Review of Overdose Fatalities: An Analysis of West Virginia SUDORS Data, 2019-2021

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The following report contains analyses of drug overdose fatalities that occurred in West Virginia in 2019, 2020, and 2021, as compiled in the State Unintentional Drug Overdose Reporting System (SUDORS).

Key Findings

- There were 847 overdose deaths in 2019 and 1,301 overdose deaths in 2020, an increase of 53.6%. In 2021, there were 1453 overdose deaths, representing an increase of 11.7% over the prior year.
- Overdose deaths among males outnumber females by a ratio of 2:1 in each year.
- The percentage of decedents who were unmarried increased each year from 78.7% in 2019 to 81.4% in 2021, a much larger share than is unmarried in the general population.
- The percentage of overdose deaths who had survived a prior overdose ranged from 16.6% to 25.4% during the three years, suggesting an opportunity for intervention exists for some individuals who survive an overdose.
- Opiates were the most common substance class listed as a cause of death, with other common causes of death including amphetamines, benzodiazepines, antidepressants, cocaine, and alcohol. (Multiple substances were listed as a cause of death for many decedents.)
- Naloxone was administered to 19.8% of decedents in 2019, 36.3% in 2020, and 33.9% in 2021, suggesting greater availability of the emergency treatment. Emergency Medical Services (EMS) administered 40-50% of naloxone doses in each year.

West Virginia SUDORS

West Virginia SUDORS data consist of de-identified accidental and undetermined manner drug overdose deaths confirmed by the West Virginia Office of the Chief Medical Examiner (WVOCME), updated and distributed semi-annually by the Centers for Disease Control (CDC). Drug overdose deaths where the manner of death is suicide or homicide are not included in SUDORS. For nearly all decedents, core demographic variables are available, including age, sex, race, marital status, education level, and state of residence. Additional variables are available for some or most decedents, drawn from death scene investigations including bystander reports, autopsy, toxicology reports, and prescription history. Cause of death codes (ICD-10) and cause of death statements are derived from the WV Health Statistics Center's (HSC) Vital Statistics System death database.

SUDORS does not include West Virginia resident deaths that occur outside the state. For this reason, population rates should not be calculated from SUDORS data and comparisons of overdose death counts from HSC data, such as those in the West Virginia Office of Drug Control Policy (ODCP) public dashboard, are subject to this important limitation.

Demographic Characteristics of Decedents

In 2019, a total of 847 overdose deaths were reported (Table 1). In 2020, there were 1,301 overdose deaths, an increase of 53.6%. In 2021, there were 1,453 overdose deaths, an increase of 11.7% over the prior year. West Virginia residents constituted 95.0%, 93.9%, 93.4% of overdose deaths in WV SUDORS for 2019, 2020, and 2021, respectively. In each year, males outnumbered females by more than 2:1.

The median age of decedents was 41-42 years, and more than three quarters of decedents were 25-54 years old in each year.

Most decedents were non-Hispanic, White in each year. Non-Hispanic Blacks comprised 5.9%, 5.8%, and 6.6% of decedents in 2019, 2020, and 2021, respectively. Decedents of Hispanic ethnicity, as well as Asian or Pacific Islanders, American Indians, Alaskan Natives, and decedents of multiple races were pooled in Table 1 due to small numbers.

The percentage of decedents who were married, in a civil union, or in a domestic partnership declined each year from 19.0% in 2019 to 15.4% in 2021. For comparison, around half of the adult population in West Virginia is married.

Most decedents were high school graduates with no college, at 56.9%, 57.4%, and 57.8% in 2019, 2020, and 2021, respectively. Between 19.7% and 23.2% did not complete high school, while 11.8% to 15.0% had some college or an associate degree. The percentage of decedents with a bachelor's or higher degree was 4.1% to 6.1%.

Table 1. Demographic characteristics of decedents by year, 2019 – 2021

	2019		2020		2021	
	n	(%)	n	(%)	n	(%)
Total decedents	847		1,301		1,453	
State of Residence						
West Virginia	805	(95.0)	1,222	(93.9)	1,357	(93.4)
Other State or Unknown	42	(5.0)	79	(6.1)	96	(6.6)
Sex						
Male	572	(67.5)	931	(71.6)	1,032	(71.0)
Female	275	(32.5)	370	(28.4)	421	(29.0)
Age[1]						
Under 25	52	(6.1)	49	(3.8)	75	(5.2)
25-34	197	(23.3)	321	(24.7)	309	(21.3)
35-44	243	(28.7)	394	(30.3)	468	(32.2)
45-54	199	(23.5)	308	(23.7)	327	(22.5)
55+	156	(18.4)	229	(17.6)	272	(18.7)
Race						
White, non-Hispanic	767	(90.6)	1,190	(91.5)	1,312	(90.3)
Black, non-Hispanic	50	(5.9)	76	(5.8)	96	(6.6)
Other or multi-race	11	(1.3)	21	(1.6)	16	(1.1)
Unknown or missing	19	(2.2)	14	(1.1)	29	(2.0)
Marital Status						
Never married	349	(41.2)	555	(42.7)	596	(41.0)
Married, civil union, or domestic partnership	161	(19.0)	231	(17.8)	224	(15.4)
Divorced, widowed, married but separated	318	(37.5)	495	(38.0)	587	(40.4)
Unknown or not specified	19	(2.2)	20	(1.5)	46	(3.2)
Education						
Did not complete high school	167	(19.7)	276	(21.2)	337	(23.2)
High school graduate or GED	482	(56.9)	747	(57.4)	840	(57.8)
Some college or associate's	127	(15.0)	192	(14.8)	172	(11.8)
Bachelor's or higher	52	(6.1)	62	(4.8)	60	(4.1)
Unknown	19	(2.2)	24	(1.8)	44	(3.0)

Source: SUDORS

[1] Two decedents in 2021 had an unknown age.

Naloxone Administration

In 2019, 168 individuals received one or more doses of naloxone during the fatal overdose incident, representing 19.8% of fatal overdoses (Table 2). The number and percent increased to 472 and 36.3% in 2020. In 2021, 493 individuals received naloxone during a fatal overdose incident, or 33.9% of overdose deaths. In each year, naloxone was most often administered by EMS personnel.

Table 2. Administration of naloxone during fatal overdose episode

	2019		2020		2021	
	n	(%)	n	(%)	n	(%)
Total decedents	847		1,301		1,453	
Decedents administered naloxone	168	(19.8)	472	(36.3)	493	(33.9)
One Administrator						
Bystander	27	(16.1)	53	(11.2)	62	(12.6)
EMS	64	(38.1)	222	(47.0)	184	(37.3)
Hospital	3	(1.8)	9	(1.9)	7	(1.4)
Law enforcement	6	(3.6)	8	(1.7)	6	(1.2)
Other	2	(1.2)	2	(0.4)	1	(0.2)
Unknown	46	(27.4)	141	(29.9)	201	(40.8)
Two Administrators						
Bystander and EMS	5	(3.0)	17	(3.6)	16	(3.2)
Bystander and hospital	2	(1.2)	1	(0.2)	0	(0.0)
Bystander and law enforcement	2	(1.2)	2	(0.4)	1	(0.2)
Bystander and other	1	(0.6)	2	(0.4)	0	(0.0)
EMS and hospital	6	(3.6)	13	(2.8)	14	(2.8)
EMS and law enforcement	2	(1.2)	0	(0.0)	0	(0.0)
EMS and other	0	(0.0)	1	(0.2)	0	(0.0)
Three Administrators						
Bystander, EMS, and law enforcement	1	(0.6)	0	(0.0)	1	(0.2)
Bystander, EMS, and other	1	(0.6)	1	(0.2)	0	(0.0)

Source: SUDORS

Previous Overdose

Between 16.6% and 25.4% of decedents had a nonfatal overdose prior to the fatal incident (Table 3), suggesting an opportunity for intervention in up to a quarter of fatal overdose deaths. The window for intervention following a nonfatal overdose is wide, however, ranging from 1 month to more than 1 year.

Table 3. Timing of previous overdose

	2019		2020		2021	
	n	(%)	n	(%)	n	(%)
Total decedents	847		1,301		1,453	
No previous OD reported[1]	706	(83.4)	971	(74.6)	1,146	(78.9)
Previous OD, anytime	141	(16.6)	330	(25.4)	306	(21.1)
Previous OD:						
Within last month	36	(4.3)	47	(3.6)	37	(2.5)
1 month to 1 year ago	56	(6.6)	129	(9.9)	98	(6.7)
More than 1 year ago	21	(2.5)	121	(9.3)	159	(10.9)
Timing unknown	28	(3.3)	33	(2.5)	12	(0.8)

Source: SUDORS

[1] One decedent in 2021 was missing data on previous overdose.

Emergency Department Care

In each year, between 25.8% to 30.1% of decedents were seen in an emergency department (ED) following the fatal overdose incident (Table 4). Of those decedents seen in the ED following the incident, 145 died in the ED in 2019 (60.2% of those seen in the ED), 246 died in the ED in 2020 (62.8% of those seen in the ED), and 221 died in the ED in 2021 (58.9% of those seen in the ED). There were 70 decedents admitted and later died in the hospital in 2019, 110 in 2020, and 120 in 2021.

Table 4. Decedent seen in ED during fatal incident and subsequent location of death

	2019		2020		2021	
	n	(%)	n	(%)	n	(%)
Total decedents	847		1,301		1,453	
Decedent seen in ED during fatal incident						
Yes	241	(28.5)	392	(30.1)	375	(25.8)
No	601	(71.0)	901	(69.3)	1,066	(73.4)
Unknown	5	(0.6)	8	(0.6)	12	(0.8)
Death location after decedent seen in ED						
ED / Outpatient	145	(60.2)	246	(62.8)	221	(58.9)
Hospital Inpatient	70	(29.0)	110	(28.1)	120	(32.0)
Dead on Arrival	1	(0.4)	12	(3.1)	12	(3.2)
Hospice Facility	4	(1.7)	4	(1.0)	1	(0.3)
Decedent's Home	9	(3.7)	2	(0.5)	0	(0.0)
Other or unknown	12	(5.0)	18	(4.6)	21	(5.6)

Source: SUDORS

Substances Contributing to Cause of Death

Toxicology results were used to identify substances contributing to cause of death. For many decedents, more than one substance contributed to cause of death.

In each year, opiates were the most common substance class that contributed to cause of death (Table 5a), with amphetamines the second most common. Cocaine declined in rank over these three years while antidepressants increased. Other substance classes among the Top 5 contributing to cause of death were benzodiazepines and alcohol.

The most common drug or metabolite contributing to cause of death in all three years was fentanyl (Table 5b). 4-ANPP, a fentanyl metabolite, rose to the second most common cause of death in 2020 and 2021. Norfentanyl was the third most common cause of death in each year. Amphetamines and methamphetamine increased in counts over the three years though their ranks declined. Morphine was among the Top 5 in 2019 but not in 2020 or 2021.

Table 5a. Top 5 substance classes contributing to cause of death

2019	2020	2021
Opiates (1,735)	Opiates (3,880)	Opiates (4,041)
Amphetamines (642)	Amphetamines (1,119)	Amphetamines (1,537)
Cocaine (249)	Benzodiazepines (421)	Antidepressants (472)
Benzodiazepines (237)	Antidepressants (297)	Benzodiazepines (432)
Alcohol (111)	Cocaine (246)	Cocaine (313)

Source: SUDORS
Note: Substances contributing to cause of death exceed decedents as many individuals had multiple substances involved in the death.

Table 5b. Top 5 drugs or metabolites contributing to cause of death

2019	2020	2021
Fentanyl (480)	Fentanyl (988)	Fentanyl (1,139)
Methamphetamine (375)	Despropionyl Fentanyl[2] (777) (4-ANPP)	Despropionyl Fentanyl[2] (996) (4-ANPP)
Norfentanyl[1] (302)	Norfentanyl[1] (765)	Norfentanyl[1] (946)
Amphetamine (264)	Methamphetamine (605)	Methamphetamine (784)
Morphine (140)	Amphetamine (513)	Amphetamine (751)

Source: SUDORS
Note: Substances contributing to cause of death exceed decedents as many individuals had multiple substances involved in the death.

1. *Norfentanyl is a fentanyl metabolite with a rapid onset and short duration of action. It is used as a pre-op pain reliever (https://premierbiotech.com/innovation/facing-fentanyl-p2/).*
2. *Despropionyl fentanyl (4-ANPP) is both a fentanyl metabolite and precursor used for the manufacture of fentanyl and related opioids (https://www.overdosepreventionstrategies.org/glossary/4-anpp/).*

Conclusion

SUDORS is a valuable dataset for describing the magnitude and changing nature of the drug overdose epidemic in West Virginia. From 2019 to 2021, the count of overdose deaths captured in SUDORS increased each year, while demographic trends of the decedent population changed little. The SUDORS dataset also made it possible to identify increases in naloxone administration, which may be attributed to increased efforts across the state to distribute naloxone. Further, SUDORS data provided information on public safety and healthcare touch points – EMS, law enforcement, and hospital emergency departments – through which individuals with a substance use disorder may be guided to treatment. Up to a quarter of decedents had a prior nonfatal overdose. The SUDORS dataset also reveals drug class and metabolite trends, such as the increase in fentanyl and fentanyl metabolites in the illicit drug supply. In contrast to trends in the illicit drug supply, SUDORS did not provide a clear picture of decedents' prescription history due to low completeness of these variables. Improvements in completeness of these variables could provide future analyses with a more complete understanding of prescribing trends and drug diversion.