

Increases in Drug and Opioid-Involved Overdose Deaths — United States, 2010–2015

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The U.S. opioid epidemic is continuing, and drug overdose deaths nearly tripled during 1999–2014. Among 47,055 drug overdose deaths that occurred in 2014 in the United States, 28,647 (60.9%) involved an opioid (1). Illicit opioids are contributing to the increase in opioid overdose deaths (2,3). In an effort to target prevention strategies to address the rapidly changing epidemic, CDC examined overall drug overdose death rates during 2010–2015 and opioid overdose death rates during 2014–2015 by subcategories (natural/semisynthetic opioids, methadone, heroin, and synthetic opioids other than methadone).^{*} Rates were stratified by demographics, region, and by 28 states with high quality reporting on death certificates of specific drugs involved in overdose deaths. During 2015, drug overdoses accounted for 52,404 U.S. deaths, including 33,091 (63.1%) that involved an opioid. There has been progress in preventing methadone deaths, and death rates declined by 9.1%. However, rates of deaths involving other opioids, specifically heroin and synthetic opioids other than methadone (likely driven primarily by illicitly manufactured fentanyl) (2,3), increased sharply overall and across many states. A multifaceted, collaborative public health and law enforcement approach is urgently needed. Response efforts include implementing the CDC *Guideline for Prescribing Opioids for Chronic Pain* (4), improving access to and use of prescription drug monitoring programs, enhancing naloxone distribution and other harm reduction approaches, increasing opioid use disorder treatment capacity, improving linkage into treatment, and supporting law enforcement strategies to reduce the illicit opioid supply.

^{*}Natural opioids include morphine and codeine, and semisynthetic opioids include drugs such as oxycodone, hydrocodone, hydromorphone, and oxymorphone. Methadone is a synthetic opioid. Synthetic opioids, other than methadone, include drugs such as tramadol and fentanyl. Heroin is an illicit opioid synthesized from morphine that can be a white or brown powder, or a black sticky substance.

The National Vital Statistics System multiple cause-of-death mortality files were used to record drug overdose deaths.[†] Drug overdose deaths were identified using the *International Classification of Disease, Tenth Revision* (ICD-10), based on the ICD-10 underlying cause-of-death codes X40–44 (unintentional), X60–64 (suicide), X85 (homicide), or Y10–Y14 (undetermined intent). Among deaths with drug overdose as the underlying cause, the type of opioid is indicated by the following ICD-10 multiple cause-of-death codes: opioids (T40.0, T40.1, T40.2, T40.3, T40.4, or T40.6); natural/semisynthetic opioids (T40.2); methadone (T40.3); synthetic opioids other than methadone (T40.4); and heroin (T40.1). Some deaths involved more than one type of opioid; these deaths were included in the rates for each subcategory. Therefore, categories of deaths presented are not mutually exclusive.[§]

Changes in drug overdose death rates were analyzed for all 50 states and the District of Columbia (DC) from 2010 to 2015 using joinpoint regression.[¶] Opioid overdose death rates were examined for the period 2014–2015 by subcategories (natural/semisynthetic opioids, methadone, heroin, and synthetic opioids other than methadone) and by demographics, region, and across states. State-level analyses were conducted for 28 states meeting the following criteria: 1) >80% of drug overdose death certificates named at least one specific drug in 2014; 2) change from 2014 to 2015 in the percentage of death certificates reporting at least one specific drug was <10 percentage points^{**}; and

[†] https://www.cdc.gov/nchs/nvss/mortality_public_use_data.htm.

[§] For example, a death involving both a synthetic opioid other than methadone and heroin would be included in both the “synthetic other than methadone” and heroin death rates.

[¶] For all analyses, a p-value of <0.05 was considered to be statistically significant. <https://surveillance.cancer.gov/joinpoint/>.

^{**} States whose reporting of any specific drug or drugs involved in an overdose changed by ≥10 percentage points from 2014 to 2015 were excluded, because drug-specific overdose numbers and rates might change substantially from 2014 to 2015 because of changes in reporting.



Summary

What is already known about this topic?

The U.S. opioid epidemic is continuing. Drug overdose deaths nearly tripled during 1999–2014. In 2014, among 47,055 drug overdose deaths, 61% involved an opioid. During 2013–2014, deaths associated with the most commonly prescribed opioids (natural/semisynthetic opioids) continued to increase slightly; however, the rapid increase in deaths appears to be driven by heroin and synthetic opioids other than methadone.

What is added by this report?

From 2014 to 2015, the death rate from synthetic opioids other than methadone, which includes fentanyl, increased by 72.2%, and heroin death rates increased by 20.6%. Rates of death involving heroin and synthetic opioids other than methadone increased across all demographic groups, regions, and in numerous states. Natural/semisynthetic opioid death rates increased by 2.6%, whereas, methadone death rates decreased by 9.1%.

What are the implications for public health practice?

There is an urgent need for a multifaceted, collaborative public health and law enforcement approach to the opioid epidemic, including implementing the CDC *Guideline for Prescribing Opioids for Chronic Pain*; improving access to and use of prescription drug monitoring programs; expanding naloxone distribution; enhancing opioid use disorder treatment capacity and linkage into treatment, including medication-assisted treatment; implementing harm reduction approaches, such as syringe services program; and supporting law enforcement strategies to reduce the illicit opioid supply.

3) ≥ 20 deaths occurred during 2014 and 2015 in at least two opioid subcategories examined. Analyses comparing changes in age-adjusted death rates from 2014 to 2015 used z-tests when deaths were ≥ 100 and nonoverlapping confidence intervals based on a gamma distribution when deaths were < 100 .^{††}

The drug overdose death rate increased significantly from 12.3 per 100,000 population in 2010 to 16.3 in 2015. Death rates increased in 30 states and DC and remained stable in 19 states (Figure). Two states had changing trends during this period of decreasing rates followed by increases.^{§§} During 2015, a total of 52,404 persons in the United States died from a drug overdose, an increase from 47,055 in 2014; among these deaths, 33,091 (63.1%) involved an opioid, an increase from 28,647 in 2014. The age-adjusted opioid-involved death rate increased by 15.6%, from 9.0 per 100,000 in 2014 to 10.4 in 2015, driven largely by increases in deaths involving

heroin and synthetic opioids other than methadone. Death rates for natural/semisynthetic opioids, heroin, and synthetic opioids other than methadone increased by 2.6%, 20.6%, and 72.2%, respectively (Table 1) (Table 2). Methadone death rates decreased by 9.1% (Table 1).

During 2014–2015, rates of natural/semisynthetic opioid deaths increased among males overall, both sexes aged 25–44 years, and non-Hispanic whites. Methadone death rates decreased among males and females overall, but increased among persons aged ≥ 65 years (Table 1). Death rates involving heroin and synthetic opioids other than methadone increased in both males and females, persons aged ≥ 15 years, and all racial/ethnic populations; however, heroin death rates among males aged 15–24 years remained stable. In 2015, death rates involving synthetic opioids other than methadone were highest among males aged 25–44 years (8.9 per 100,000), increasing 102.3% from 2014 to 2015 (Table 2). Heroin death rates also were highest in this demographic group (13.2), increasing 22.2% from 2014 to 2015. Natural/semisynthetic opioid death rates increased in the Northeast and South U.S. Census regions, and methadone death rates decreased in the South (Table 1). Death rates involving synthetic opioids other than methadone and heroin increased in all regions from 2014 to 2015 (Table 2).

Among the 28 states meeting inclusion criteria for state-level analyses, 16 (57.1%) experienced increases in death rates involving synthetic opioids other than methadone, and 11 (39.3%) experienced increases in heroin death rates from 2014 to 2015. The largest absolute rate change in deaths from synthetic opioids other than methadone occurred in Massachusetts, New Hampshire, Ohio, Rhode Island and West Virginia. The largest percentage increases in rates occurred in New York (135.7%), Connecticut (125.9%) and Illinois (120%) (Table 2). Connecticut, Massachusetts, Ohio, and West Virginia experienced the largest absolute rate changes in heroin deaths, while the largest percentage increases in rates occurred in South Carolina (57.1%), North Carolina (46.4%), and Tennessee (43.5) (Table 2). Three states (New Mexico, Oklahoma, and Virginia) experienced decreases in natural/semi-synthetic opioid death rates, while increases occurred in five states (Massachusetts, New York, North Carolina, Ohio, and Tennessee) (Table 1).

Discussion

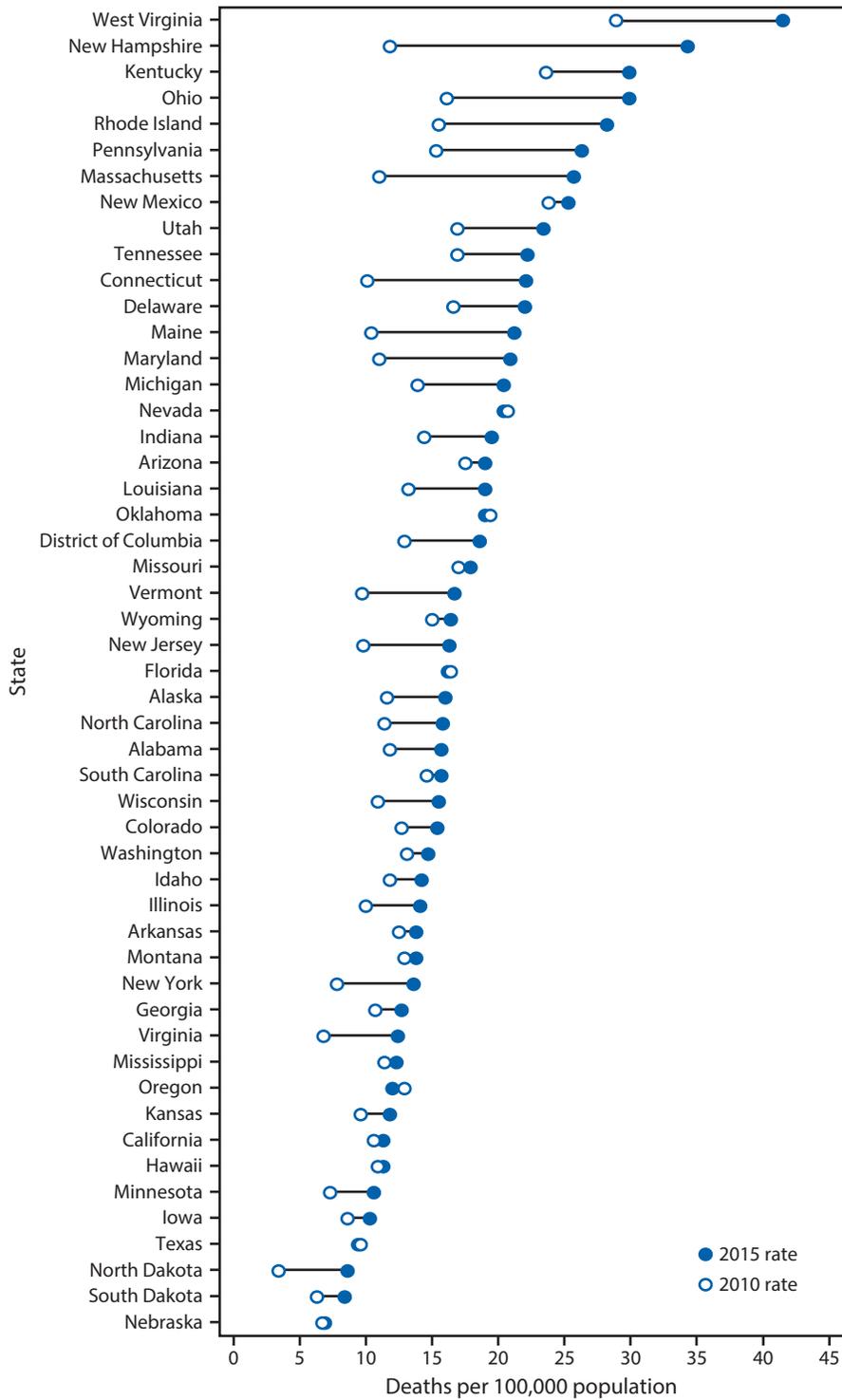
During 2010–2015, the rate of drug overdose deaths in the United States increased in 30 states and DC, remained stable in 19 states, and showed decreasing trends followed by increases in two states.^{§§,¶¶} From 2014 to 2015, drug overdose deaths increased by 5,349 (11.4%), signifying a continuing

^{††} Age-adjusted death rates were calculated by applying age-specific death rates to the 2000 U.S. Census standard population age distribution https://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf. For z-tests, a p-value of < 0.05 was considered to be statistically significant.

^{§§} Florida and South Carolina, had both decreasing and increasing trends during this period. In Florida, rates decreased from 2010 to 2013, then increased to 2015; in South Carolina, rates decreased from 2010 to 2012, then increased to 2015.

^{¶¶} <https://www.cdc.gov/drugoverdose/data/statedeaths.html>.

FIGURE. Age-adjusted rate* of drug overdose deaths,† by state — 2010 and 2015§



Source: CDC. National Vital Statistics System, Mortality. CDC WONDER. Atlanta, GA: US Department of Health and Human Services, CDC; 2016. <https://wonder.cdc.gov/>.
 * Rates shown are the number of deaths per 100,000 population. Age-adjusted death rates were calculated by applying age-specific death rates to the 2000 U.S. standard population age distribution.

† Deaths were classified using the *International Classification of Diseases, Tenth Revision (ICD-10)*. Drug overdose deaths were identified using underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14.

§ Joinpoint regression examining changes in trends from 2010 to 2015 indicated that 30 states had significant increases from 2010 to 2015 (Alabama, Arizona, Connecticut, Delaware, District of Columbia, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, Tennessee, Utah, Vermont, Virginia, Wisconsin). In two states, Florida and South Carolina, decreases were followed by increases during this period. In Florida, there was a decrease from 2010 to 2013, followed by an increase to 2015. In South Carolina, there was a decrease from 2010 to 2012, followed by an increase to 2015. All remaining states had nonsignificant trends during this period.

TABLE 1. Number and age-adjusted rate of drug overdose deaths* involving natural and semisynthetic opioids† and methadone,§,¶ by sex, age group, race/ethnicity, U.S. Census region, and selected states†† — United States, 2014 and 2015**

Characteristic	Natural and semisynthetic opioids			Methadone		
	2014	2015	% change in rate, 2014 to 2015	2014	2015	% change in rate, 2014 to 2015
	No. (Rate)	No. (Rate)		No. (Rate)	No. (Rate)	
Overall	12,159 (3.8)	12,727 (3.9)	2.6 ^{§§}	3,400 (1.1)	3,301 (1.0)	-9.1 ^{§§}
Sex						
Male	6,732 (4.2)	7,117 (4.4)	4.8 ^{§§}	2,009 (1.3)	1,939 (1.2)	-7.7 ^{§§}
Female	5,427 (3.3)	5,610 (3.4)	3.0	1,391 (0.9)	1,362 (0.8)	-11.1 ^{§§}
Age group (yrs)						
0–14	42 (0.1)	48 (0.1)	0.0	14 ^{-¶¶}	13 ^{-¶¶}	^{-¶¶}
15–24	726 (1.7)	715 (1.6)	-5.9	241 (0.5)	201 (0.5)	0.0
25–34	2,115 (4.9)	2,327 (5.3)	8.2 ^{§§}	796 (1.8)	735 (1.7)	-5.6
35–44	2,644 (6.5)	2,819 (6.9)	6.2 ^{§§}	768 (1.9)	739 (1.8)	-5.3
45–54	3,488 (8.0)	3,479 (8.1)	1.3	854 (2.0)	843 (2.0)	0.0
55–64	2,437 (6.1)	2,602 (6.4)	4.9	629 (1.6)	642 (1.6)	0.0
≥65	706 (1.5)	736 (1.5)	0.0	98 (0.2)	127 (0.3)	50.0 ^{§§}
Sex/Age group (yrs)						
Male						
15–24	529 (2.3)	493 (2.2)	-4.3	173 (0.8)	149 (0.7)	-12.5
25–44	2,869 (6.8)	3,139 (7.4)	8.8 ^{§§}	969 (2.3)	926 (2.2)	-4.3
45–64	3,015 (7.4)	3,095 (7.5)	1.4	808 (2.0)	777 (1.9)	-5.0
Female						
15–24	197 (0.9)	222 (1.0)	11.1	68 (0.3)	52 (0.2)	-33.3
25–44	1,890 (4.5)	2,007 (4.8)	6.7 ^{§§}	595 (1.4)	548 (1.3)	-7.1
45–64	2,910 (6.8)	2,986 (6.9)	1.5	675 (1.6)	708 (1.6)	0.0
Race/Ethnicity**						
White, non-Hispanic	10,308 (5.0)	10,774 (5.3)	6.0 ^{§§}	2,845 (1.4)	2,725 (1.4)	0.0
Black, non-Hispanic	814 (2.0)	878 (2.1)	5.0	256 (0.6)	247 (0.6)	0.0
Hispanic	727 (1.4)	780 (1.5)	7.1	228 (0.5)	235 (0.5)	0.0
U.S. Census region of residence						
Northeast	1,851 (3.3)	2,095 (3.6)	9.1 ^{§§}	587 (1.0)	643 (1.1)	10.0
Midwest	2,205 (3.3)	2,302 (3.4)	3.0	675 (1.0)	673 (1.0)	0.0
South	5,101 (4.2)	5,374 (4.4)	4.8 ^{§§}	1,298 (1.1)	1,228 (1.0)	-9.1 ^{§§}
West	3,002 (3.9)	2,956 (3.8)	-2.6	840 (1.1)	757 (1.0)	-9.1

See table footnotes on next page.

trend observed since 1999 (1). Opioid death rates increased by 15.6% from 2014 to 2015. These significant increases in death rates were driven by synthetic opioids other than methadone (72.2%), most likely illicitly-manufactured fentanyl (2,3), and heroin (20.6%). Increases in these opioid subcategories occurred overall and across all demographics and regions. Natural/semisynthetic opioid death rates increased by 2.6%, whereas methadone death rates decreased by 9.1%.

These findings are consistent with recent reports highlighting the increasing trend in deaths involving heroin and synthetic opioids other than methadone (1–3,5). The number of deaths involving synthetic opioids other than methadone have been associated with the number of drug products obtained by law enforcement testing positive for fentanyl, but not with fentanyl prescribing rates (2,3). A recent report found that these increases, likely attributable to illicitly manufactured fentanyl, were concentrated in eight of 27 states examined (2).

The decline in methadone death rates, a trend observed since 2008, followed efforts to reduce methadone use for pain, including Food and Drug Administration warnings, limits on high dose formulations, and clinical guidelines (6). The small increase in natural/semisynthetic opioid death rates illustrates an ongoing problem with prescription opioids; however, the increase has slowed from 2013–2014, potentially because of policy and health system changes, required prescription drug monitoring program review, legislative changes in naloxone distribution, and prescribing guidelines (7,8).***

*** Some state examples are available. New Mexico: <https://nmhealth.org/news/information/2016/6/?view=429>; <https://nmhealth.org/news/information/2016/9/?view=484>; and <http://hscnews.unm.edu/news/education-program-successful-in-reducing-opioid-abuse010715>; Oklahoma: https://www.ok.gov/health2/documents/UP_Oklahoma_Office_Based_Guidelines.pdf; Oregon: <http://www.orpdmp.com>. Washington: <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2014.302367?journalCode=ajph>.

TABLE 1. (Continued) Number and age-adjusted rate of drug overdose deaths* involving natural and semisynthetic opioids† and methadone,§,¶ by sex, age group, race/ethnicity,** U.S. Census region, and selected states†† — United States, 2014 and 2015

Characteristic	Natural and semisynthetic opioids			Methadone		
	2014 No. (Rate)	2015 No. (Rate)	% change in rate, 2014 to 2015	2014 No. (Rate)	2015 No. (Rate)	% change in rate, 2014 to 2015
Selected states††						
States with very good or excellent reporting (n = 21)						
Alaska	40 (5.6)	51 (6.5)	16.1	12 ^{¶¶}	10 ^{¶¶}	^{¶¶}
Connecticut	157 (4.3)	183 (4.8)	11.6	50 (1.4)	72 (1.9)	35.7
Iowa	81 (2.7)	75 (2.5)	-7.4	16 ^{¶¶}	24 (0.8)	^{¶¶}
Maine	80 (6.1)	102 (7.7)	26.2	29 (2.2)	36 (2.8)	27.3
Maryland	388 (6.2)	398 (6.5)	4.8	153 (2.4)	182 (2.9)	20.8
Massachusetts	178 (2.6)	225 (3.3)	26.9 ^{§§}	88 (1.3)	82 (1.2)	-7.7
Nevada	224 (7.4)	259 (8.6)	16.2	64 (2.2)	57 (1.9)	-13.6
New Hampshire	81 (5.8)	63 (4.4)	-24.1	29 (2.3)	25 (1.9)	-17.4
New Mexico	223 (10.9)	160 (8.1)	-25.7 ^{§§}	45 (2.3)	33 (1.6)	-30.4
New York	608 (3.0)	705 (3.4)	13.3 ^{§§}	231 (1.1)	246 (1.2)	9.1
North Carolina	462 (4.7)	554 (5.5)	17.0 ^{§§}	131 (1.4)	108 (1.1)	-21.4
Oklahoma	370 (9.6)	277 (7.2)	-25.0 ^{§§}	67 (1.7)	62 (1.7)	0.0
Oregon	137 (3.2)	150 (3.6)	12.5	59 (1.4)	70 (1.7)	21.4
Rhode Island	70 (6.7)	95 (8.3)	23.9	24 (2.2)	30 (2.4)	9.1
South Carolina	319 (6.5)	322 (6.5)	0.0	77 (1.6)	57 (1.2)	-25.0
Utah	367 (13.6)	357 (12.7)	-6.6	47 (1.7)	45 (1.6)	-5.9
Vermont	21 (3.4)	25 (3.9)	14.7	^{¶¶} ^{¶¶}	^{¶¶} ^{¶¶}	^{¶¶}
Virginia	323 (3.9)	276 (3.3)	-15.4 ^{§§}	105 (1.2)	67 (0.8)	-33.3 ^{§§}
Washington	288 (3.8)	261 (3.5)	-7.9	115 (1.5)	111 (1.4)	-6.7
West Virginia	363 (20.2)	356 (19.8)	-2.0	35 (2.0)	29 (1.7)	-15.0
Wisconsin	279 (4.8)	249 (4.3)	-10.4	78 (1.4)	73 (1.3)	-7.1
States with good reporting (n = 7)						
Colorado	259 (4.6)	259 (4.5)	-2.2	51 (0.9)	34 (0.6)	-33.3
Georgia	388 (3.8)	435 (4.2)	10.5	124 (1.2)	115 (1.1)	-8.3
Illinois	253 (1.9)	271 (2.0)	5.3	106 (0.9)	99 (0.8)	-11.1
Minnesota	102 (1.9)	125 (2.2)	15.8	81 (1.6)	55 (1.0)	-37.5
Missouri	237 (4.0)	237 (3.9)	-2.5	53 (0.9)	62 (1.0)	11.1
Ohio	618 (5.4)	690 (6.1)	13.0 ^{§§}	107 (0.9)	109 (1.0)	11.1
Tennessee	554 (8.6)	643 (9.7)	12.8 ^{§§}	71 (1.1)	67 (1.0)	-9.1

Source: CDC. National Vital Statistics System, Mortality. CDC WONDER. Atlanta, GA: US Department of Health and Human Services, CDC; 2016. <https://wonder.cdc.gov/>.

* Rates are for the number of deaths per 100,000 population. Age-adjusted death rates were calculated using the direct method and the 2000 standard population. Deaths were classified using the *International Classification of Diseases, Tenth Revision* (ICD-10). Drug overdose deaths were identified using underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14.

† Drug overdose deaths, as defined, that have natural and semisynthetic opioids (T40.2) as contributing causes.

§ Drug overdose deaths, as defined, that have methadone (T40.3) as a contributing cause.

¶ Categories of deaths are not exclusive because deaths might involve more than one drug. Summing categories will result in a number greater than the total number of deaths in a year.

** Data for Hispanic ethnicity should be interpreted with caution; studies comparing Hispanic ethnicity on death certificates and on census surveys have shown inconsistent reporting.

†† Analyses were limited to states meeting the following criteria. For states with very good to excellent reporting, ≥90% of drug overdose death certificates mention at least one specific drug in 2014, with the change in percentage of drug overdose deaths mentioning at least one specific drug differing by <10 percentage points from 2014 to 2015. States with good reporting had 80% to <90% of drug overdose death certificates mention at least one specific drug in 2014, with the change in the percentage of drug overdose deaths mentioning at least one specific drug differing by <10 percentage points from 2014 to 2015. Rate comparisons between states should not be made because of variations in reporting across states.

§§ Statistically significant at p<0.05 level. Gamma tests were used if the number of deaths was <100 in 2014 or 2015, and z-tests were used if the number of deaths was ≥100 in both 2014 and 2015.

¶¶ Cells with nine or fewer deaths are not reported, and rates based on <20 deaths are not considered reliable and not reported.

TABLE 2. Number and age-adjusted rate of drug overdose deaths* involving synthetic opioids other than methadone† and heroin,§,¶ by sex, age group, race/ethnicity,** U.S. Census region, and selected states†† — United States, 2014 and 2015

Characteristic	Synthetic opioids other than methadone			Heroin		
	2014	2015	% change in rate, 2014 to 2015	2014	2015	% change in rate, 2014 to 2015
Overall	5,544 (1.8)	9,580 (3.1)	72.2 ^{§§}	10,574 (3.4)	12,989 (4.1)	20.6 ^{§§}
Sex						
Male	3,465 (2.2)	6,560 (4.2)	90.9 ^{§§}	8,160 (5.2)	9,881 (6.3)	21.2 ^{§§}
Female	2,079 (1.3)	3,020 (1.9)	46.2 ^{§§}	2,414 (1.6)	3,108 (2.0)	25.0 ^{§§}
Age group (yrs)						
0–14	10 ^{¶¶}	14 ^{¶¶}	40 ^{¶¶}	10 ^{¶¶}	14 ^{¶¶}	40 ^{¶¶}
15–24	514 (1.2)	999 (2.3)	91.7 ^{§§}	1,452 (3.3)	1,649 (3.8)	15.2 ^{§§}
25–34	1,474 (3.4)	2,896 (6.6)	94.1 ^{§§}	3,493 (8.0)	4,292 (9.7)	21.3 ^{§§}
35–44	1,264 (3.1)	2,289 (5.6)	80.6 ^{§§}	2,398 (5.9)	3,012 (7.4)	25.4 ^{§§}
45–54	1,359 (3.1)	1,982 (4.6)	48.4 ^{§§}	2,030 (4.7)	2,439 (5.6)	19.1 ^{§§}
55–64	742 (1.9)	1,167 (2.9)	52.6 ^{§§}	1,064 (2.7)	1,407 (3.4)	25.9 ^{§§}
≥65	181 (0.4)	232 (0.5)	25.0 ^{§§}	136 (0.3)	184 (0.4)	33.3 ^{§§}
Sex/Age group (yrs)						
Male						
15–24	376 (1.7)	718 (3.2)	88.2 ^{§§}	1,079 (4.8)	1,172 (5.2)	8.3
25–44	1,845 (4.4)	3,764 (8.9)	102.3 ^{§§}	4,566 (10.8)	5,602 (13.2)	22.2 ^{§§}
45–64	1,176 (2.9)	1,948 (4.7)	65.5 ^{§§}	2,397 (5.9)	2,953 (7.2)	22.0 ^{§§}
Female						
15–24	138 (0.6)	281 (1.3)	116.7 ^{§§}	373 (1.7)	477 (2.2)	29.4 ^{§§}
25–44	893 (2.1)	1,421 (3.4)	61.9 ^{§§}	1,325 (3.2)	1,702 (4.0)	25.0 ^{§§}
45–64	925 (2.2)	1,201 (2.8)	27.3 ^{§§}	697 (1.6)	893 (2.1)	31.3 ^{§§}
Race/Ethnicity**						
White, non-Hispanic	4,685 (2.4)	7,995 (4.2)	75.0 ^{§§}	8,253 (4.4)	10,050 (5.4)	22.7 ^{§§}
Black, non-Hispanic	449 (1.1)	883 (2.1)	90.9 ^{§§}	1,044 (2.5)	1,310 (3.1)	24.0 ^{§§}
Hispanic	302 (0.6)	524 (0.9)	50.0 ^{§§}	1,049 (1.9)	1,299 (2.3)	21.1 ^{§§}
U.S. Census region of residence						
Northeast	1,485 (2.7)	3,071 (5.6)	107.4 ^{§§}	2,755 (5.1)	3,461 (6.3)	23.5 ^{§§}
Midwest	1,319 (2.0)	2,548 (3.9)	95.0 ^{§§}	3,385 (5.2)	3,959 (6.1)	17.3 ^{§§}
South	2,087 (1.8)	3,303 (2.8)	55.6 ^{§§}	2,733 (2.4)	3,722 (3.2)	33.3 ^{§§}
West	653 (0.8)	658 (0.9)	12.5 ^{§§}	1,701 (2.2)	1,847 (2.4)	9.1 ^{§§}

See table footnotes on next page.

The findings in this report are subject to at least five limitations. First, factors related to death investigation might affect rate estimates involving specific drugs. At autopsy, the substances tested for, and circumstances under which tests are performed to determine which drugs are present, might vary by jurisdiction and over time. Second, the percentage of deaths with specific drugs identified on the death certificate varies by jurisdiction and over time. Nationally, 19% (in 2014) and 17% (in 2015) of drug overdose death certificates did not include the specific types of drugs involved. Additionally, the percentage of drug overdose deaths with specific drugs identified on the death certificate varies widely by state, ranging from 47.4% to 99%. Variations in reporting across states prevent comparison of rates between states. Third, improvements in testing and reporting of specific drugs might have contributed to some observed increases in opioid-involved death rates. Fourth, because heroin and morphine are metabolized similarly (9), some heroin deaths might have been misclassified as morphine deaths, resulting in underreporting of heroin deaths. Finally,

the state-specific analyses of opioid deaths are restricted to 28 states, limiting generalizability.

The ongoing epidemic of opioid deaths requires intense attention and action. In a November 2016 report, the Drug Enforcement Administration referred to prescription drugs, heroin, and fentanyl as the most significant drug-related threats to the United States.^{†††} The misuse of prescription opioids is intertwined with that of illicit opioids; data have demonstrated that nonmedical use of prescription opioids is a significant risk factor for heroin use (10), underscoring the need for continued prevention efforts around prescription opioids. Intensifying efforts to distribute naloxone (an antidote to reverse an opioid overdose), enhancing access to treatment, including medication-assisted treatment, and implementing harm reduction services are urgently needed. It is important to focus efforts on expanding opioid disorder treatment capacity, including medication-assisted treatment and improving linkage into treatment.^{§§§}

††† <https://www.dea.gov/resource-center/2016%20NDA%20Summary.pdf>.
§§§ http://aspe.hhs.gov/sites/default/files/pdf/107956/ib_OpioidInitiative.pdf.

TABLE 2. (Continued) Number and age-adjusted rate of drug overdose deaths* involving synthetic opioids other than methadone† and heroin,§,¶ by sex, age group, race/ethnicity,** U.S. Census region, and selected states†† — United States, 2014 and 2015

Characteristic	Synthetic opioids other than methadone			Heroin		
	2014	2015	% change in rate, 2014 to 2015	2014	2015	% change in rate, 2014 to 2015
	No. (Rate)	No. (Rate)		No. (Rate)	No. (Rate)	
Selected states††						
States with very good or excellent reporting (n = 21)						
Alaska	14 –¶¶	14 –¶¶	–¶¶	25 (3.3)	37 (4.7)	42.4
Connecticut	94 (2.7)	211 (6.1)	125.9 ^{§§}	299 (8.9)	390 (11.3)	27.0 ^{§§}
Iowa	29 (1.0)	44 (1.5)	50.0	37 (1.3)	45 (1.6)	23.1
Maine	62 (5.2)	116 (9.9)	90.4 ^{§§}	38 (3.1)	52 (4.5)	45.2
Maryland	230 (3.8)	357 (5.8)	52.6 ^{§§}	313 (5.2)	405 (6.6)	26.9 ^{§§}
Massachusetts	453 (6.9)	949 (14.4)	108.7 ^{§§}	469 (7.2)	634 (9.6)	33.3 ^{§§}
Nevada	32 (1.0)	32 (1.1)	10.0	64 (2.2)	82 (2.7)	22.7
New Hampshire	151 (12.4)	285 (24.1)	94.4 ^{§§}	98 (8.1)	78 (6.5)	-19.8
New Mexico	66 (3.3)	42 (2.1)	-36.4	139 (7.2)	156 (8.1)	12.5
New York	294 (1.4)	668 (3.3)	135.7 ^{§§}	825 (4.2)	1,058 (5.4)	28.6 ^{§§}
North Carolina	217 (2.2)	300 (3.1)	40.9 ^{§§}	266 (2.8)	393 (4.1)	46.4 ^{§§}
Oklahoma	73 (1.9)	93 (2.4)	26.3	26 (0.7)	36 (1.0)	42.9
Oregon	33 (0.8)	34 (0.9)	12.5	124 (3.2)	102 (2.5)	-21.9
Rhode Island	82 (7.9)	137 (13.2)	67.1 ^{§§}	66 (6.8)	45 (4.3)	-36.8
South Carolina	110 (2.3)	161 (3.3)	43.5 ^{§§}	64 (1.4)	100 (2.2)	57.1 ^{§§}
Utah	68 (2.5)	62 (2.3)	-8.0	110 (3.8)	127 (4.3)	13.2
Vermont	21 (3.6)	33 (5.6)	55.6	33 (5.8)	33 (5.8)	0.0
Virginia	176 (2.1)	270 (3.3)	57.1 ^{§§}	253 (3.1)	353 (4.3)	38.7 ^{§§}
Washington	62 (0.8)	65 (0.9)	12.5	289 (4.1)	303 (4.2)	2.4
West Virginia	122 (7.2)	217 (12.7)	76.4 ^{§§}	163 (9.8)	194 (11.8)	20.4
Wisconsin	90 (1.6)	112 (2.1)	31.3	270 (4.9)	287 (5.3)	8.2
States with good reporting (n = 7)						
Colorado	80 (1.5)	64 (1.2)	-20.0	156 (2.9)	159 (2.8)	-3.4
Georgia	174 (1.7)	284 (2.8)	64.7 ^{§§}	153 (1.6)	222 (2.2)	37.5 ^{§§}
Illinois	127 (1.0)	278 (2.2)	120.0 ^{§§}	711 (5.6)	844 (6.7)	19.6 ^{§§}
Minnesota	44 (0.8)	55 (1.0)	25.0	100 (1.9)	115 (2.2)	15.8
Missouri	109 (1.9)	183 (3.1)	63.2 ^{§§}	334 (5.8)	303 (5.3)	-8.6
Ohio	590 (5.5)	1,234 (11.4)	107.3 ^{§§}	1,208 (11.1)	1,444 (13.3)	19.8 ^{§§}
Tennessee	132 (2.1)	251 (4.0)	90.5 ^{§§}	148 (2.3)	205 (3.3)	43.5 ^{§§}

Source: CDC. National Vital Statistics System, Mortality. CDC WONDER. Atlanta, GA: US Department of Health and Human Services, CDC; 2016. <https://wonder.cdc.gov/>.

* Rates are for the number of deaths per 100,000 population. Age-adjusted death rates were calculated using the direct method and the 2000 standard population. Deaths were classified using the *International Classification of Diseases, Tenth Revision* (ICD-10). Drug overdose deaths were identified using underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14.

† Drug overdose deaths, as defined, that have synthetic opioids other than methadone (T40.4) as contributing causes.

§ Drug overdose deaths, as defined, that have heroin (T40.1) as a contributing cause.

¶ Categories of deaths are not exclusive because deaths might involve more than one drug. Summing categories will result in a number greater than the total number of deaths in a year.

** Data for Hispanic ethnicity should be interpreted with caution; studies comparing Hispanic ethnicity on death certificates and on census surveys have shown inconsistent reporting.

†† Analyses were limited to states meeting the following criteria. For states with very good to excellent reporting, ≥90% of drug overdose death certificates mention at least one specific drug in 2014, with the change in percentage of drug overdose deaths mentioning at least one specific drug differing by <10 percentage points from 2014 to 2015. States with good reporting had 80% to <90% of drug overdose death certificates mention at least one specific drug in 2014, with the change in the percentage of drug overdose deaths mentioning at least one specific drug differing by <10 percentage points from 2014 to 2015. Rate comparisons between states should not be made because of variations in reporting across states.

§§ Statistically significant at p<0.05 level. Gamma tests were used if the number of deaths was <100 in 2014 or 2015, and z-tests were used if the number of deaths was ≥100 in both 2014 and 2015.

¶¶ Cells with nine or fewer deaths are not reported, and rates based on <20 deaths are not considered reliable and not reported.

Implementing harm reduction approaches, such as the scaling up comprehensive syringe services programs can reach persons with opioid use disorders and provide them with access to naloxone and medication-assisted treatment, reduce transmission risk for human immunodeficiency virus or hepatitis C, and reduce other harms from drug use. Law enforcement strategies to reduce the illicit opioid supply must also be supported. A recent report did

not find evidence that efforts to reduce opioid prescribing were leading to heroin overdoses; rather, such policies could help reduce the number of persons who are exposed to opioids (7). Continued improvements in guideline-recommended opioid prescribing practices for chronic pain (4), increased improving access to and use of prescription drug monitoring programs, and increased utilization of nonopioid pain treatments are needed.

A multifaceted, coordinated approach between public health and public safety is also necessary to address the U.S. opioid epidemic.

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