

Are overdoses in the United States down and why?

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University of North Carolina

Chapel Hill, NC, USA



March 28, 2025 • LJMU Drug Related Deaths Conference • Virtual meeting

Funding

I do not accept industry funding. My views do not necessarily reflect those of our funders.

Foundations & Non-profits

Vital Strategies
FORE
NACCHO
NASTAD

State

NC DHHS

NC General Assembly,
via NC Collaboratory,
using opioid settlement
funds

Federal

US FDA

Fee-for-service

Drug checking kits,
at-cost or free

County governments

University research

Disclosure

I am an uncompensated Board member of the non-profit Remedy Alliance For The People, which provides technical assistance for drug checking, and distributes bulk naloxone and other supplies at-cost or free.

Agenda

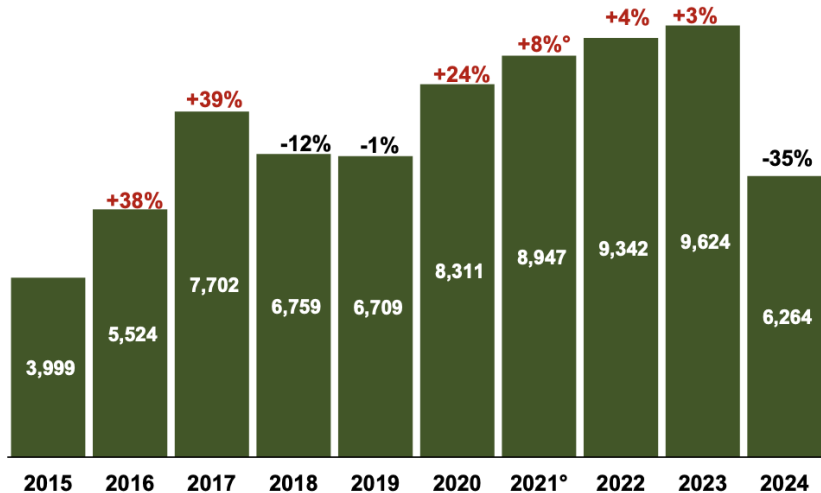
1. Are ODs down?
2. Was this a sudden decline?
3. How do we measure OD declines?
4. What's working? Who's left behind?

Why North Carolina?

411 Opioid overdose ED visits in December 2024 compared to **665** in December 2023.

Note: Counts based on ICD-10-CM diagnosis code of an opioid overdose: T40.0 (Opium), T40.1 (Heroin), T40.2 (Other Opioids), T40.3 (Methadone), T40.4 (Other Synthetic Narcotics), and T40.6 (Other and Unspecified Narcotics). restricted to North Carolina residents.

Opioid Overdose ED Visits by Year



Note: Percent change is YTD total compared to YTD total of previous year;
*There are known data quality gaps for May-June 2021 impacting the shown trends.

North Carolina Injury and Violence Prevention

Source: NC DETECT via NC DHHS IVPB

-35%

Hospital emergency visits for opioid overdose since 2023

-27%

911 calls for non-fatal opioid overdose Feb 2023 vs. Feb 2024

Source: NEMSIS / NHTSA Dashboard

42%

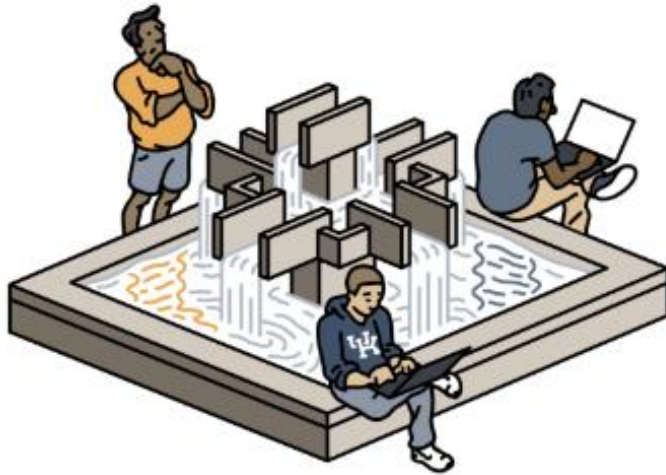
Adults who have personally known
someone who died of a drug overdose

Athey A. American Journal of Public Health. March 2024.

Opioid Data Lab



Theory



Practice



Lived Experience



Foundational Studies

Biostatistics
Epidemiology methods
Psychology of communication
Pharmacology

Applied Research

Pharmacy
Medicine
Vital statistics
Harm reduction

Science in Service

Drug checking
Sociology (qualitative)
Evidence-making interventions
History of asylums

Our Approach is Different.

Science

in

Service

Overdose



Are overdoses down and why?



Nabarun Dasgupta

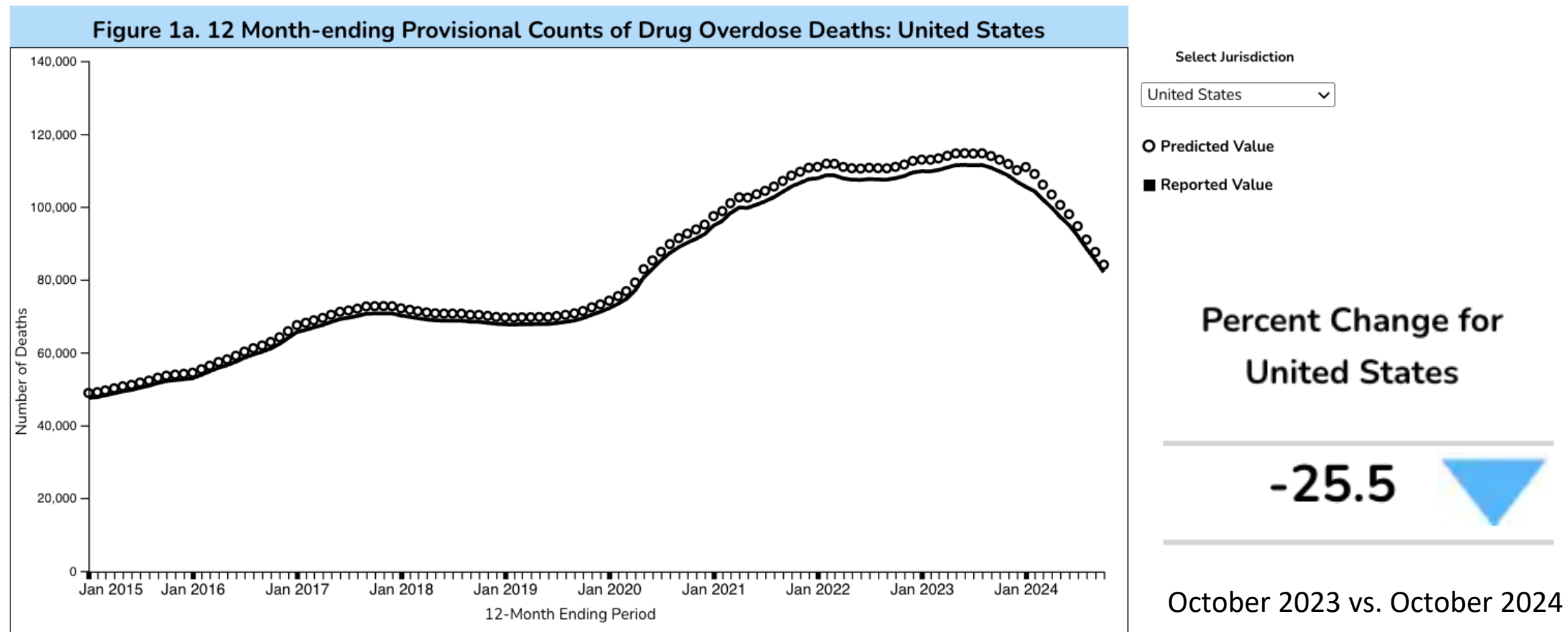
Sep 18, 2024 • 37 min read

*We are still losing
too many people
we love.*

1. Are ODs down?

12 Month-ending Provisional Number and Percent Change of Drug Overdose Deaths

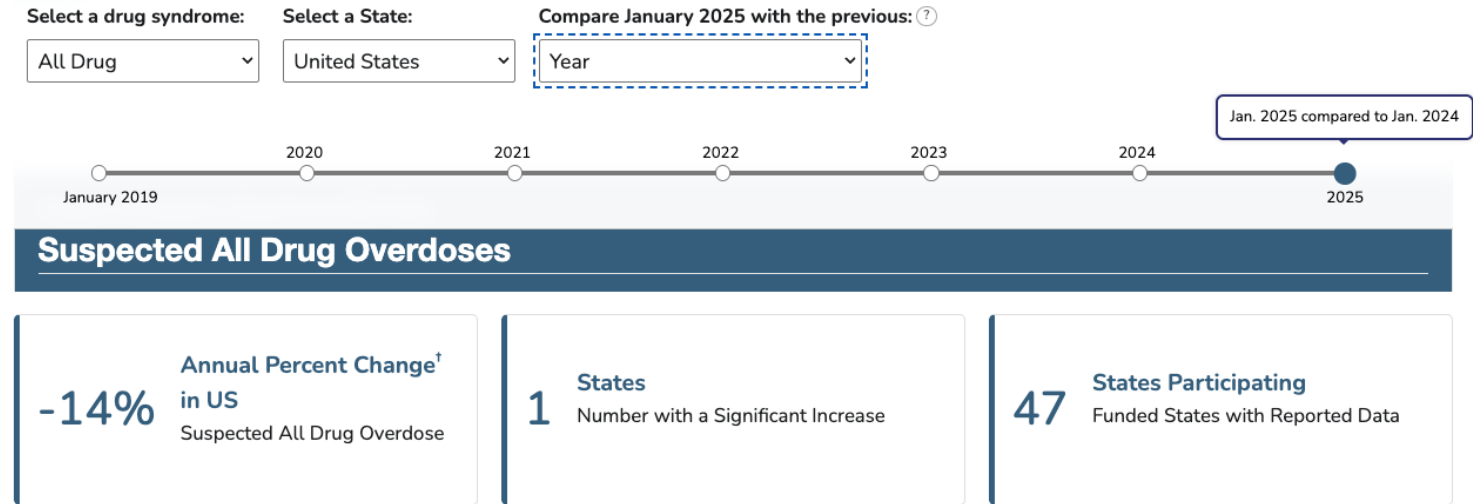
Based on data available for analysis on: March 2, 2025



Hospital Emergency Visits

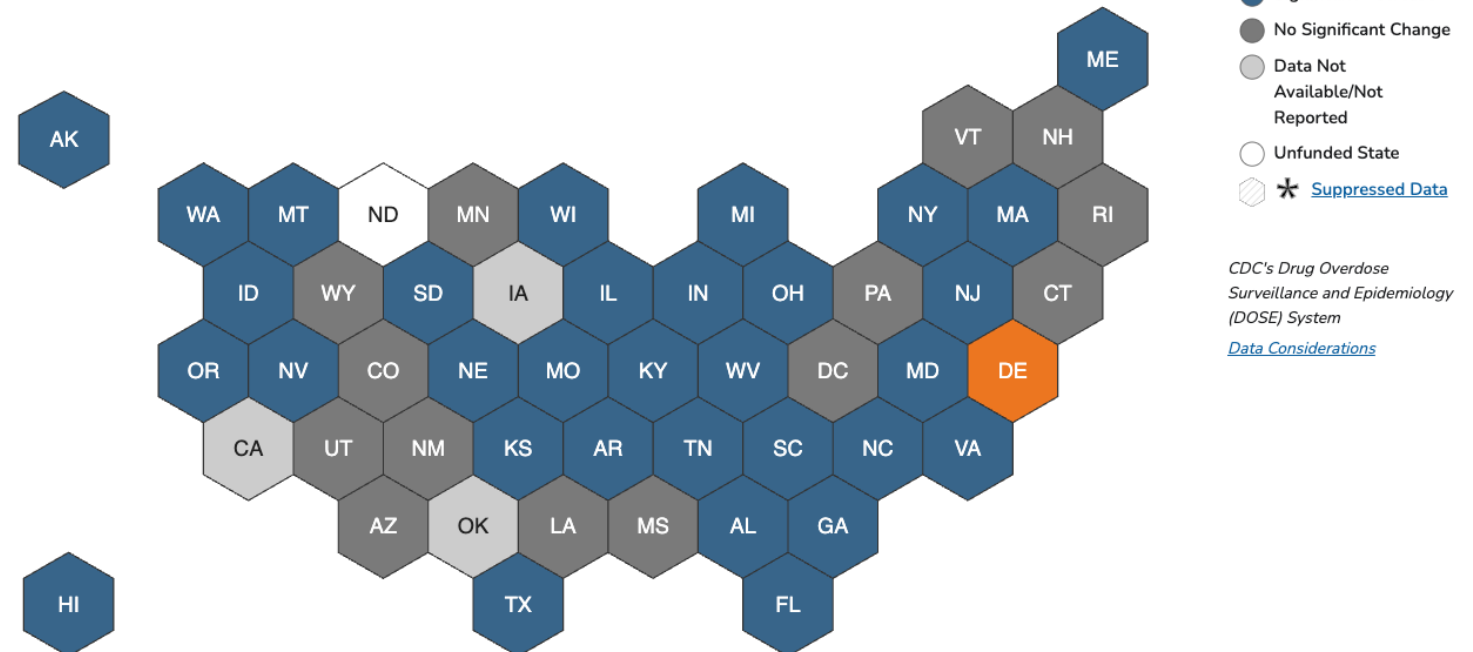
Non-fatal OD

-14%



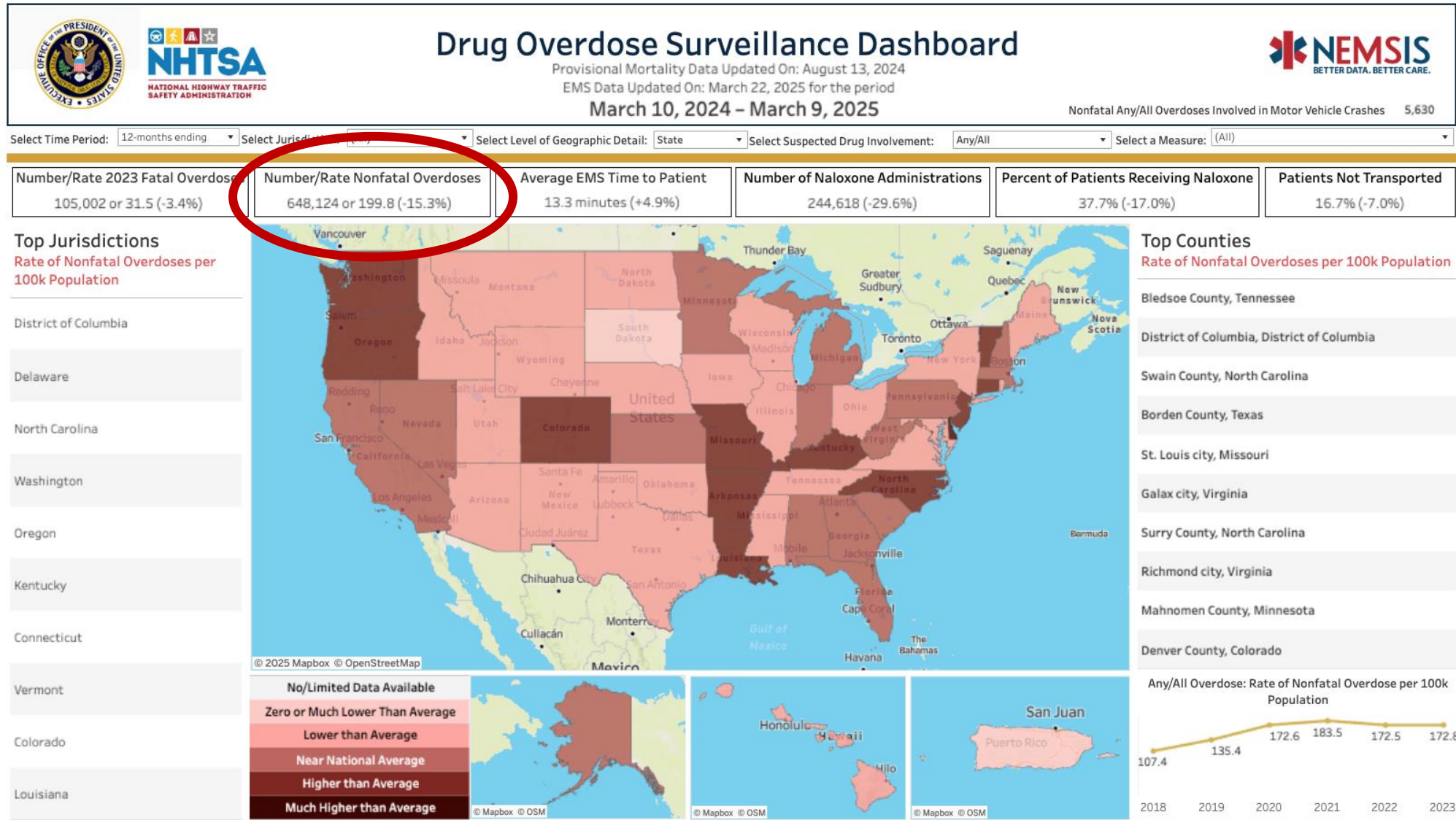
Annual percent change in ED visit rates[†] of suspected All Drug overdoses

Click on a state to see more.



911 Calls
non-fatal
overdoses

-15.3%



Looking at North Carolina

-53%

Drop in OD fatalities
since peak in 2023

4,545 vs. 2,142

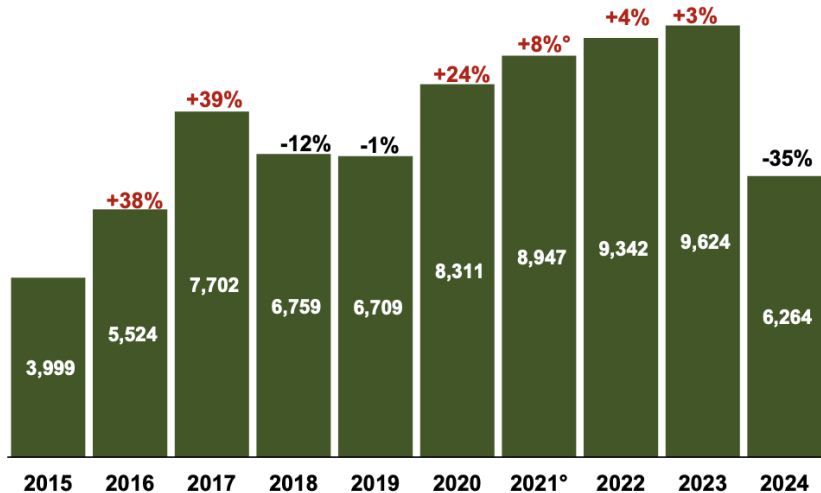
deaths per anum

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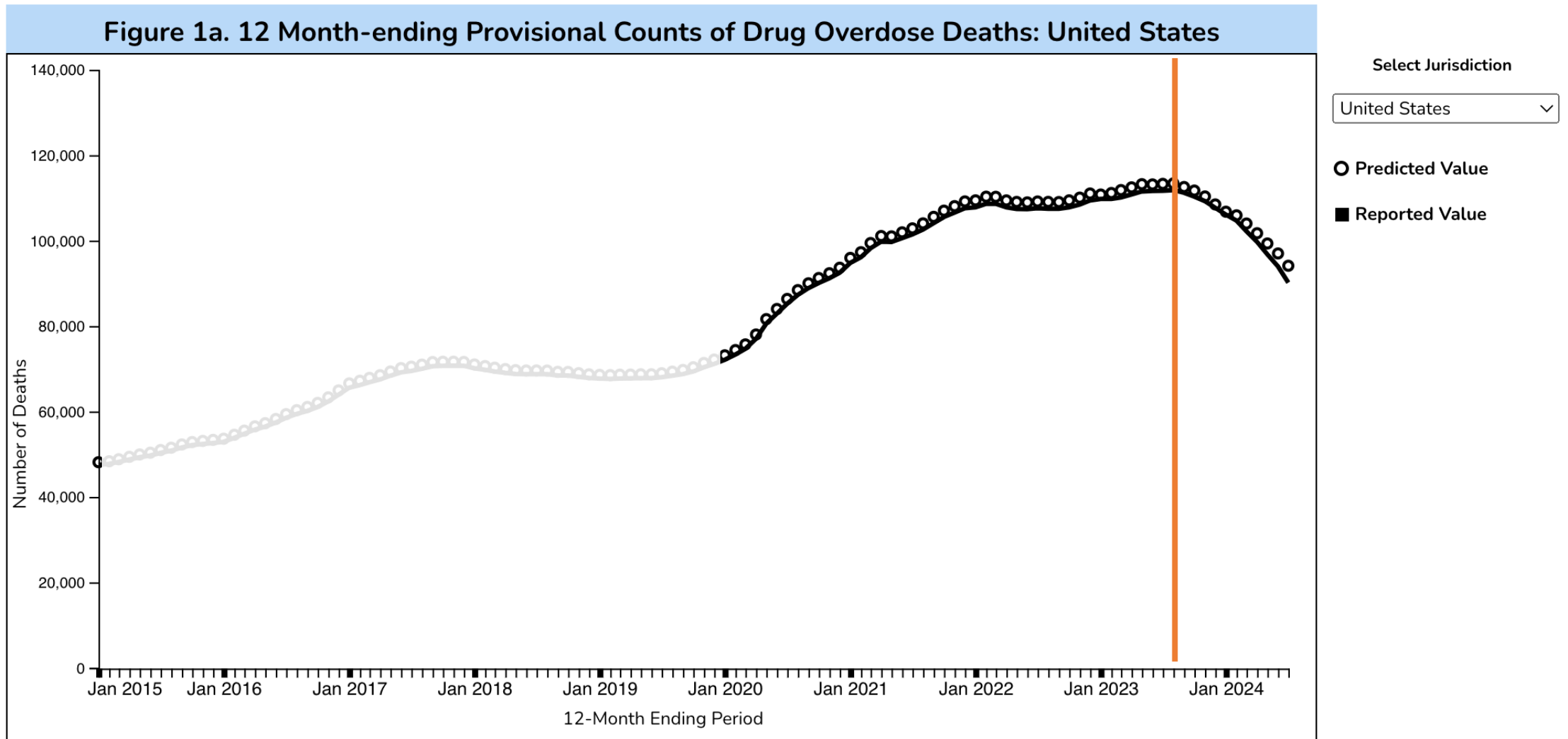
2. Was this a sudden decline?

Implications for causality...

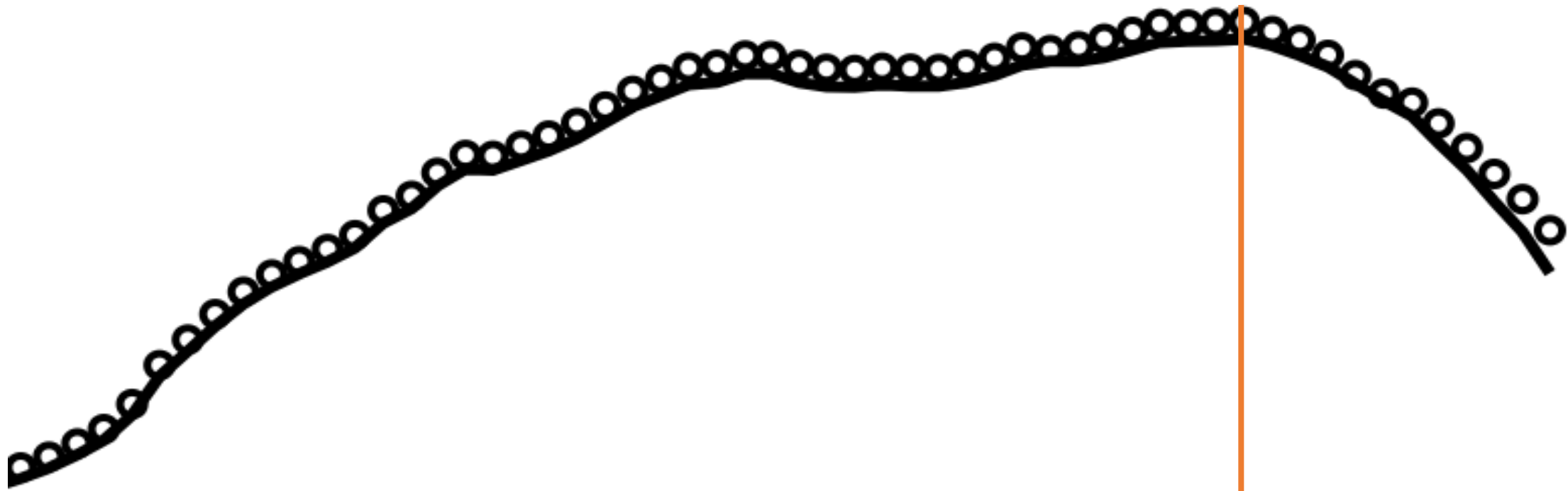
*When did each
state reach
peak OD?*

12 Month-ending Provisional Number and Percent Change of Drug Overdose Deaths

Based on data available for analysis on: December 1, 2024



Source: US CDC NCHS



2020

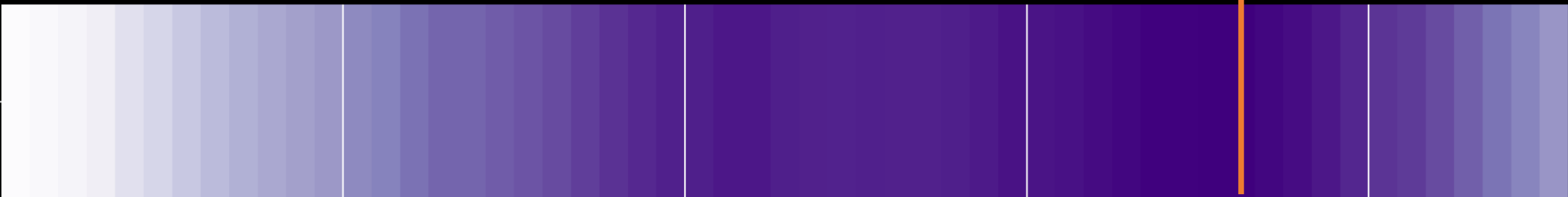
2021

2022

2023

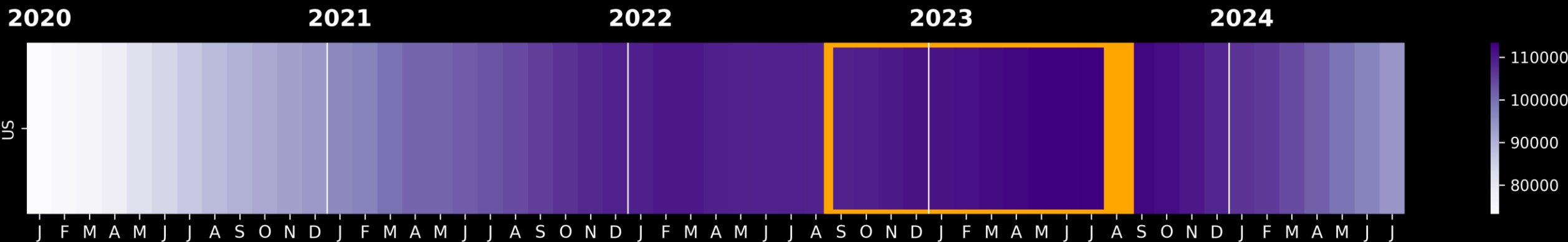
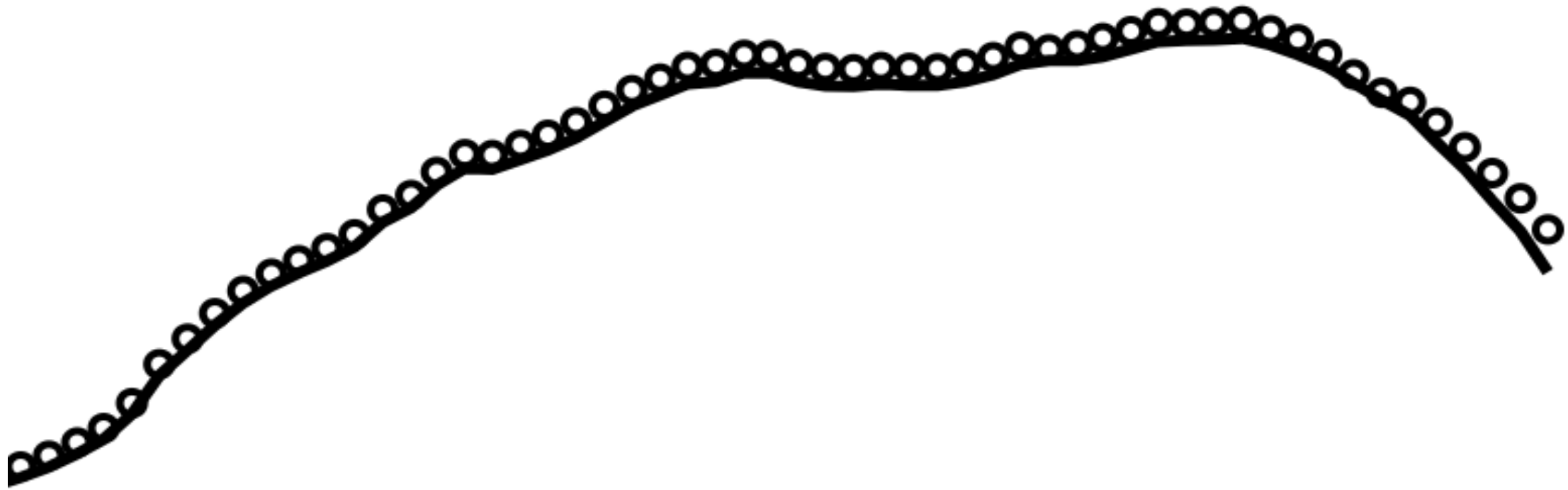
2024

US



J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J

National 12-month cumulative overdose deaths, Predicted Values, Jan 2020 to July 2024



National 12-month cumulative overdose deaths, Predicted Values, Jan 2020 to July 2024

The national fatal OD data used to inform policy is a 12-month, sliding window, cumulative sum.

Defining Peak OD

Our fear about “*drugs*” is that they can become suddenly unpredictable. Our perception of the “*Opioid Crisis*” is that the problem is intractable.

1. Month with the highest number of overdoses

Sudden increases drive media and political attention, drug alerts, medical and public health announcement of concern, increased law enforcement activity, concern about new potent drugs or adulterants.

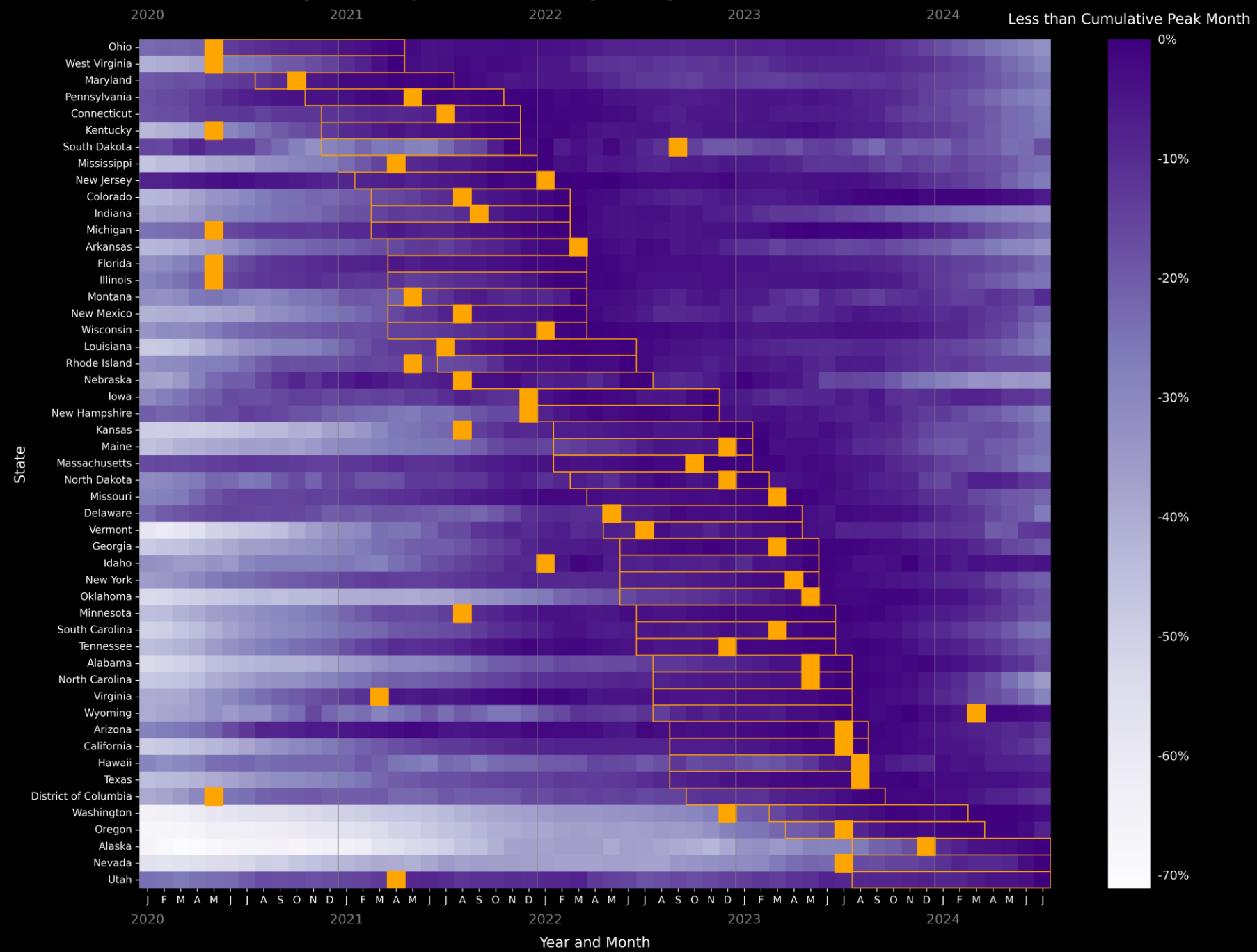
2. Worst 12-month period

Sustained spells of high overdose lead to public perceptions of crisis and anger, overtaxed medical facilities, and may drive public health systems to adapt



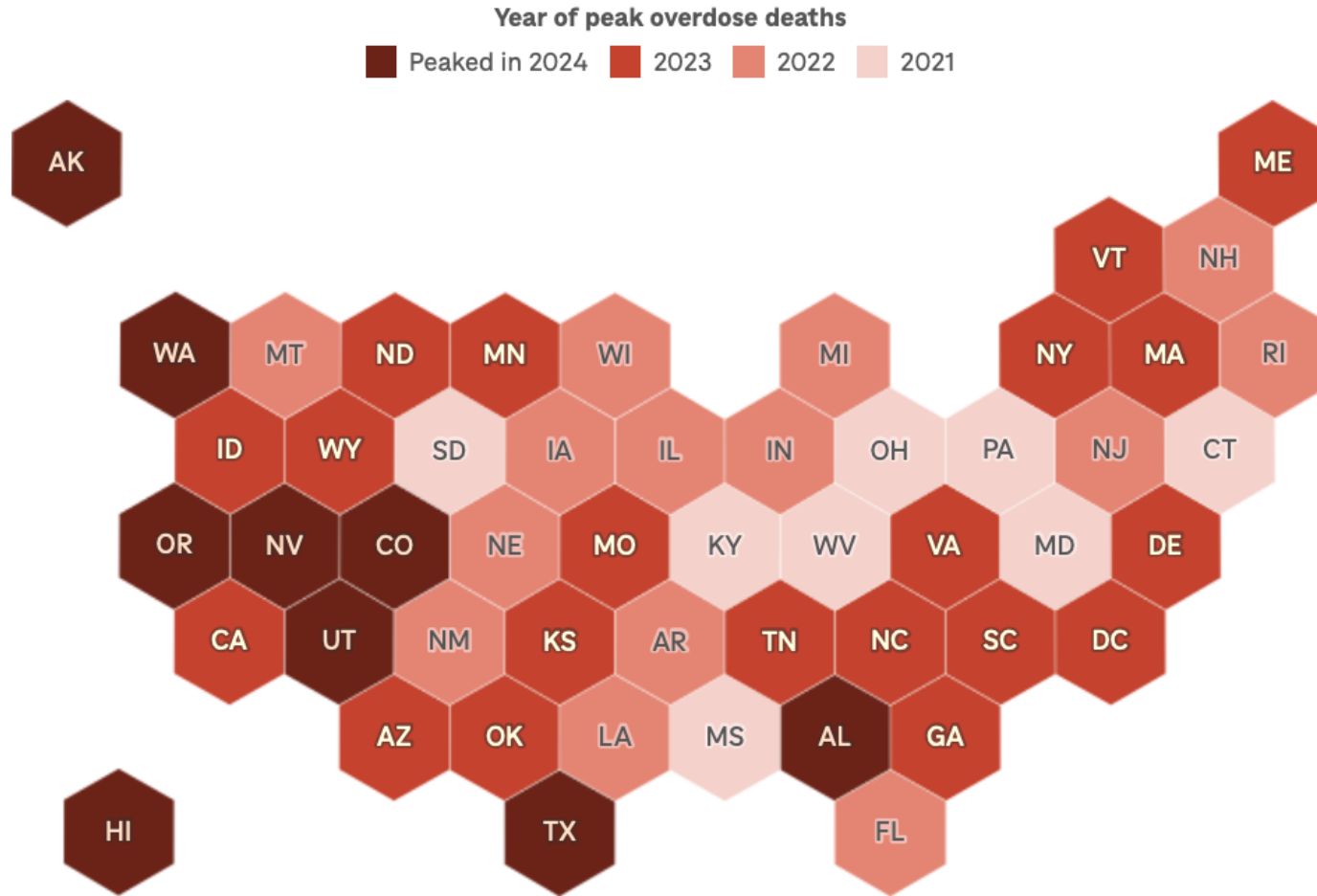
When did Drug Overdose Deaths Peak in each State?

Solid orange boxes are peak OD month; orange rectangles are worst cumulative 12-months



Drug overdose deaths peaked at different times across the U.S. They're now down everywhere

A band of states across Appalachia — Kentucky, West Virginia, Ohio, Pennsylvania and Maryland — all saw overdose deaths peak in 2021. West Coast states peaked more recently, but deaths are falling there too.



Source: Nabarun Dasgupta, University of North Carolina at Chapel Hill, based on provisional overdose data compiled by the Centers for Disease Control and Prevention

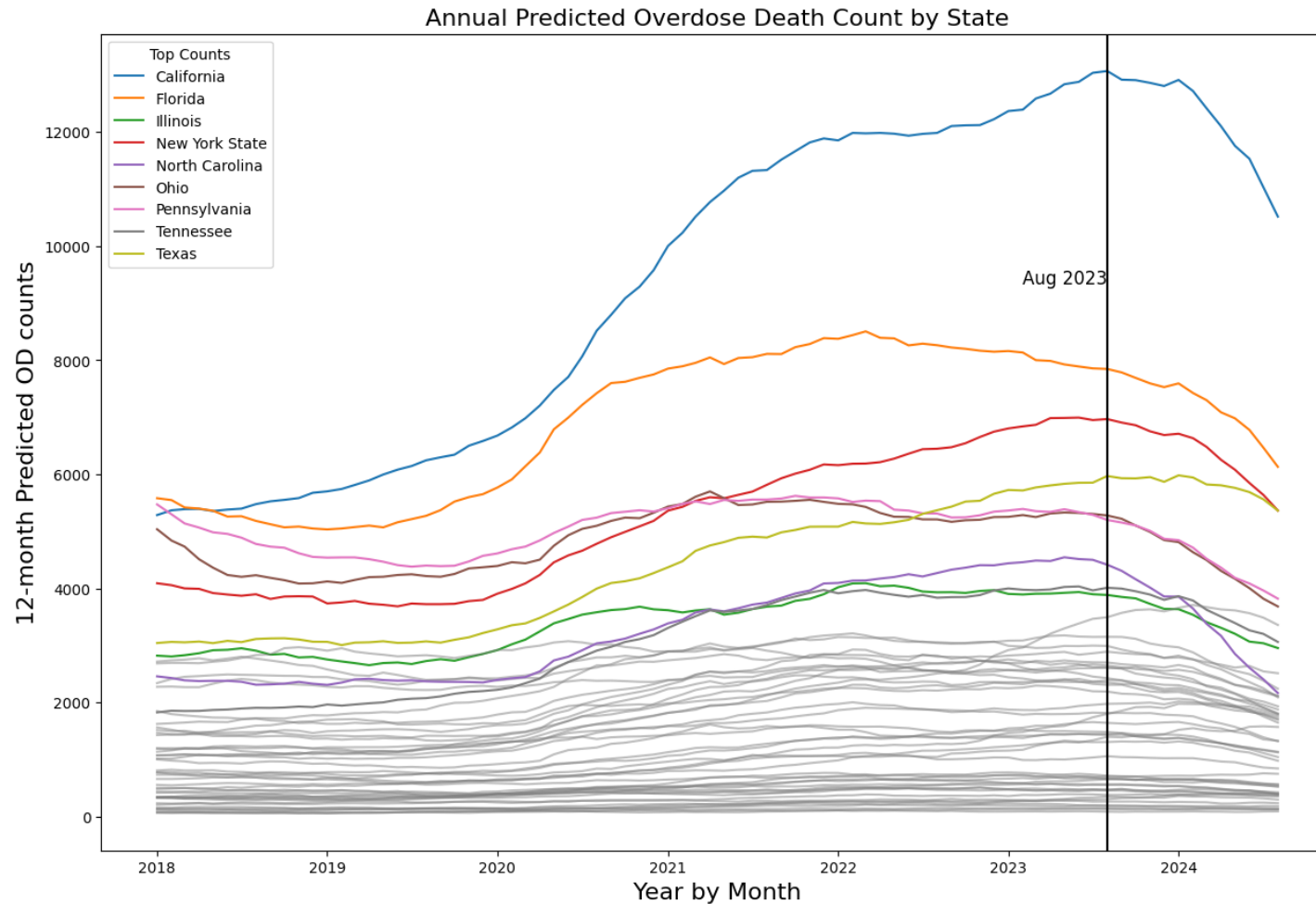
Credit: Brent Jones/NPR

Conclusions

The US experienced a gradual decline in overdose deaths over 3 years.

The decline started at different times throughout the country.

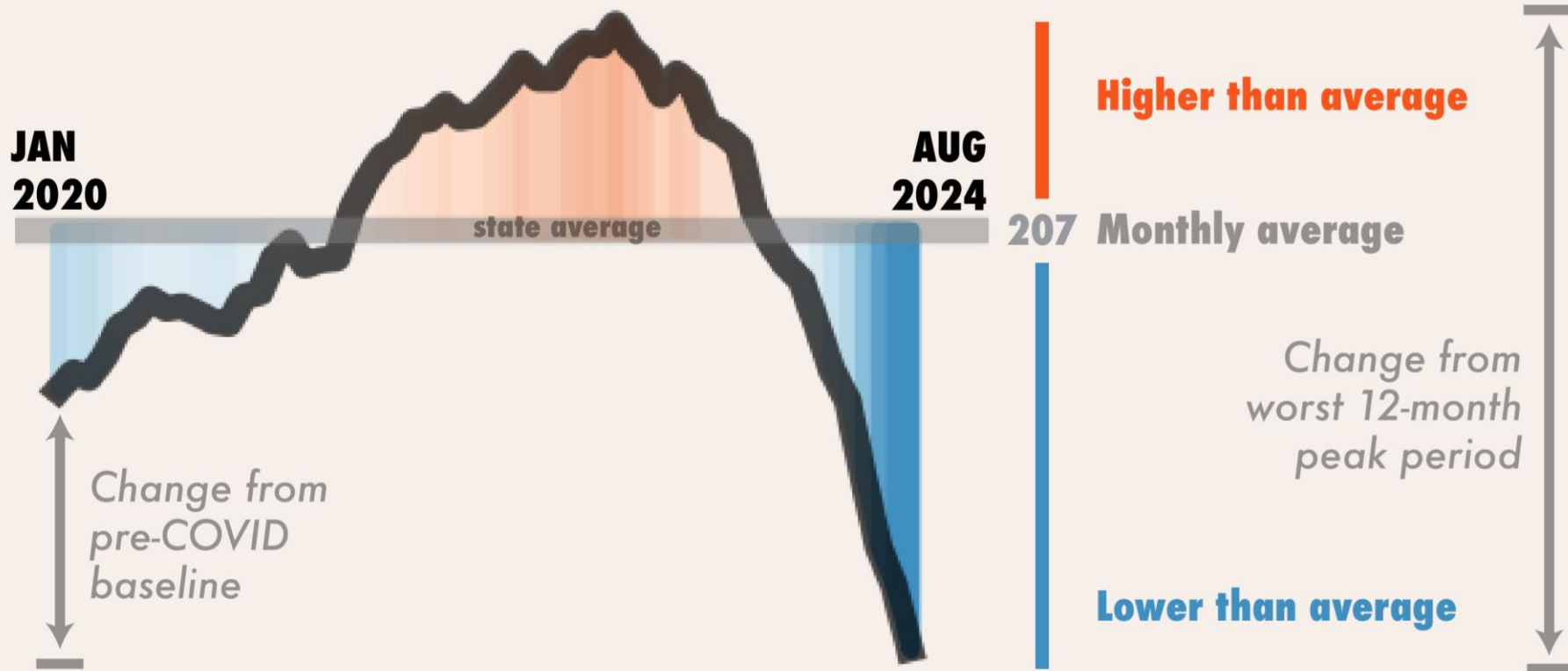
Simpson's Paradox explains why we didn't see the trend sooner.



*3. How do we
measure OD
declines?*

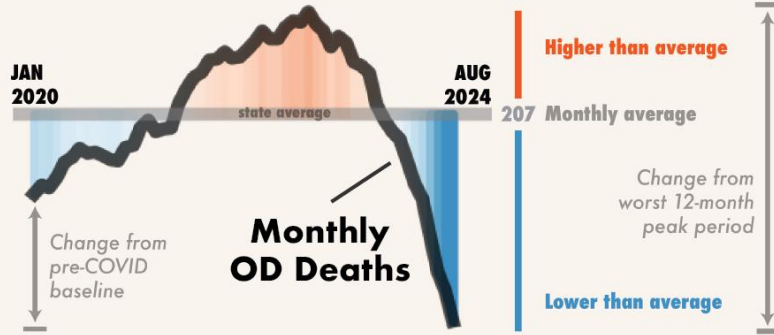
In-depth analysis of overdose death rates

How to read our visualization of provisional overdose mortality from CDC.

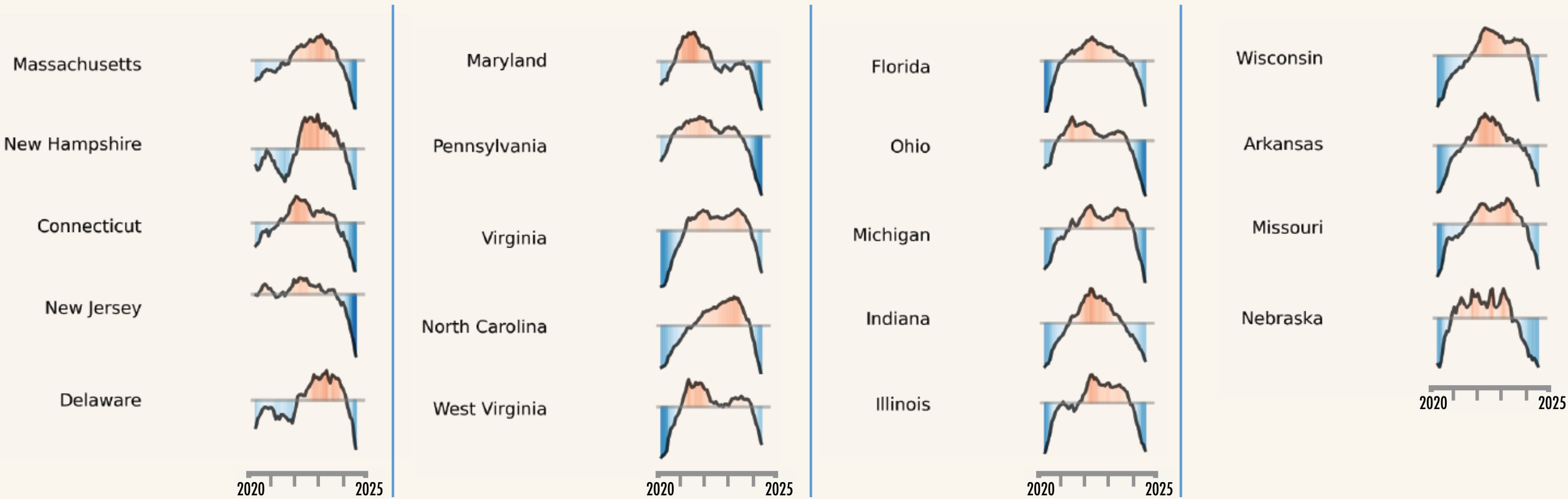


Monthly Overdose Deaths by State January 2020 to August 2024

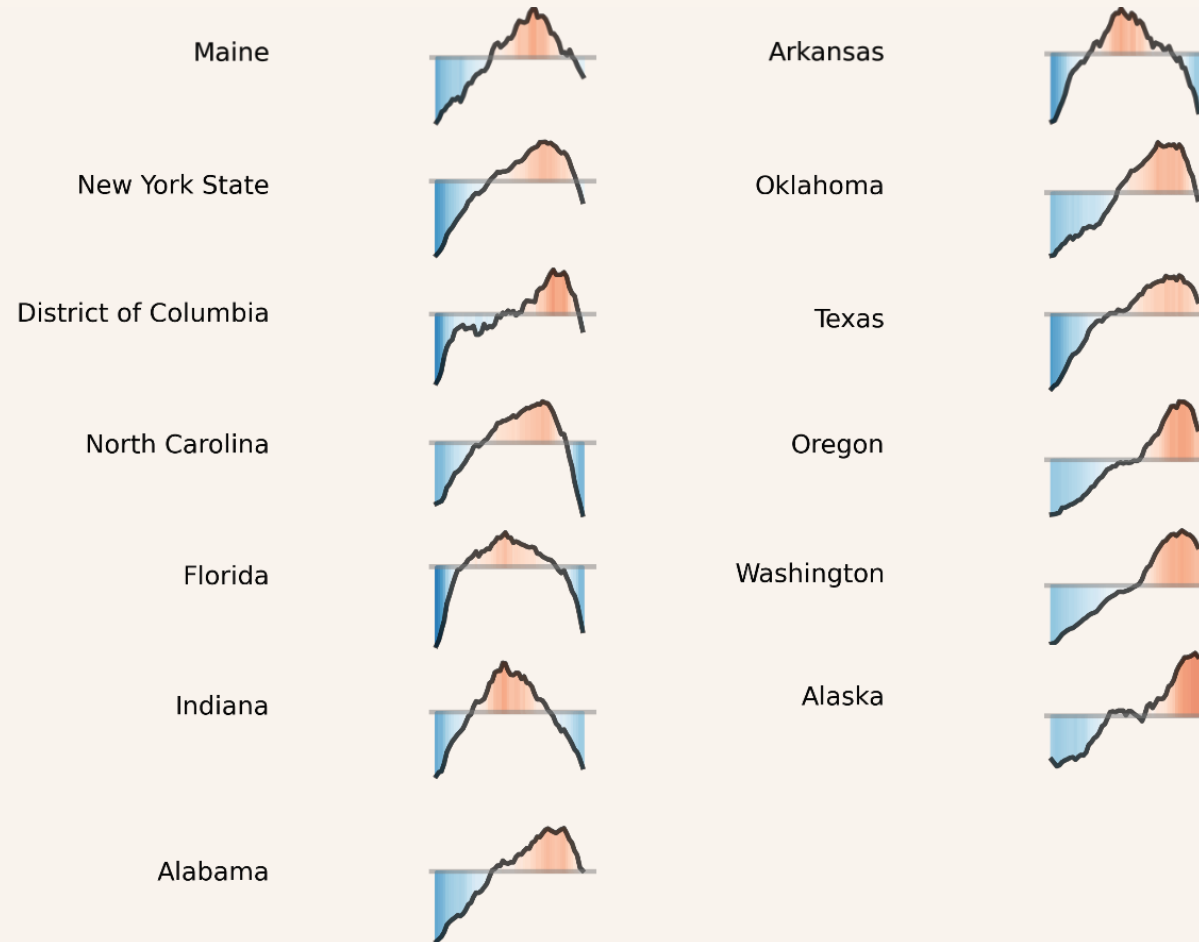
Figure Legend



19 States have returned to pre-COVID (pre-fentanyl?) overdose mortality.



A-shape



M-shape

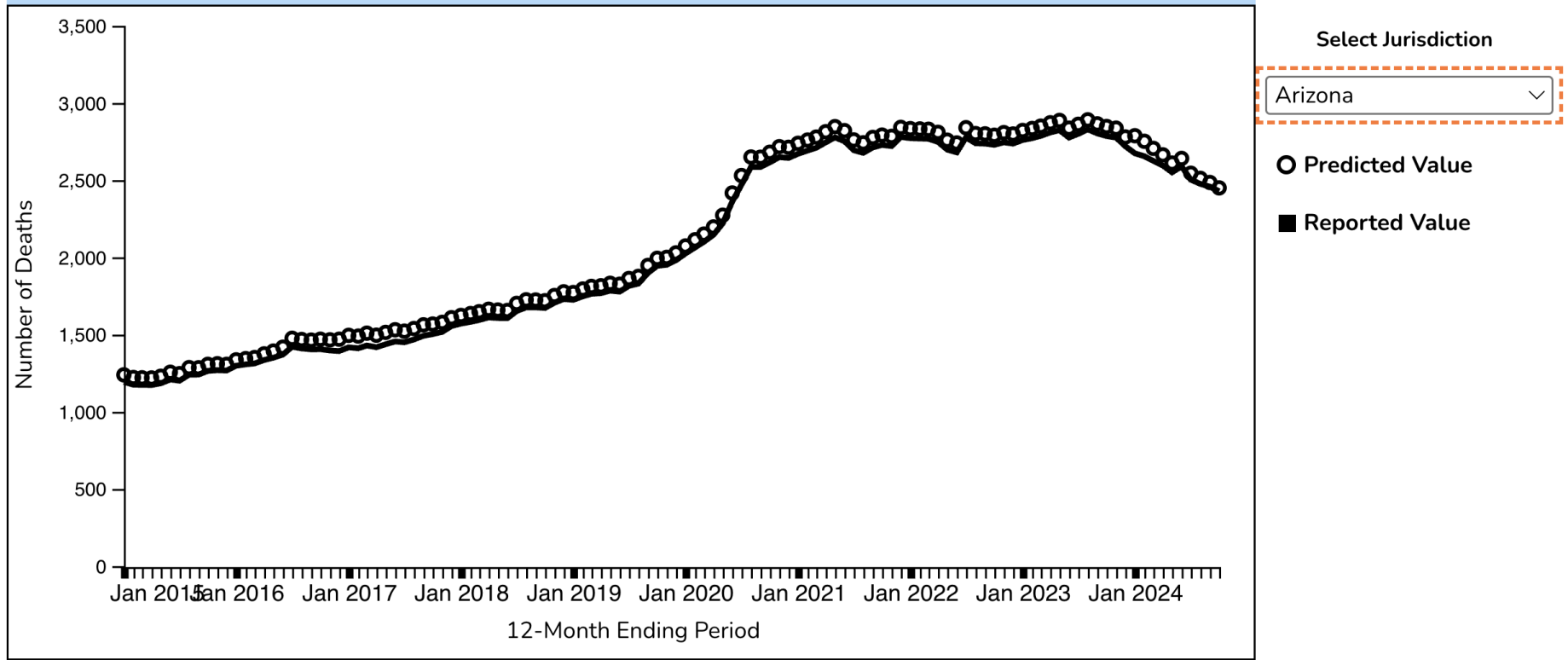


Arizona

12 Month-ending Provisional Number and Percent Change of Drug Overdose Deaths

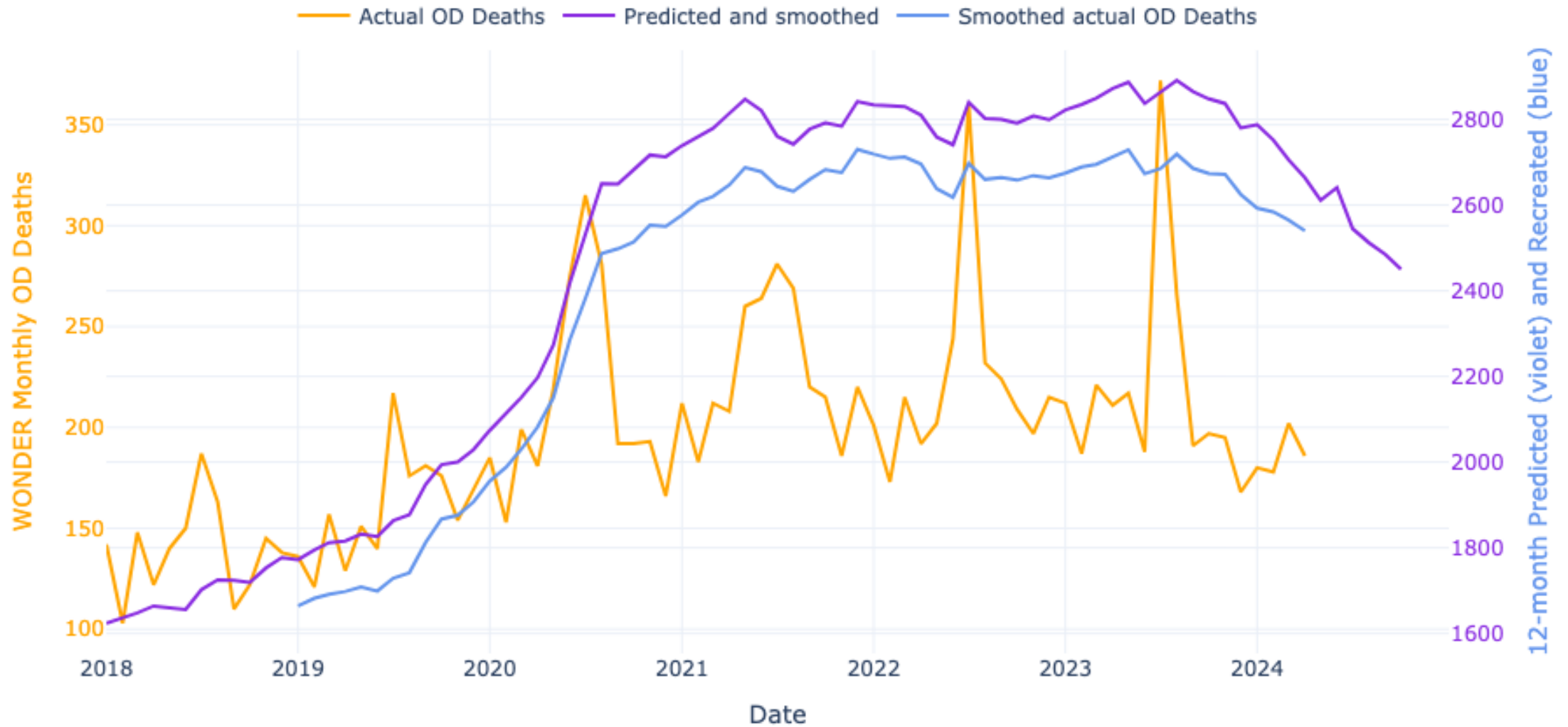
Based on data available for analysis on: March 2, 2025

**Figure 1a. 12 Month-ending Provisional Counts of Drug Overdose Deaths:
Arizona**



Source: CDC Provisional Overdose Death Counts

Confirmed Monthly vs 12-month Predicted OD Counts for Arizona



Source: UNC Opioid Data Lab, using CDC Provisional and WONDER mortality data

Alaska Case Study: Overly aggressive smoothing generates misinformation.

Confirmed Monthly vs 12-month Predicted OD Counts for Alaska

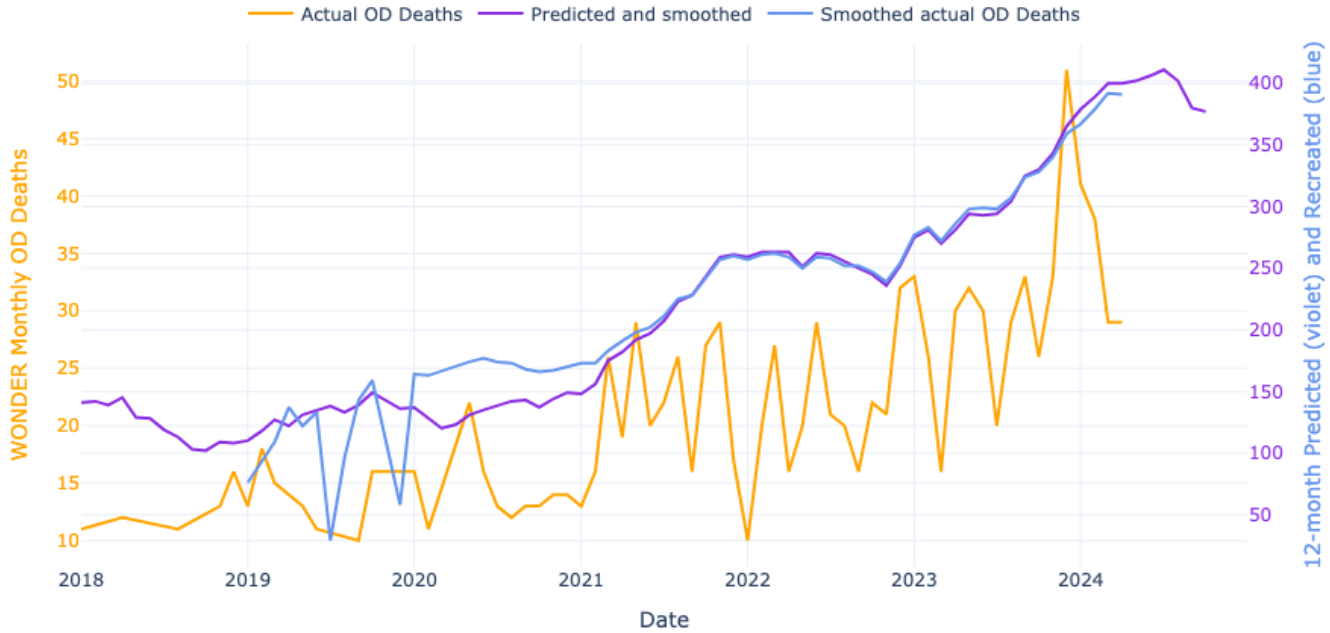
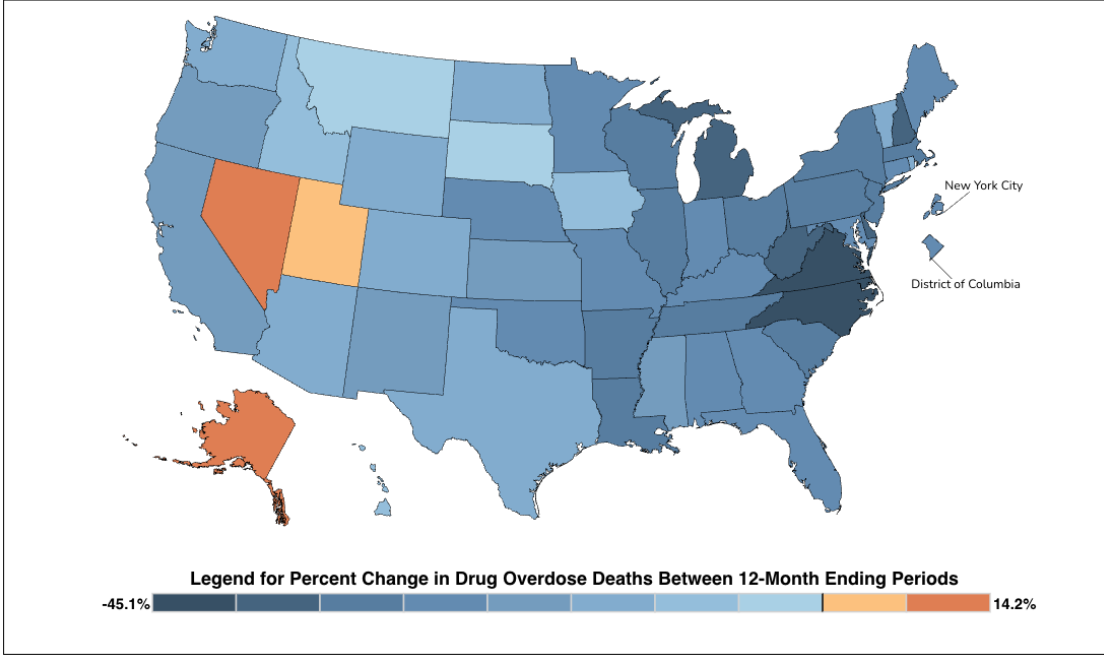
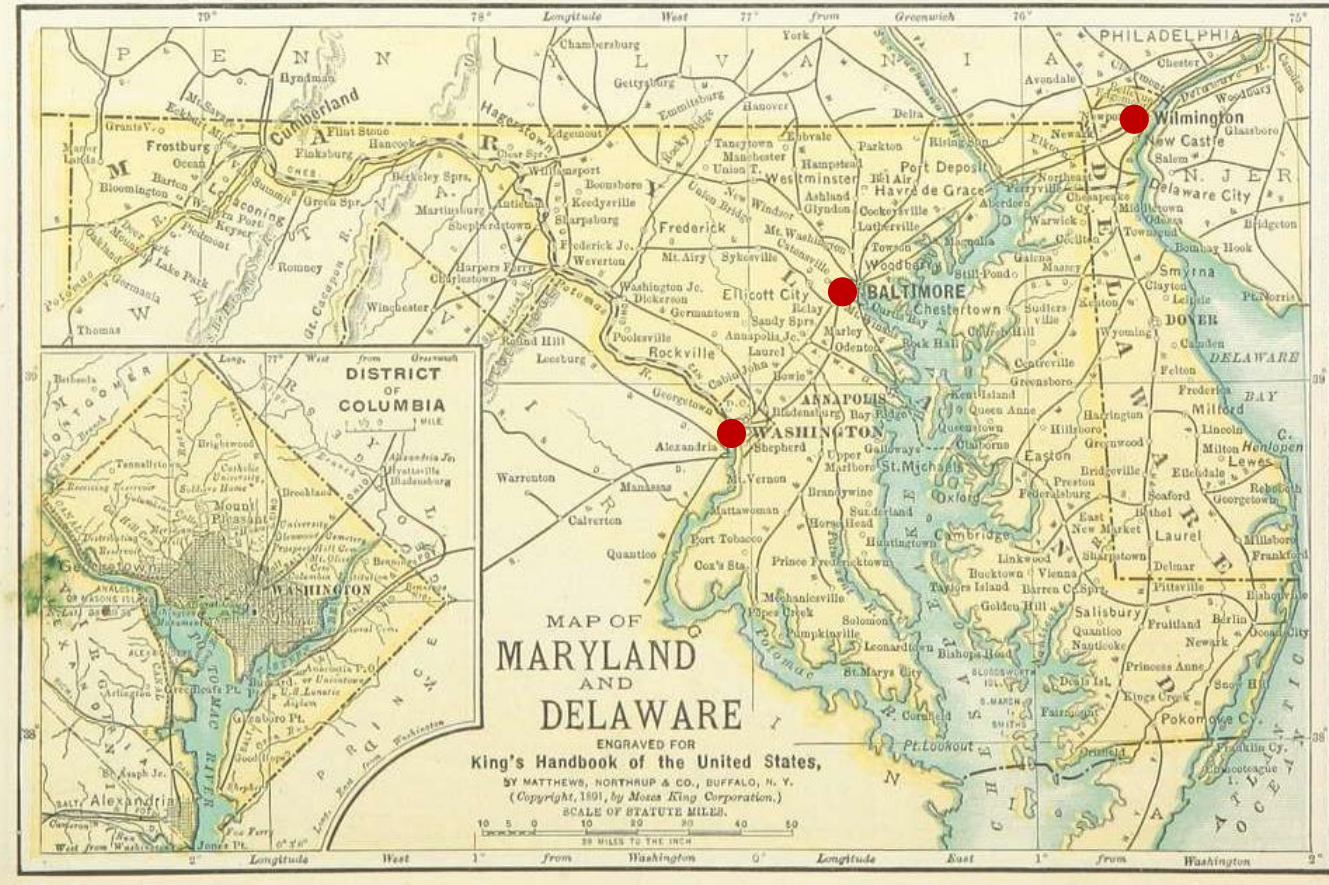


Figure 1b. Percent Change in Predicted 12 Month-ending Count of Drug Overdose Deaths, by Jurisdiction: October 2023 to October 2024





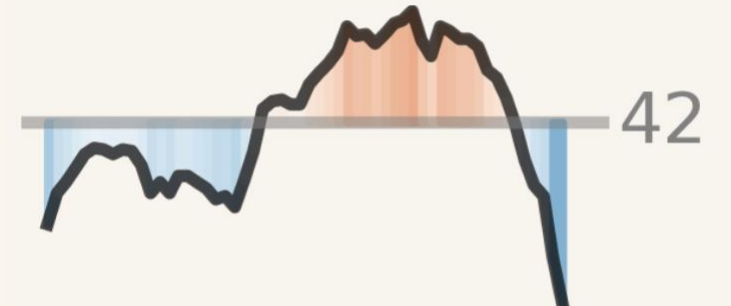
Can drug supply or geography explain declines?



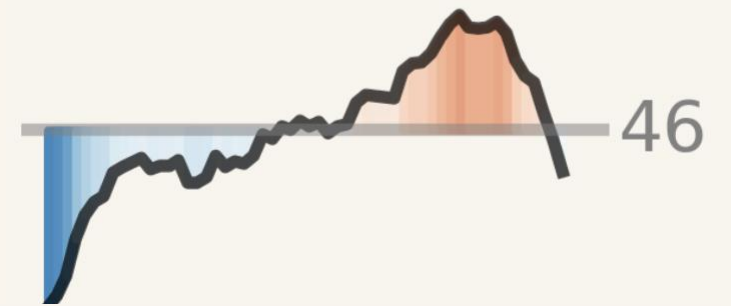
MD



DE



DC



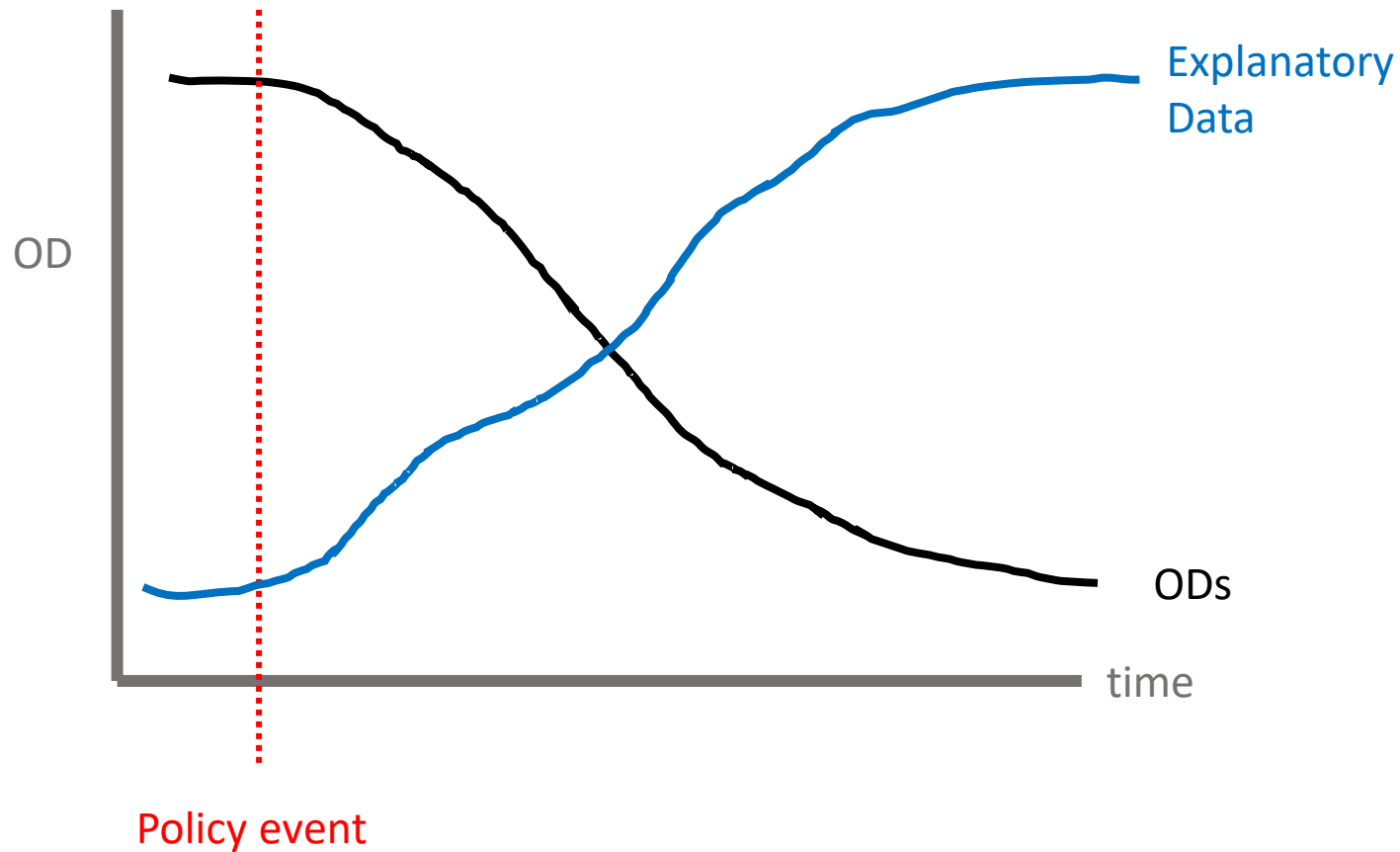
2020

2025

4.

*What's working?
Who's left behind?*

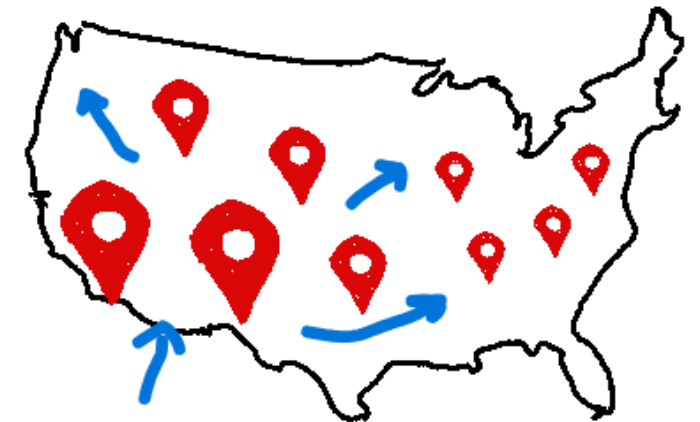
Drawing hypotheses



National policy with uneven uptake

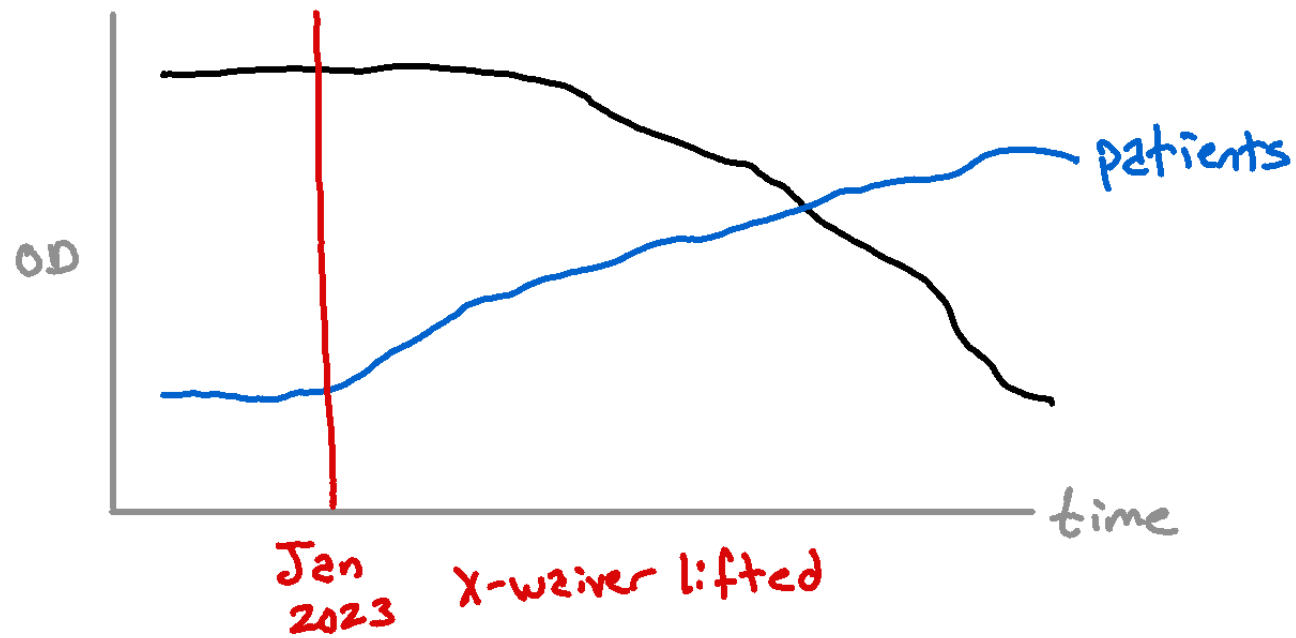


SW border interdiction effort



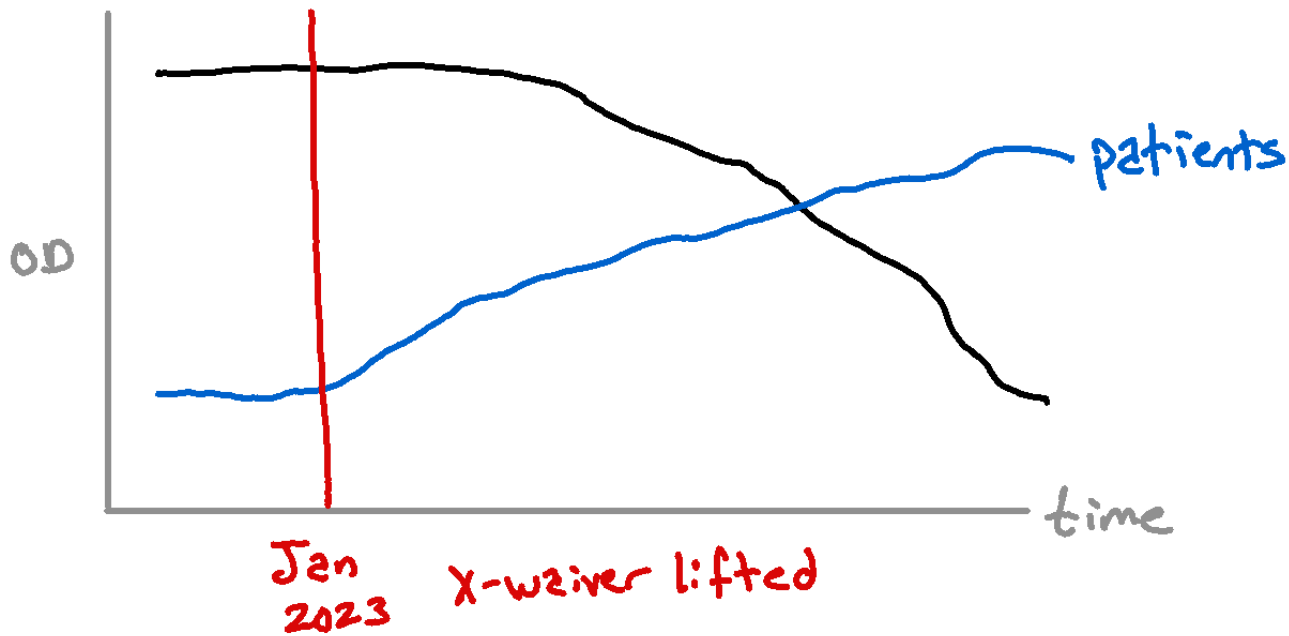
Applied Example

Removing barriers to drug treatment

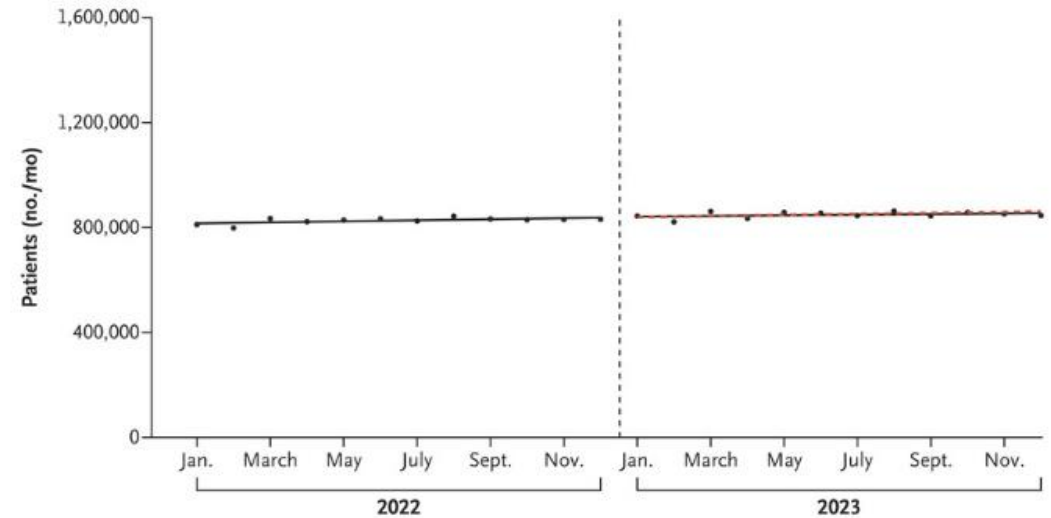


Use data to test your hypothesis

Removing barriers to drug treatment



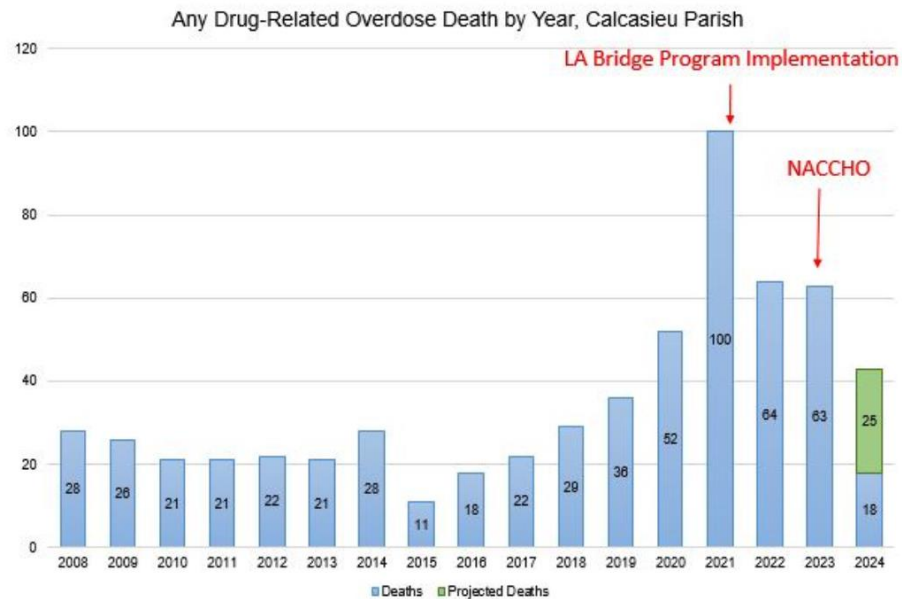
B Monthly No. of Patients to Whom Buprenorphine was Dispensed



Chua KP, Bicket MC, Bohnert AS, Conti RM, Lagisetty P, Nguyen TD. Buprenorphine dispensing after elimination of the waiver requirement. *New England Journal of Medicine*. 2024 Apr 25;390(16):1530-2.

Lake Charles, Louisiana: Buprenorphine dispensing in hospital emergency department

The WHY we do this work.....



St. Louis, Missouri: Naloxone distro

UMSL Addiction Science Team
University of Missouri–St. Louis

KEY TAKEAWAYS

Overdose deaths across Missouri decreased by 23% in the first six months of 2024 compared to the first six months of 2023.

- **Each Missouri region experienced a decrease** in the number of overdose deaths in 2024, with the St. Louis Metro Region showing the highest decrease (–32%).
- Fewer individuals died in the first six months of 2024 **across all drug types**.
 - The proportion of deaths involving an opioid decreased by almost 10%. The likelihood fentanyl was involved among these opioid-involved deaths also slightly decreased.
- The total number of **overdose deaths for Black Missourians decreased by 37%** statewide.
 - Most significantly, deaths among **Black residents in the St. Louis Metro Region decreased by almost half (46%)**.



- For information on how to get naloxone visit: getmissourinaloxone.com
- To find linkage to SUD treatment visit: <https://www.nomodeaths.org/get-treatment>
- To see previous reports visit: <https://www.mimhaddisci.org/missouri-overdose-data-2>



Possible reasons for a decline?

1. Removing barriers to drug treatment
2. Increased distribution of naloxone
3. Law enforcement operations at US-Mexico border
4. Cartel arrests and fentanyl shipment restriction
5. Depletion of susceptibles
6. Marijuana legalization
7. Xylazine reducing overdose severity
8. Transition to smoking & price

And more!

- “Never use alone” message penetration
- Shift in location of death to residence
- Things “chilling out” after COVID
- Operation Blue Lotus and Multi-Energy Portals
- Market maturity and moving on from fentanyl
- Fentanyl is ~~more expensive~~ cheaper!?
- Influx of traditional heroin
- Spread of dexmedetomidine

Public health is working. Keep going!

- 1. Don't let up, don't divert settlement funds**
Keep going with interventions based in science.
- 2. Be critical - not all interventions are created equal**
Use opioid settlement funds wisely.
- 3. Ask who is being left behind**
Improvements are not uniform.
- 4. Address other drug-related harms**
Skin wounds, hepatitis, endocarditis, etc. stem from an unregulated drug supply.
- 5. Properly resource medical examiners**
The key to faster and higher quality data.

*We are still losing
too many people
we love.*

“Love is a research value.” – Louise Vincent



Photos by Pearson Ripley



Hand drawn by

**BRITAIN
PECK**

Natalie
Shay
Jalice
Adams
Bridgette
Tushar
William
David
Paula
Dmitri
Allison
Shelby
Mirian
Meredith
Leslie
Ginger



Brandie



Illyana



LaMonda



Nabarun



Colin



Erin

Anuja
Erin N.
Elijah
Bryn
Zoë

Slides and sign up
for our newsletter →



*Could we have
seen this coming?*

We don't always pay attention to prediction models, but when we do...

PNAS 🔍 ☰

RESEARCH ARTICLE | MEDICAL SCIENCES |  f X in ✉ 

Modeling the evolution of the US opioid crisis for national policy development

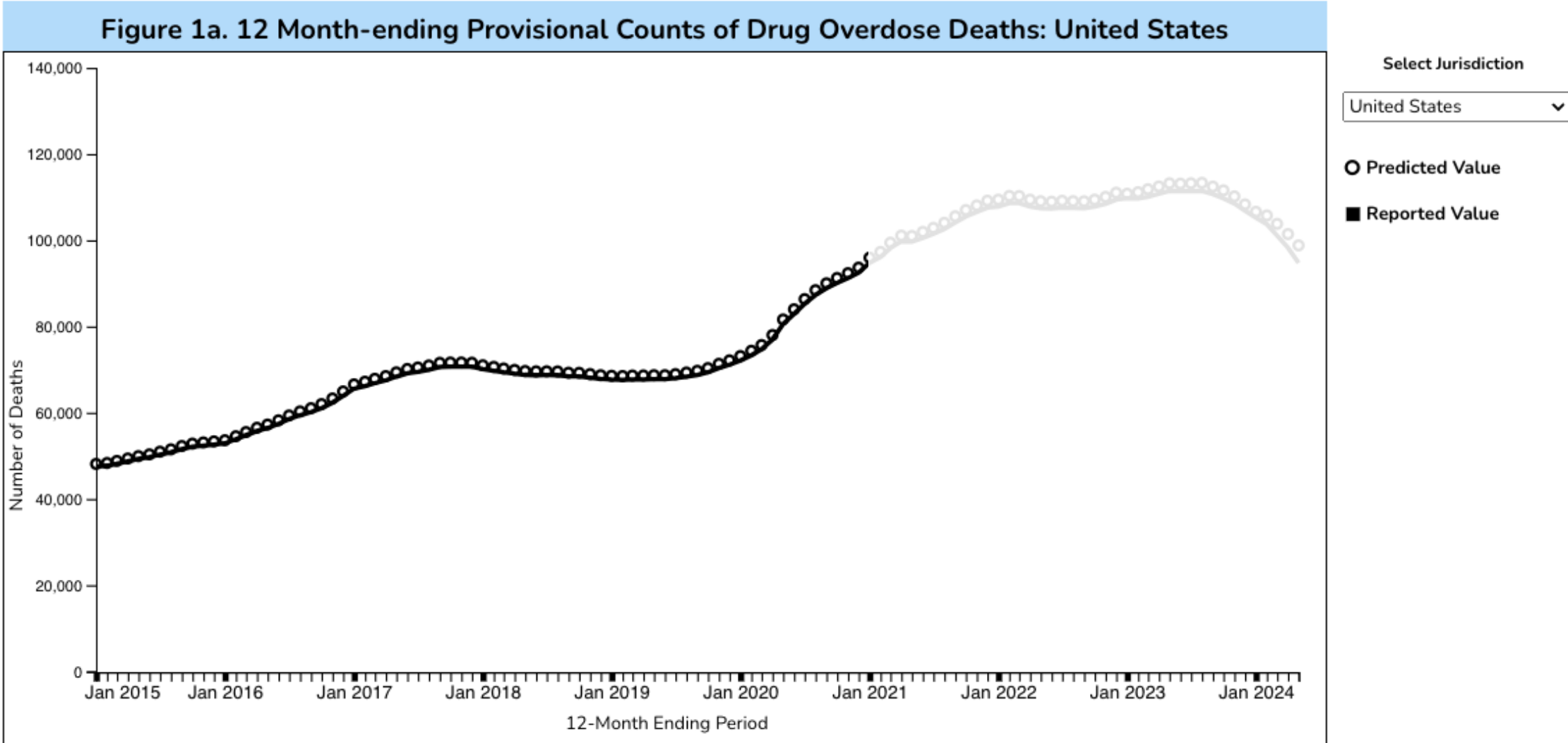
Tse Yang Lim , Erin J. Stringfellow, Celia A. Stafford, Catherine DiGennaro, Jack B. Homer , Wayne Wakeland , Sara L. Eggers, Reza Kazemi, Lukas Glos , Emily G. Ewing , Calvin B. Bannister, Keith Humphreys, Douglas C. Throckmorton, and Mohammad S. Jalali  ✉ -10 [Authors Info & Affiliations](#)

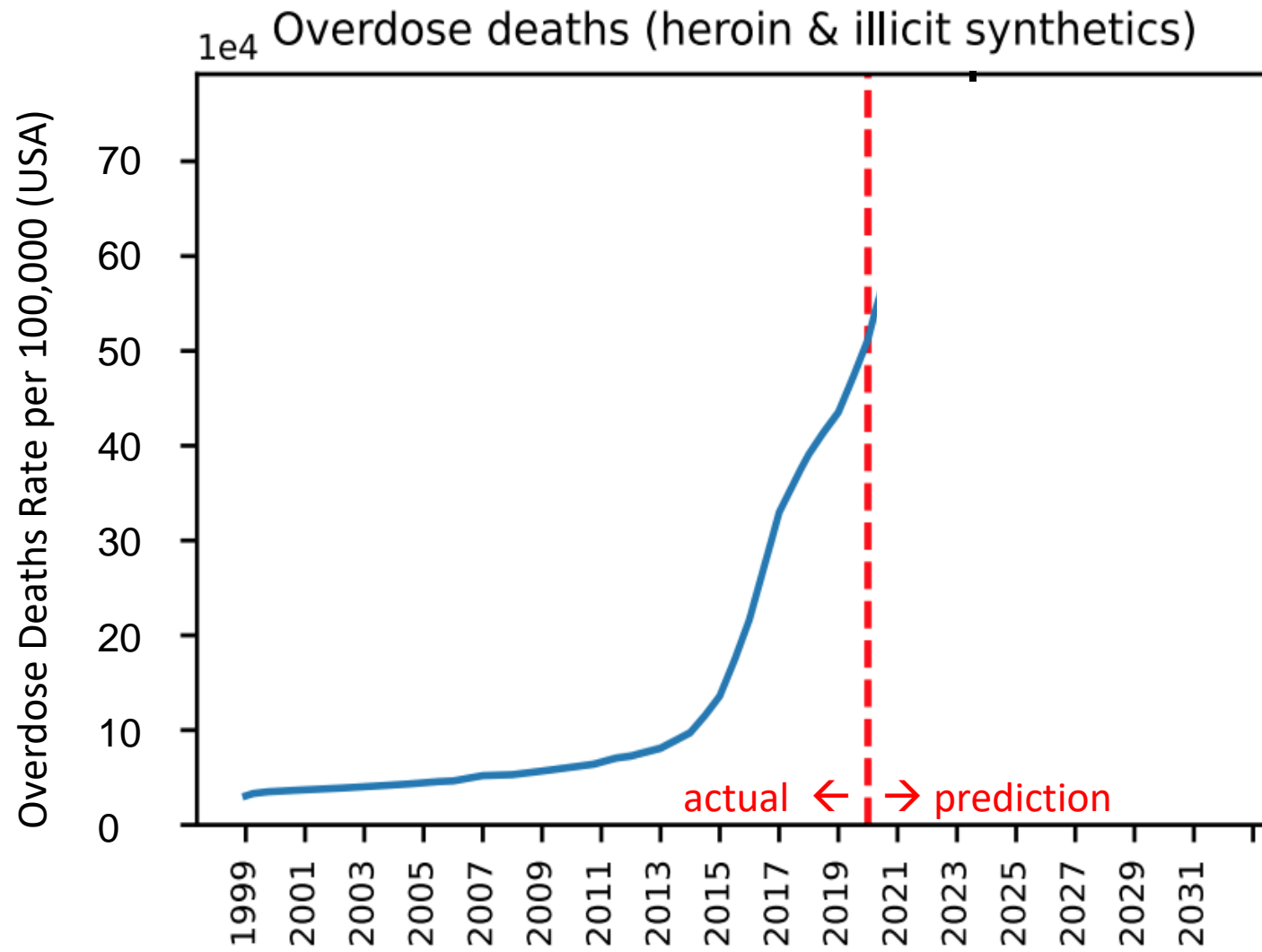
Edited by Andrea Bertozzi, University of California, Los Angeles, A; received August 26, 2021; accepted March 16, 2022

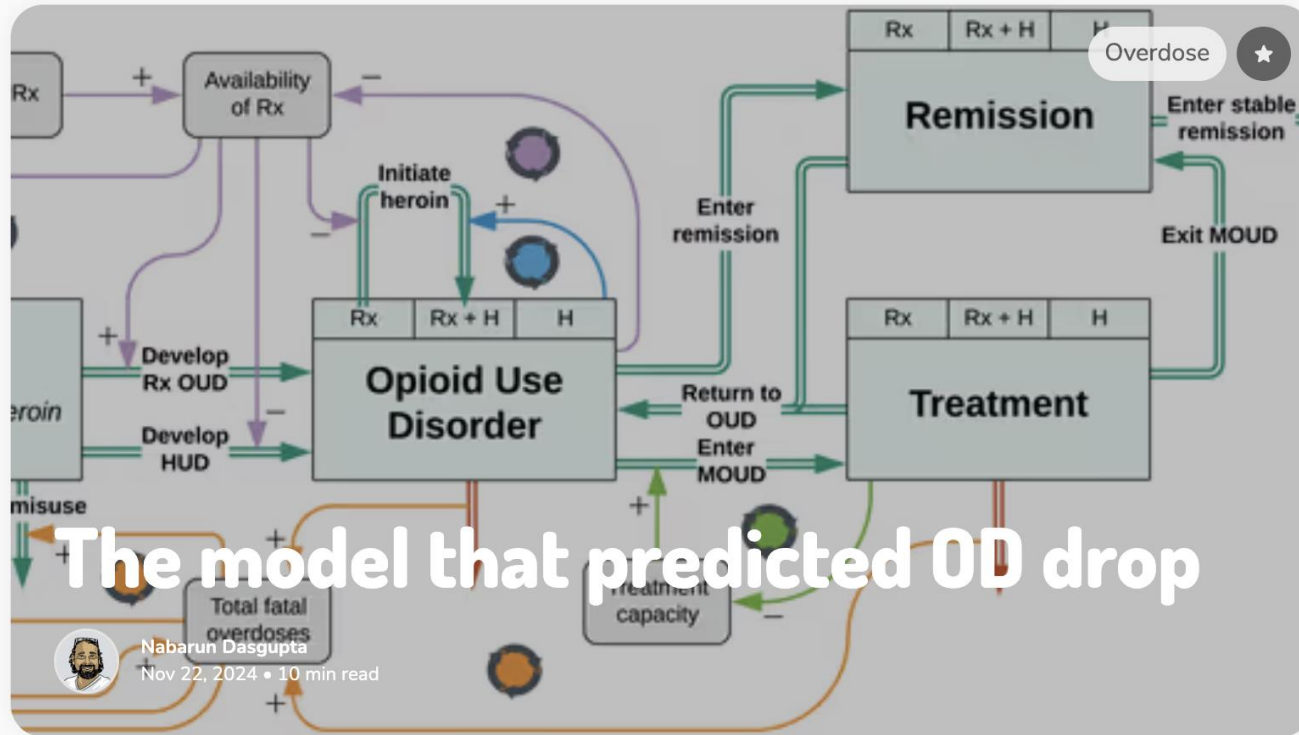
May 31, 2022 | 119 (23) e2115714119 | <https://doi.org/10.1073/pnas.2115714119>

Overdose Deaths

Based on data available for analysis on: October 6, 2024







Deep dive 



In the aftermath of a presidential election, there is a lot of navel gazing about the reliability of prediction models. The lesson is clear: It takes immense skill (and a touch of good fortune) to model complex human and social phenomena with mathematics.

And so, predicting big trends in overdose takes some panache. Cynically, the scientific literature is replete with mediocre predictive models who's big conclusion is *shockingly* that previous history of overdose is predictive of future overdose. Meh.

But there is just one model that I've come to trust, after watching [Mo Jalali of Harvard Medical School](#) present at the [RADARS Annual Meeting](#) in May 2023. His presentation is based on [this paper](#) (and supporting information)

