



# The Opioid Epidemic: National Trends in Opioid-Related Overdose Deaths from 2000 to 2015

## AUTHOR

**Colin Planalp**

*Research Fellow, State Health Access Data Assistance Center*

**Megan Lahr**

*Graduate Research Assistant, State Health Access Data Assistance Center*

## SUMMARY

This brief examines the United States opioid epidemic, analyzing trends in overdose deaths from heroin and other opioids, such as prescription painkillers. Using vital statistics data, it also looks at differences in opioid deaths by age, race/ethnicity and urbanization.

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## INTRODUCTION

The number of annual deaths from drug overdoses in the United States has tripled during the past 15 years, from 17,500 in 2000 to 52,500 in 2015.<sup>1</sup> Most of these deaths involved opioids, including heroin and prescription painkillers.<sup>2</sup> Although the incidence of opioid-related deaths has grown for more than a decade, the problem began drawing substantially more attention from policy-makers, the news media, and the public since 2011, when the U.S. Centers for Disease Control and Prevention (CDC) declared overdoses from prescription painkillers an “epidemic.” More recently, heroin use has received increasing attention as deaths related to the illegal cousin of prescription painkillers more than tripled between 2010 and 2015.<sup>3</sup> This brief provides high-level information about opioids and opioid addiction, presents the historical context for the epidemic of opioid-related addiction and mortality in the United States, and examines trends in opioid-related mortality across the country and among population subgroups.

## Background

### *Addictive properties of opioids*

To better understand the development of the opioid crisis, it is important to recognize the addictive properties of opioids and the relationship between different opioid types. Generally, there are three kinds of opioids: 1) natural opiates, like morphine, which are made from the opium poppy plant; 2) semi-synthetic opioids, like hydrocodone and oxycodone, which are chemically derived from natural opiates; and 3) fully synthetic opioids, like fentanyl, which are chemically created to mimic natural opiates but are typically much more potent. Chemically, illicit opioids, such as heroin, are similar to legal opioid painkillers, such as oxycodone and hydrocodone.<sup>4</sup> All of these opioids stimulate the same opioid receptors in the reward centers in the brain, creating similar feelings of euphoria.<sup>5</sup> Repeated use of opioids can affect the chemistry and wiring of the brain, causing addiction that prompts people to crave and use opioids habitually and can cause symptoms of withdrawal if people stop using opioids.<sup>6</sup>

Because all opioids act similarly in the same parts of the brain, someone who is chemically dependent on a prescription opioid painkiller and unable to obtain it may switch to an illicit opioid, such as a heroin, to relieve their cravings or withdrawal symptoms. In fact, studies have shown that many people who use heroin or misuse prescription opioids began with “legitimate” prescriptions for their own pain treatment or obtained these painkillers from friends or family members with prescriptions.<sup>7,8</sup> For example, a national study found that 80 percent of people who reported using heroin also reported earlier misuse of prescription opioids.<sup>9</sup> Research also shows that people often advance from misuse of prescription opioids to heroin because heroin provides stronger effects and is often less expensive than prescription opioids.<sup>10</sup>

## COMPANION BRIEF

To read SHADAC’s analysis of state-level data on opioid-related overdose deaths, visit: [www.shadac.org/OpioidBriefs](http://www.shadac.org/OpioidBriefs).

## Rise of the epidemic

The rise of the opioid crisis is commonly attributed to an increase in the prescribing of opioid painkillers, which was driven by a confluence of several factors.

First, in the 1980s, some peer-reviewed journals published letters and articles suggesting that opioids were an effective way to treat pain with little risk of addiction. Specifically, a commonly cited 1980 letter published in the *New England Journal of Medicine* and another commonly cited research article published in the *Journal of Pain* in 1986 are believed to have contributed to a belief that opioids did not pose a high risk for addiction.<sup>11,12,13,14</sup>

Second, in the 1990s and 2000s, there was an increased emphasis among health care professionals on the importance of recognizing and treating pain. In 1996, the president of the American Pain Society raised the idea of “pain as a vital sign,” stating that “quality care means that pain is measured and treated”— a concept that was adopted by many health professionals and throughout many health care organizations.<sup>15</sup> As examples, the Veterans Health Administration undertook efforts beginning in 1999 to regularly measure and record patients’ self-reported pain on a scale of 0 to 10, and the health care accreditation organization The Joint Commission introduced pain-management standards that encouraged the assessment and treatment of pain.<sup>16,17</sup>

In 1995, around the same time that health professionals were focusing on under-treatment of pain, the Food and Drug Administration approved the opioid painkiller Oxycontin, which has become among the most-common controlled substances in the U.S., and which the FDA has since described as “a focal point of opioid abuse issues.”<sup>18</sup> In 2007, the maker of Oxycontin, Purdue Pharma, settled criminal and civil claims by the U.S. Department of Justice that the company knowingly made false marketing claims that Oxycontin was less addictive than other medications.<sup>19,20</sup> Despite its renown, the case of Oxycontin is not unique; use of other opioid painkillers also has increased substantially, and other pharmaceutical companies have settled charges of misrepresenting the abuse-resistance and addictive properties of their medications.<sup>21,22</sup>

## U.S. Opioid Deaths

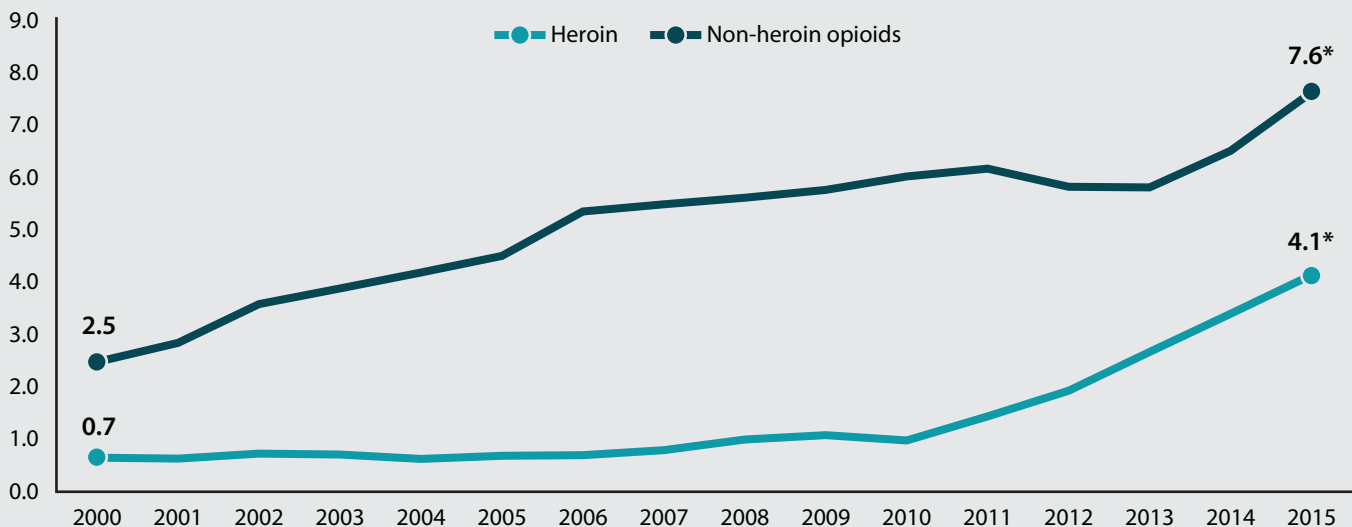
Over more than a decade, the U.S. has experienced statistically significant increases in overdose deaths related to opioids; these increases have occurred throughout the country, with nearly every state having experienced increases in opioid-related deaths since 2000.<sup>23</sup> However, data on overdose deaths show a nuanced story, with different but related trends in mortality from heroin versus other opioids. Additionally, while opioid death rates have increased for most groups across ages, race/ethnicity, and metropolitan/non-metropolitan communities, not all groups have been affected equally. The following section uses vital statistics data from the CDC to examine increases in overdose deaths from heroin and other opioids at the U.S. level since 2000, as well as differences across groups by age, race/ethnicity, and metro/non-metro communities.

### Heroin and non-heroin opioid deaths

Between 2000 and 2015, rates of drug poisoning deaths related to opioids other than heroin—such as prescription painkillers—more than tripled, from 2.5 to 7.6 per 100,000 people (Figure 1). During the same time, deaths from heroin grew nearly six times, from 0.7 to 4.1 deaths per 100,000 people.

Although deaths from both heroin and non-heroin opioids have increased since 2000, there are notable differences in their paths. While death rates from non-heroin opioids steadily increased from 2000 to 2010, more than doubling from 2.5 to 6.0 deaths per 100,000 people, the increase in death rates during that time from heroin was comparatively modest, increasing by less than half, from 0.7 to 1.0 deaths per 100,000 people. Since 2010, however, death rates from heroin have increased more rapidly—more than quadrupling from 1.0 to 4.1 per 100,000. During that same time period, deaths from non-heroin opioids dipped slightly to 5.8 deaths per 100,000 in 2012 and 2013, then resumed their climb to a high of 7.6 by 2015.

**Figure 1: U.S. Heroin and Non-heroin Opioid Death Rates Per 100,000 People, 2000-2015**



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

Some research suggests the increase in heroin death rates since 2010 may be due, at least in part, to people switching from prescription painkillers to heroin.<sup>24,25</sup> For example, studies have found that most people who use heroin began by abusing prescription painkillers and that rates of heroin use have increased in recent years among people who use prescription opioids for non-medical purposes.<sup>26,27</sup> Other studies have found evidence that a reformulation of the popular prescription opioid Oxycontin, designed to make the medication abuse-resistant, may have caused some people to adopt heroin as a substitute.<sup>28,29,30</sup>

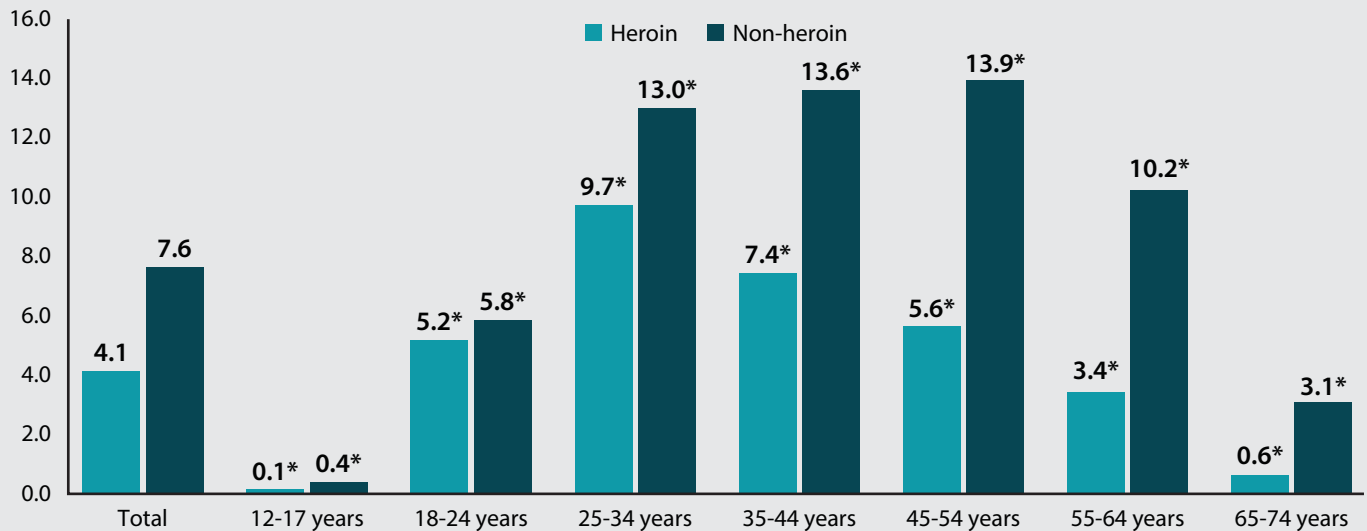
### Opioid deaths by age

Since 2000, U.S. deaths from non-heroin opioids have increased significantly across all ages of adolescents (ages 12-17) and adults,<sup>31,32</sup> and heroin-related death rates increased significantly across non-elderly adults (ages 18-64).<sup>33,34,35</sup> These increases across age sub-groups largely mirror the overall trends in overdose deaths among the U.S. population as a whole—steep increases in heroin deaths since 2010, and more gradual but consistent increases in deaths from non-heroin opioids since 2000.<sup>36</sup>

Even though opioid death rates for most age groups moved in similar directions over time, actual opioid death rates differed between age groups. In 2015, four age groups had heroin death rates that were significantly higher than the overall rate for all ages (4.1 per 100,000): Adults ages 25-34 had the highest rate for heroin deaths (9.7 per 100,000), followed by ages 35-44 (7.4 per 100,000), ages 45-54 (5.6 per 100,000) and ages 18-24 (5.2 per 100,000) (Figure 2). Adults ages 55-64 and 65-74 had rates that were significantly lower than the overall rate, as did adolescents ages 12-17.

The three age groups with the highest heroin death rates in 2015 also had the highest death rates from non-heroin opioids: Adults ages 45-54 had the top rate for non-heroin opioid deaths (13.9 per 100,000), followed by ages 35-44 (13.6 per 100,000) and ages 25-34 (13.0 per 100,000). The rate for adults ages 55-64 (10.2 per 100,000) also was significantly higher than the overall rate of 7.6 per 100,000. Non-heroin opioid death rates were significantly lower than the overall rate for adolescents ages 12-17, young adults ages 18-24, and elderly adults ages 65-74.

**Figure 2: U.S. Heroin and Non-heroin Opioid Death Rates Per 100,000 People by Age, 2015**



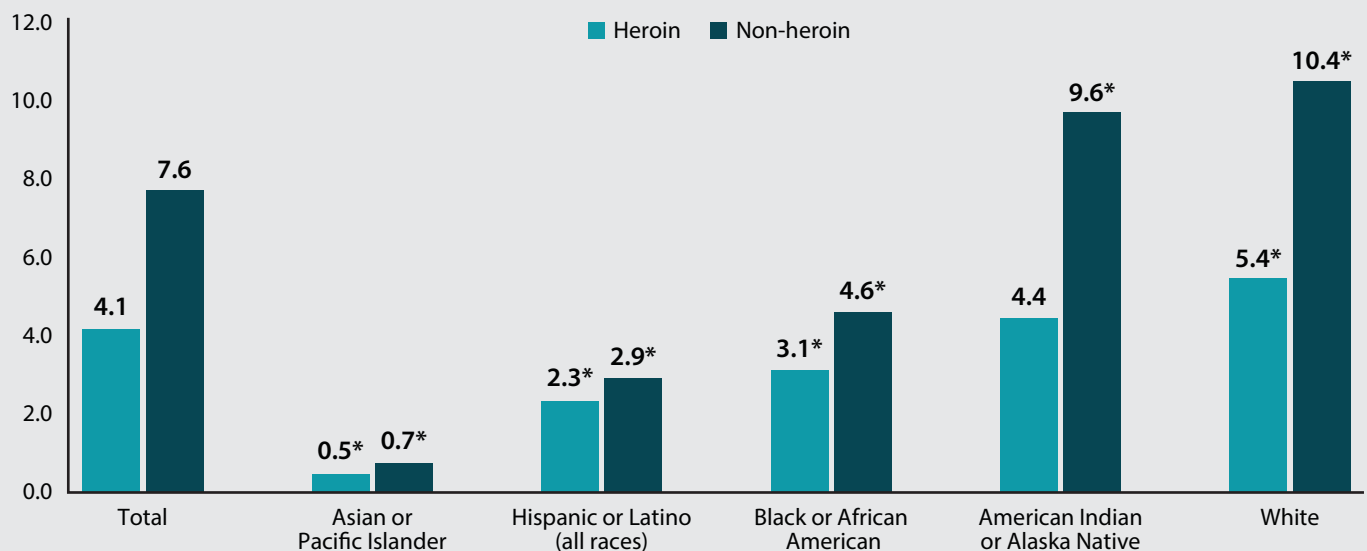
\* Statistically significant difference from total rate at 95% level. Source: SHADAC analysis of vital statistics data from the CDC WONDER system.

### Opioid deaths by race and ethnicity

Death rates from non-heroin opioids have increased significantly since 2000 for all races and ethnicities—American Indians and Alaska Natives, Asians and Pacific Islanders, blacks, whites and Hispanics/Latinos. Heroin death rates also increased significantly since 2000 among blacks, whites and Hispanics/Latinos.<sup>37</sup>

Whites were the only racial/ethnic group for which the heroin death rate was significantly higher than the overall rate (5.4 per 100,000 versus 4.1 per 100,000) (Figure 3). Heroin death rates were significantly lower than the overall rate for blacks, Hispanics/Latinos, and Asians and Pacific Islanders. For non-heroin deaths, whites and American Indians and Alaska Natives both had rates significantly higher than the overall rate (10.4 and 9.6 per 100,000, respectively, versus an overall rate of 7.6 per 100,000). Blacks, Hispanics/Latinos, and Asians and Pacific Islanders had non-heroin opioid death rates that were significantly lower than the overall rate.

**Figure 3: U.S. Heroin and Non-heroin Opioid Death Rates Per 100,000 People by Race/ethnicity, 2015**



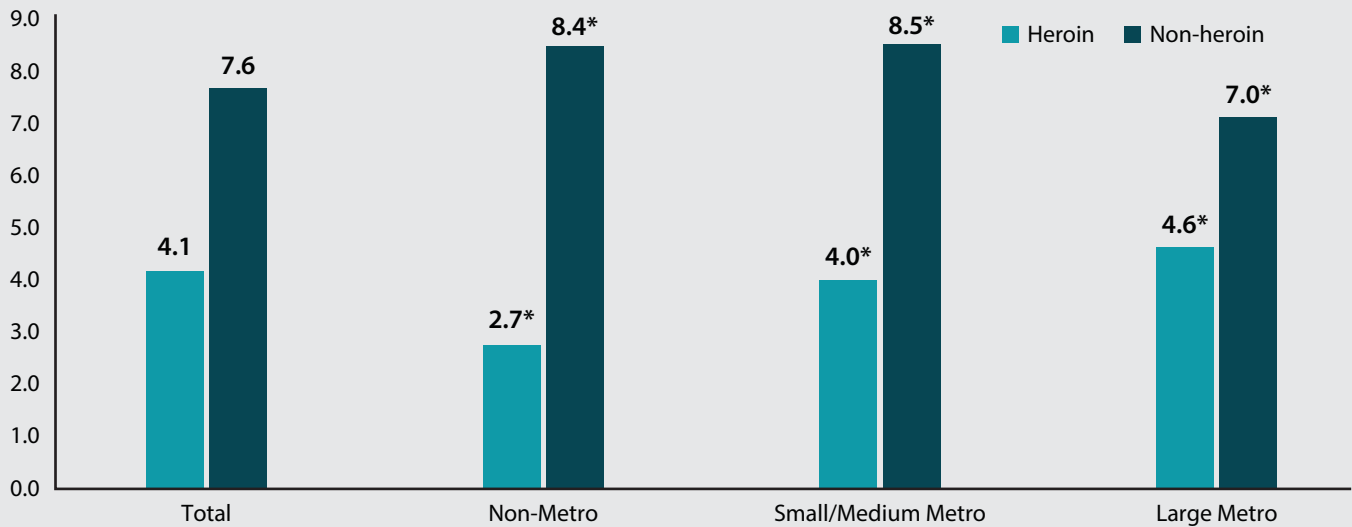
\* Statistically significant difference from total rate at 95% level. Source: SHADAC analysis of vital statistics data from the CDC WONDER system.

### Opioid deaths by urbanization

Death rates from both heroin and non-heroin opioids have increased significantly since 2000 in all categories of urbanization: large metro, small/medium metro, and non-metro (i.e., rural) areas of the U.S. However, the types of opioids associated with deaths vary across these settings.

In 2015, heroin death rates were significantly higher in large metro areas (4.6 per 100,000) than the overall rate of 4.1 per 100,000 (Figure 4). The rate for non-metro areas was significantly lower at 2.7 per 100,000, and while the rate for small/medium metros was only slightly lower (4.0 per 100,000), the difference was statistically significant. For non-heroin opioids, death rates followed an opposite pattern: Non-metro and small/medium metro areas had rates that were significantly higher than the overall rate (8.4 and 8.5 per 100,000, respectively), while the rate for large metro areas was significantly lower than the overall rate (7.0 per 100,000).

Figure 4: U.S. Heroin and Non-heroin Opioid Death Rates Per 100,000 People by Metro Size, 2015



\* Statistically significant difference from total rate at 95% level  
Source: SHADAC analysis of vital statistics data from the CDC WONDER system.

## CONCLUSIONS

Since 2000, the U.S. has experienced statistically significant increases in opioid-related overdose deaths. This trend began earlier for non-heroin opioids, such as prescription painkillers, with increases in overdoses dating to at least the early 2000s. Overdose deaths related to heroin also have increased, but most of that growth has occurred since 2010—around the same time that the steady climb of non-heroin opioid overdose deaths was interrupted by a brief decline.

Our examination of opioid overdose deaths across different segments of the U.S. population shows that, while the epidemic has affected a broad swath of people, certain groups have been harder hit. Among age groups, adults ages 25-54 had the highest opioid-related death rates. That is somewhat surprising because other research finds that younger adults (ages 18-25) typically report the highest rates of substance abuse, while adults over age 25 typically report lower rates of substance abuse.<sup>38</sup> Our analysis by race/ethnicity found that non-Hispanic whites had the highest rates of opioid-related overdose deaths—both for heroin and non-heroin opioids—followed by American Indians/Alaska Natives. In comparison, blacks, Hispanics/Latinos and Asians/Pacific Islanders had opioid death rates that were significantly lower than the overall population.

The epidemic also has affected people in both rural and urban areas across the country, with significant increases in opioid-related deaths across large metro, small/medium metro and non-metro areas. However, there were differences between these groups: Non-metro and small/medium metro areas had higher death rates from non-heroin opioids than the overall population, while large metro areas had higher death rates from heroin than the overall population.

Our findings may be useful to policymakers as they look for ways to tackle the opioid crisis. For example, the more-recent rise in heroin-related deaths suggests that states should consider approaches to address substance abuse more broadly, rather than focusing exclusively on prescription painkillers. Additionally, findings on the demographics of people affected by the crisis may help policymakers to design interventions to help people at greatest risk in the opioid epidemic, such as adults age 45-54, who have the highest rates of death from non-heroin opioids, and people in non-metro areas, which have higher rates of deaths from non-heroin opioids but who tend to have reduced access to treatment due to provider shortages in rural areas.

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- <sup>4</sup> The issue of legal status of opioid drugs is complex. Heroin, as a Schedule 1 controlled substance, is treated as an "illegal" drug with a high risk for abuse and no medicinal value. Most other opioids, such as oxycodone and hydrocodone, are considered Schedule 2 controlled substances, meaning they have substantial potential for abuse but also have medicinal value. The legality of Schedule 2 opioids depends on how they are manufactured and distributed. If a person takes an opioid painkiller that was properly prescribed and dispensed by licensed health care provider, then that would generally be legal. However, opioid painkillers are sometimes fraudulently prescribed or diverted from their intended patients, which is illegal. Additionally, criminal drug traffickers also manufacture counterfeit opioids that are chemically similar to prescription painkillers (e.g., fentanyl) and sell them illegally on the black market.
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- <sup>32</sup> Due to a small number of deaths of children/adolescents (ages 17 and younger) due to heroin and elderly adults (ages 65 and older) in 2000, it was not possible to conduct statistical testing for significant changes in rates. While non-heroin rates were available for some children (ages 11 and younger) and elderly adults in 2000, we excluded these from our analysis because they were relatively small compared to non-elderly adults and to remain consistent with our analysis of heroin-related death rates.

<sup>33</sup> We did not conduct statistical testing for increases in heroin deaths among elderly adults because those data were mostly unavailable due to a small number of deaths.

<sup>34</sup> We did not conduct statistical testing for increases in deaths among children because those data were mostly unavailable due to a small number of deaths. There is evidence of an increase in opioid poisonings among children, which is likely related to the proliferation of prescription painkillers. However, research suggests opioid poisonings among children are caused mostly by accidental ingestion (i.e., young children consuming pills they find) or suicide attempts rather than opioid addiction, which is thought to drive the opioid crisis among adults. See endnote No. 35.

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<sup>37</sup> Testing was not possible for American Indians and Alaska Natives, and Asians and Pacific Islanders because rates were not available for these groups in 2000.

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