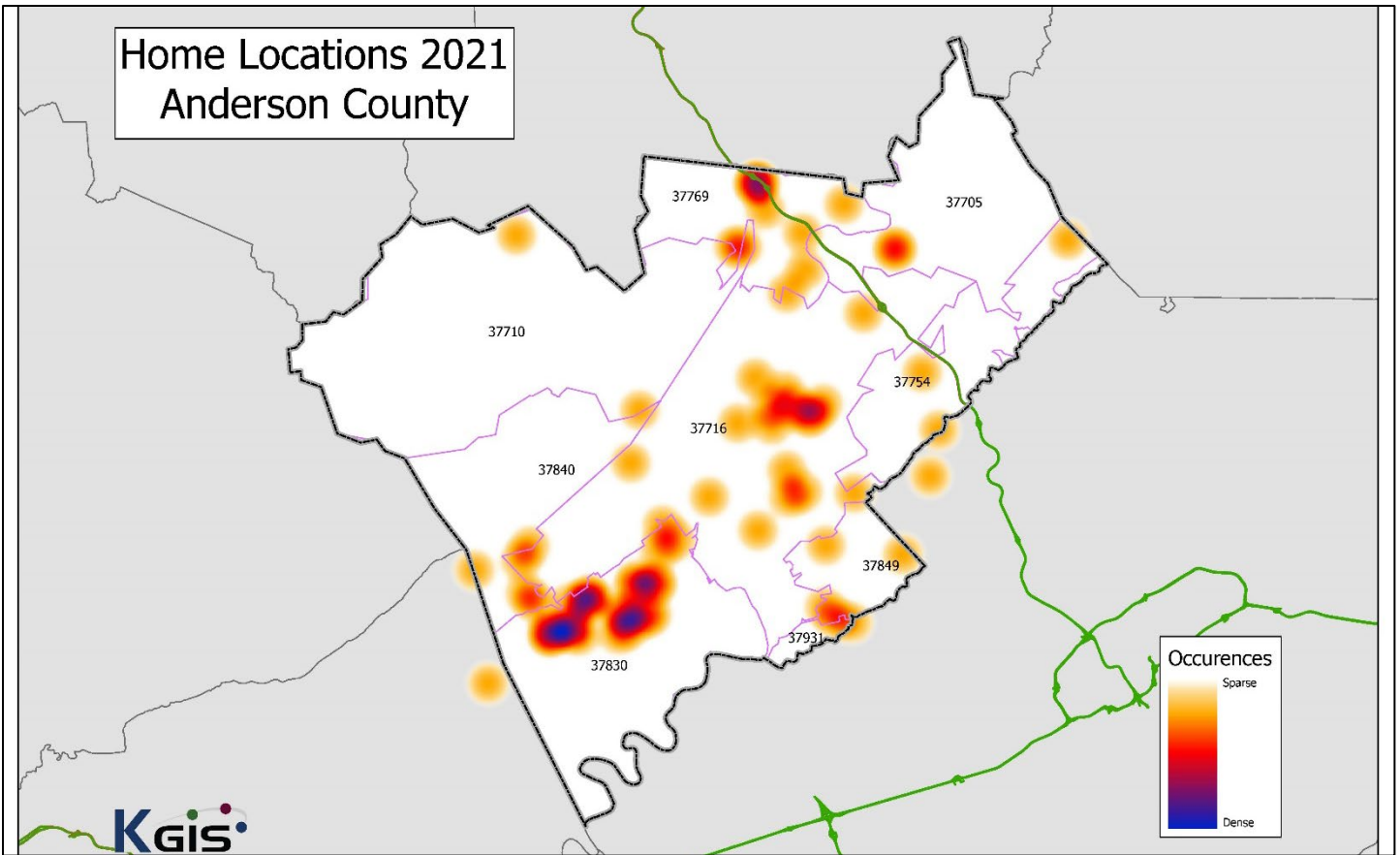
1. The Home Address Location maps represent where the people who died of a drug-related death resided.
2. The Location of Injury Address maps represent where drug-related injury occurred.
3. The Death Location maps represent where the people died from the drug-related death. Hospital locations were added to the maps for reference.



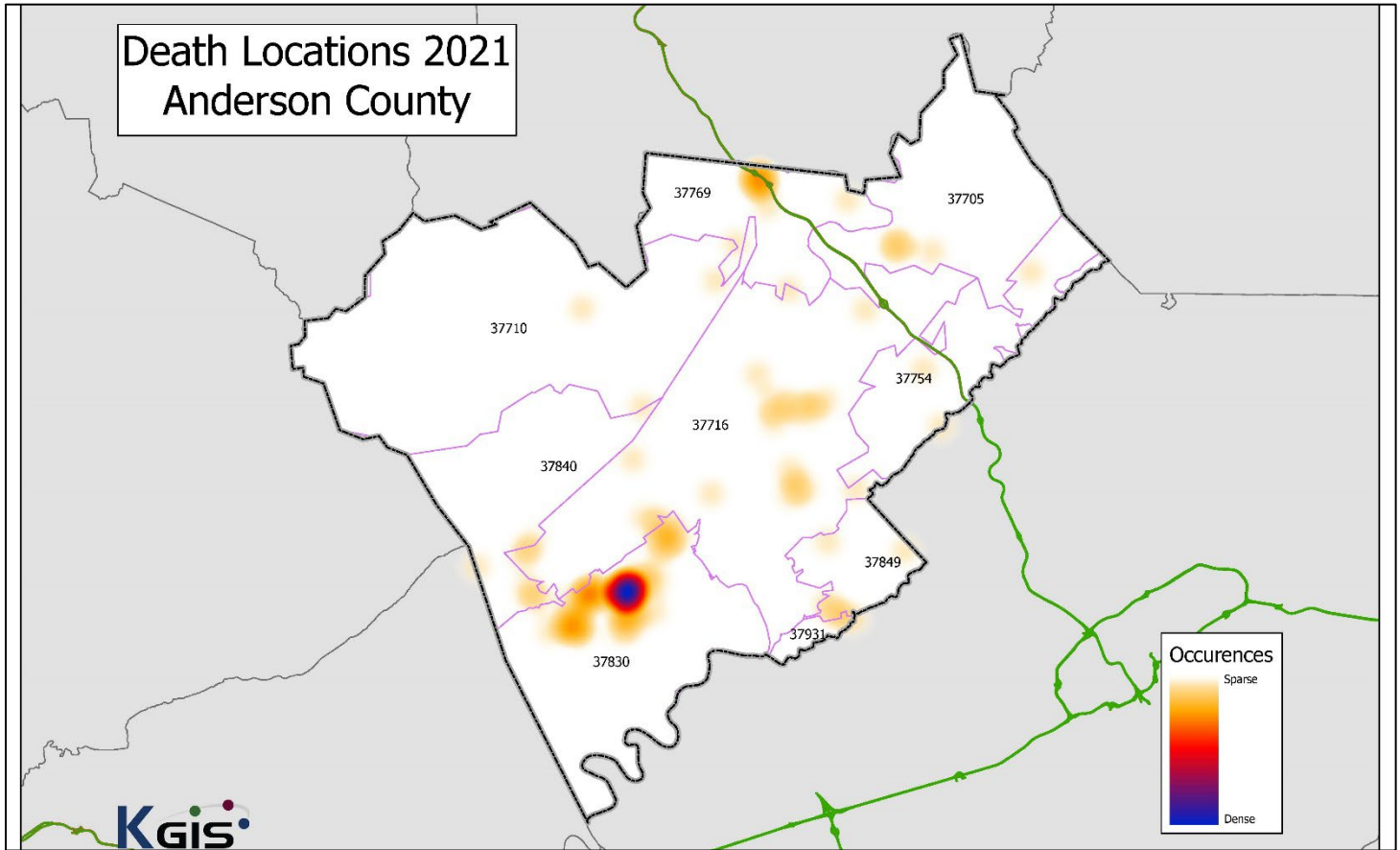
# 2021 Drug-Related Death Report



# 2021 Drug-Related Death Report



# 2021 Drug-Related Death Report



# 2021 Drug-Related Death Report

## Knox and Anderson Counties Analytes Found and Number of Cases 2019-2021

Analyte name	2021	2020	2019
Fentanyl	463	308	183
4-ANPP	417	249	75
Norfentanyl	391	262	150
Methamphetamine	290	164	111
Amphetamine	279	148	102
Naloxone	198	109	67
Delta-9 THC	133	110	66
Diphenhydramine	108	64	20
Ethanol	102	92	53
Benzoyllecgonine	94	70	61
Delta-9 Carboxy THC	94	71	38
Gabapentin	83	69	48
Morphine - Free	71	100	84
cocaine	52	39	32
Acetyl Fentanyl	51	87	74
Quinine	47	43	8
Alprazolam	45	28	42
Oxycodone - Free	44	31	42
11-Hydroxy Delta-9 THC	41	38	18
para-Fluorofentanyl	33	6	0
Oxymorphone - Free	30	27	44
6-MAM - Free	29	53	59
7-Amino Clonazepam	28	29	18
Desmethylsertraline	27	11	8
Metonitazene	27	1	0
Nordiazepam	25	17	19
Xylazine	25	15	4
Hydroxyzine	24	29	7
Citalopram / Escitalopram	22	13	10
Promethazine	22	25	15
Norbuprenorphine - Free	21	11	14
Sertraline	21	10	7
Diazepam	20	11	16
Norfluoxetine	20	16	13
Trazodone	20	26	10
Acetaminophen	19	11	12
Fluoxetine	19	15	11
Metoprolol	19	12	3
Tramadol	18	22	4



# 2021 Drug-Related Death Report

Analyte name	2021	2020	2019
Hydrocodone - Free	17	14	13
Mirtazapine	17	5	6
Buprenorphine - Free	16	12	14
Lorazepam	16	8	5
LSD	16	33	11
Bupropion	15	13	2
Cyclobenzaprine	15	11	13
Olanzapine	15	8	7
Desmethyloperamide	14	9	5
Dextro / Levo Methorphan	14	5	9
Ephedrine	14	4	2
Hydroxybupropion	14	10	3
Mitragynine	14	22	6
Cocaethylene	13	10	9
Hydromorphone - Free	13	9	9
Lidocaine	12	9	3
Midazolam	12	9	3
O-Desmethylvenlafaxine	12	8	6
Lamotrigine	11	7	7
Venlafaxine	11	8	5
Chlorpheniramine	10	7	3
Methadone	10	15	11
Paroxetine	10	8	2
Duloxetine	9	9	5
Quetiapine	9	3	5
Dextrorphan / Levorphanol	8	5	3
Dihydrocodeine / Hydrocodol - Free	8	3	1
Levetiracetam	8	8	5
Phenylpropanolamine	8	3	0
9-Hydroxyrisperidone	7	6	0
Alpha-Hydroxyetizolam	7	2	0
Doxylamine	7	5	2
Methoxyacetylfentanyl	7	39	1
Phentermine	7	4	0
Amitriptyline	6	11	7
EDDP	6	10	9
MDMA	6	6	1
Nortriptyline	6	12	8
Temazepam	6	1	2
Zolpidem	6	4	3
Alpha-Hydroxyalprazolam	5	2	3
Aripiprazole	5	7	8



# 2021 Drug-Related Death Report

Analyte name	2021	2020	2019
Clonazepam	5	15	8
Ketamine	5	1	0
Risperidone and 9-Hydroxyrisperidone - Total	5	6	0
4-Hydroxynltazene	4	1	0
Acetone	4	7	6
Codeine - Free	4	13	3
O-Desmethyltramadol	4	4	4
Risperidone	4	2	0
Topiramate	4	2	1
Ziprasidone	4	0	0
10-Hydroxycarbazepine	3	6	0
Butalbital	3	4	0
Carboxyhemoglobin	3	6	3
Etonitazene	3	0	0
Loperamide	3	3	1
mCPP	3	4	1
MDA	3	3	0
MDEA	3	0	0
Meprobamate	3	1	0
N-Desmethylsildenafil	3	1	1
Oxazepam	3	2	3
Oxycodone / Oxymorphone	3	2	3
Sildenafil	3	1	1
Tadalafil	3	4	0
1,1-Difluoroethane	2	2	1
8-Aminoclonazepam	2	0	0
Butorphanol - Free	2	0	0
Carisoprodol	2	0	0
Clobazam	2	0	0
Desalkylflurazepam	2	4	0
Dicyclomine	2	1	0
Flubromazolam	2	1	0
Haloperidol	2	0	0
Hydroxyethylflurazepam	2	2	0
Levamisole	2	4	4
Metaxalone	2	0	0
Norketamine	2	1	0
Norpseudoephedrine	2	1	1
Phenytoin	2	2	2
Protonitazene	2	0	0
Pseudoephedrine	2	1	0





# 2021 Drug-Related Death Report

Analyte name	2021	2020	2019
Salicylate	2	1	1
Warfarin	2	0	0
6-Beta-Naltrexol – Free	1	2	1
Amlodipine	1	1	2
Beta-hydroxy fentanys	1	0	0
Beta-Phenethylamine	1	4	0
Bromazolam	1	0	0
Buspirone	1	1	5
Chlordiazepoxide	1	1	0
Chlorpromazine	1	0	0
Clonidine	1	0	0
Clozapine	1	0	0
Desmethyldoxepin	1	2	3
Diltiazem	1	3	0
Donepezil	1	0	0
Doxepin	1	3	3
Eszopiclone / Zopiclone	1	0	0
Etizolam	1	14	1
Flualprazolam	1	19	0
Flubromazepam	1	0	0
Isotonitazene	1	5	0
Lacosamide	1	2	0
Metoclopramide	1	1	2
Monoethylglycinexylidide (MEGX)	1	2	1
Naltrexone - Free	1	1	0
Norclozapine	1	0	0
para-Fluoroisobutyrylfentanyl	1	0	0
Phenobarbital	1	0	0
Tripolidine	1	2	0

## Knox and Anderson Counties Top 10 Drugs Found in Drug-Related Deaths by Year 2017-2021

	2017	2018	2019	2020	2021
1	Fentanyl & Analogues	Fentanyl & Analogues	Fentanyl & Analogues*	Fentanyl & Analogues*	Fentanyl & Analogues*
2	Cocaine	Methamphetamine	Methamphetamine	Methamphetamine	Methamphetamine
3	Methamphetamine	Heroin	Alcohol/Ethanol	Heroin	Diphenhydramine
4	Heroin	Cocaine	Heroin	Alcohol/Ethanol	Alcohol/Ethanol
5	Oxymorphone	Alcohol/Ethanol	Cocaine	Cocaine	Cocaine
6	Alprazolam	Alprazolam	Oxymorphone	Gabapentin	Gabapentin
7	Oxycodone	Oxycodone	Alprazolam	Diphenhydramine	Heroin
8	Alcohol/Ethanol	Oxymorphone	Oxycodone	Oxycodone	Alprazolam
9	Morphine	Morphine	Gabapentin	Alprazolam	Oxycodone
10	Hydrocodone	Methadone	Diphenhydramine	Oxymorphone	Oxymorphone

\*Includes Fentanyl, Acetyl Fentanyl, Methoxyacetyl fentanyl, para-Fluorofentanyl, Beta-Hydroxy Fentanyl, and Para-Fluoroisobutyrylfentanyl

Data Source: MDILog Database 2016-2021 Knoxville, TN

**Note:**

1. This report notes only the presence of the drugs contributing to death but does not indicate the appropriate or legal use of a drug.
2. Drug poisoning deaths may involve more than one specific substance.
3. Some drugs are listed as Not Otherwise Specified (NOS) because information was obtained from sources that did not define the drug type.

2021 DRD Cases with Naloxone Use and Drug Type				
	Naloxone- Rx Drug Only	Naloxone- Illicit Drug Only	Naloxone- Rx and Illicit Drug	Total
<b>Knox</b>	8	88	78	<b>174</b>
<b>Anderson</b>	0	14	10	<b>24</b>
<b>Total</b>	<b>8</b>	<b>102</b>	<b>88</b>	<b>198</b>

This report is also available [online](#).

\*Acknowledgements to Anna Hoekstra at RFC and Sean Kitts at KGIS