HAMILTON COUNTY
PUBLIC HEALTH

PREVENT. PROMOTE. PROTECT.

FENTANYL

THE EMERGING PUBLIC HEALTH THREAT IN HAMILTON COUNTY

10/26/2015 REPORT

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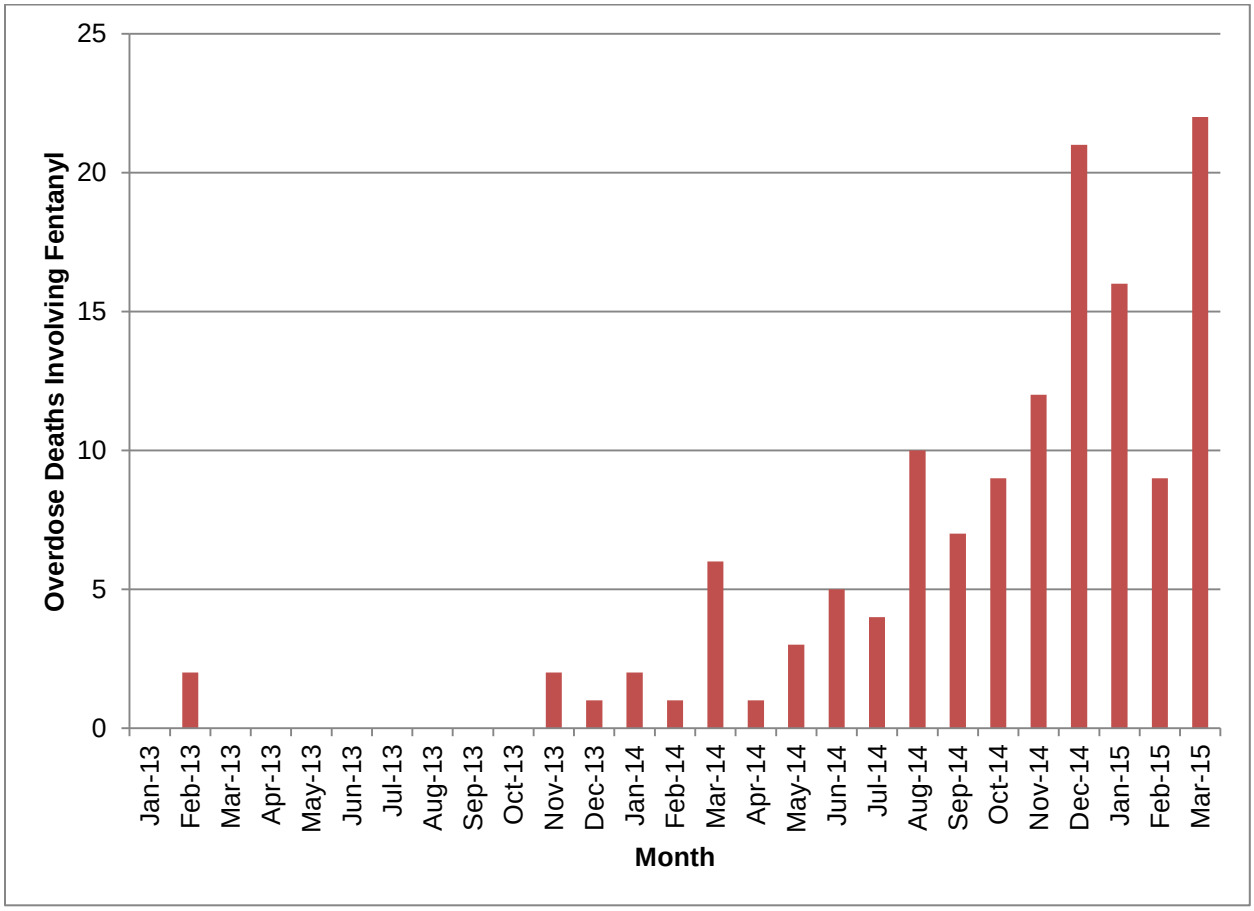
OVERVIEW

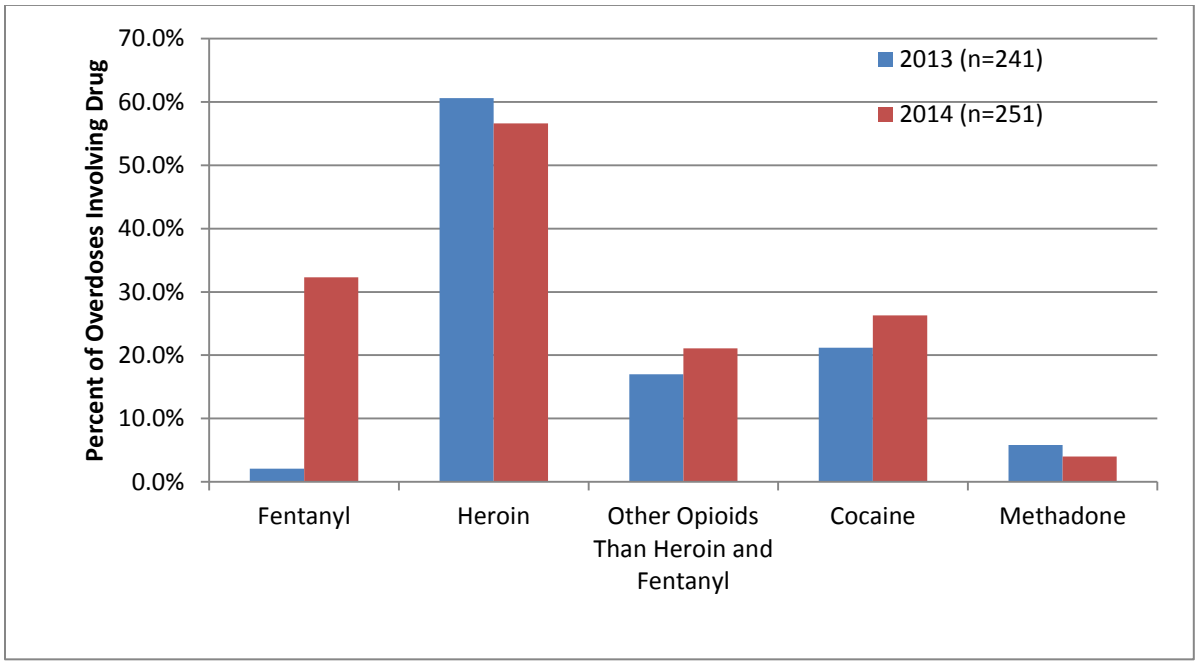
Figure 1. Overdose deaths related to fentanyl; Hamilton County, Q1 2013 through Q1 2015.



According to the National Institute on Drug Abuse (NIDA), fentanyl is a powerful synthetic opiate analgesic similar to but more potent than morphine. Fentanyl is produced both legally in pharmaceutical laboratories and illegally by underground laboratories. It is not clear from preliminary death record data to what degree recent Hamilton County overdose deaths are linked to illegally produced fentanyl and fentanyl analogs versus diverted pharmaceutical fentanyl.

The drug overdose epidemic continues to grow in Ohio. Ohio overdose deaths have steadily risen since 1999. In 2007, unintentional drug overdoses overtook motor vehicle traffic crashes as the leading cause of injury-related death, and have continued to hold that distinction.[1] This trend is apparent in Hamilton County, where the average age-adjusted rate of unintentional drug overdose deaths from 2009-2014 was 19.8 per 100,000 persons. This is greater than Ohio's average rate of 16.6 unintentional drug overdose deaths per 100,000 persons.[1]

Figure 2. Percentage of all overdoses for which substances were involved; Hamilton County 2013-2014.*



*Percentages total more than 100% due to overdoses involving combinations of multiple substances.

As demonstrated in Figure 1, the drug fentanyl is a fast-emerging new player in Hamilton County's drug overdose statistics. Figure 2 reflects the increase in the drug's involvement in Hamilton County's overdoses, playing a part in nearly one-third of all of the county's overdoses in 2014. Preliminary data indicate the number of overdose deaths will continue to rise significantly in 2015.

[1] Ohio Department of Health, Bureau of Vital Statistics. Analysis by Injury Prevention Program. 2015. *2014 Ohio Drug Overdose Preliminary Data: General Findings*. Columbus, OH: Ohio Department of Health.

METHODS

Data from death certificates of Hamilton County residents were analyzed to describe the fentanyl overdose epidemic. Data were pulled on September 30, 2015, and include deaths up to August 2015. All findings are preliminary and subject to error, especially in more recent records where basic death details such as official cause of death and intent are yet to be determined.

Deaths between 2007 and 2014 were included if the official cause of death was drug overdose, regardless of intent (unintentional, suicide, homicide, or undetermined intent). Fentanyl typically falls under the category of other opioids on the death certificate, which is indicated when an overdose death involves any opioids that are not heroin. Death records that had some mention of fentanyl in the death certificate free text fields - either 'cause of death' or 'other condition' - were identified as fentanyl-related deaths.

Deaths from 2015 were included primarily on the basis of some mention of fentanyl, as there is little data from 2015 deaths relating to overdoses from all other drugs (n=20). Fentanyl-related deaths from 2015 are in no way final and include only death records that were available at time of analysis (9/30/2015). It is expected that more fentanyl-related overdose deaths will be identified for past dates in 2015 as death records are processed and finalized.

Initially, 185 death records met the criteria of fentanyl-related drug overdose. These 185 records were screened by reading the text that accompanied the death records. It was determined that three records mentioned fentanyl, but did not fit the description of fentanyl-related drug overdose, resulting in a total of 182 fentanyl-related drug overdoses between 2007 and present day.

RESULTS - DETAILS & DEMOGRAPHICS

Table 1. Details and demographics of deaths related to overdose of fentanyl and all drugs; Hamilton County, 2007-2015.

	Fentanyl-Related Drug Overdose Deaths (n=182)	Opioid-Related Drug Overdose Deaths Not Involving Fentanyl (n=786)*	All Drug Overdose Deaths (n=1,445)**
Period of Death (n,%)			
2007-2013	7 (3.8)	643 (81.8)	1,080 (74.7)
2014	81 (44.5)	132 (16.8)	251 (17.4)
2015 (as of 9/30/15)	94 (51.7)	11 (1.4)	114 (7.9)
Intent (n,%)* **			
Unintentional	103 (98.1)	735 (93.5)	1,215 (88.8)
Suicide	1 (1.0)	34 (4.3)	114 (8.3)
Homicide	0	1 (0.1)	3 (0.2)
Undetermined	1 (1.0)	16 (2.0)	36 (2.6)
Sex (n,%)			
Male	123 (67.6)	537 (68.4)	938 (65.0)
Female	59 (32.4)	248 (31.6)	504 (35.0)
Race (n,%)			
Black	34 (18.7)	90 (11.5)	228 (15.8)
White	147 (80.8)	690 (87.9)	1,202 (83.4)
Asian	1 (0.6)	0	2 (0.1)
Other	0	5 (0.6)	10 (0.7)
Age (n,%)			
14 & Younger	0	0	3 (0.2)
15-24	19 (10.4)	52 (6.6)	90 (6.2)
25-34	55 (30.2)	186 (23.7)	314 (21.8)
35-44	44 (24.2)	178 (22.7)	333 (23.1)
45-54	45 (24.7)	260 (33.1)	459 (31.8)
55-64	16 (8.8)	88 (11.2)	189 (13.1)
65 & Older	3 (1.7)	21 (2.7)	54 (3.7)

*Does not include fentanyl-related deaths. One individual had missing sex, race, and age.
**Does Include fentanyl-related deaths. Three individuals had missing sex, race, and age.
***77 fentanyl-related deaths had missing intent classification. All 77 were 2015 deaths.

Year of Death

The overwhelming majority of fentanyl-related deaths since 2007 occurred in 2014 and 2015. 2015 data is incomplete and more fentanyl-related overdose deaths are expected to be identified as death records are processed and finalized. Therefore, it is expected that the final count of 2015 fentanyl-related deaths will significantly exceed the final count for 2014. Estimates for both years are preliminary in this report.

Intent

Of the 94 fentanyl-related deaths from 2015, only 18 (19.1 percent) had intent classified. For the available data, the vast majority of fentanyl-related overdoses (98.1 percent) were classified as unintentional drug overdoses.

A Fisher's exact test was performed to determine if the proportion of overdoses that were suicides versus unintentional deaths significantly differed between overdoses involving fentanyl and those that did not.

Table 2. Chi-Square Test of Intent for Fentanyl vs. Other Opioids (including heroin); Hamilton County; 2007-2015.*

	Unintentional (n,%)	Suicide (n,%)	Fisher's exact p-value
Involving Fentanyl (n=104)	103 (99.0)	1 (1.0)	-
Involving Opioids but Not Fentanyl (n=769)	735 (95.6)	34 (4.4)	0.11

*Includes overdose deaths with complete information for intent.

The results of this test were borderline significant (p=0.11), indicating that fentanyl-related deaths may be more likely to be unintentional than deaths involving other opioids but not fentanyl (Table 2). It should be noted that vast majority of drug overdoses are unintentional in both groups.

Demographics

The sex breakdown of overdoses was not discernably different between drug overdose groups; about 2/3 of each overdose type were male.

The impact of race, for the two majority races (African-American and Caucasian), on odds of fentanyl-related overdose versus overdose related to other opioids was analyzed using a chi-square test.

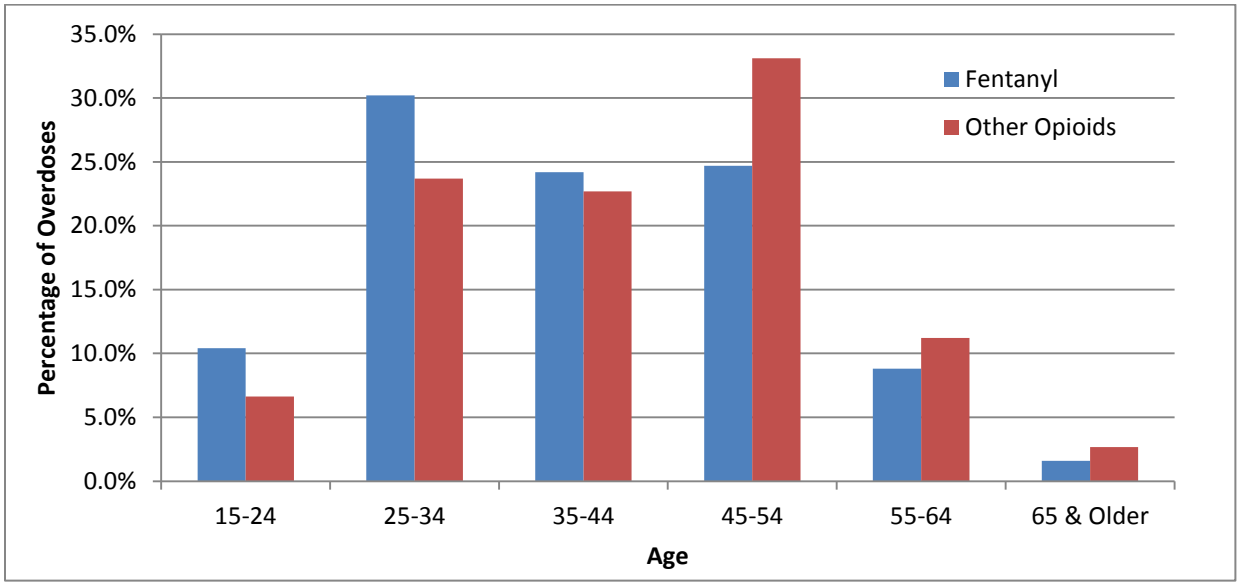
Table 3. Chi-Square Test of Race for Fentanyl vs. Other Opioids (including heroin); Hamilton County; 2007-2015.*

	Black (n,%)	White (n,%)	Chi-Square p-value
Involving Fentanyl (n=181)	34 (18.8)	147 (81.2)	-
Involving Opioids but Not Fentanyl (n=780)	90 (11.5)	690 (88.5)	<0.01

*Includes overdose deaths with complete information for race.

This test did yield a significant result ($p<0.01$) (Table 3). Therefore, there is evidence to suggest an association between fentanyl-related deaths and race. 18.8 percent of all fentanyl-related deaths were among black residents, compared to 11.5 percent among non-fentanyl-related opioid overdose deaths.

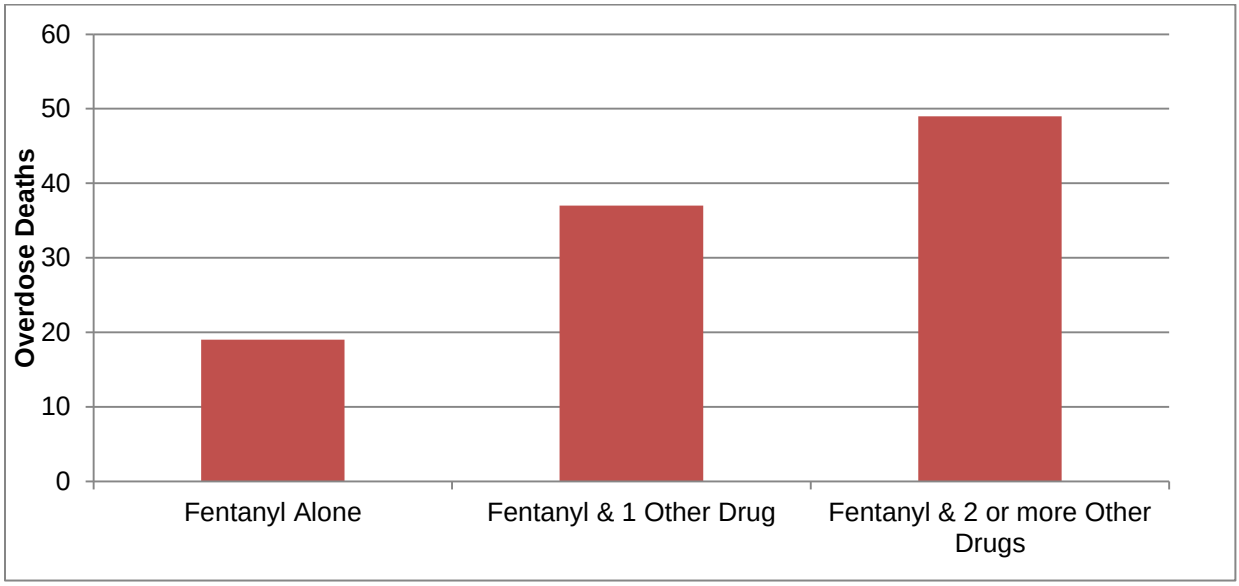
Figure 3. Age distribution of drug overdose deaths related to fentanyl and opioids other than fentanyl; Hamilton County, 2007-2015.



There is a slightly younger age distribution for overdoses related to fentanyl compared to those that were related to other opioids, as demonstrated in Figure 3. Of the seven age groups identified, the largest share of fentanyl-related overdoses occurred in the 25-34 age group (30.2 percent). By contrast, the largest share of overdoses related to other opioid drugs was in the 45-54 age group (33.1 percent).

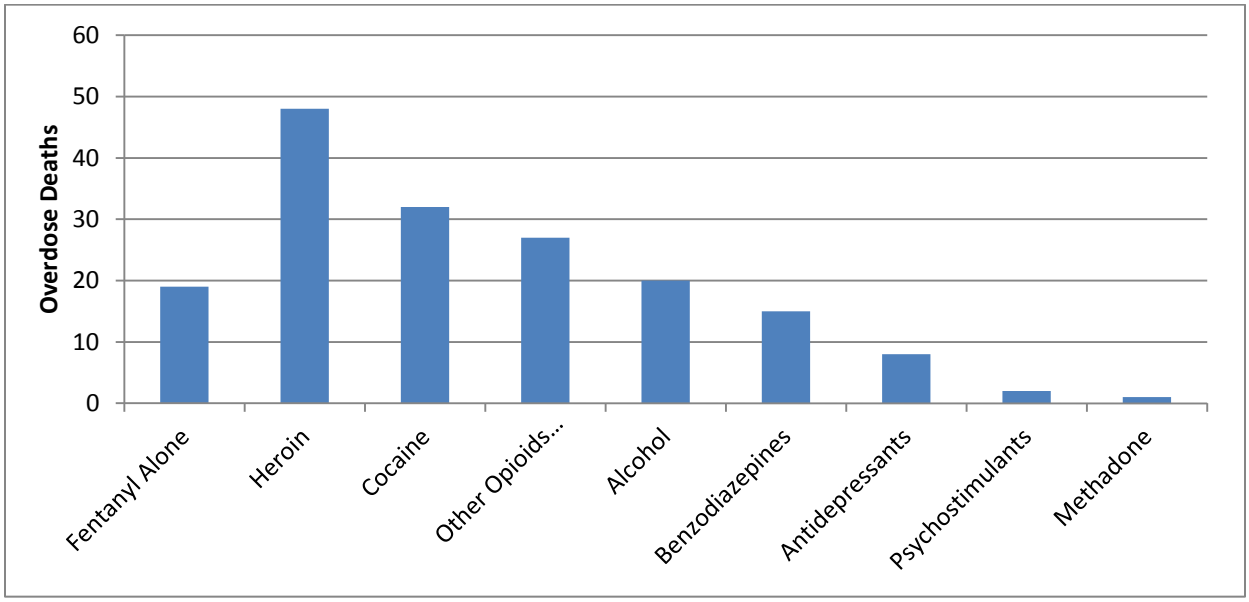
RESULTS - DRUG COMBINATIONS

Figure 4. Count of drugs involved for overdose deaths involving fentanyl; Hamilton County, 2007-2015 (n=105)*



*105 drug overdoses were included that involved fentanyl between 2007 and 2015, where data was up to date enough to include cause of death and intent.

Figure 5. Drug combinations involved in overdose deaths involving fentanyl; Hamilton County, 2007-2015 (n=105)*



*105 drug overdoses were included that involved fentanyl between 2007 and 2015, where data was up to date enough to include cause of death and intent. Columns will total more than 105 due to combinations of more than 2 drugs implicated in some overdose deaths.

DISCUSSION

The abuse of multiple substances can drastically increase the odds of death from overdose. Fentanyl is not only used alone, but is often used in combination with other drugs or laced within other drugs. Figure 4 demonstrates that overdose deaths that involved fentanyl in Hamilton County were most often attributed to some combination of drugs. Over 80 percent of Hamilton County's overdoses related to fentanyl involved at least one other drug.

The most commonly linked combination drug to fentanyl was heroin, involved in about 46 percent of fentanyl-related overdoses. It is unclear from death records if this is due to use of heroin laced with fentanyl, or separate use of the two drugs. However, two pieces of evidence point to the possibility of heroin laced with fentanyl being responsible for many recent Hamilton County overdose deaths.

The first is that heroin laced with fentanyl has been implicated in past outbreaks of overdose deaths, particularly in 2006, when several U.S. cities saw surges in overdose deaths from a combination of heroin and fentanyl.[2, 3] The Drug Enforcement Agency (DEA) issued a nationwide alert on the dangers of fentanyl and the potential for it to be laced in heroin in March 2015.[4] Officials suspect that recent overdose epidemics in other U.S. cities are linked to a re-introduction of fentanyl-laced heroin to the drug market.[5]

Secondly, the nearly unanimous classification of unintentional death as opposed to suicide suggests that drug users may have unknowingly injected themselves with a lethal dose. Drug-users may have used an amount that they could survive with heroin or another familiar drug alone, but deadly when fentanyl was added to the mix.

Alarmingly, heroin laced with fentanyl is not the only explanation for the surge in deaths, as over half of fentanyl-related deaths did not have heroin indicated as a contributing factor on the death certificate. Fentanyl is a danger on its own – 18 percent of fentanyl-related overdoses only involved fentanyl. There is also a possibility that fentanyl could be laced with or available with other leading combination drugs like other opioids or cocaine. Combined, these two drugs were implicated in nearly as many fentanyl-related overdoses as heroin.

[2] NIH National Institute on Drug Abuse. Nora D. Volkow. June 2006. *Fentanyl Use in Combination With Street Drugs Leading do Death in Some Cases*. http://www.drugabuse.gov/about-nida/directors-page/messages-director/2006/06/fentanyl-use-in-combination-street-drugs-leading-to-death-in-some-cases.
[3] The Washington Post. Peter Slevin and Kari Lydersen. 2006. *Heroin Users Warned About Deadly Additive*. http://www.washingtonpost.com/wp-dyn/content/article/2006/06/03/AR2006060300602.html.
[4] Drug Enforcement Agency. DEA Public Affairs. March 18, 2015. *DEA Issues Nationwide Alert on Fentanyl as Threat to Health and Public Safety*. http://www.dea.gov/divisions/hq/2015/hq031815.shtml.
[5] The Chicago Tribune. Jeremy Gorner, Peter Nickeas, Rosemary Regina Sobol. October 2, 2015. *74 overdoses in 72 hours: Laced heroin may be to blame*. http://www.chicagotribune.com/news/local/breaking/ct-heroin-overdoses-met-20151002-story.html.

All death data for 2014 and 2015 are preliminary and subject to change as death records are reviewed and finalized. In particular, most 2015 deaths have not had an official cause of death determined. Complete 2015 records for overdoses not related to fentanyl were not yet available. Additionally, because fentanyl is not specifically indicated on death certificates, there is risk for under-reporting, since the methods employed would not capture deaths where fentanyl was not specifically mentioned or was misspelled on the death certificate free text.

Hamilton County Public Health would like to acknowledge and thank the Ohio Department of Health Vital Statistics and Division of Prevention and Health Promotion, Violence and Injury Prevention Program for their assistance with this report. Death data note: "These data were provided by the Ohio Department of Health. The Department specifically disclaims responsibility for any analyses, interpretations or conclusions."