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RESEARCH BRIEF
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There are Multiple and Geographically Distinct Opioid Crises in the U.S.

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Rates of fatal drug overdose increased 250% in the U.S., from 6.1 deaths per 100,000 population in 1999 to 21.7 in 2017. Opioids (prescription opioids, heroin, and synthetic opioids like fentanyl) have been the primary contributor to this increase, accounting for 47,600 deaths in 2017 alone, making opioids among the greatest public health threats of the 21st century. However, as we show in a recent study,[1] there is widespread geographic variation in fatal opioid overdose rates, and prescription opioids, heroin, and fentanyl are differentially responsible for high overdose rates across different parts of the U.S.

Using mortality data from the National Vital Statistics System, we classified U.S. counties into six different opioid classes, based on their overall rates and rates of growth in fatal overdoses from specific types of opioids between 2002-04 and 2014-16. We then compared the economic, labor market, and demographic characteristics of counties across these different opioid classes. Results show that economic disadvantage and the concentrations of specific occupations and industries are important to explaining the geography of the U.S. opioid overdose crisis.

KEY FINDINGS

- There are at least four distinct opioid overdose crises in the U.S. - prescription opioids, heroin, synthetic opioids, and multiple combinations of opioids.
- U.S. counties vary both in the magnitude of their fatal opioid overdose rates overall and in their rates of fatal overdose from specific types of opioids.
- Fatal overdose rates overall are higher in places with more economic disadvantage, more blue-collar and service employment, and higher opioid prescribing rates.
- High rates of prescription opioid overdoses and overdoses involving both prescription and synthetic opioids cluster in more rural and economically disadvantaged counties with the highest rates of opioid prescribing.
- High heroin and "syndemic" opioid overdose counties (counties with high overdose rates across all major opioid types) are more urban, have larger concentrations of professional workers, and are less economically disadvantaged.

Multiple Overdose Crises in the U.S.

There is not one universal opioid overdose crisis in the U.S. Counties vary both in the magnitude of their drug overdose rates overall and in their rates of overdose from specific types of opioids (see Fig. 1). Most counties (58%) had low fatal opioid overdose rates and rates of change from 2002 to 2016. These *low overdose counties* are distributed throughout the southern and central U.S. and California. Nearly 9% of counties had high overall rates and high rates of growth in prescription opioid overdoses. *High prescription opioid overdose counties* are concentrated in southern Appalachia, eastern Oklahoma, parts of the desert southwest, Mountain West, and Great Plains. *High heroin counties* (5.4%) and *emerging heroin counties* (14.5%) are geographically distinct from the prescription opioid counties and are concentrated throughout parts of New York, the Industrial Midwest, central North Carolina, and parts of the southwest and northwest.

There are two classes of counties where large shares of deaths involved multiple opioids, including fentanyl. *Synthetic+ overdose counties* (6.9%) had high and fast-growing fatal overdose rates from synthetic opioids alone and synthetic opioids in combination with prescription opioids. Counties in the other multi-opioid class (4.2%) are in the depths of the opioid crisis, having very high and rapidly-growing fatal overdose rates from all types of opioids: heroin, prescription, synthetic, and combinations of the three. We term this class of counties the *syndemic opioid* class because it reflects an aggregation of multiple concurrent or sequential epidemics, wherein the combination of high overdose rates from multiple opioids greatly exacerbates the crisis. The synthetic+ and syndemic classes are concentrated throughout New England, central Appalachia, and central New Mexico.

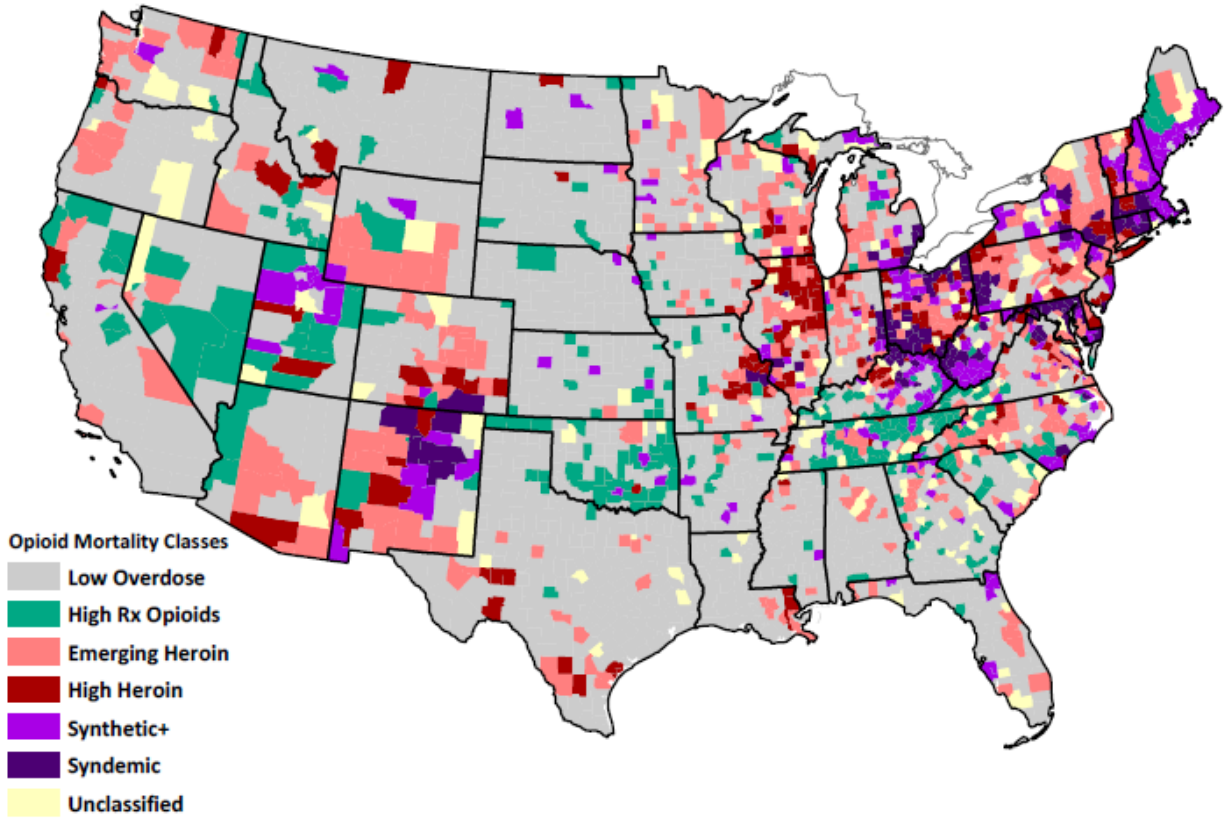

Figure 1. The Types of Opioid Involved in Overdose Deaths Vary across the U.S.
Data Source: National Vital Statistics System, 2002-2016; *Map*: Shannon M. Monnat and David J. Peters
Note: Opioid mortality classes are based on absolute fatal overdose rates in 2014-2016 and the change in rates between 2002-2004 and 2014-2016. Analyses included 3,079 U.S. counties.

In 2014-16, fatal overdose rates from all drugs and fatal overdose rates from opioids were highest in the syndemic class (41.3 overall drug deaths and 31.7 opioid deaths per 100,000 population), followed by the synthetic+ class (30.3, 20.9), the high prescription opioid class (27.3, 16.9), the high heroin class (25.1, 16.7), the emerging heroin class (19.3, 10.8), and the low overdose class (11.0, 3.5) (See Fig. 2).

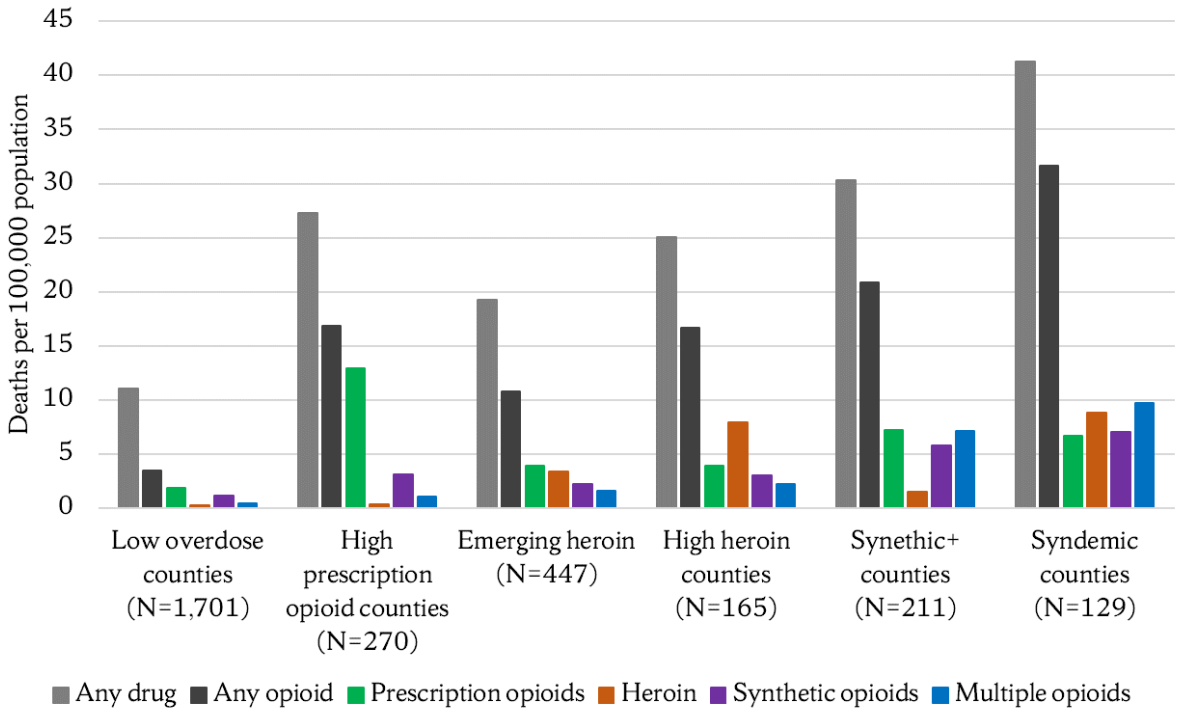

Figure 2. Overdose Rates Vary Substantially across Different Classes of Counties

Data Source: National Vital Statistics System, 2002-2016; *Chart:* Shannon M. Monnat

Note: Opioid mortality classes are based on county-level fatal overdose rates in 2014-2016 and the change in rates between 2002-04 and 2014-16. The bars represent average fatal overdose rates for that class of counties.

Opioid Overdose Classes Vary in their Socioeconomic and Labor Market Characteristics

The different opioid overdose classes are also distinct in their socioeconomic and labor market characteristics, suggesting different underlying structural causes and the need for different policy responses to address the problem in different geographic areas.

Fatal drug overdose rates overall are higher in counties characterized by more economic disadvantage, more blue-collar and service employment, and higher opioid prescribing rates. On average, *low overdose* counties have the highest percentages of racial/ethnic minority residents, the largest shares of workers in agriculture, and the lowest shares of workers in manufacturing. They also had the lowest opioid prescribing rates throughout the mid- and late-2000s, when U.S. opioid prescribing rates were at their peak.

High prescription opioid overdose counties are the most rural; 73% of counties in the high prescription opioid class are rural compared to 35% in the syndemic class. High prescription opioid overdose counties have the largest shares of workers in blue-collar industries and occupations and the lowest shares of workers in professional industries and occupations and had the highest opioid prescribing rates in the mid- and late-2000s. High prescription opioid overdose counties and *synthetic+* counties (places with high overdose rates from synthetic opioids alone or in combination with prescription opioids) are the most economically disadvantaged, as measured by factors such as poverty, employment, single parent families, median household income, etc..

The *emerging heroin*, *high heroin*, and *syndemic* counties are the least economically disadvantaged, have the largest shares of workers in professional industries and occupations, and had much lower opioid prescribing rates than the high prescription opioid overdose counties.

Public Health Implications

Policy strategies to combat the opioid crisis cannot be assumed to be universally applicable across these different types of counties. For example, policies aimed at reducing opioid prescribing are unlikely to be effective in places characterized by high rates of heroin and synthetic opioid overdose. Addressing our opioid overdose crisis requires more than supply side interventions. It is clear from our study that economic and labor market factors matter for understanding the geography of the U.S.'s multiple opioid crises. Yet these factors are getting far too little attention from policymakers. Without explicit attention to place-based structural economic and social drivers of the opioid crisis, interventions are unlikely to have any real sustained impact on reducing rates of drug addiction and drug-related deaths.

Data and Methods

Mortality data came from the National Vital Statistics System, 2002-2016. These data identify causes of death and county of residence from all death certificates filed in the U.S. We categorized drug deaths on the basis of International Statistical Classification of Diseases, 10th Revision (ICD-10) codes, as any death that included an underlying cause of accidental or intentional poisoning, poisoning of undetermined intent by exposure to drugs, assault by drugs, drug-induced diseases, finding of drugs in the blood, and mental or behavioral disorders attributable to drugs. We identified opioid deaths as those with an underlying cause reflecting drug poisoning, along with any multiple cause of death opioid-specific code or any mental and behavioral disorder attributable to opioids. County-level demographic, socioeconomic, and labor market measures came from the 2008-12 American Community Survey (ACS) and 2000 US Census. All models controlled for county racial/ethnic and age composition and county-level retail opioid prescribing rates. Our analyses included 3,079 U.S. counties. We restricted analyses to the 48 contiguous states and Washington, DC. We used latent profile analysis (LPA) to identify opioid-specific mortality classes based on age-adjusted mortality rates for 2014-16 and the change in rates between 2002-04 and 2014-16 using the opioid-specific mortality rates for prescription opioids, heroin, synthetic opioids, and opioid combinations. We also included rates for drug overdose deaths that did not specify an opioid on the death certificate. For full methodological details. see the journal publication.[1]

References

1. Monnat, S.M., Peters, D.J., Berg, M.T., Hochstetler, A. (2019). Using Census data to understand county-level differences in overall drug mortality and opioid-related mortality by opioid type. *American Journal of Public Health*. Published online ahead of print. https://ajph.aphapublications.org/doi/10.2105/AJPH.2019.305136

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