



Fentanyl and Heroin-Related Deaths in North Carolina

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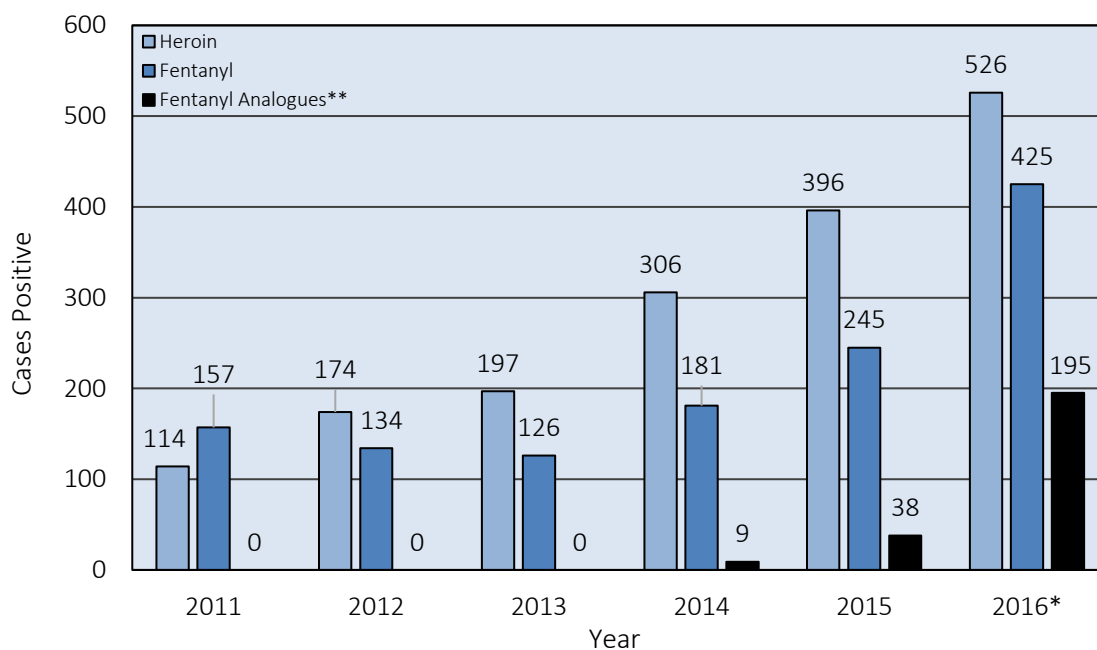
OVERVIEW

The Office of the Chief Medical Examiner (OCME) investigates all suspicious, violent, unexpected, and sudden deaths in North Carolina, including all suspected drug-related deaths. The OCME collects data from autopsy reports, death certificates, investigation reports, and toxicology reports on all deaths investigated by the medical examiner system in North Carolina. The data collected by the OCME can be used to identify trends relating to deaths in North Carolina, inform public health initiatives, and develop prevention strategies.

OCME TOXICOLOGY LABORATORY

The OCME Toxicology Laboratory is accredited by the American Board of Forensic Toxicology (ABFT) and performs toxicology testing on all drug-related deaths in North Carolina to assist the pathologist in determining cause and manner of death. The OCME Toxicology Laboratory screens for more than 600 compounds. The number of novel compounds detected during screening has risen dramatically in the last two years.

- Fentanyl is a potent narcotic analgesic of the pethidine class. The drug is available by prescription as indicated for cancer and chronic pain and additionally manufactured in illicit drug laboratories.
- Fentanyl analogues are drugs with the main structural features of fentanyl that have been modified to bypass current United States drug laws and/or change the pharmacological profile of the drug.
- While the OCME Toxicology Laboratory had not detected any fentanyl analogues prior to 2014, fentanyl has been regularly detected in the decedent population since the mid-late 1990s. By 2016, numerous fentanyl analogues were detected and confirmed.
- Heroin is often supplemented with varying amounts of fentanyl and/or fentanyl analogues, which explains the increasing numbers of cases positive for both.

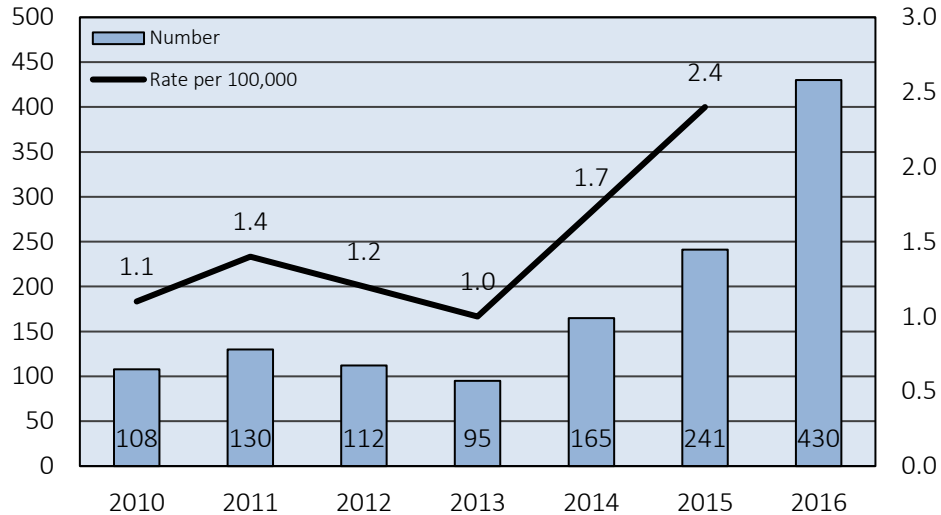


FENTANYL AND HEROIN-RELATED DEATHS IN NORTH CAROLINA

Based on provisional data, deaths involving fentanyl and/or analogues increased by 298.2% from 2010 to 2016.

- Deaths involving fentanyl and/or analogues increased by 46.1% from 2014 to 2015. Based on provisional data, deaths involving fentanyl and/or analogues increased by 78.4% from 2015 to 2016.

Figure 1 Deaths Involving Fentanyl and/or Analogues in North Carolina, 2010 – 2016*



Based on provisional data, deaths involving heroin increased by 988.6% from 2010 to 2016.

- Deaths involving heroin increased by 43.0% from 2014 to 2015. Based on provisional data, deaths involving heroin increased by 20.1% from 2015 to 2016.

Figure 2 Deaths Involving Heroin in North Carolina, 2010 – 2016*

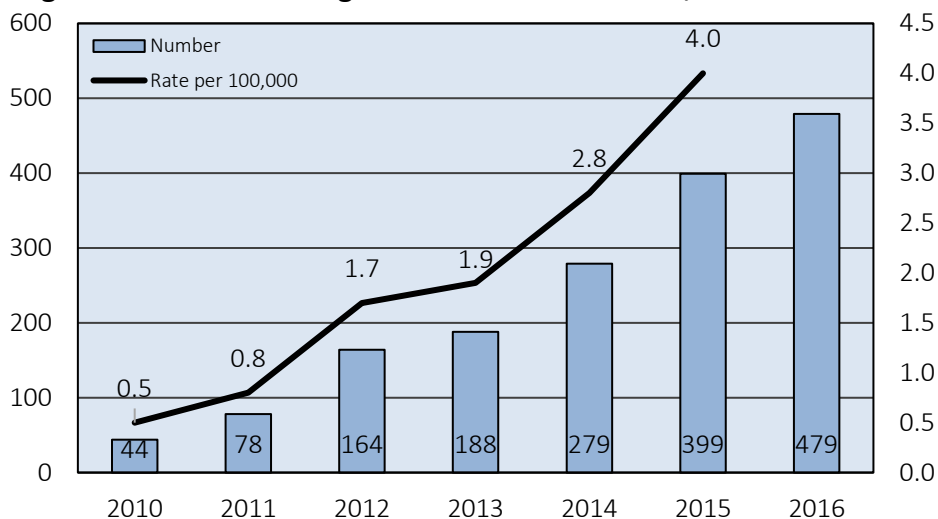


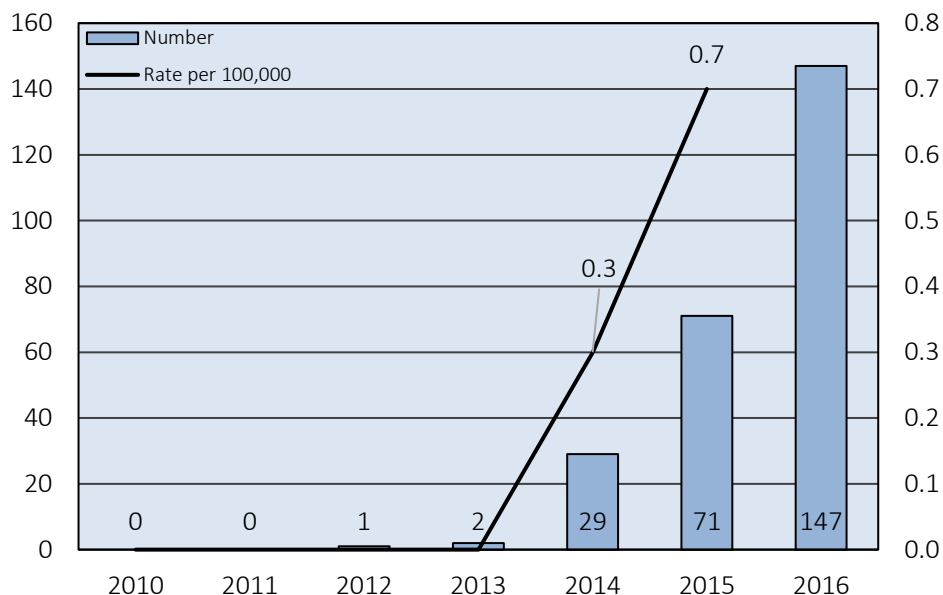
Table 1 Fentanyl and/or Analogues and Heroin-Related Deaths in North Carolina, 2010 – 2016*

Fentanyl and/or Analogue-Related Deaths	Heroin-Related Deaths
65.4% (n = 838) were male.	75.2% (n = 1,226) were male.
87.0% (n = 1,114) were white.	87.1% (n = 1,420) were white.
32.3% (n = 414) were between 25 and 34 years of age.	35.1% (n = 573) were between 25 and 34 years of age.
95.7% (n = 1,226) were accidental.	98.9% (n = 1,613) were accidental.

COMBINED FENTANYL AND HEROIN-RELATED DEATHS IN NORTH CAROLINA

In 2015, there were 71 deaths involving both fentanyl and/or analogues and heroin. Based on provisional data, there were 147 deaths involving both fentanyl and/or analogues and heroin in 2016. This represents an increase of 107.0% from 2015 to 2016.

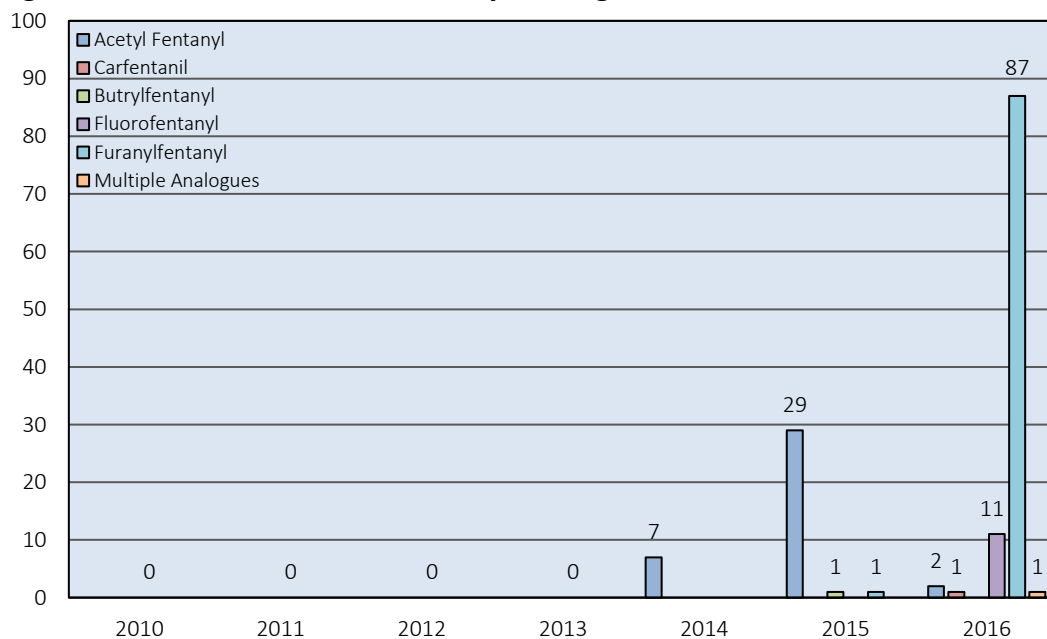
Figure 3 Deaths Attributed to Fentanyl and/or Analogues + Heroin in North Carolina, 2010 – 2016*



FENTANYL ANALOGUE-RELATED DEATHS IN NORTH CAROLINA

In 2014, there were 7 deaths attributed to a fentanyl analogue known as acetyl fentanyl. In 2015, there were a total of 31 deaths attributed to fentanyl analogues. Based on provisional data, there were 102 deaths attributed to fentanyl analogues in 2016.

Figure 4 Deaths Attributed to Fentanyl Analogues in North Carolina, 2010 – 2016*



*2016 is considered provisional and is current as of March 2017.

**Fentanyl analogues include: Acetyl fentanyl, Butrylfentanyl, Furanylfentanyl, Fluorofentanyl, Acrylfentanyl, Fluoroisobutrylfentanyl, Beta-Hydroxythiofentanyl, Carfentanil.

- What are NPS or research chemicals?
 - NPS is an acronym for new/novel psychoactive substances continually changed or modified to bypass current United States drug laws. These substances are usually targeted for production by illicit drug chemists/cartels after being identified in research papers and drug patents and are exploited for their different effects on the brain and body. Also referred to as “research chemicals” in online drug forums; different types of these compounds are listed below:
 - Synthetic Cannabinoids: commonly referred to as Spice or K2, these compounds mimic the effects of marijuana.
 - Cathinones: commonly referred to as bath salts, plant food and Flakka; these compounds mimic the effects of methamphetamine and MDMA (Ecstasy/Molly).
 - Synthetic Opioids: This group of compounds is designed to mimic the effects of morphine, oxycodone, heroin and other common prescription opiates/opioids. Some are similar in chemical structure to existing compounds (e.g., fentanyl) while others are more novel (e.g., U-47700).
- If I see fentanyl on my toxicology report, how do I know which one it is? How do I know if the fentanyl detected was from a prescription product or illicitly manufactured?
 - The toxicology report will always list the specific fentanyl variety detected, as we do not report positive drug findings in general terms. Negative results are reported by drug class/test. The lab uses a variety of techniques to detect fentanyl and fentanyl analogues and we keep informed about new variants so that we can expand our list of targeted drugs as needed.
 - There is no definitive way to differentiate between prescription fentanyl (e.g., Duragesic®, Fentora®, Sublimaze®, etc.) and illicitly manufactured fentanyl on the basis of the detection of fentanyl alone. However, a moderate percentage of cases with illicitly manufactured fentanyl will also be positive for 4-ANPP which is a byproduct of the production process. The lab will list 4-ANPP on the toxicology report when detected and confirmed. This byproduct is also frequently detected in cases positive for fentanyl analogues.
- How are illicit fentanyl and fentanyl analogues produced?
 - Fentanyl and its analogues can be produced in a moderately equipped home based laboratory (like a meth lab) but are primarily produced in large manufacturing facilities in China and Mexico. To illustrate how closely related these compounds are; fentanyl, 4-ANPP and some of the confirmed fentanyl analogues in NC cases are depicted below.

