



# Overdose Crisis in Transition: Changing National Trends in a Widening Drug Death Epidemic

## NATIONAL BRIEF

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### SUMMARY

This brief examines the United States opioid epidemic by analyzing trends in overdose deaths from various types of opioids, as well as cocaine and psychostimulants. Using vital statistics data, it also looks at differences in overdose deaths by age, sex, race/ethnicity and urbanization.

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[National and State Trends in Opioid-Related Overdose Deaths from 2000 to 2017.](#)

## INTRODUCTION

In January 2020, the U.S. Centers for Disease Control and Prevention (CDC) announced that the national mortality rate from drug overdoses had declined by 4.6 percent from 2017 to 2018—dropping from about 70,200 to 67,400 deaths.<sup>1</sup> Although drug overdose death rates still hovered near record highs, the improvement offers encouragement that federal, state and local efforts to fight the opioid crisis may be starting to return desired results. However, a deeper examination of the overdose data across individual drug types paints a more nuanced picture.

While the United States has made progress in reducing deaths from some types of opioids, deaths from other opioids have continued to climb. In 2018, U.S. overdose death rates from natural and semi-synthetic opioids (i.e., prescription opioid painkillers) declined significantly compared with the prior year, as did those from the illicit opioid heroin. But death rates from synthetic opioids (e.g., fentanyl) again increased significantly—reaching yet another record high.

Also concerning are emerging signs that the opioid crisis is increasingly broadening to encompass deaths from non-opioid illicit substances; for instance, in 2018, U.S. overdose death rates for cocaine and for psychostimulants (e.g., methamphetamine) increased significantly. Substantial evidence has recently emerged linking the growth in death rates from cocaine and psychostimulants with the opioid crisis. The CDC released research findings that indicate more than 70 percent of cocaine overdoses, and roughly 50 percent of methamphetamine overdoses, also involve opioids,<sup>2</sup> and U.S. Drug Enforcement Administration (DEA) reports reveal that illicitly trafficked cocaine and methamphetamine have increasingly begun to also contain opioids.<sup>3,4</sup>

This brief examines changes in opioid and related drug overdose deaths across the U.S. in recent years. It focuses especially on 2018 overdose death rates and changes from the prior year, as well as differences across groups by age, sex, race/ethnicity, and metro/non-metro communities. State-level analysis can be found in the companion brief, [Opioid Crisis in Transition: Changing State Trends in a Widening Drug Death Epidemic.](#)

## Disaggregating the Crisis

For nearly two decades, the U.S. has experienced statistically significant increases in overdose deaths related to opioids; these increases have occurred throughout the country, with nearly every state experiencing increases in overdose deaths from one or more types of opioids since 2000.<sup>5</sup> However, while examining composite data on opioids points towards a singular overarching trend of increase, breaking down overdose deaths by individual or related drug types shows a more complex story, with related but distinct trends in mortality for different types of opioids and associated drugs. Additionally, while opioid death rates have increased almost universally across different subpopulations in the U.S. (e.g., age, sex, race/ethnicity, and metropolitan/non-metropolitan communities), not all groups have been affected equally.

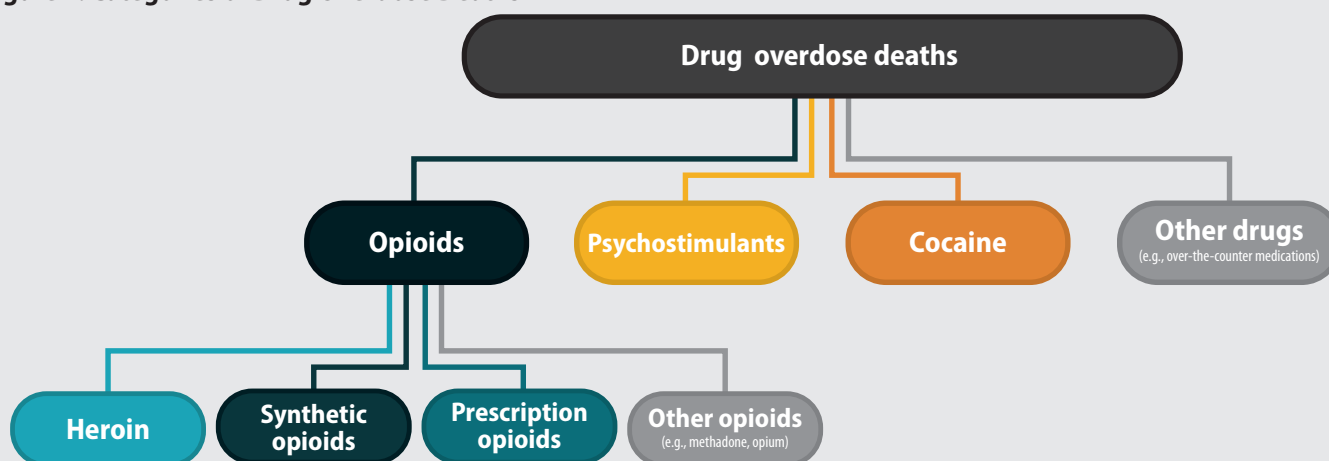
This analysis focuses primarily on the three categories of opioids that account for the bulk of opioid overdose deaths, as well as two other categories of non-opioid drugs that evidence suggests are related to the opioid crisis, and are grouped according to how overdose data are recorded.

## Opioid and Related Drug Overdose Deaths

Using vital statistics data published by the CDC, we examined rates of drug overdose deaths from three types of opioids—natural and semi-synthetic opioids (i.e., prescription opioid painkillers), heroin, and synthetic opioids—that account for the bulk of opioid overdose deaths. We also examined two types of non-opioids—cocaine and psychostimulants—because evidence indicates they are closely related to the opioid crisis, with CDC research finding that most cocaine overdose deaths and roughly half of methamphetamine overdose deaths also involve opioids.<sup>6</sup>

Additionally, because our initial analysis found competing patterns across different types of drugs—with some rates increasing while others decreased—we also further examine two aggregate categories of overdose deaths to determine the cumulative effects. We define those aggregate categories as “opioid overdose deaths,” which includes those from prescription opioids, heroin, and synthetic opioids, as well as other types of opioids that have considerably lower death rates (e.g., methadone, opium);<sup>7</sup> and “drug overdose deaths,” which includes overdose deaths from any drug—including opioids, psychostimulants, cocaine, as well as other types of drugs (e.g., other prescription and over-the-counter medications) (Figure 1).

**Figure 1. Categories of Drug Overdose Deaths**



## Opioids and Associated Drugs

This issue brief examines overdose death rates involving the following drug categories:

### Prescription Opioids

Natural opioids (e.g., morphine) and semi-synthetic opioids (e.g., hydrocodone, oxycodone) are drugs derived directly from the opium poppy or synthesized using its derivatives. This category is commonly called “prescription opioid painkillers,” a term used in this brief.

### Heroin

Heroin is classified as a semi-synthetic opioid, but overdose deaths from heroin are tracked separately due to its illicit status and having no sanctioned medical uses in the U.S.

### Synthetic Opioids

Synthetic opioids are drugs created to act on the brain’s opioid receptors but, unlike other opioids, don’t require opium poppy as an ingredient. Some drugs in this category have legitimate medical uses (such as fentanyl and tramadol), but most synthetic opioid deaths are believed to be caused by illicitly manufactured and trafficked drugs.

### Cocaine

Cocaine, which is trafficked in both powder and “crack” or rock forms, is not an opioid. However, recent CDC research found that most cocaine overdose deaths have also involved opioids.<sup>8</sup>

### Psychostimulants

“Psychostimulants with abuse potential” is a broad category of drugs that includes some prescription medications (e.g., Adderall, Ritalin) and illicit methamphetamine, which accounts for the largest share of psychostimulant overdose deaths.<sup>9</sup> These are not opioids, but recent CDC research found that roughly half of methamphetamine deaths also involved opioids.<sup>10</sup>

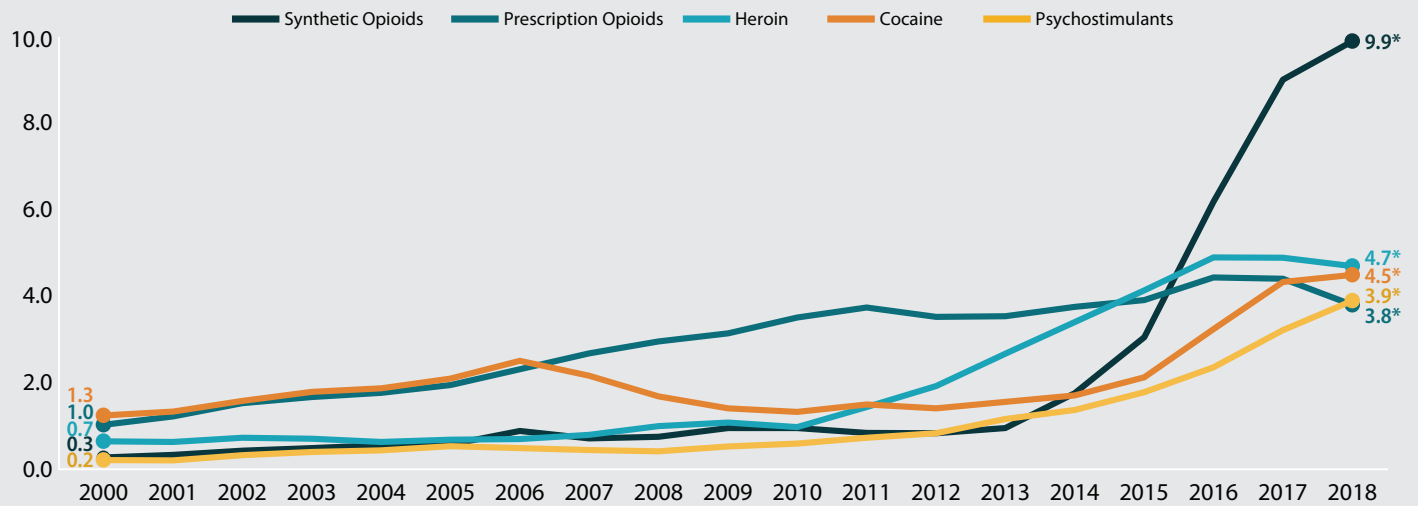
### Opioid Death Trends

Since 2000, overdose death rates have increased significantly for each of the drug categories we examined (Figure 2). In 2017, deaths from certain opioids hinted at early signs of progress in the fight to contain the crisis, as overdose rates from heroin and prescription opioids departed from their trend of growth and remained stable as compared to the prior year. But data from 2018 showed an even clearer departure from historical trends. While death rates from some drugs continued to increase, deaths from heroin and prescription opioids declined—all of which were significant changes.

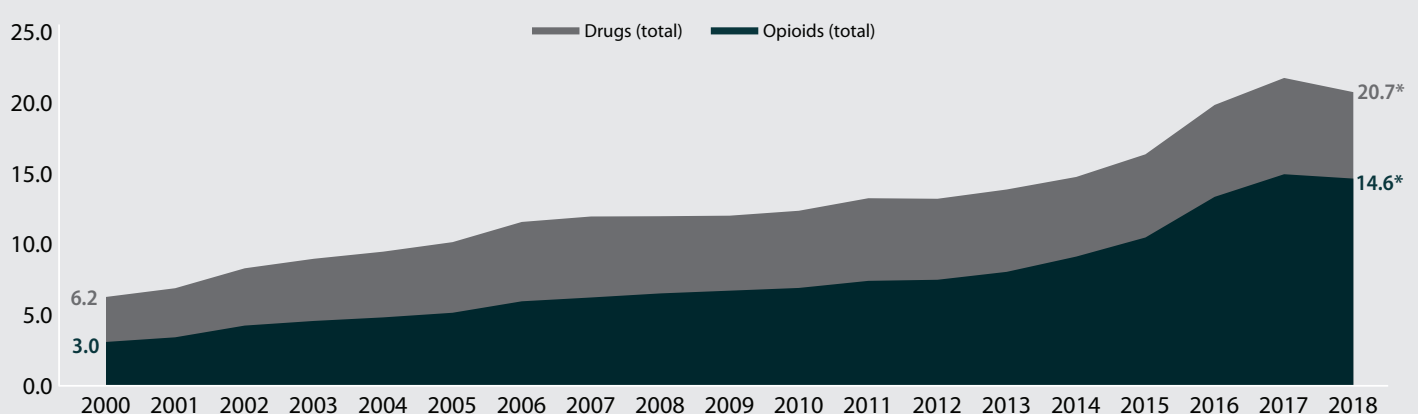
In 2018, the overdose death rate from heroin dropped by 3.8 percent when compared with 2017, declining from 4.9 to 4.7 deaths per 100,000 people. Death rates from prescription opioids recorded a larger decline of 14.7 percent, dropping from 4.4 to 3.8 deaths per 100,000 people. However, death rates from synthetic opioids climbed 9.6 percent, growing from 9.0 to 9.9 deaths per 100,000 people. Meanwhile, deaths also increased from certain non-opioid drugs that are nonetheless frequently involved in opioid overdoses. Cocaine overdose death rates increased 4.1 percent, from 4.3 to 4.5 deaths per 100,000 people. And death rates from psychostimulants, such as methamphetamine, increased by 22.1 percent, from 3.2 to 3.9 deaths per 100,000 people. All of these changes were statistically significant.

Ultimately, those competing patterns had a net positive effect on drug overdose death rates, though overall they remained near peak levels. From 2017 to 2018, death rates from aggregated drug overdose deaths—including opioids, cocaine, psychostimulants and other drugs—declined 4.6 percent, from 21.7 to 20.7 deaths per 100,000 people (Figure 3). During that same time, death rates from aggregated opioid overdoses declined by 2.1 percent, from 14.9 to 14.6 deaths per 100,000 people. Both of those declines were statistically significant.

**Figure 2. U.S. Overdose Death Rates by Drug Type per 100,000 People, 2000-2018**



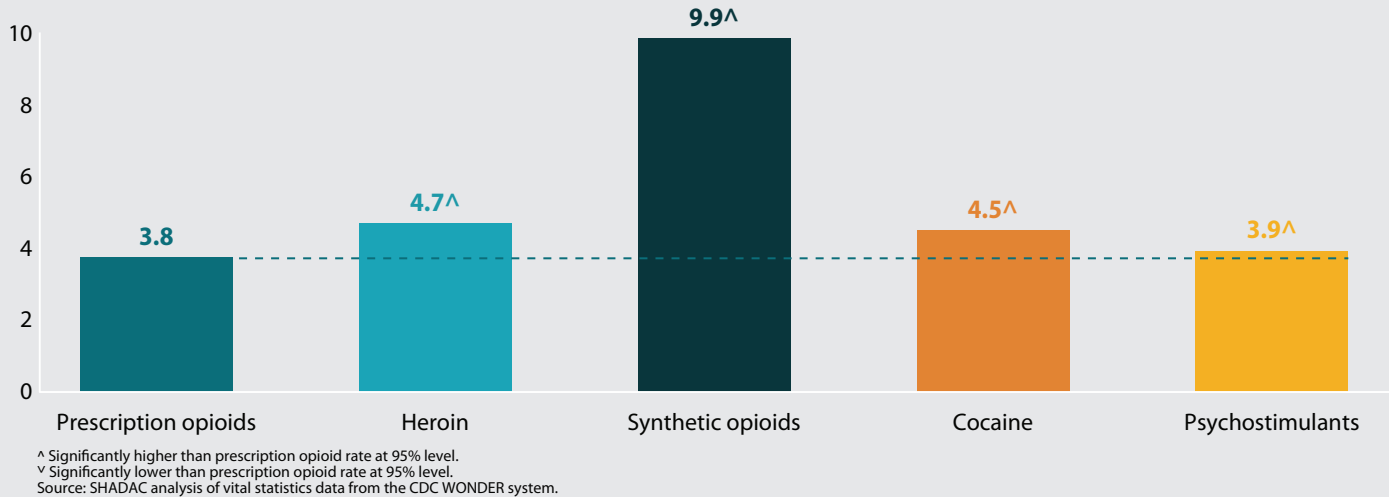
**Figure 3. U.S. Drug and Opioid Overdose Death Rates per 100,000 People, 2000-2018**



\* Statistically significant change since 2000 at 95% level.  
Source: SHADAC analysis of vital statistics data from the CDC WONDER system.

Together, these data illustrate some important findings. The U.S. appears to be making its first steps toward progress in reducing death rates from some opioids, with those from heroin and prescription opioids holding statistically steady in 2017 and declining in 2018. Unfortunately, however, overdose deaths from synthetic opioids deaths have continued to rise, perhaps in part because efforts to combat overdose deaths from prescription opioids may have driven some people toward illicitly trafficked opioids.<sup>11,12,13</sup> Overdose death rates from cocaine and psychostimulants also continued to grow. In fact, as of 2018, overdose death rates from cocaine and psychostimulants were each significantly higher than from prescription opioids—and significantly higher than the prescription opioid overdose death rate in 2011, when the CDC first announced the epidemic (Figure 4).

**Figure 4. U.S. Prescription Opioids vs. Other Drug Overdose Death Rates per 100,000 People, 2018**

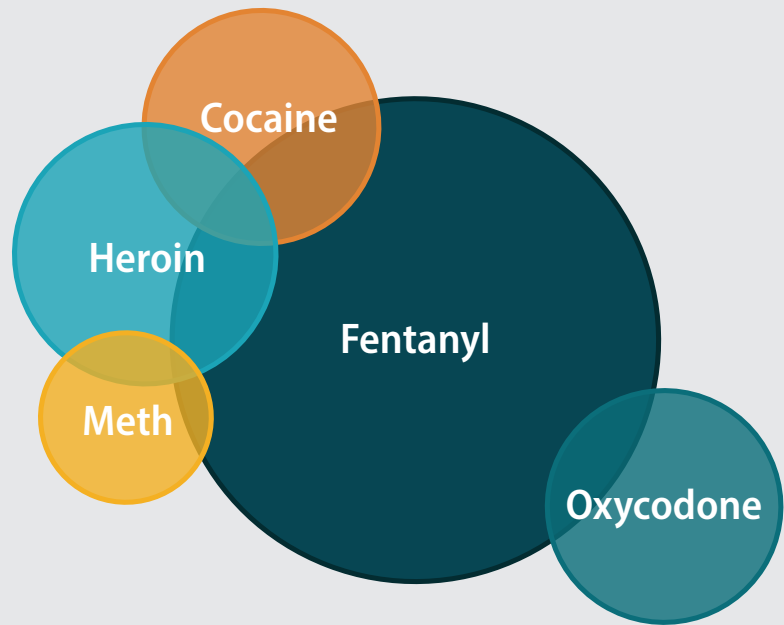


### Overlapping Opioid, Cocaine and Psychostimulant Overdose Deaths

A 2018 study by the CDC found that opioid overdose deaths commonly involve more than one substance.<sup>14</sup> Sometimes multiple opioids are involved (e.g., fentanyl and heroin), and sometimes those deaths involve opioids as well as other non-opioid substances, especially cocaine and psychostimulants (e.g., methamphetamine).

Figure 5 illustrates common patterns in opioid-involved overdose deaths, with the size of the circles roughly illustrating the relative rates of deaths from the named substances and the amount of overlap indicating the frequency of multi-drug overdose deaths.<sup>15</sup> For example, because the study found that about 37 percent of heroin deaths also involved fentanyl, the circle representing heroin is overlapped by the circle for fentanyl by roughly that amount.<sup>16</sup>

**Figure 5. Common Patterns in Overlapping Drug Overdose Deaths**



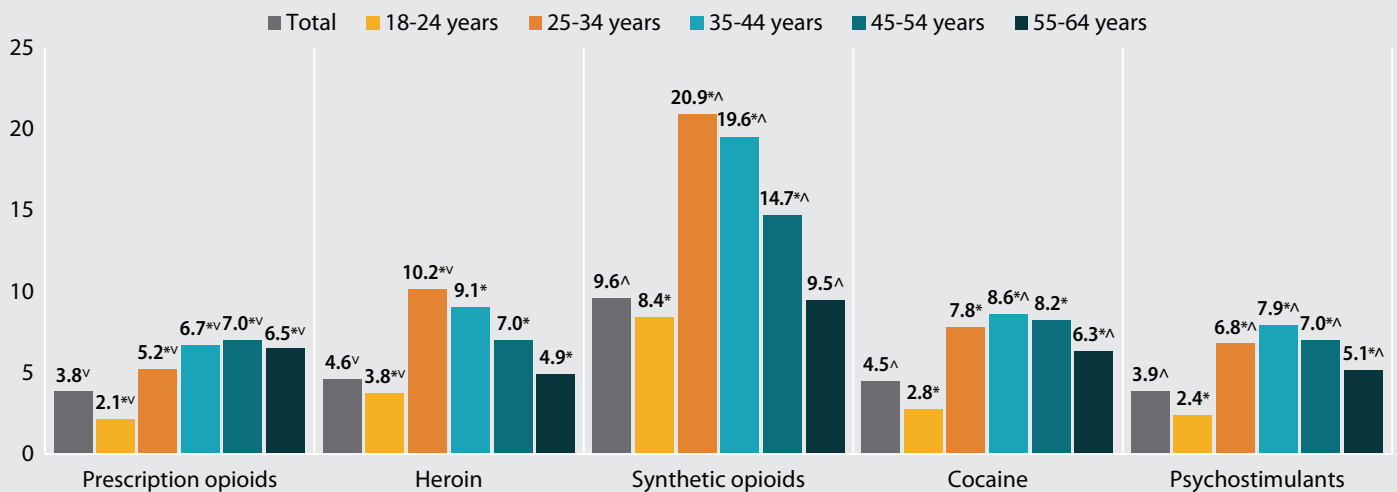
### Opioid and Related Deaths by Age

Since 2000, U.S. deaths from opioids have measurably increased across nearly all age categories of adolescents and adults, but we focus on non-elderly adults for our analysis by age subgroup, as they have the highest rates of overdose deaths.<sup>17,18</sup> However, the overall death rate totals presented here still include people of all ages (i.e., children, non-elderly adults, and elderly adults).

Across the five drug categories, our analysis found two distinct patterns: Among heroin and cocaine, which saw relatively small changes in their total overdose death rates in 2018, only two age categories experienced statistically significant changes. By contrast, synthetic opioids, prescription opioids and psychostimulants, which saw relatively large changes in their total overdose death rates, experienced statistically significant changes in most or all age categories.

For prescription opioids, all of the age subcategories we examined experienced statistically significant declines in their overdose death rates between 2017 and 2018. The 45-54 age category had the highest prescription opioid death rate (7.0 deaths per 100,000 people) in 2018, and their drop of 19.1 percent also was the second-largest statistically significant decline (Figure 6). Young adults age 18-24 in 2018 had the lowest rate of prescription opioid overdose deaths (2.1 per 100,000 people), and their decline of 25.5 percent was also the largest drop.

**Figure 6. U.S. Overdose Death Rates per 100,000 People by Age, 2018**



<sup>^</sup> Significantly significant increase from 2017 rate at 95% level.  
<sup>v</sup> Significantly significant decrease from 2017 rate at 95% level.  
<sup>\*</sup> Statistically significant difference from total rate at 95% level.  
 Source: SHADAC analysis of vital statistics data from the CDC WONDER system.

For heroin, only young adults age 18-24 and age 25-34 experienced statistically significant declines in overdose death rates between 2017 and 2018. While young adults had the lowest heroin overdose death rate in 2018 (3.8 per 100,000 people), their drop of 20.0 percent was the larger significant decline. Young adults age 25-34 had the highest heroin death rate in 2018 (10.2 per 100,000 people), but their significant decline was a smaller 5.8 percent.

For synthetic opioids, all age subcategories except young adults saw their overdose death rates worsen in 2018. Adults age 55-64 had the second-lowest synthetic opioid death rate in 2018 (9.5 per 100,000 people), but their increase of 14.7 percent was the largest significant change. Adults age 25-34 had the highest synthetic opioid death rate in 2018 (20.9 deaths per 100,000), but they experienced the smallest significant increase (7.6 percent).

For cocaine, only the 35-44 and 55-64 age groups experienced statistically significant changes in their overdose death rates. The former (age 35-44) had the highest cocaine overdose death rate in 2018 (8.6 per 100,000 people), but their significant increase of 7.4 percent was not the highest. The latter group (age 55-64) had the highest significant increase (13.9 percent), although their cocaine overdose death rate was the second-lowest at 6.3 per 100,000.

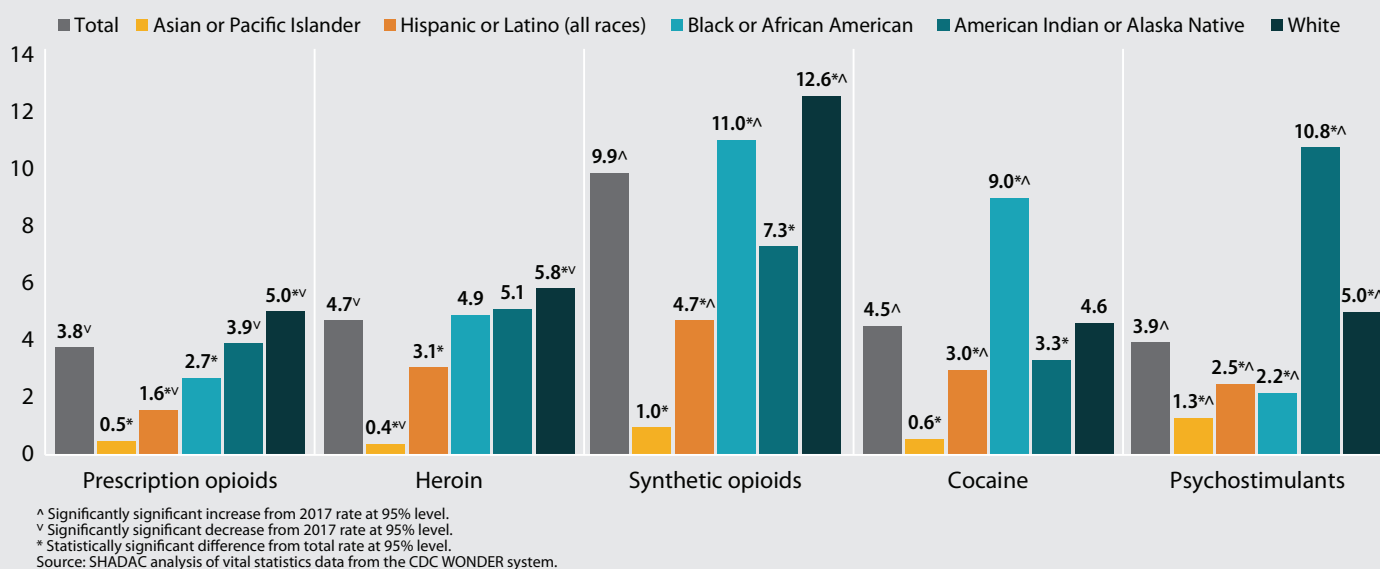
For psychostimulants, all age categories except young adults experienced increased overdose death rates in 2018. The 35-44 age group had the highest psychostimulant overdose death rate in 2018 (7.9 per 100,000 people) as well as the second-largest significant change at an increase of 27.4 percent. Adults age 55-64 had the second-lowest psychostimulant death rate in 2018 (5.1 per 100,000), but they recorded the largest significant increase at 31.1 percent.

### Opioid and Related Deaths by Race and Ethnicity

Although the scale of the opioid crisis varies across racial and ethnic groups in the U.S., with some groups being hit especially hard, the crisis has not excluded any group entirely. Death rates from each type of opioids—prescription pain killers, heroin, and synthetic—have increased significantly since 2000 across all groups examined in this report: American Indians and Alaska Natives, Asians and Pacific Islanders, Blacks, Whites, and Hispanics/Latinos.<sup>19</sup> Death rates from cocaine and psychostimulants have similarly increased significantly across racial/ethnic groups since 2000. Our study also found that all racial and ethnic groups experienced statistically significant changes in overdose death rates between 2017 and 2018 for at least some of the five drug categories we examined.

In 2018, three subgroups experienced statistically significant declines in their prescription opioid overdose death rates. Though American Indians and Alaska Natives had the second-highest death rate (3.9 per 100,000 people) that year, their decline of 32.1 percent was the largest drop (Figure 7). Whites, on the other hand, had the highest prescription opioid death rate in 2018 (5.0 per 100,000 people), and their decline of 14.4 percent since 2017 was the second-highest significant decline. Hispanics/Latinos also experienced a significant decline of 11.0 percent, although their death rate was the second lowest (1.6 per 100,000 people).

**Figure 7. U.S. Overdose Death Rates per 100,000 People by Race/Ethnicity, 2018**



Only Whites and Asians and Pacific Islanders experienced significant declines in heroin overdose death rates in 2018. Asians and Pacific Islanders had the lowest heroin overdose death rate in 2018 (0.4 per 100,000), but their decline of 30.4 percent was still the largest significant drop. Whites had the highest heroin death rate in 2018 (5.8 per 100,000 people), and their rate declined a statistically significant 4.5 percent since 2017.

When looking at death rates from synthetic opioids in 2018, Whites, Blacks and Hispanics/Latinos all saw significant increases. Hispanics/Latinos had the second-lowest synthetic opioid overdose death rate (4.7 per 100,000 people), but their statistically significant increase of 26.4 percent was the largest. Blacks had the second-highest death rate from synthetic opioids (11.0 per 100,000), and their increase was a statistically significant 23.2 percent. Whites had the highest death rate (12.6 per 100,000 people), but they had the smallest significant increase of 6.2 percent.

Only Blacks and Hispanics/Latinos experienced significant changes in their cocaine overdose death rates in 2018. Blacks had the highest death rate (9.0 per 100,000 people), and their cocaine overdose death rate increased by 9.1 percent. Hispanics/Latinos had the second-lowest cocaine death rate in 2018 (3.0 per 100,000 people), but, at 18.1 percent, they experienced the largest significant increase.

For psychostimulants, all racial and ethnic groups experienced statistically significant increases in their overdose death rates. In 2018, American Indians and Alaska Natives had the highest psychostimulant death rate (10.8 per 100,000 people), and their increase since 2017 was in the middle at 26.0 percent. Blacks had the second-lowest psychostimulant death rate in 2018 (2.2 per 100,000 people), but their increase of 38.1 percent was the largest.

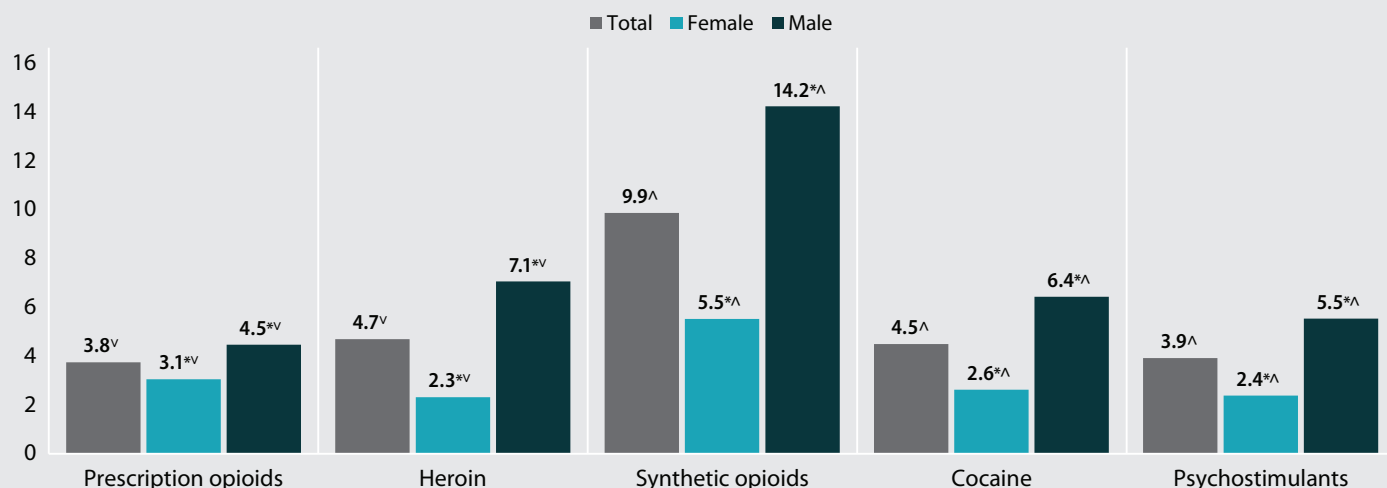
### Opioid and Related Deaths by Sex

Death rates from each type of opioid, as well as cocaine and psychostimulants, have increased significantly among both males and females since 2000, though males have consistently had higher rates of overdose deaths. Our study found that from 2017 to 2018, both males and females experienced statistically significant changes in overdose death rates for each drug category; however, females consistently experienced larger changes than males.

Looking at prescription opioids, males had higher prescription opioid death rates than females in 2018 (4.5 versus 3.1 per 100,000 people), while females saw a larger decline when comparing with the prior year (14.9 percent versus 13.7 percent) (Figure 8). For heroin, males had an overdose death rate of 7.1 versus the rate of 2.3 per 100,000 people among females, but females again experienced a larger decline in heroin death rates (5.2 percent versus 3.1 percent). For synthetic opioids, males once again had a higher overdose death rate than females (14.2 versus 5.5 deaths per 100,000), while females yet again experienced a larger change in overdose death rates, this time in the form of a significant increase (10.8 percent versus 9.3 percent).

Both males and females experienced statistically significant increases in cocaine and psychostimulant overdose deaths. Males had higher cocaine overdose death rates than females in 2018 (6.4 versus 2.6 per 100,000 people), but females had a larger increase in death rates than males (6.7 percent versus 3.2 percent). When examining psychostimulants, males again had higher death rates than females (5.5 versus 2.4 deaths per 100,000), but females experienced a slightly larger increase (22.7 percent versus 22.1 percent).

**Figure 8. U.S. Overdose Death Rates per 100,000 People by Sex, 2018**



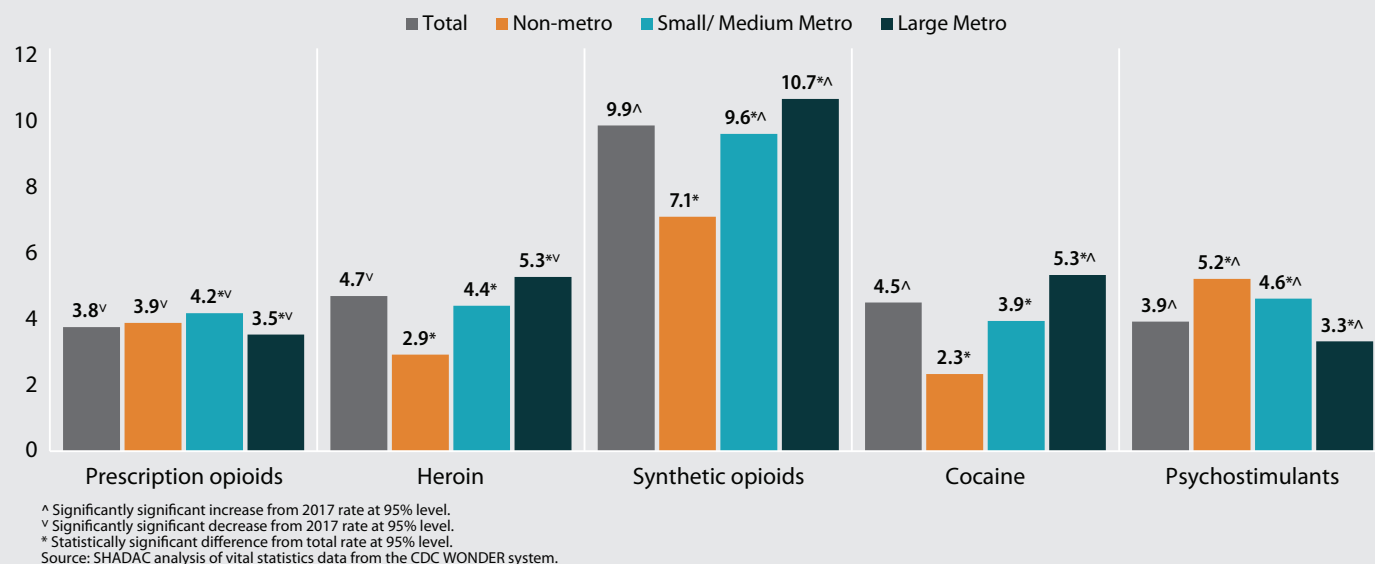
<sup>^</sup> Significantly significant increase from 2017 rate at 95% level.  
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<sup>\*</sup> Statistically significant difference from total rate at 95% level.  
 Source: SHADAC analysis of vital statistics data from the CDC WONDER system.

### Opioid and Related Deaths by Urbanization

Death rates from each type of opioid, cocaine, and psychostimulants have increased significantly since 2000 in all categories of urbanization: large metro, small/medium metro, and non-metro (i.e., rural) communities. However, different levels of urbanization demonstrate different patterns in drug overdose death rates, with higher heroin death rates in large metros as opposed to higher psychostimulant death rates in non-metro areas, for instance. Our study also found differences by urbanization in how drug overdose death rates had changed between 2017 and 2018.

Prescription opioid overdose deaths declined significantly across all levels of urbanization from 2017 to 2018. Small/medium metros had the highest prescription opioid overdose death rate in 2018 (4.2 per 100,000 people), though their decline fell in the middle of the results (14.3 percent). Large metros had the lowest prescription opioid death rate (3.5 per 100,000 people), and their decline was the smallest (13.5 percent) (Figure 9). Non-metro areas had a prescription opioid death rate in the middle at 3.9 per 100,000 people, but their 20.1 percent decline in death rates was the largest.

Figure 9. U.S. Overdose Death Rates per 100,000 People by Metro Size, 2018



Large metros were the only urbanization subcategory to experience a significant decline in heroin overdose death rates in 2018, while the rates in non-metro and small/medium metro areas remained statistically unchanged since 2017. The heroin death rate in large urban areas was highest (5.3 per 100,000 people), and it declined 6.0 percent from 2017. Small/medium metro areas had a heroin overdose death rate in the middle, while non-metro areas had the lowest rate (4.4 and 2.9 deaths per 100,000 people, respectively). Their rates were not significantly different from 2017.

Unlike with prescription opioids and heroin, no urbanization subcategories saw improvements in synthetic opioid overdose death rates from 2017 to 2018. Large metro areas had the highest synthetic opioid overdose death rates in 2018 (10.7 per 100,000) along with an increase of 12.2 percent from the prior year, which was the largest significant change. Small/medium metro areas had the second-highest death rate from synthetic opioids (9.6 per 100,000 people), and they also experienced a statistically significant increase since 2017 (7.4 percent). Non-metro areas had the lowest death rate from synthetic opioids (7.1 deaths per 100,000 people), which was not significantly different from 2017.

Only large metros saw a statistically significant increase in cocaine deaths in 2018, while those of small/medium metro and non-metro areas remained statistically unchanged from 2017. In 2018, cocaine overdose death rates for large metros were the highest (5.3 per 100,000), and they increased by 8.0 percent from 2017. The rate for small/medium metros fell in the middle, while non-metros had the lowest rate (3.9 and 2.3 deaths per 100,000, respectively).

From 2017 to 2018, all subcategories of urbanization experienced statistically significant increases in psychostimulant overdose death rates. Non-metro areas had the highest psychostimulant death rate (5.2 per 100,000 people) in 2018, corresponding with the highest increase of 29.3 percent since 2017. Large metros had the lowest psychostimulant overdose death rate in 2018 (3.3 per 100,000 people), and their increase of 22.3 percent fell in the middle. Psychostimulant overdose death rates in small/medium metros landed in the middle in 2018 (4.6 per 100,000), and they had the smallest increase since 2017 at 17.1 percent.



### CONCLUSIONS AND DISCUSSION

One of the hallmark features of the national opioid epidemic is a capacity to rapidly evolve, which it has demonstrated multiple times. While the crisis began with more than a decade of steady growth in overdose deaths from prescription opioids, that growth slowed around 2011—only to be swiftly overtaken by heroin death rates just a few years later. Then, after years of amounting to relatively small numbers of deaths, synthetic opioids emerged and eclipsed the death rates of both prescription opioids and heroin. Now, as some states begin to see early signs of progress in combatting the opioid crisis, deaths from certain non-opioid drugs that are closely intertwined with the opioid crisis have begun surging.

In 2018, drug overdose deaths overall and opioid overdose deaths in aggregate declined a small but statistically significant amount. But our focus on the dynamics of the overdose crisis at a more granular level has uncovered a much more nuanced story. Death rates from both prescription opioids and heroin declined significantly in 2018, a sign that various efforts to intervene in the epidemic—such as expanding access to medication assisted treatment for opioid addiction and use of the opioid overdose-reversing medication naloxone—may be succeeding. Our study found evidence that the decline in death rates from prescription opioids has been especially pervasive, with significant declines almost universally across age, gender, urbanization, and racial and ethnic groups. Our analysis found that the decline in deaths from heroin was much more limited, with effects especially for Whites, younger adults, and those in large metro areas.

However, we also found components of the overdose crisis that continued to worsen in 2018. Death rates from synthetic opioids grew significantly again in 2018, reaching yet another record level of 9.9 deaths per 100,000 people. Similar to prescription opioids, we saw the prevailing trend for synthetic opioids affected nearly every group we examined—except in this case, the trends were moving in the wrong direction, with large increases in death rates as compared to the prior year. Additionally, we found that death rates from cocaine and psychostimulants, such as methamphetamine, continued to increase in 2018. In fact, they both marked two disquieting milestones in 2018, overtaking the death rate for prescription opioids both that year and when compared with rates in 2011, which was the year the CDC first rang alarm bells about the epidemic. By that measure, deaths from cocaine and psychostimulants could now be considered growing epidemics in their own rights.

Nonetheless, our findings about cocaine overdose deaths do offer some reason for hope. While cocaine overdose deaths increased significantly, their growth was relatively small as compared to synthetic opioids, for instance. Additionally, the growth in cocaine overdose deaths was not as widespread across population subgroups as was that for synthetic opioids, which could offer an opportunity to contain this crisis. The data on psychostimulant deaths, however, seem more foreboding. In 2018, death rates from psychostimulants grew faster than even the rate of synthetic opioids and, with only the single exception of young adults, we found that psychostimulant deaths increased significantly across every age, gender, urbanization, and racial and ethnic category we examined.

These findings show that while the U.S. is making progress in curbing at least some types of opioid overdose deaths, other segments of the crisis continue to escalate. This limited progress suggests that targeted policy interventions may be effective in working to mitigate the death toll, but also that it's far from time to let up on efforts to reverse the epidemic and instead turn the focus toward applying lessons of success to emerging threats like cocaine and psychostimulants.

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<sup>1</sup> Hedegaard, H., Miniño, A.M., & Warner, M. (2020). Drug overdose deaths in the United States, 1999-2018 [Data brief No. 356]. Retrieved from <https://www.cdc.gov/nchs/data/databriefs/db356-h.pdf>

<sup>2</sup> Kariisa, M., Scholl, L., Wilson, N., Seth, P., & Hoots, B. (2019, May 3). Drug overdose deaths involving cocaine and psychostimulants with abuse potential—United States, 2003-2017. *MMWR*, 68(17), 388-395. DOI: <http://dx.doi.org/10.15585/mmwr.mm6817a3>

<sup>3</sup> Drug Enforcement Administration (DEA) Strategic Intelligence Section. (2020). 2019 National Drug Threat Assessment [DEA-DCT-DIR-007-20]. Retrieved from [https://www.dea.gov/sites/default/files/2020-01/2019-NDTA-final-01-14-2020\\_Low\\_Web-DIR-007-20\\_2019.pdf](https://www.dea.gov/sites/default/files/2020-01/2019-NDTA-final-01-14-2020_Low_Web-DIR-007-20_2019.pdf)

<sup>4</sup> There is insufficient evidence to say definitively whether the pattern of non-opioid illicit substances is driven primarily by unintentional contamination (e.g., drug traffickers accidentally mixing fentanyl into cocaine due to sloppy packaging) or intentional mixing of different drug types (e.g., drug traffickers purposefully blending methamphetamine and fentanyl into counterfeit prescription pills).

<sup>5</sup> State Health Access Data Assistance Center (SHADAC). (2019). The opioid epidemic: State trends in opioid-related overdose deaths from 2000 to 2017 [PDF file]. Available from <http://www.shadac.org/2017OpioidBriefs>

<sup>6</sup> Kariisa, M., Scholl, L., Wilson, N., Seth, P., & Hoots, B. (2019, May 3). Drug overdose deaths involving cocaine and psychostimulants with abuse potential—United States, 2003-2017. *MMWR*, 68(17), 388-395. DOI: <http://dx.doi.org/10.15585/mmwr.mm6817a3>

<sup>7</sup> The category of overall opioid overdose death rates includes deaths from three types of opioids we do not examine independently in this brief because they are less common and have not experienced the same dramatic increase in death rates: opium; methadone; and other and non-specified opioids.

<sup>8</sup> Kariisa, M., Scholl, L., Wilson, N., Seth, P., & Hoots, B. (2019, May 3). Drug overdose deaths involving cocaine and psychostimulants with abuse potential—United States, 2003-2017. *MMWR*, 68(17), 388-395. DOI: <http://dx.doi.org/10.15585/mmwr.mm6817a3>

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<sup>10</sup> Kariisa, M., Scholl, L., Wilson, N., Seth, P., & Hoots, B. (2019, May 3). Drug overdose deaths involving cocaine and psychostimulants with abuse potential—United States, 2003-2017. *MMWR*, 68(17), 388-395. DOI: <http://dx.doi.org/10.15585/mmwr.mm6817a3>

<sup>11</sup> Cicero, T., Ellis, M., & Harney, J. (2015). Shifting patterns of prescription opioid and heroin abuse in the United States. *New England Journal of Medicine*, 373(18), 1789-1790. DOI: [10.1056/NEJMc1505541](https://doi.org/10.1056/NEJMc1505541)

<sup>12</sup> Unick, G., Rosenblum, D., Mars, S., & Ciccarone, D. (2013). Intertwined epidemics: National demographic trends in hospitalizations for heroin- and opioid-related overdoses, 1993-2009. *PLOS One*, 8(2), e54496. DOI: [10.1371/journal.pone.0054496](https://doi.org/10.1371/journal.pone.0054496)

<sup>13</sup> Pitt, A., Humphreys, K., & Brandeau, M. (2018). Modeling health benefits and harms of public policy responses to the US opioid epidemic. *American Journal of Public Health (AJPH)*, 108(10), 1394-1400. DOI: <https://doi.org/10.2105/AJPH.2018.304590>

<sup>14</sup> U.S. Centers for Disease Control and Prevention. (2018). Drugs Most Frequently Involved in Drug Overdose Deaths: United States, 2011–2016 [PDF file]. National Vital Statistics Reports. Available at: [https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67\\_09-508.pdf](https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_09-508.pdf)

<sup>15</sup> Though the figure uses names of specific substances from the CDC study (e.g., fentanyl, oxycodone, methamphetamine), the relative size of the circles are based on those substances' larger drug categories. For example, the size of the methamphetamine circle relative to the others is based on the rate of overdose deaths from "psychostimulants with abuse potential"—the parent drug category that includes methamphetamine.

<sup>16</sup> For ease of presentation, this figure treats fentanyl as the diagram "hub" because synthetic opioid deaths (the category including fentanyl) account for the most overdose deaths; while the amount that satellite substances overlap with fentanyl roughly corresponds to findings from the cited CDC study, the converse is not necessarily true. For example, approximately 37 percent of heroin deaths involve fentanyl, so the figure shows heroin overlapped roughly that amount by fentanyl. However, approximately 32 percent of fentanyl deaths involve heroin, which the figure does not reflect. Additionally, because the figure treats fentanyl as the hub, it is unable to illustrate the overlap between methamphetamine and cocaine overdose deaths.

<sup>17</sup> Gaither, J., Leventhal, J., & Ryan, S. (2016). National trends in hospitalizations for opioid poisonings among children and adolescents, 1997 to 2012. *JAMA Pediatrics*, 170(12), 1194-1201. DOI: [10.1001/jamapediatrics.2016.2154](https://doi.org/10.1001/jamapediatrics.2016.2154)

<sup>18</sup> Because the estimates in this section on age subgroups cannot be age-adjusted like the data in other sections, the death rate totals here differ slightly from the totals listed elsewhere in the brief.

<sup>19</sup> State Health Access Data Assistance Center (SHADAC). (2019). The opioid epidemic: State trends in opioid-related overdose deaths from 2000 to 2017 [PDF file]. Available from <http://www.shadac.org/2017OpioidBriefs>