

# Geographic variation in drug overdose as donor cause of death

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## Introduction

- The number of deceased organ donors in the US has increased steadily since 2012, with large increases since 2015.
- Many have speculated that the opioid epidemic has driven donor increases.
- Drug overdose deaths in the US increased from 41,502 in 2012 to 63,632 in 2016; overall rates increased from 13.1 deaths per 100,000 population in 2012 to 19.7 in 2016.
- In 2016, unadjusted drug overdose death rates by state varied from 6.3 deaths per 100,000 population in Nebraska to 48.3 in West Virginia, an 8-fold difference (Fig 2).
- Generally, drug overdose death rates in 2016 were highest in the Northeast, Appalachia, and Rust Belt states, and lowest between the Mississippi River and the Rocky Mountains and on the West Coast (Fig 2).
- We examined donor cause of death data to explore geographic differences in drug overdose as donor cause of death, and changes from 2012 to 2017.

## Methods

- Using SRTR standard analytic files, we examined causes of death among donors, 2012 to 2017.
- We classified cause of death as drug overdose if “drug intoxication” was chosen as the mechanism of death on OPTN’s Deceased Donor Registration form, or if the text field specified overdose.
- No data field specified “opioid death.”
- We examined numbers and proportions of overdose deaths by state from 2012 to 2017, and changes in that interval.

## Results

- From 2012 to 2017, the number of deceased organ donors increased by 2099 (25.8%), resulting in 5995 more transplants, a 26.2% increase (Fig 1).
- The number of donors who died of drug overdose increased 216%, from 420 to 1328. The number of donors who died of other causes increased 16.6%, from 7193 to 8384 (Table 1).
- From 2012 to 2017, the number of donors who died of drug overdose increased by 20 or more in 15 states.

Fig 1: Numbers of donors by manner of death

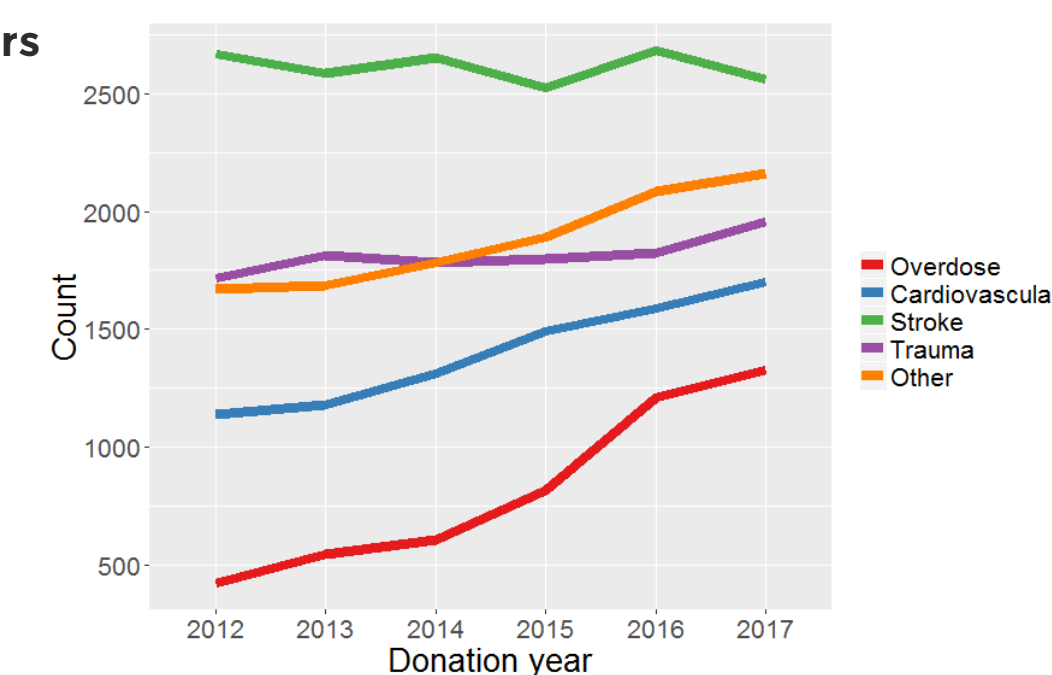


Fig 2: Drug overdose deaths per 100,000 population by state, 2016 (CDC data)

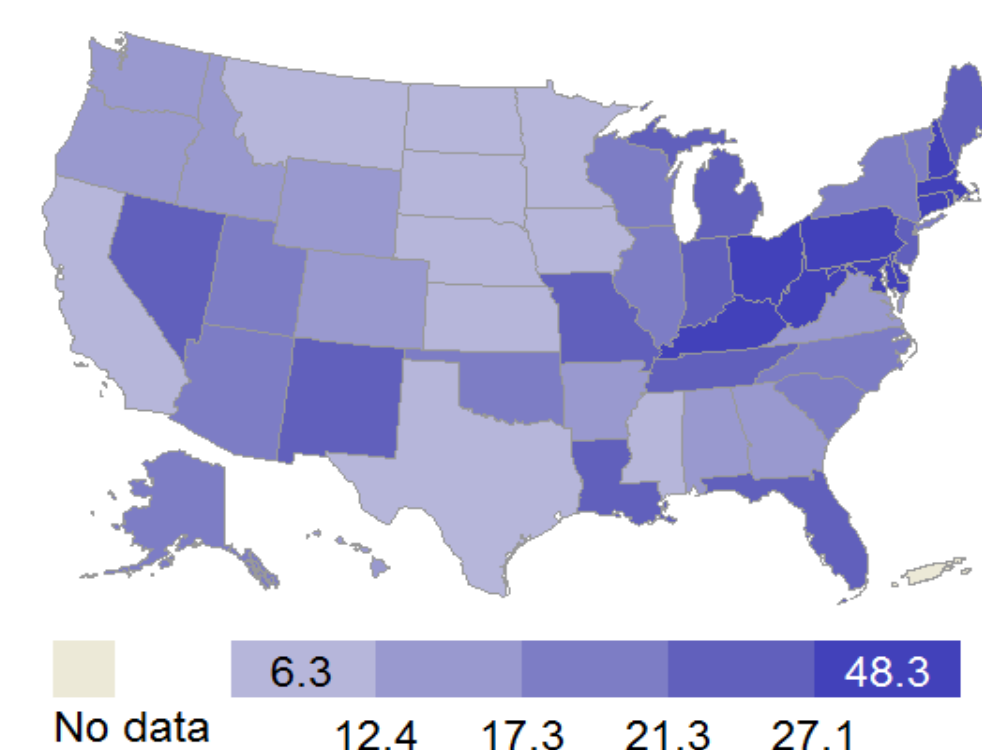


Fig 3: Percent of drug overdose deaths, deceased donors, 2012

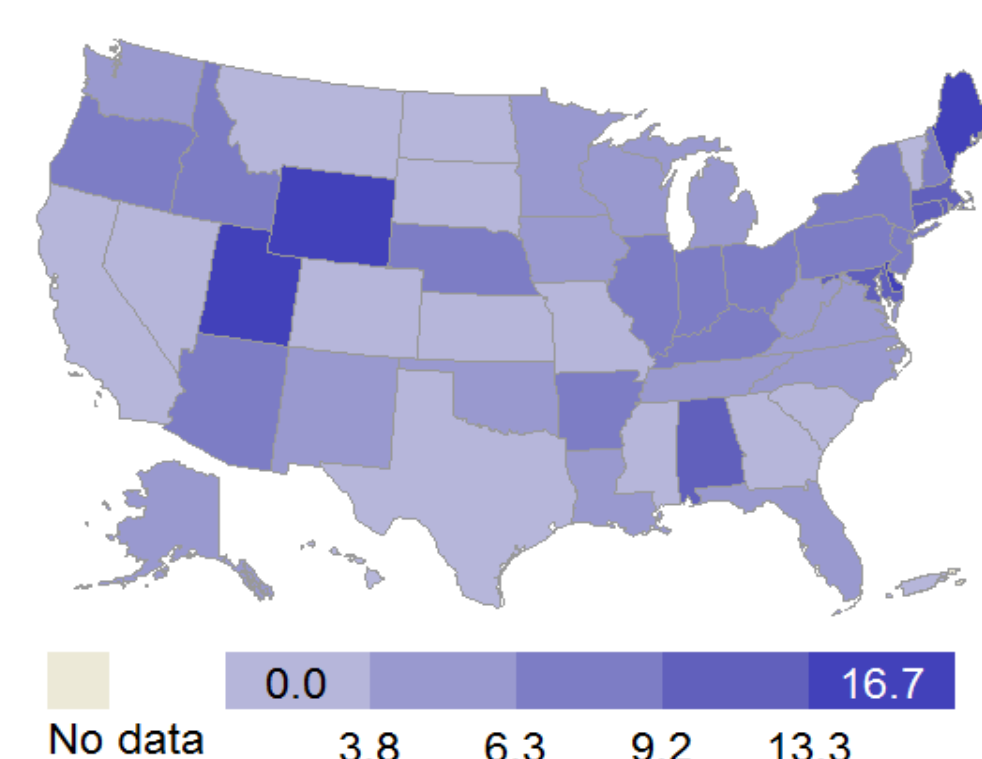
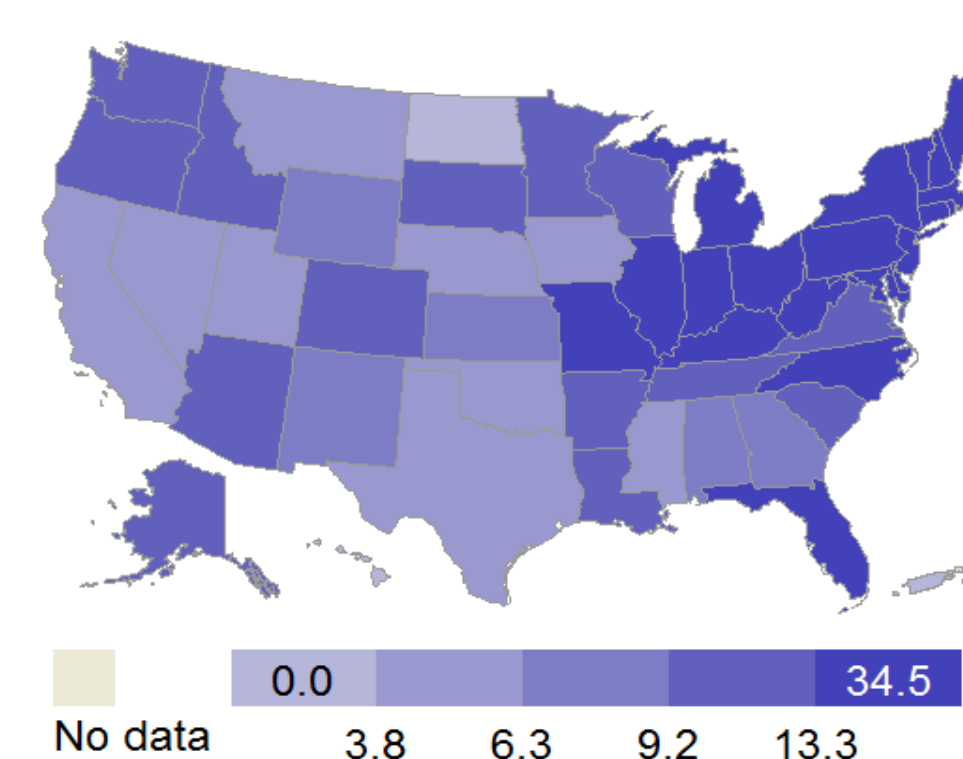


Table 1: Donor demographics, 2012 & 2017, by cause of death (OD vs. not)

Characteristic	Level	2012 donors		2017 donors	
		Overdose	Not OD	Overdose	Not OD
All donors		420	7193	1328	8384
Age (years)	< 18	10	822	13	869
	18-34	280	2018	751	2366
	35-49	101	1911	435	2215
	50-64	29	1967	121	2374
	≥ 65	0	475	8	563
Sex	Female	199	2879	562	3261
	Male	221	4314	766	5123
Race/eth	White	370	4647	1090	5307
	Black	17	1348	100	1495
	Asian	3	197	9	228
	Hispanic	27	945	117	1245
	Other	3	569	12	109
PHS high risk	Yes	198	707	956	1631
	No	222	6486	372	6753
OPTN region (See Fig 5)	1	30	225	78	281
	2	81	994	317	1015
	3	67	1249	175	1348
	4	24	668	55	980
	5	47	1075	89	1326
	6	15	284	44	361
	7	34	544	113	680
	8	18	493	70	586
	9	21	310	71	338
	10	50	649	194	694
	11	32	668	117	718

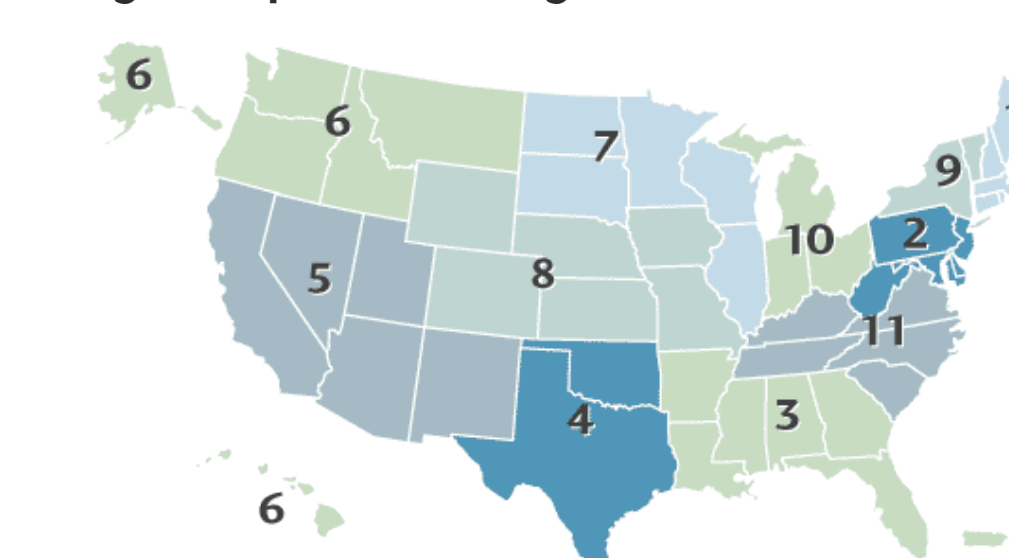
Fig 4: Percent of drug overdose deaths, deceased donors, 2017



## Results (cont'd)

- In Pennsylvania, 34 donors (8.4%) died of drug overdose in 2012, compared with 149 (27.2%) in 2017, a >3-fold increase. Similarly large increases occurred in Ohio and Florida (Figs 3 and 4), in which over 100 donors died of drug overdose.
- In 2012, ≥15% of donors died of drug overdose in only 2 states, Maine (5 donors) and Wyoming (1 donor). By 2017, ≥15% of donors died of drug overdoses in 18 states (Figs 3 and 4).
- OPTN regions 4 and 5 had the lowest proportion of donors who died of drug overdose deaths in 2012 (3.5% and 4.2%, respectively) and 2017 (5.3% and 6.3%), and the smallest increases (129% and 89%, Table 1).

Fig 5: Map of OPTN regions



## Results (cont'd)

- The number of donors who died of drug overdose nearly quadrupled in OPTN regions 2 and 10, while non-drug deaths increased 30% and 66%, respectively (Table 1).

## Conclusions

- Donor deaths due to drug overdoses increased substantially from 2012 to 2017.
- Geographic variation was evident in 2012, and differences intensified in 2017.
- Number and proportion of overdose deaths among donors were largest in the Northeast, Rust Belt (PA, OH, IL, IN, MI), and Appalachia, and lowest in the middle of the US and on the West Coast.
- Some of this difference may be attributed to high rates of drug overdose deaths in these states in general (Fig 2), and some is likely due to variability in how efficiently organs are placed.

## References

- National data on deaths from “drug poisoning” downloaded from <https://wisqars-viz.cdc.gov/> on 4/24/2018.