Foreign Policy at BROOKINGS

THE DYNAMICS OF US DRUG MARKETS

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Photo: REUTERS/Andrew Kelly

Executive summary

Four decades of unabated growth in drug-related fatalities in the United States shows an escalating public health crisis, though drug use prevalence has not shown much increase since 2002. The national overdose growth rate, remarkably constant over the period and roughly doubling every eight years, is apparently impervious to shifts in policy interventions. Even the emergence and decline of specific drugs has little effect; deadly as fentanyl is, statistically, it looks merely like an extension of what was even in 2015 a 35-year trend.

Fentanyl has saturated many U.S. drug markets as a cheaper and more potent replacement for heroin, and entered others where heroin was rare or absent. Fentanyl now also shows up primarily in fatal overdoses that also involve cocaine and methamphetamine; it is not just a substitute opioid. Cocaine use in the United States has declined substantially perhaps as a result of the falling price of methamphetamine. The significant decline in cocaine use is demand-driven since cocaine production has expanded substantially in the Andes over the last decade. Methamphetamine now is cheaper and more potent than the product that existed in the previous wave of the early 1990s. Fentanyl and methamphetamine have supplanted heroin and cocaine as the dominant drugs of policy concern.

This paper focuses on overdose mortality as the most important measure of the impact of the use of illicit drugs. It is also the best-measured aspect of drug markets available. The paper's focus on overdose deaths will weight its attention toward opioids since fatal and non-fatal overdose risk is greater for opioids than stimulants of abuse. This perspective may give short shrift to the very large social costs of drug abuse and dependence that do not result in death, particularly those costs generated by the markets for methamphetamine and cocaine. We lack data to present a more complete analysis of these broader social costs.

If not for the attention fentanyl has understandably drawn, the methamphetamine crisis would be a larger national concern, with over 12,000 deaths in 2021 (comparable to total overdoses from all drugs in 2000), not including another 20,000 that also include fentanyl. This is despite regulatory efforts to curb methamphetamine's production and distribution, which seemed to disrupt the market in the short term but may have spurred innovation in meth production. The rise in mortality is attributed to the drug's increased potency and availability, and lower purity-adjusted prices, driven by production shifts to large-scale operations in Mexico. Meth continues to impact rural areas much more heavily than crack or heroin did in the past.

The interplay between these various drugs in the U.S. market underscores a broader trend toward more deadly and potent substances dominating the illicit drug landscape. The shift from plant-based to synthetic drugs poses new challenges for drug policy and public health strategies. These substances are not only deadlier but also harder to enforce against, due to their low cost, low detectability, the wide array of substitute precursor chemicals for production, and the complexity of their distribution networks.

Drug enforcement is about market regulation, yet the federal government makes little effort to collect systematic market data. Restoring researcher access to the System to Retrieve Information from Drug Evidence (STRIDE), the Drug Enforcement Agency's data system for drug price and purity, is an easy first step. Other relatively easy steps are to strengthen the National Forensic Lab Information System (NFLIS), a national seizure database, and reestablish drug abuse monitoring programs among justice-involved populations, as well as the adoption of wastewater drug monitoring.

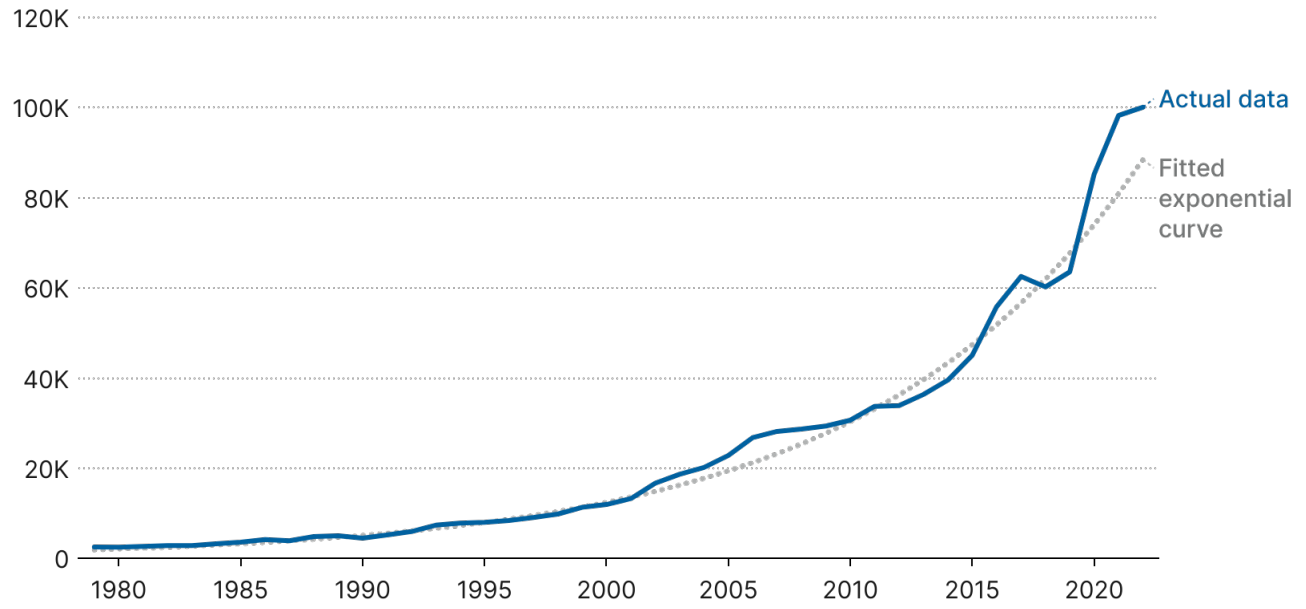
Expanding treatment and harm reduction services in quality, quantity, and accessibility is perhaps all that can be done at this stage to reduce the devastating drug death rates in the United States. But, tragically, expectations of success in substantially reducing the death toll in the near future should be low.

Introduction

The most important graphic for understanding the dynamics of the U.S. drug problem traces fatal overdoses from all drugs from 1980 to 2022, brought to light by Donald Burke, Hawre Jalal, and colleagues.[1] Figure 1 shows that over a more than 40-year period the number of fatal overdoses grew at about 9% per annum, which constitutes a doubling every eight years. Only in three of those years did the number fall, each time slightly, and the rate of increase since 2019 outpaced already dire expectations. Preliminary data for 2023 and early 2024 suggest overdose mortality has declined from the 2022 peak but remains at over 100,000 decedents per year. This may well represent a return to the underlying curve as the specific effects of COVID-19 and the associated lockdown wear off.

FIGURE 1

Trend in US fatal overdoses



Source: Authors' analysis adapted from Jalal and Burke (2022).

What is important for our purposes is less the still unexplained regularity of the annual rise than the fact that throughout this period, with specific drugs coming and going and the policy mix changing, there is essentially no sign of the effect of any drug arrival or policy intervention. Looking at this chart, you would not identify the sudden arrival of crack in the early 1980s or even the development of the prescription opioid problem around 2000. Nor would you see the effect of rapid rises in incarceration for drug offenses in the 1980s or the gradual decline in those incarcerations beginning in the mid-2000s. Some drugs were largely urban (e.g., heroin in the 1970s, crack in the 1980s) while others were just as prevalent in rural areas (methamphetamine in the 1990s, misused prescription opioids in the 2000s). The ethnic/national origin composition of users varied. Nonetheless, there is an extraordinary relentlessness and regularity to this curve, rarely seen for any other problem indicator over such a long period. Childhood obesity is an exception, rising 3% annually from the 1970s to the late 2010s, a fourfold increase over 50

years.[2] Both trends may be the consequence of an increasingly harmful product, heterogeneous changes to economic opportunity, and decreasing physical activity over time.[3]

Thus, it is likely that some factors other than the specific drug or policy choices are driving this continuing worsening of the problem. Much of drug epidemiology and drug policy scholarship has focused on a specific drug, typically that which most recently had risen to prominence. It is astonishing that the long-term and regular rise in total overdoses was not prominent in the literature until two researchers who had not previously published on drug epidemiology "discovered" it in the course of a study of the changing sources of mortality in the U.S. population. While it is certainly important to understand the dynamics of the spread of individual drugs, which this paper assesses, it is also important to put this in the context of the broader phenomenon, namely the continuing, rather regular, growth of overdose mortality.

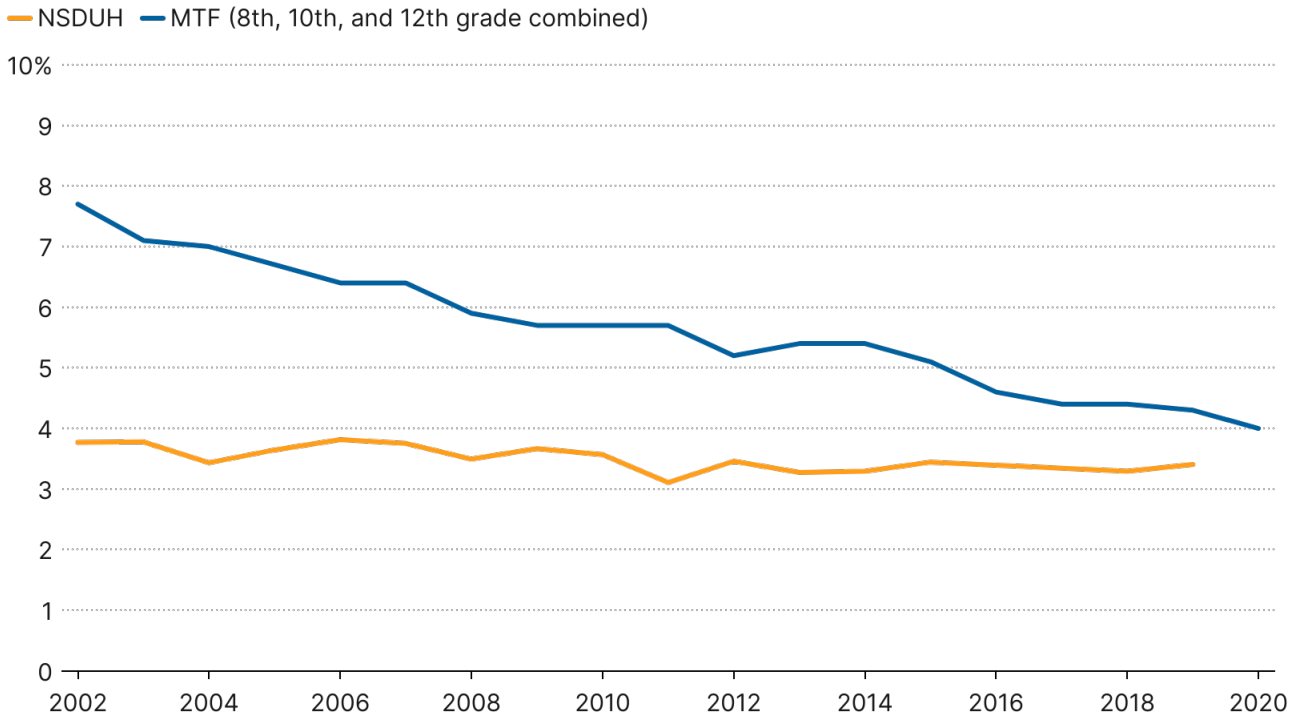
One possible explanation that points to broader economic and social factors is the "deaths of despair" analysis of Anne Case and Angus Deaton.[4] By analyzing U.S. mortality data from 1990 to 2013, Case and Deaton showed that deaths from alcohol, suicide, and drug poisonings had risen so sharply from 1999-2013 for non-Hispanic whites aged 45-54 that mortality rates for that age group had reversed their decades-long decline. "Concurrent declines in self-reported health, mental health, and ability to work, increased reports of pain, and deteriorating measures of liver function all point to increasing midlife distress."[5] Since 2013 there has been some further increase in mortality for age groups from 34-64, though the pattern is a little uneven.[6] They hypothesized that the most fundamental driver of these changes was the decline of employment opportunities for less educated Americans, associated with the rise of manufactured imports from China. The mechanisms were complicated, including not just the direct effects on individuals (such as increased mental illness) but the general discouragement in communities.

Case and Deaton's work is an important contribution that may apply to the second half of the period, with the rapid deindustrialization following China's entry into the World Trade Organization in 2000. That leaves the first half (1979-1999) unexplained, but it is worth noting that the plot of manufacturing jobs over 1979-2010 looks a lot like the inverse of overdose mortality—non-trivial declines in the 1980s due to Korean and Japanese trade, acceleration after the adoption of the North American Free Trade Agreement, and then the bottom falls out.[7] For no other Western nation do we know of a similar long-term increase in drug overdoses and only Scotland has a similar per capita death rate.[8] Canada has seen a largely parallel worsening in the past 15 years, but it appears that this is new.[9]

Other indicators of the U.S. drug problem suggest mortality is not driven by a broad-based increase in use prevalence, though the data from which we infer should be interpreted carefully.[10] If one excludes cannabis, the general population survey, the National Survey on Drug Use and Health (NSDUH), shows no such relentless increase, and the Monitoring the Future survey of school-aged adolescents suggests a long-term decline in use (see Figure 2). Treatment admissions for drugs (i.e., excluding all those with alcohol) rose only about 18% from 2011 (1,114,000) to 2018 (1,316,000).[11] Unfortunately, there are no recent useful Emergency Department admissions series available.[12]

FIGURE 2

Past-month illicit drug use prevalence among adolescents and adults (excluding cannabis)



Sources: Monitoring the Future National Survey Results on Drug Use, 1975-2022 Table C-3 and National Survey of Drug Use and Health concatenated file; NSDUH prevalence estimated using survey weights.

But as a measure of the severity of the nation's drug problem, fatal overdoses seem more important—and better measured—than any of the others. Thus, any study of the use of specific drugs in a specific sub-period needs to be set in the context of this long-term and unrelenting worsening of the U.S. problem.

This paper considers only the last decade and is focused on two specific drugs, fentanyl and methamphetamine, which drove the fatal overdose curve's increasing slope. It analyzes what is known about the demography of use (both occasional and regular), the spread of the drugs, and the prices and methods of access. Shorter sections deal with cocaine and heroin.

Data sources

Data on fatal overdoses are reported on a relatively timely basis, within a quarter in many jurisdictions. Despite the vagaries of medical examiner and coroner competence,[13] they are treated as high quality, though almost certainly an undercount for specific drugs.[14] Every other indicator is much weaker. For the prevalence of use, there is almost no alternative to the NSDUH, which is known to severely underestimate the number of individuals who frequently use less popular and more dangerous drugs.[15] Price and purity data used to be available through a Drug Enforcement Agency (DEA) system called the System To Retrieve Information from Drug

Evidence (STRIDE). However, the DEA ceased publishing its price/purity series in 2016 and no longer makes the data available for researchers.[16] Today, there are limited data available from the National Forensic Laboratory Information System (NFLIS) summarizing the counts of seizures of specific drugs (and combination of drugs) by state and year. Treatment data come from Treatment Episode Data System (TEDS) admissions which reports only information from federally funded treatment centers, which account for approximately half of drug treatment facilities.[17] This paper makes opportunistic use of less comprehensive and systematic data on all these aspects of drug markets.

Heroin

Heroin is modern America's traditional opioid drug problem. It was the center of attention in the Nixon administration, with a market that had grown in part because of U.S. soldiers returning from Vietnam, adjacent to the opium-producing Golden Triangle.[18] Though it was eclipsed by cocaine/crack in the 1980s and 1990s, it showed remarkable persistence until about 2015. Today, fentanyl has entered or replaced heroin in markets where the drug is supplied as a powder, generally east of the Mississippi River, while black tar markets in the western United States remain more separated from fentanyl.

The restrictions on and increased monitoring of opioid prescribing practices around 2010 were the most recent events to push heroin to the forefront of U.S. drug problems.[19] Many individuals who had become dependent on OxyContin and other strong prescription analgesics in the 1990s and 2000s found that these substances had become substantially more expensive since the flow of diverted legal prescriptions through pill mills and other sources had thinned.[20] Heroin, produced and trafficked from Mexico, was the cheap alternative. From 2010 to 2014, heroin-related fatal overdoses soared from 2,789 to 10,009 while prices (per pure gram) fell from $1,126 to $724.[21]

As already noted, heroin's prevalence is severely underestimated by NSDUH but an alternative measure using a broader range of indicators found that the number of persons who use heroin regularly (i.e., have had a daily or near daily [DND] use in the past 30 days) had doubled between 2010 and 2016, from 1.1 million to 2.2 million.[22] Since 2016, fentanyl's replacement of heroin in many major markets implies that the number of persons who use heroin DND might have declined substantially, even as the number of persons who use opioids may have modestly increased. Though not a perfect indicator of that change, it is worth noting that the number of fatal overdoses involving heroin without fentanyl fell from 10,400 in 2015 to 6,000 in 2019; the number involving only a synthetic opioid increased in that same period from 9,800 to over 35,000.[23] Seizure figures support this. In 2015, there were 188,000 heroin seizures reported by NFLIS and only 14,000 fentanyl seizures; by 2022 there were only 41,000 heroin seizures but 163,000 fentanyl seizures; the total remained almost unchanged at around 200,000. The ratio of heroin to fentanyl seizures fell from 13-to-1 to 0.25-to-1; no doubt enforcement agencies were more fentanyl oriented by 2022 but that is unlikely to account for much of such a dramatic change. Fentanyl has simply replaced heroin in many markets.

For nearly 20 years, the U.S. heroin market has been supplied almost exclusively by Mexican production, since Colombian poppy growing withered in the early 2000s.[24] Mexican heroin does not seem to be exported to any country other than the United States. Mexican production fluctuated in the period 2010-2013 around 25 tons of pure heroin but then rose rapidly through 2017 and 2018 when the potential total was estimated at over 100 tons. The decline in U.S. heroin consumption was not related to the availability of heroin supply. The Mexican market value of one kilo of raw opium in 2018 was one-third its price a year earlier.[25] The rise of fentanyl consumption in the United States has, since 2018, led to a collapse in opium growing in Mexico; by 2020, total opium production was estimated at 501 tons, compared to 944 tons in 2017.[26]

Fentanyl

Most new drugs that shake up illegal markets strike with apparently little warning. Whereas pharmaceutical companies go through years of development and multiple trials before releasing a drug, illegal markets bring new products seemingly out of nowhere. Crack arrived as a shock in the early 1980s, as did methamphetamine in the 1990s. Both arrived as altered forms of previously known drugs, but the speed or ferocity with which they dominated illegal markets caught health professionals, policymakers, and law enforcement by surprise.

Some prescient observers had been forecasting that synthetic drugs would take over from plant-based drugs[27] but it was a broad and vague prediction, unhelpful for policymakers. Yet the arrival of illegally manufactured fentanyl in 2014 was also a shock, even though or perhaps because there had been a few short-lived episodes of illegally manufactured fentanyl popping up but not lasting.[28] Furthermore, fentanyl patches had been a staple anesthetic in the United States for over 40 years, with some diversion and misuse resulting in about 2,000-3,000 fatal overdoses annually, a small share of all overdose fatalities.[29]

Multiple factors drove the appearance of cheap and plentiful illegally manufactured fentanyl, including the dissemination on the internet of new, simpler methods of synthesizing the drug that had been developed in India and published as a "one-pot method" for synthesis in 2006.[30] Fentanyl is roughly 25 times more powerful than heroin per unit weight; about 2 milligrams of pure fentanyl is the standard quantity in counterfeit tablets today.[31] To get a sense of how minute that is, note that a grain of sand weighs about 4 milligrams: so, a dose of fentanyl weighs half of a grain of sand. The drug has caused a doubling of fatal overdoses nationally in just seven years, to a total in 2021 of over 100,000 in the United States.[32] More than 70,000 of these deaths involve synthetic opioids, the vast majority of which are fentanyl.

While this chapter refers to fentanyl, that should be seen as representative of a class of synthetic opioids. Some variants, most notoriously carfentanil, are much stronger than fentanyl, the dominant form in North America.[33] Nor is the fentanyl family of synthetic opioids the only one posing a threat. There is another family, nitazenes, that has shown up in some markets both in the United States and Western Europe which provides a similar opioid effect.[34]

What is unique about fentanyl compared to other new illegal drugs that have dominated U.S. markets is that its spread was not driven by demand. For example, crack was an exciting, fast-acting form of cocaine that was sold in smaller, more affordable units. More fundamentally, crack was observably different. It looked different. It was used in different ways. And it gave a shorter, more intense high than did insufflating powder cocaine.[35]

By contrast, fentanyl's original appeal was to the drug traffickers, who found it attractive to mix cheap fentanyl with expensive heroin. It has been estimated that, adjusting for differences in potency (MED: morphine equivalent doses), the factory gate price of fentanyl was barely 1% of that for heroin.[36] Later, many dealers left out the heroin and just sold fentanyl.

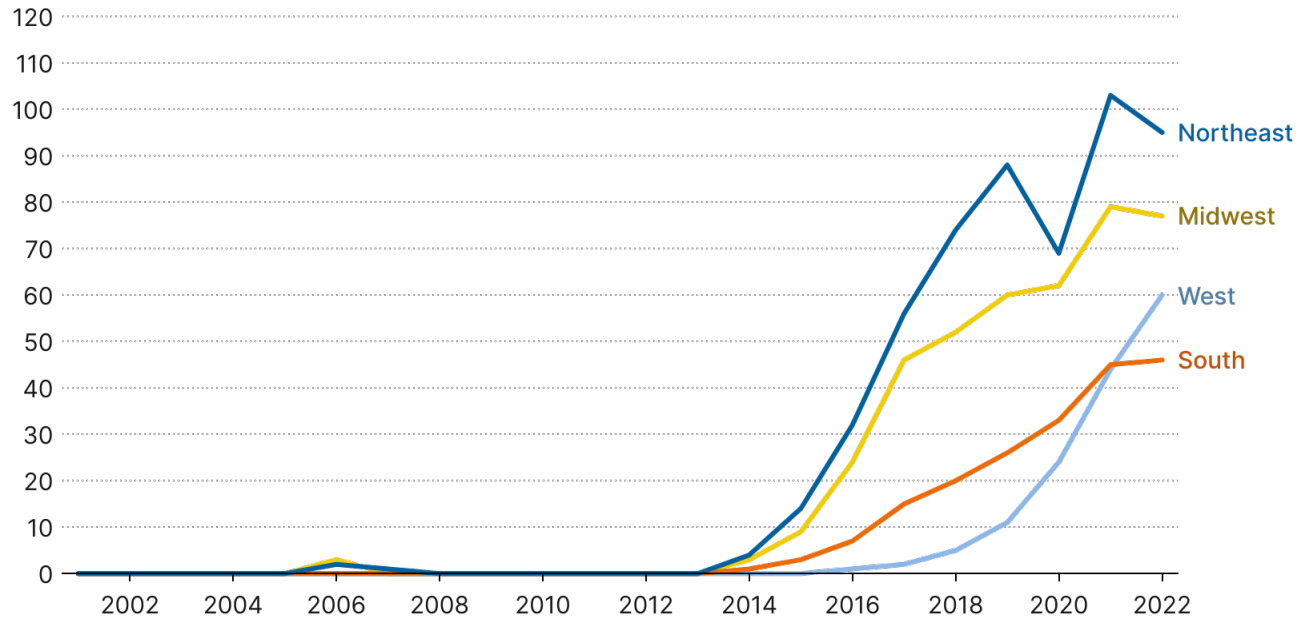
Few of those who initially bought the mixture even knew they were consuming fentanyl or asked for it by name.[37] The reaction to the new drug was mixed; some liked it and others did not.[38] The fact that most opioid buyers did not know they were purchasing fentanyl in the early years, perhaps through 2019 in most cities, means that it is impossible to trace the prevalence of fentanyl use over time via self-report. The NSDUH only included a question about illegally manufactured fentanyl for the first time in 2022.[39] It is unlikely that this will lead to valid estimates as many who consume fentanyl mixed with other drugs are unaware of its presence.

Over time, in some markets, customers became used to fentanyl and, as one author's food scientist father used to say, "Good is what you're used to." These markets largely became fentanyl-only markets; as shown by seizure data, heroin has essentially disappeared in cities such as Philadelphia and Baltimore.[40]

The early diffusion of illegally manufactured fentanyl showed striking and puzzling regional differences. It first appeared in parts of New England, Ohio, and Appalachia as well as in British Columbia, Canada.[41] This is indicated in Figure 3, showing the regional distribution of fentanyl seizures per 100,000 population from 2007 to 2021. Whereas in 2018 the Northeastern figure was already nearly 80, in the West it was barely five.[42]

FIGURE 3

Regional trends in fentanyl reported per 100,000 people aged 15 or older, January 2008-December 2022



Source: NFLIS-Drug 2022 Annual Report.

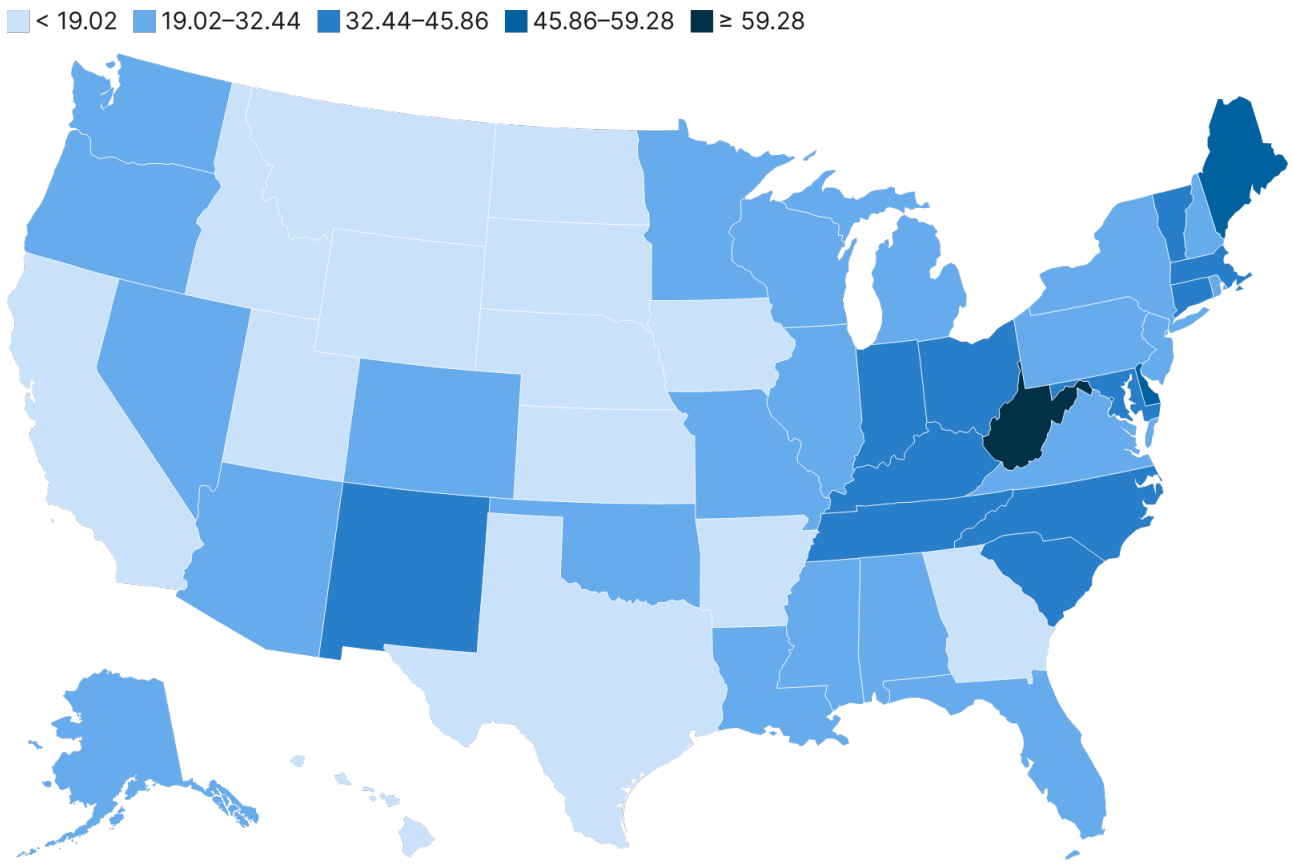
For the period 2014-2018, the great mystery is not why fentanyl dominated illegal opioid markets in some places, but why there were so many cities west of the Mississippi where it remained rare. Heroin was still the dominant opioid in the West five years after Ohio and New Hampshire had already been flooded with fentanyl, adding to the damage caused by prescription opioids. The fatal overdose figures showed dramatic regional disparities in those first five years. Whereas in 2019 in Ohio there were 38 drug overdoses per 100,000 residents, mostly fentanyl-related, in Washington State the rate was only 16 per 100,000, with minimal fentanyl involvement.

It is hardly possible that West Coast heroin dealers were unaware of the attractions of fentanyl. The notion that they were more concerned than East Coast dealers with the well-being of their customers is hard to state with a straight face. Moreover, there was at least some availability on the darknet of small amounts ordered directly from vendors.[43] It is possible that fentanyl was technically harder to add to black tar heroin, the dominant form west of the Mississippi, than to white heroin, the dominant form in the eastern half of the country. As we will see, though it is possible to insert fentanyl into black tar, even a modest obstacle such as that might really have influence in a market dominated by technologically unsophisticated dealers. Alternatively, cocaine and fentanyl may be trafficked on the same supply network in the West, while black tar is separate. Convenience or logistics may explain why on the West Coast cocaine is more commonly mixed with fentanyl than heroin. However, that is all unsupported conjecture; the difference in regional diffusion remains a mystery.

And indeed, fentanyl has now reached the West Coast. In 2022, Washington State had almost caught up with the Ohio of 2019 (36/100,000). However, Ohio's overdose rate has continued to surge to 48/100,000 in 2022. Figure 4 gives the per capita distribution by state for 2022.

FIGURE 4

Opioid deaths per 100,000 by state, 2022



One of the many unexpected features of the spread is that fentanyl is no longer just a substitute for heroin in the illegal opioid market. It now shows up primarily in fatal overdoses that also involve stimulants, both cocaine and methamphetamine. While it is possible that this could simply be the result of individuals who use fentanyl also separately using stimulants, a 2023 paper by Joseph Friedman and Chelsea Shover reports that ethnographers have found that "many individuals report that mixing a small amount of methamphetamine into injected doses of fentanyl subjectively prolongs the onset of withdrawal symptoms, increases euphoria, decreases overdose risk and improves energy levels required to continue to collect funds for the next set of drug purchases."[44] This mixture of stimulant and synthetic opioids is known as a "goofball" and has a long history.[45] States where fentanyl is found in fatal overdoses with cocaine are distinct from states where fentanyl is found with methamphetamine in fatal overdoses. However, in all but three states, the share of fentanyl deaths involving a stimulant was at its highest in 2021, which was the most recent year available to Friedman and Shover. Nationally, approximately half of 2021 deaths involving fentanyl also showed a stimulant present in the decedent's body.

Fatal overdoses of individuals who have short histories of opioid use and who used only occasionally capture attention as somehow more unjust than fatal overdoses amongst individuals who have long and intense histories of opioid use. Naïve opioid users may account for a small share of fentanyl consumption but a more substantial share of fentanyl overdoses. What is unclear is the share of the total market that is served by pills.[46]

Given the lack of direct indicators of fentanyl's prevalence, we need to use the composition of decedents and persons involved in fentanyl trafficking to describe the demography of fentanyl. Friedman and Shover analyze the characteristics of fentanyl decedents in 2021. As with almost all drug-related measures, males dominate, accounting for 73% of the 70,000 deaths. Non-Hispanic Blacks account for 18% of deaths, compared to their 12% share of the general population. However, there is little concentration by age; it is broadly even by decade from 25-64. This of course is consistent with Case and Deaton's "deaths of despair" argument, discussed above, first noticed amongst individuals aged 45-64. Though the overlap between suppliers and consumers is unclear, it is worth noting that among 1,553 convictions in federal court for trafficking fentanyl in fiscal years 2021-2023, approximately 88% of defendants (almost all sellers or traffickers) were male, 60% were Black, 23% were Hispanic, and nearly 89% were U.S. citizens.[47]

Treatment data are unhelpful. The TEDS system does not distinguish fentanyl from other synthetic opioids. It is likely that, at least until very recently, those who were using fentanyl were coded as heroin patients.

SUPPLY SIDE

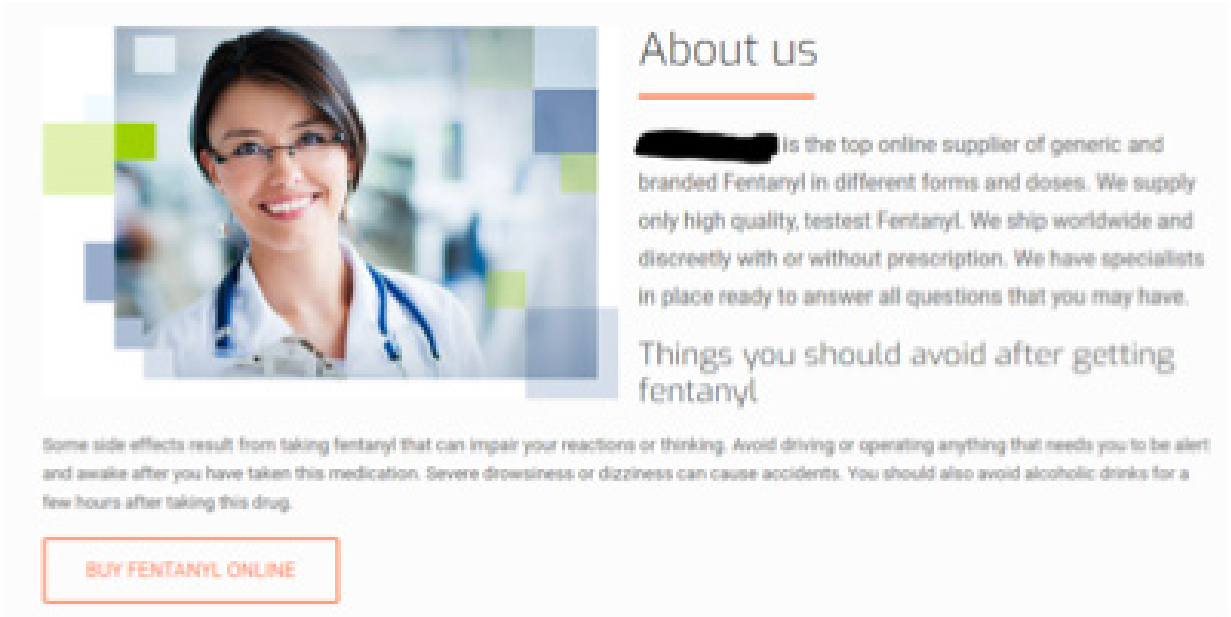
For the first five years, 2014-2018, small players associated with the chemical/pharmaceutical industry in China, the largest in the world, appear to have had an important role in the supply of fentanyl, advertising it for sale on the open web, as shown in Figure 5. The offer was to deliver as much as a kilogram of very pure fentanyl to an address anywhere in the United States for about $5,000, which is about a penny per dose.[48] Delivery was usually by parcel post or express courier, with payment in cryptocurrencies.[49]

Under pressure from the U.S. government, China in 2019 passed new legislation prohibiting the manufacture and marketing of fentanyl and fentanyl analogs.[50] U.S. seizures of fentanyl in the postal and parcel system fell by 93% from fiscal year 2018 to 2020.[51] Today, illegally manufactured fentanyl is largely processed in Mexico, using precursor chemicals that are often exported from China.

After years of U.S. pressure on the government of China, this hard-won victory had surprisingly no visible effect on the U.S. fentanyl market. There is no break in domestic seizures or prices to suggest that fentanyl became more expensive or less available, and we fear interpreting the small one-year downturn in fatal overdoses in 2019 as an effect of this change, as this was also the year carfentanil largely disappeared.[52] Though it is no longer as widely available for purchase on the web, the wholesale price of fentanyl inside the United States continued to fall and for users, it remains much cheaper than heroin.[53] A recent investigation by Reuters shows that even in mid-2024, it is remarkably easy to purchase the precursors from China, as well as the equipment needed for producing tablets.[54]

FIGURE 5

Example of 2018 internet ads for fentanyl



The uneven distribution in the United States and Canada is wrapped in a larger mystery; why has illegally manufactured fentanyl not spread beyond North America? Countries with substantial and long-standing heroin markets, such as Australia and the United Kingdom, are also well connected in commerce and traffic with China, the source of the drug. Yet almost a decade after illegally manufactured fentanyl entered the United States and Canada in quantity, it still remains a fringe contributor to opioid markets outside of North America.

Methamphetamine

In the 1950s and 1960s, methamphetamine was commonly prescribed as Desoxyn or Methedrine to treat depression and obesity; most of the illicit market was comprised of diverted prescription meth.[55] Recognition of methamphetamine's potential for abuse led policymakers to place it into Schedule II in the 1971 Controlled Substances Act. As physicians substituted other pharmaceuticals starting in the late 1960s, illicit

production in the United States began in San Francisco, then spread south and east. Since then, the use of methamphetamine has been considered a more rural and western U.S.-concentrated phenomenon than drugs that drove other epidemics. This idea frames meth in reference to other dangerous drugs like heroin and cocaine, for which use and associated mortality were acutely concentrated in cities. In reality, meth overdose mortality rates are not much different in rural areas than in large cities, and this has been true for decades. Meth use also remains more geographically diffuse than crack and heroin, which were traditionally much more concentrated in coastal states.[56]

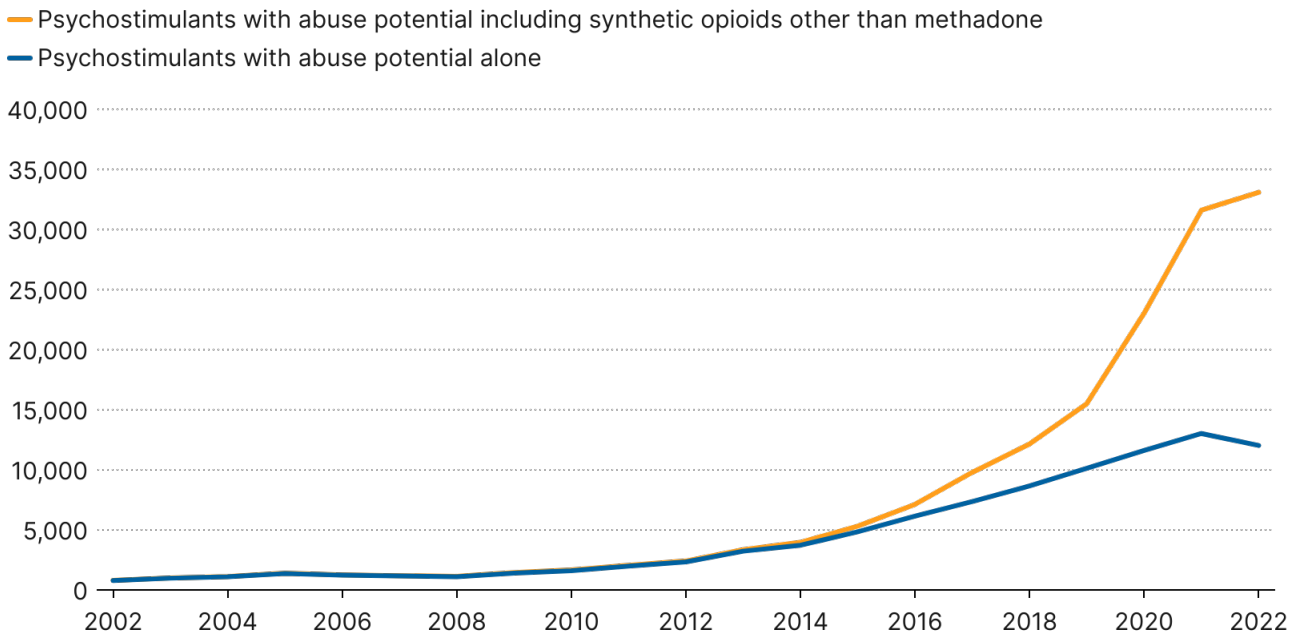
The Combat Methamphetamine Epidemic Act (CMEA) of 2005 placed heavy controls on precursor chemicals domestically. The period that followed saw a significant but temporary reduction in consumption.[57] Despite increasing use prevalence in the 1990s and early 2000s, by 2005 methamphetamine decedents still only comprised about 6% of all overdose deaths. Between 2009 and 2022, meth overdose mortality rose by 18% per annum, and by 27% when accounting for cases including both meth and synthetic opioids including fentanyl (see Figure 6).[58]

The geographic dispersion of meth use remains broadly similar to patterns from prior waves of the drug in the 1990s and early 2000s. Mortality is concentrated in the Pacific and Mountain states, though the mortality rate has increased most dramatically in Kentucky, Tennessee, Mississippi, and Alabama (i.e., the East South Central Census division), where the crude mortality rate increased from 0.4 to 11.5 deaths per 100,000 population between 2010 and 2020. These three areas have meth mortality rates that are roughly double the rates of the midwestern and southern states, whose rates are double those in the Northeast (see Figure 7). However, the drug appears to be largely absent from some cities. For example, in Washington, DC, there were 11 meth seizures in all of 2022; there were 17.5 times as many cocaine seizures and 13 times more fentanyl seizures. However, by 2023, the Washington metro region saw a spike in meth seizures, 118% above a year earlier, driven exclusively by growth outside of the nation's capital.[59]

The product that is sold today is notably deadlier. To understand how we got here, it is necessary to know a little bit of chemistry. Methamphetamine can be manufactured in two different isomer forms (arrangements of the same chemical compound), Dextro-methamphetamine and Levo-methamphetamine. The former is strongly preferred since the latter has little intoxicating effect. However, it requires heavily regulated precursors to be produced without L-meth or sophisticated reduction methods to remove L-meth from the mixture produced from precursors that are readily available internationally. In the 1990s and early 2000s, most of the illegal market was DL-meth mixture made using phenyl-2-propanone (P2P) precursors, or D-meth produced via ephedrine or pseudoephedrine reduction methods.[60] Though the production process was more technically demanding and dangerous, D-meth could be produced from large quantities of over-the-counter decongestant medicine in combination with red phosphorus or hypophosphorous with iodine. Technological innovation in the intervening decades led to improvements in the resolution of D-meth from P2P-derived racemic meth mixture, most often using tartaric acid. This new P2P precursor-based method dominates production today, yielding cheaper and more potent d-methamphetamine.

FIGURE 6

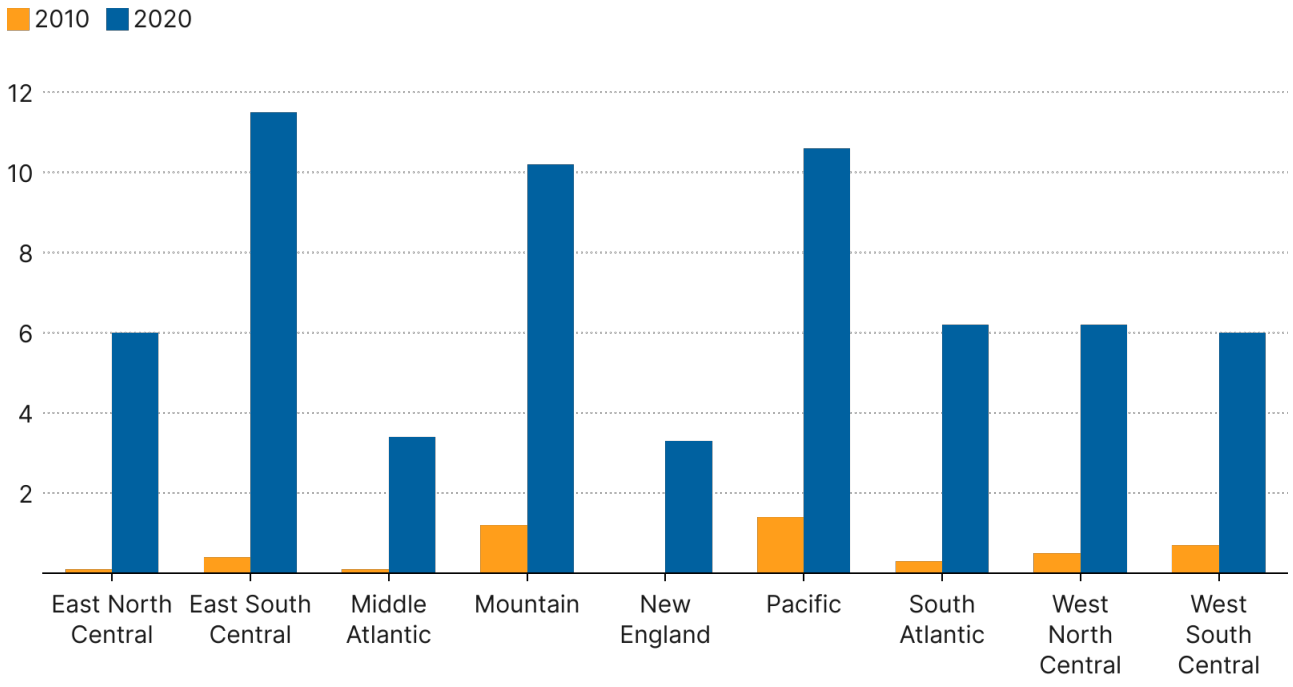
Trend in methamphetamine overdose mortality, 2005-2022



Source: Authors' analysis of CDC WONDER MCOD data.

FIGURE 7

Methamphetamine overdose mortality by Census district



Source: Authors' analysis of CDC WONDER MCOD data.

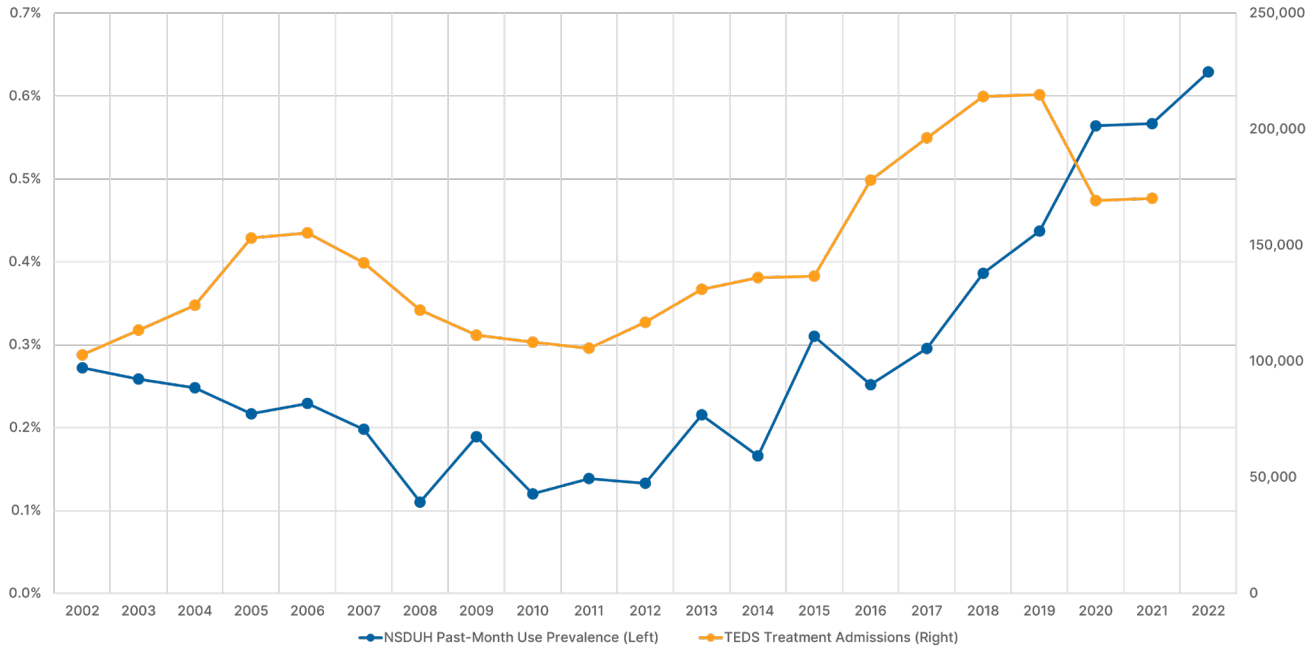
Increased harms are likely associated with growing prevalence, more frequent use among people who use meth, increasing polydrug use, and increasing meth potency. The indicators we have, however flawed, all suggest meth prevalence has increased dramatically since 2010 (see Figure 6). The amount consumed per day among frequent users is probably more important than prevalence—overdose risk is more directly related to hyperthermia or cardiotoxicity from the amount consumed, rather than the frequency of consumption—but there is very little credible evidence in this regard. We understand the drug's intoxicating effects to endure for six to eight hours, so consumption is likely not as frequent as fentanyl or crack; higher potency is unlikely to affect meth consumption in the way fentanyl use patterns differ from other illicit opioids.

The risk of fatal overdose from methamphetamine is much smaller than from opioids, but the harms of long-term use are numerous and severe. According to the National Institute on Drug Abuse, at low doses, methamphetamine produces typical psychostimulant effects—extra energy and euphoria—but heavy chronic use of the very potent meth that dominates today's market has been associated with "symptoms that can include significant anxiety, confusion, insomnia, mood disturbances, and violent behavior."[61] Neuroimaging studies reveal reduced dopamine activity and damage in areas related to emotion and memory. Chronic use is associated with an elevated risk of psychosis, including paranoia and hallucinations, and changes in brain function and structure, affecting memory and motor skills. And while some neurobiological effects are partially reversible with prolonged abstinence, some brain changes are long-lasting. Physical effects include extreme weight loss, severe tooth erosion, and skin sores. We are not aware of evidence of the change in the potency of street meth on these outcomes.[62]

Meth co-use with opioids carries a greater overdose risk. This combination appears to now be common, particularly in rural areas.[63] A second potential contributor to increased mortality is dramatically increased meth purity. In the late 1990s and early 2000s, methamphetamine seizure purity ranged between 20% and 70%, though most domestically produced meth was lower purity, and higher purity super lab-produced meth is likely overrepresented in the sample.[64] According to the DEA, the average seizure purity from recent seizures is nearly 98%.[65]

FIGURE 8

Methamphetamine prevalence and treatment admissions, 2002-2022



Meth's increased purity is likely due to a confluence of factors. After the CMEA, domestic meth lab seizures fell from 23,703 at their peak in 2004 to 890 in 2019.[66] Shrinking domestic meth supply and the technological breakthrough driving down the cost of D-meth production via resolution of P2P-derived mixtures around 2009 coincided with laxer policies toward domestic production of cannabis (including legalization in many states) and shrinking demand for cocaine. In retrospect, this nexus predicts substitution from cannabis and cocaine to meth among transnational trafficking organizations.

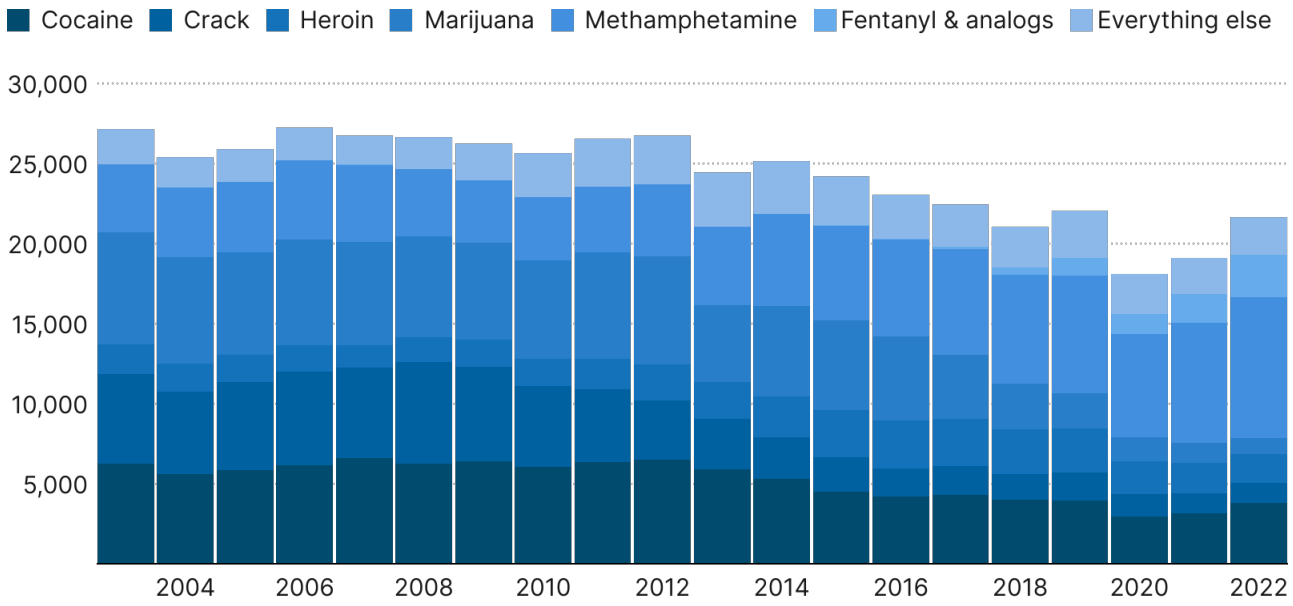
Today, most meth in the United States is thought to be produced by super labs in Mexico.[67] Even after Mexico imposed precursor controls similar to the CMEA, methamphetamine flourished, and innovation continued. CMEA and equivalent regulations in Mexico made pseudoephedrine-based production impractical and led to investment in alternatives. Since 2014, cheap, nearly pure meth produced from modern P2P precursors dominates the domestic market. The crystalline product can be dissolved into a liquid solution to be recrystallized for street sale, crushed into powder, or compressed into pill form; most product at the street level is sold in crystal or powder form.

Meth is now the focal drug in a plurality of federal court drug cases, exceeding cocaine (powder plus crack) by nearly 75%. In absolute terms, the total volume of federal drug cases fell throughout the 2010s. This was driven primarily by a shrinking crack market and laxer cannabis enforcement in response to state-level recreational cannabis legalization and deprioritization after the Cole memo.[68] This rise is likely a consequence of the clear increase in meth use prevalence and the parallel rise in attention paid to meth by law enforcement. These data essentially mirror trends in federal law enforcement arrests.[69]

In relative terms, fentanyl's contribution to the docket is rising quickly but remains a tiny share of the total.

FIGURE 9

Distribution of drug cases heard in federal court over time



Source: Authors' analysis of U.S. Sentencing Commission data.

Cocaine

Cocaine use declined dramatically between 2006-2010 and remained flat through the mid-2010s.[70] Subsequent growth in coca production to historic levels in Bolivia, Colombia, and Peru (much of it now destined for expanded markets in Europe and increasing markets in the Asia-Pacific region) through at least 2019 has spurred prognostication about its impending resurgence.[71] To date, the evidence to back up these concerns is mixed. In NSDUH, past-month cocaine use prevalence grew from 0.53% at its nadir in 2011 to 0.7% by 2016 and has remained at this elevated level at least through 2022. Based on approximately 6 million tests per year, cocaine positivity from workplace drug testing reported by Quest Diagnostics suggests continued declines, from 0.28% in 2018 to 0.22% in 2022.[72]

Treatment admissions are a better measure of heavy use than past-month prevalence measured from a general population survey or the results of periodic drug testing. These data indicate cocaine was the primary drug of abuse for just over 100,000 treatment episodes before the pandemic, a decline of more than 60% from the 2006 peak. The most impactful trend in the domestic cocaine market is the substitution away from heroin and prescription opioids toward fentanyl. According to data from the Centers for Disease Control and Prevention, in 2010, half of the 4,183 cocaine overdose decedents also consumed an opioid, but only 4% consumed a synthetic form. In 2021, nearly three-quarters of fatal cocaine overdoses included a synthetic opioid. These impacts were concentrated in the Northeast and Midwest, though all areas of the country were profoundly impacted.

Discussion

The last decade has seen yet another transformation of the U.S. illegal drug market. Even with various problems in the roll-out of the new regulatory regime, the legal cannabis market is expanding and cutting into the illegal market.[73] Total consumption has probably increased substantially, mostly because of an increase in intensity of use rather than an increase in the prevalence of use.[74] In 2014, the total number of arrests for cannabis offenses (88% for simple possession) totaled about 700,000; by 2022, the number had fallen to about 227,000 (92% for simple possession).[75] The most likely future is an end to the federal prohibition and an expansion of the legal market as the major tobacco and liquor corporations enter the market.

Cocaine use has also declined substantially; it is hard to find any explanation for that change. Perhaps the declining price of methamphetamine has shifted preferences between the two stimulants. It is certainly a demand-driven decline, since cocaine production has expanded substantially in the Andes over the last decade.

Fentanyl understandably occupies most attention now. It has largely replaced heroin and has recently entered the distribution of methamphetamine and cocaine. The stimulant market probably accounts for a small share of the fentanyl consumed but is important in contributing to fatalities because many users are opioid naïve. Methamphetamine gets less attention but the rise in its consumption would in another period be a prominent story; even without fentanyl, methamphetamine is now responsible for more than 12,000 fatal overdoses annually, about the same as the total number of fatal overdoses from all drugs in the early 2000s.

Table 1 summarizes our assessment of recent changes in the U.S. markets for cocaine, fentanyl, heroin, and methamphetamine. In sum, meth and fentanyl have replaced cocaine and heroin as the dominant illicit drugs of abuse in the United States. Though extraordinary data challenges hamper our confidence, it is clear that part of the explanation for exponential growth in mortality lies in falling cost per intoxicant dose. These purer, deadlier drugs are also harder to detect. Both meth and fentanyl are produced in clandestine labs. They do not require land or a large labor force for cultivation as poppies or coca do.

TABLE 1

Summary table of illicit drug trends in the past decade (darker shade coloring denotes greater confidence)

	Mortality	Use prevalence	Treatment admissions
Cocaine	Rising (due mainly to co-cuse with fentanyl)	Flat, though well below its 2006 peak	Falling
Fentanyl	Rose rapidly, at inflection or saddle point	Rising	Rising
Heroin	Falling	Falling	Rising, though potentially fentanyl cases
Methamphetamine	Rising	Rising	Rising

The future is bleak. A Lancet Commission projected a total of 1.1 million fatal opioid-related overdoses in the 2020s in the United States without major changes to policy, continuing the 45-year trend discussed above. One could say that the introduction of fentanyl was just God's way of keeping us on the curve. There is no reason to think that the peak of this problem is in sight. New York City, already badly hit in 2019 with 1,497 drug deaths, saw a doubling over the next three years; of its 3,026 fatal overdoses in 2022, 81% involved fentanyl.[76]

This paper's focus on mortality is driven by the dual opioid and meth epidemics' profound impact on mortality, but it understates the drugs' true social costs. For brevity, this paper does not discuss the substantial social costs associated with drug abuse and dependence that do not culminate in death. It is also true that we lack comprehensive data to present a thorough analysis of these broader social costs. They are likely to be diffuse and varied, depending on the availability and quality of treatment and diversion programs. This data gap limits this paper's ability to fully understand and address the extensive impact of drug abuse beyond the immediate concern of overdose fatalities.

Every drug epidemic in the past has run its course. The rise in new users turns down rapidly as the bad effects of the drug's use become prominent.[77] The problem with fentanyl is, oddly enough, that it does not attract new opioid users. There is no evidence of a rise in initiation or drug use except for marijuana.[78] Fentanyl was wreaking havoc largely among those who were already using illegal opioids, but it is now also occurring among stimulant users and in those who mistake counterfeit tablets for prescription opioids. The death rates amongst those who use opioids and stimulants are high enough that the population of individuals dependent on these drugs may now be declining. Thus, the downturn in fatalities, if it comes, may reflect not a decline in the popularity of fentanyl but just the falling numbers of those who are exposed to its effects. This will be good news wrapped in awful news.

Expanding treatment and harm reduction services in quality, quantity, and accessibility is perhaps all that can be done at this stage. Alas, expectations of success in substantially reducing the death toll in the near future should be low.

It is tempting, as always, to blame a wretched drug problem on this nation's much-excoriated drug policy. However, that temptation is easy to resist here. North of the United States, Canada is badly affected. The problem is particularly severe in harm-reduction-oriented British Columbia, where the fentanyl problem is about as bad as in the worst U.S. states. Fatal overdoses in the first seven months of 2023 suggest that British Columbia is heading to a new record number, far exceeding the 44/100,000 of 2021. If it were a U.S. state, it would be the seventh worst affected. A prominent study estimated that the overdose rate in British Columbia would have been twice as high without its interventions such as drug consumption rooms, hydromorphone dispensing, syringe exchange, and accessible treatment services.[79] There are good arguments for all these interventions, but they are clearly not enough to prevent a massive problem, or at least not without a huge expansion. Nor does the much stronger social safety net and the ready access to health care in Canada prevent this disaster.

Recommendations for improved market surveillance

Understanding drug markets' evolution is an essential foundation for developing good drug policy, but it does not translate directly into specific policy recommendations. However, it does justify recommendations for improving the surveillance of markets to improve both policy-making and scientific inquiry. In this section, this paper provides some more detail than is provided in an overview of the issue by Bryce Pardo and Beau Kilmer in 2022.[80]

Drug enforcement agencies see their business as law enforcement, not market regulation. They routinely collect important drug market descriptors including information on the chemical composition of seizures and drug screen results from arrestees and persons under community supervision. These data are used for prosecution and some level of tactical anti-narcotics intelligence, not to inform market regulation or policy formulation.[81] Yet, once one accepts the limitations of what enforcement can accomplish, market regulation is what they are doing. These agencies try to raise the risks of buying or selling drugs, and the risks of doing that in particular ways. That can affect not just prices but also many other aspects of how the business is conducted; the location (indoors, outdoors), the way participants transact (in-person, phone, internet), and the drug's purity.

Currently, it is almost impossible to accurately describe any aspect of the major U.S. drug markets.[82] As already noted, price information, which has great potential for both policy and research purposes, used to be available from DEA's STRIDE system. STRIDE provided purity data on all seizures and undercover buys by the DEA and a small subset of similar transactions from state and local agencies which used the DEA lab (in practice, mostly Washington, DC, agencies). For the undercover buys (but not seizures), STRIDE also contained the amount spent, which could be converted into prices. The DEA also conducted the Heroin Domestic Monitoring program to monitor the sources, price, and purity of heroin on the retail market[83]; these were included in STRIDE. It was far from an ideal data set, but the DEA for decades provided it to researchers, who published many papers using STRIDE across academic disciplines.[84] The Office of National Drug Control Policy used the data to publish the price per pure gram, as well as average purity levels for the major drugs.

Starting about 2016, STRIDE disappeared from public view, though it continues to operate for its original purpose, providing data for cases. There are no official publications of price or purity; as already noted, the published series ends in 2016. For a national commission on synthetic opioids—the U.S. Commission on Combatting Synthetic Opioid Trafficking (2022)— the DEA made available a limited set of observations to RAND researchers who were staffing the commission, to estimate the price of fentanyl.

In private conversations, a senior DEA official justified the withholding of the data as reflecting the agency's concerns about missing data and inaccuracies in the data set. In that telling, only DEA staff would understand the data issues well enough to properly interpret it. However, the DEA is not a statistical analysis agency. Rather, they could leverage researchers with the statistical acumen to analyze the data by providing guidance or feedback on its known flaws and vulnerabilities.

A plausible interpretation, though no more than that, is the agency's desire to reduce its vulnerability to criticism. Past STRIDE-based analyses showed that the prices of heroin and cocaine were declining. The fragments of evidence available suggest that the prices of the principal drugs, fentanyl and methamphetamine, have also been steadily falling for some years. This is hardly welcome news to the DEA. Suppressing the data is natural protective behavior. And to be fair to the DEA, most academics are overtly hostile to drug law enforcement. Carefully resurrecting STRIDE is an easy move to strengthen the surveillance of drug markets.

The other data set that could easily be improved to strengthen the monitoring of drug markets is NFLIS.[85] One could reasonably characterize its present form as the data system designed to provide the smallest possible amount of information consistent with tasking many organizations to report. Individual forensic labs report data on the composition of seizures sent to them by law enforcement agencies. In 2022, NFLIS included data on almost 650,000 distinct samples, of which methamphetamine provided just a little more than one-half (340,000).[86]

The only data that is made available to the public are state totals of the number of samples that contain specific drugs and drug combinations. Literally, no other information is available. Before laying out our criticism of the system, we should note that even that limited information does serve an important purpose, namely as an early warning about the emergence of new drugs and where they are likely to be found.

However, what is striking is what is not available in the NFLIS. For example, there is no data on the weight of the sample. Consider one of the critical questions raised by the overdose data. Toxicology results show that a substantial share of those with fentanyl in their system also show signs of consumption of stimulants, particularly methamphetamine. Does this represent the mixing of fentanyl with methamphetamine by dealers or is it simply that fentanyl users also consume methamphetamine? To answer that question, it is important to specifically examine retail-level samples to assess whether purchasers are being sold mixtures of the two drugs. Without the weight of seizures, it is impossible to separate out retail from high-level seizures, where the presence of the two drugs may simply represent logistical convenience rather than a mixing for sale.[87] Perhaps not every forensic lab collects these data for every sample it analyzes (state legal requirements vary) but even incomplete data from the NFLIS-affiliated labs would be informative. Strengthening NFLIS data collection and providing access to transaction-level data again would be another relatively simple way of improving drug market surveillance.

The demise of the Arrestee Drug Abuse Monitoring (ADAM) System has been a major blow to market surveillance.[88] ADAM provided a platform for collecting data on purchases in markets; knowing how much people who use drugs are spending on those drugs is fundamentally important. Drug use is not just a medical/health behavior; it is also an economic behavior. There are anecdotes that suggest that the quantity of fentanyl being consumed daily by individual purchasers is rising rapidly.[89] We have no systematic data collection on the intensity of consumption among the critically important population who is not well-represented by general population surveys. These measures are instrumental for both treatment and other policy purposes.

Finally, the United States has been a laggard in taking advantage of wastewater testing as a method for estimating consumption. Both in Western Europe and Australia, the testing of wastewater for the presence of metabolites of the major drugs has provided important information about consumption over time and across places.[90] The United States has had pilot programs but has failed to implement this methodology on a routine basis.

In 2022, The National Drug Control Strategy included a chapter on data needs.[91] Little, if anything, has been done to implement that. As the nation's drug problem changes and worsens, it is time to act.

Endnotes

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