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OPIOID PRESCRIBING IN ILLINOIS: EXAMINING PRESCRIPTION DRUG MONITORING PROGRAM DATA

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Abstract: Excessive opioid prescribing increases exposure to those drugs and increases their volume in communities. Over-prescribing has been associated with growing rates of opioid use disorder, overdose, and death. Opioid prescription rates are relatively low in Illinois compared to other states; however, prescription rates varies greatly by county, city, and medical practitioner. This article summarizes Illinois opioid prescription data from the Illinois Prescription Monitoring Program.

Reasons for Increased Opioid Prescribing

Increased U.S. opioid prescribing along with the use and/or misuse can be attributed in part to the following:

- **The belief that pain was undertreated and opioids carried low risk of addiction** contributed to the medical community embracing increased opioid prescribing for pain conditions. This belief was not based on rigorous empirical evidence and there was an exaggeration of the potential benefits of long-term opioid treatment.[7]

- **Patient satisfaction** based in part on federally-mandated patient satisfaction surveys asking patients to rate hospital staff on their efforts toward pain management.[8]

- **Drug companies' aggressive tactics** for selling opioid medications and the introduction in 1995 of OxyContin (a long-acting formulation of oxycodone) and subsequent unethical marketing practices employed by Purdue Pharma.[9]

- **Unethical medical practice models**, in some states sometimes referred to as "pill mills", where patients could pay out of pocket to receive prescriptions for large volumes of opioids with minimal to no medical history or examination.[10]

Introduction

Almost three times as many opioids are prescribed in the United States today as compared to 1999.[1] Health care practitioners wrote 259 million prescriptions for opioid pain medication in 2012, which is enough to provide a full bottle of pills for almost every adult in the country.[2] An estimated one in five patients with pain symptoms who go to their doctor's office receive an opioid prescription.[3] In a 2015 national survey, 13 percent of adults who report taking prescription opioids also reported misuse (defined as non-medical use). Of those, 41 percent obtained opioids for free from friends or relatives.[4]

Illinois opioid prescribing is relatively low compared to other states. According to the Centers for Disease Control and Prevention, Illinois ranked 41st out of 50 states and District of Columbia on opioid prescription totals.[5] However, prescription rates vary greatly by county, city, and medical practitioner.[6] This article describes Illinois opioid prescription practices using Illinois Prescription Monitoring Program (ILPMP) data, focusing on trends and prescribing variations by county. A review of available research on the association between opioid prescribing, opioid misuse, and opioid use disorders also is summarized. Policy and practice implications also are included.

Opioid Prescription Risks

Prescription opioids, similar to heroin, affect the reward regions of the brain and can produce a sense of well-being and pleasure, creating intrinsic risk for misuse.[11] Research indicates that individuals prescribed opioids for pain have a chance of continued use. In one study, 14 percent of those with an eight-day prescription, and 30 percent of those with a 30+ day opioid prescription were found to have opioids still being prescribed to them one year later.[12]

It is important to note, however, that the relationship between prescription opioid use, opioid misuse, and opioid use disorders is complicated. Most who rely on opioid use over an extended period of time for treatment of chronic pain never misuse opioids or develop opioid use disorders. Others who do misuse prescription opioids will never develop a disorder or progress to heroin use. A small percentage, however, will misuse, develop an opioid use disorder, and/or progress to heroin use.[13]

Twenty percent of those aged 12 and older in the United States have misused drugs in their lifetime.[14] Misuse includes taking the drug in ways other than those prescribed such as snorting or injecting crushed pills, taking more than prescribed, and combining with other drugs or alcohol. Some may transition to heroin use, which is cheaper and in many areas of the country more readily available. In a national study, 80 percent of heroin users reported non-medical use of prescription opioids before transitioning to heroin.[15] A majority of opioid misusers are poly-substance users—they use other drugs in addition to opioids. One national study found 59 percent of heroin-related overdose deaths involved at least one other drug.[16]

Consequences of Continued Prescription Opioid Use

Continued regular use of opioids will lead to:

- **Tolerance** or diminished effects of the same dose of the drug over time.
- **Physical dependence,** or the development withdrawal symptoms upon abrupt cessation of use. [21]

With high-dose opioid use, some may be at risk for:

- **Opioid use disorders**, which are diagnosed by a set of behaviors around drug use as outlined by clinical diagnostic criteria.[22]
- **Opioid overdose or death**, which are accidental and may occur with short-term use.

Opioid misuse and use disorder also increases risk for criminal justice involvement. The U.S. Department of Justice estimates about half of state and federal prisoners have substance use disorders.[17] Data on opioid misuse and use disorder among Illinois' justice-involved indicate opioids are frequently an area of concern. In 2016, 2,241 prisoners indicated opioids was their primary substance of misuse (53 percent of them were residing in one of the three Illinois correctional facilities offering substance use disorder treatment). In 2017, nine Illinois drug and mental health courts, reported one-third of their participants had an opioid use related diagnosis (n=42).[18] In an ICJIA survey of 573 Illinois prison inmates, 46 percent reported using prescription drugs to get high at some point in their lives prior to incarceration (n=262).

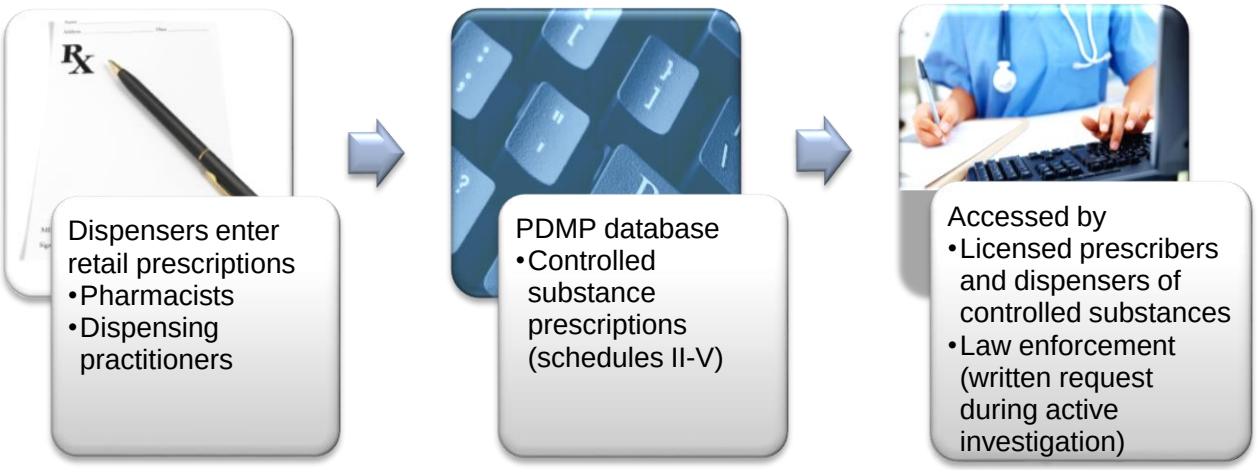
People suffering with opioid use disorder may resort to criminal activity as the need for money increases with escalating addictive behaviors. Opioid prescriptions may be illegally shared and/or sold for profit by patients and their friends and families. National estimates suggest that approximately 3 to 5 percent who misuse prescription opioids will transition to heroin as a part of the progression of their addiction.[19] Those purchasing drugs from the illicit heroin drug market are more likely to commit additional drug-related crimes.[20]

Illinois Prescription Drug Monitoring Program

Prescription Drug Monitoring Programs or PDMPs are state-operated electronic database systems containing information on dispensed retail prescriptions that are federally classified as controlled substances (Schedules II-V). PDMPs are designed to assist in detecting and preventing misuse and diversion of controlled substances.[23] PDMP data has been used to identify trends in prescription patterns, high-risk patterns of prescription drug use among recipients, and associations with opioid-related outcomes.[24] Some research indicates PDMPs may reduce prescribing behavior[25] and prescription drug overdoses,[26] it remains unknown if PDMPs reduce overall opioid deaths. In addition, the need exists to improve accuracy, accessibility, and interpretability of the data.[27] To date, every state, including Illinois, has enacted a PDMP.

Illinois Prescription Monitoring Program (ILPMP) legislation was enacted in 1961 and the program was operational in 1968. ILPMP is funded through the U.S. Department of Justice's Office of Justice Programs' Harold Rogers Prescription Drug Monitoring Program and operated by the Illinois Department of Human Services. Data is entered daily by pharmacies and dispensing practitioners for all controlled substances scheduled as II to V. The program's mission is to enhance a prescriber's and dispenser's capacity to review a patient's prescription history to assist in the effective treatment of patients.[28] A new law effective January 1, 2018, requires most licensed controlled substance prescribers to register with and attempt to access patient information in the ILPMP when providing an initial opioid prescription for Schedule II narcotics such as opioids [Public Act 100-0564].[29] Some de-identified ILPMP data are published online. *Figure 1* depicts the flow of ILPMP data.

Figure 1
Flow of Data of Illinois Prescription Monitoring Program

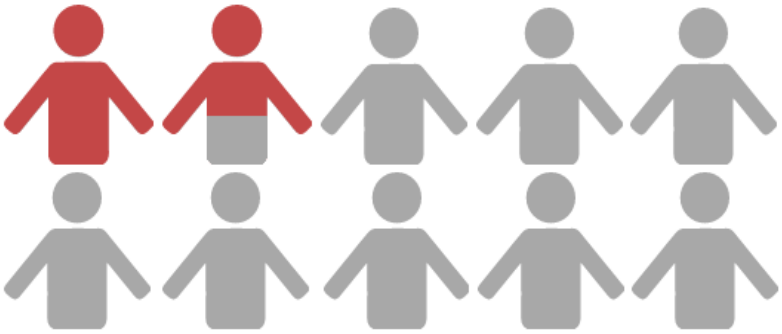


Illinois Opioid Prescribing Practices

In 2016, for every 10 Illinois residents, 1.56 individuals filled at least one opioid prescription (*Figure 2*). This number is slightly lower than that recorded in previous years in Illinois.

Compared to bordering states, Illinois opioid prescribing rates are similar to those of Wisconsin and Iowa, but lower than those in Indiana, Kentucky, and Missouri.[30]

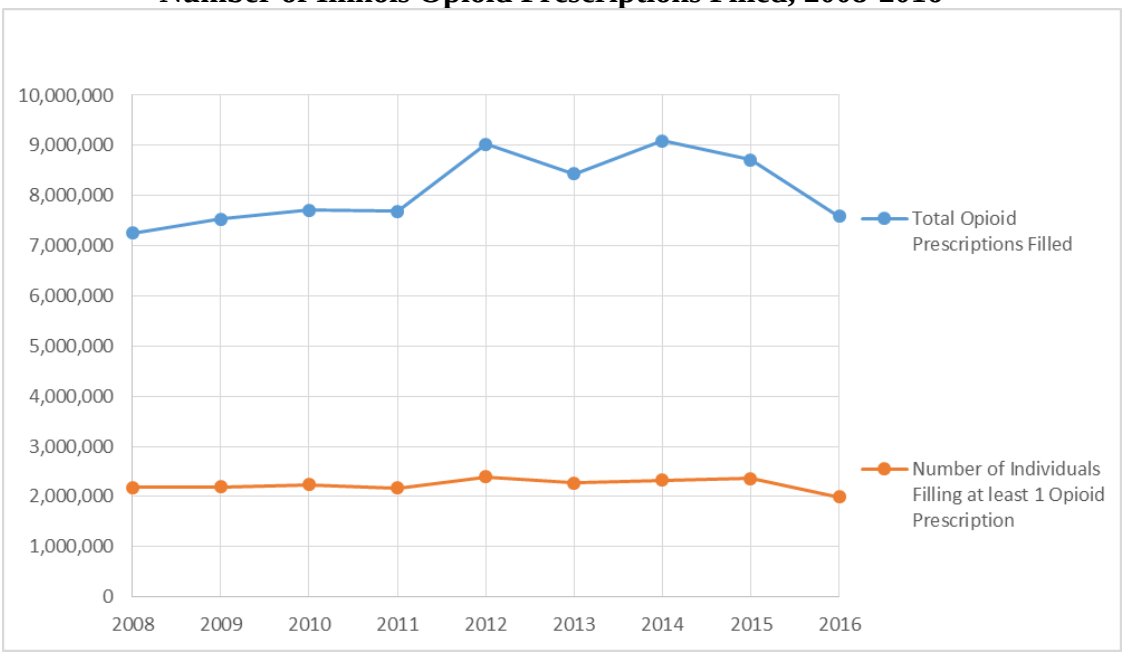
Figure 2
Individuals Filling an Opioid Prescription in Illinois by Population, 2016



Data Source: Illinois Prescription Drug Monitoring Database

As *Figure 3* shows, several major changes were seen in opioid prescription filling patterns between 2008 and 2016. The total number of opioid prescriptions filled in Illinois continued to decline in 2016, with a 16.5 percent decrease after peaking in 2014. The number of individuals filling at least one opioid prescription in Illinois remained comparatively consistent each year from 2008 to 2015, but did show a decrease between 2015 and 2016, dipping below 200,000 patients for the first time during the period studied. This was consistent with national trends and due in part to enhanced use of prescription drug monitoring programs as well as greater knowledge of opioid risks by prescribers and those receiving the prescriptions.[31]

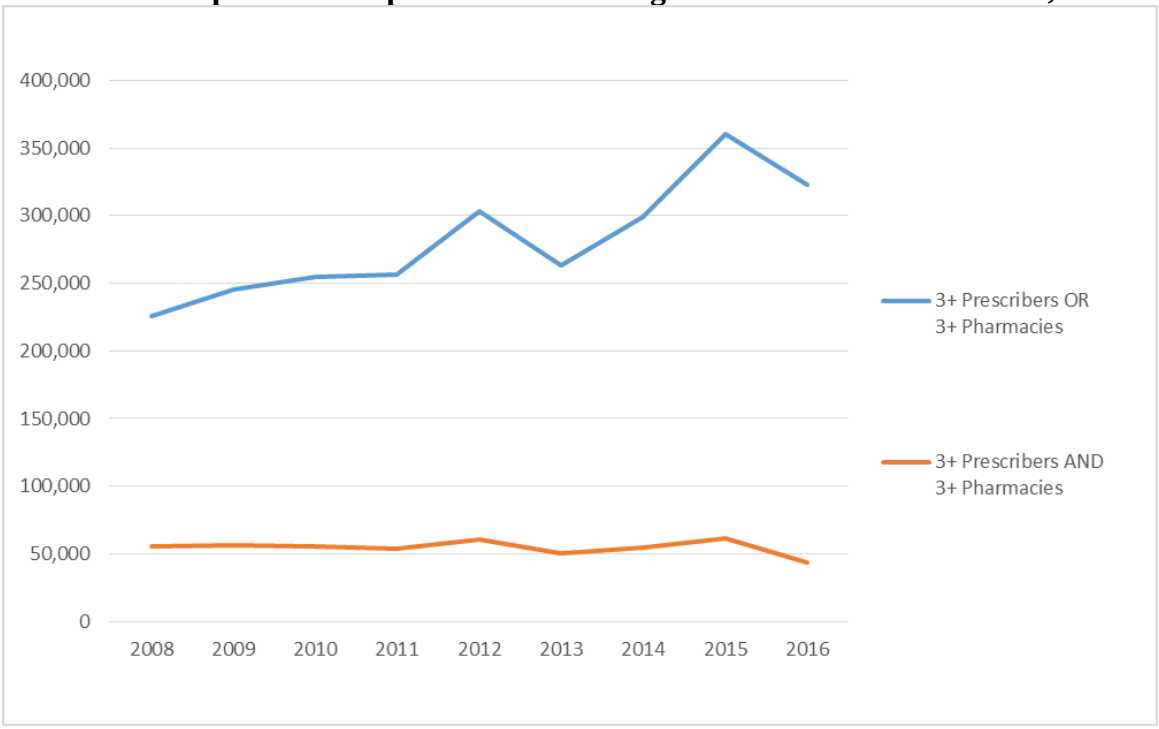
Figure 3
Number of Illinois Opioid Prescriptions Filled, 2008-2016[32]



Data Source: Illinois Prescription Drug Monitoring Database

Of particular concern are individuals who receive multiple prescriptions for opioids within a short period of time as this may indicate potential misuse of prescription opioids, opioid use disorders, and/or higher risk for overdose.[33] These individuals are sometimes referred to as "opioid shoppers." Researchers define "opioid shoppers" as individuals receiving opioid prescriptions from three or more prescribers and three or more pharmacies in a 90-day period. Analysis of multi-state data from 2015 found opioid shoppers accounted for 0.1 percent of all patients filling an opioid prescription.[34] The ILPMP showed individuals who met the definition of opioid shopper during the same period made up 2.6 percent of all individuals filling at least one opioid prescription (*Figure 4*). The number of individuals filling prescriptions that meet the definition of an opioid shopper remained relatively consistent from 2008 to 2015, but showed a modest decrease from 2015 to 2016.[35] One possible explanation for this decrease, based on national data, is an increased awareness of the risks associated with opioid use, as well as reduced prescription with the adoption and use of new policies and practices governing prescription drug monitoring programs.[36]

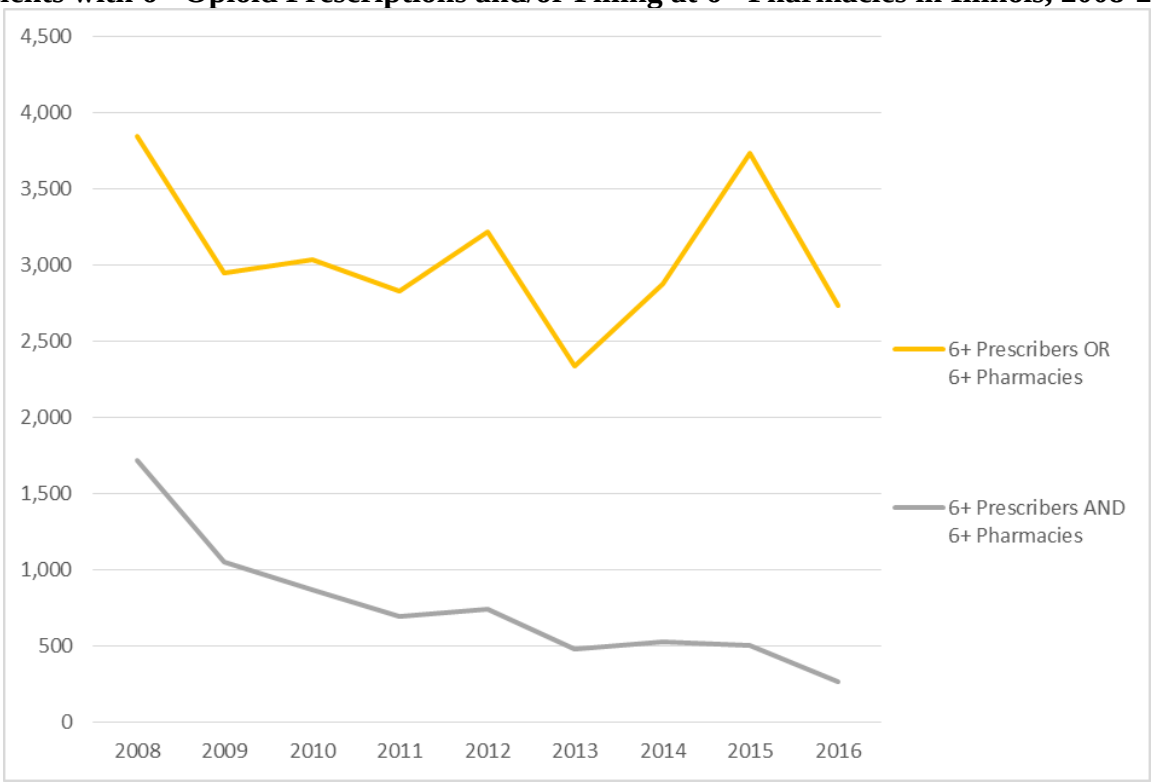
Figure 4
Patients with 3+ Opioid Prescriptions and/or Filling at 3+ Pharmacies in Illinois, 2008-2016



Data Source: Illinois Prescription Drug Monitoring Database

Figure 5 represents a subset of those in *Figure 4* and depicts the number of patients who received opioid prescriptions from six or more prescribers and/or filled prescriptions at six or more pharmacies. The term "doctor shopping" refers to the behavior of seeing multiple clinicians for multiple controlled substances. This practice has been associated with increased risk for misuse, but this pattern of behavior can be complex.[37] Patients report doctor shopping for its convenience, to address symptom persistence, for treatment for multiple conditions, and to seek opioids due to an opioid use disorder.[38] Patients also report doctor shopping due to long doctor office waiting times; inconvenient office locations and hours; poor or limited time for communication with their doctors; and doctors appearing stringent, stern, or strict.[39]

Figure 5
Patients with 6+ Opioid Prescriptions and/or Filling at 6+ Pharmacies in Illinois, 2008-2016

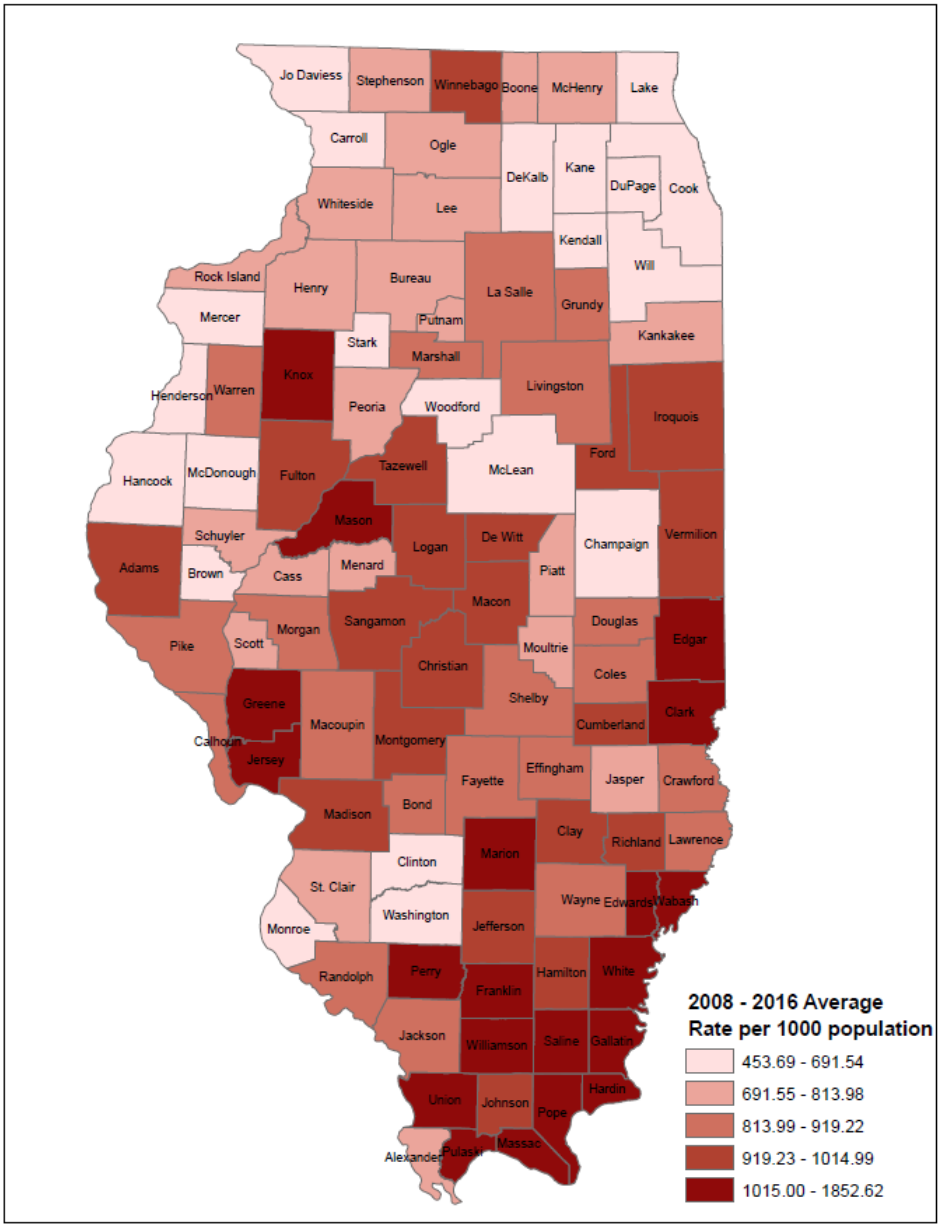


Data Source: Illinois Prescription Drug Monitoring Database

Opioid Prescription Trends by County

Map 1 depicts the total number of opioid prescriptions filled at a rate per 1,000 residents in each county in Illinois between 2008 and 2016. For example, if one person filled 12 prescriptions in a year, each of those prescriptions would be included in the calculation. The intervals in the scale are in five sections (quantiles), with each color representing 20 percent of the total distribution. Rates of opioid prescriptions per population were high in several southern and rural counties. This is consistent with the characteristics identified by the CDC; counties with moderate population density (having small cities or large towns) with primarily white residents were more likely to have higher opioid prescription rates.[40]

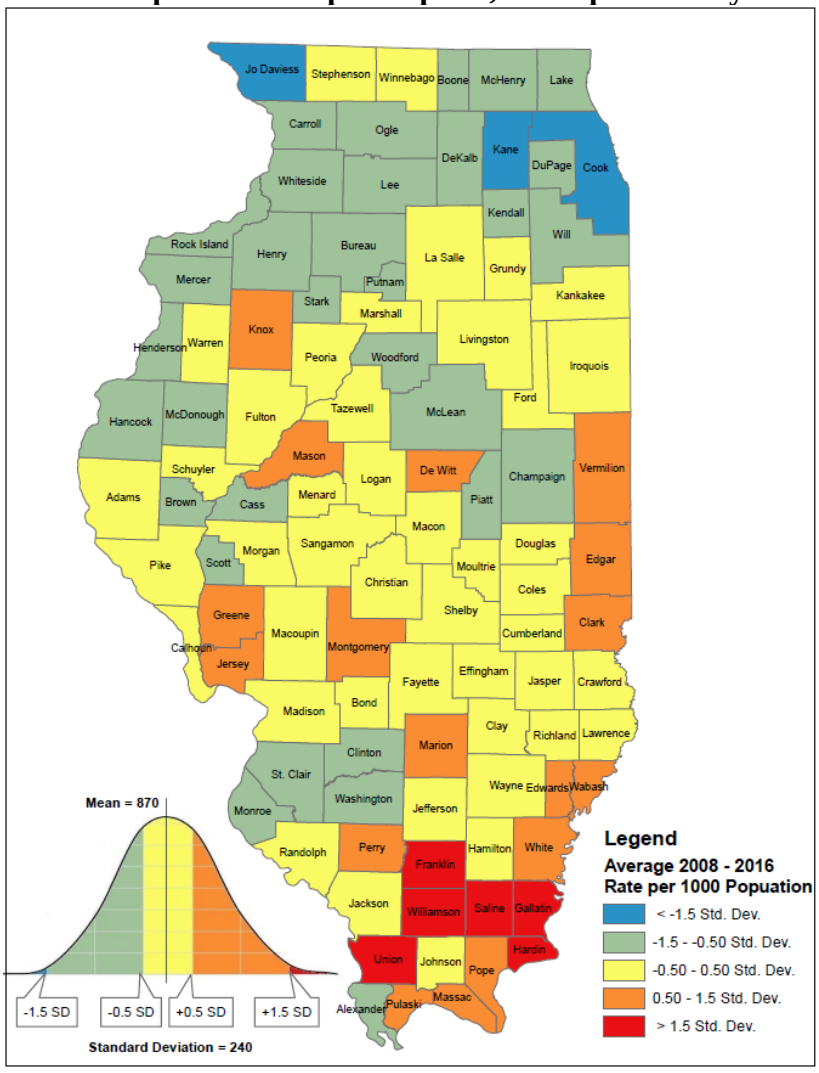
Map 1
Average Rate of Illinois Opioid Prescriptions per 1,000 Population by County, 2008-2016



Data Source: Illinois Prescription Drug Monitoring Database

Map 2 depicts the same data using standard deviations. The standard deviation is used to explore the distribution of the data and is sometimes used by researchers to identify instances in which a data point is well above or below the average. In this case, standard deviations were used to identify which county rates notably higher or lower than the state average. The map showed Cook, Jo Daviess, and Kane county opioid prescription rates for 2008 to 2016 were well below the state average; conversely, rural and southern Franklin, Gallatin, Hardin, Saline, Williamson, and Union counties demonstrated rates notably higher than the rest of Illinois.

Map 2
Average Rate of Illinois Opioid Prescriptions per 1,000 Population by County, 2008 - 2016



Data Source: Illinois Prescription Drug Monitoring Database

Opioid Prescription Trends by Drug Type

Opioid pain relievers include:

- **Naturally occurring opiates** from the opium poppy flower, e.g., morphine and codeine (heroin is also a naturally occurring opiate).
- **Semi-synthetic opioids** e.g. hydrocodone and oxycodone.
- **Fully-synthetic opioids** that are man-made, e.g. methadone, tramadol, and fentanyl.

According to the U.S. Controlled Substance Act, the U.S. Drug Enforcement Administration classifies drugs into categories or schedules depending upon the drug's acceptable medical use and misuse potential. *Figure 6* shows the schedules of the opioid medications reported in the ILPMP.

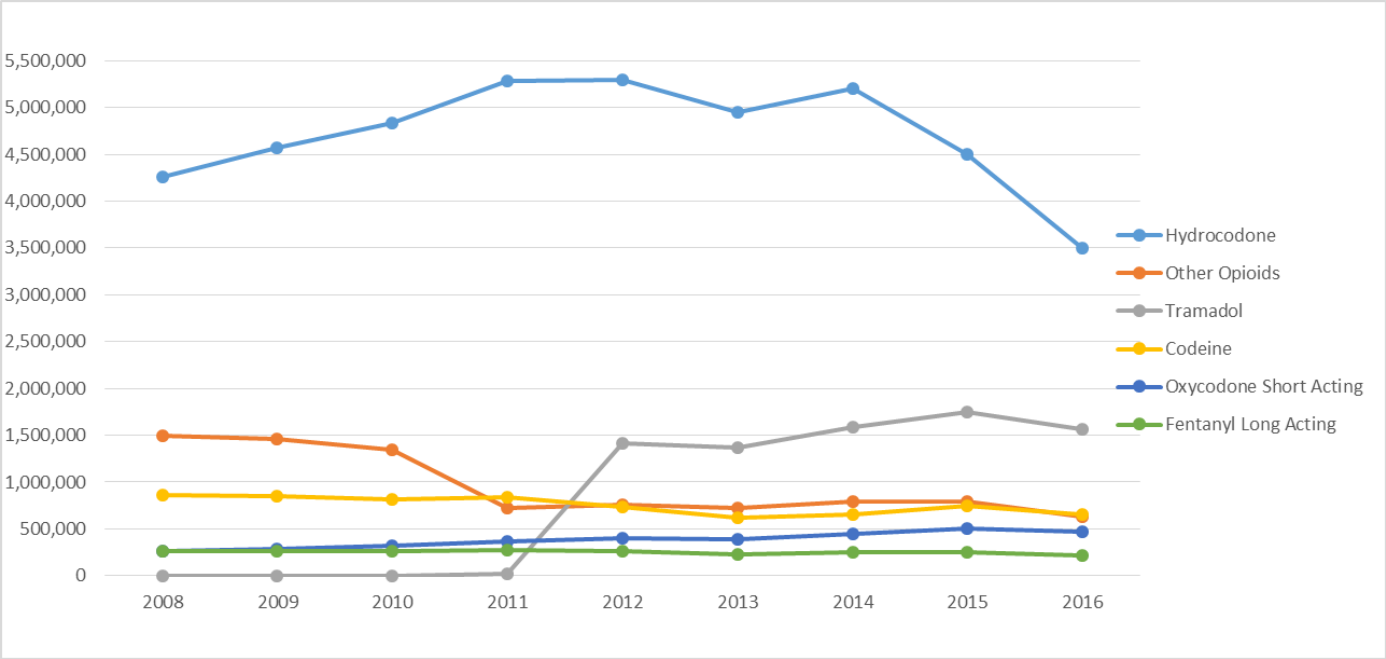
Figure 6 Federal Schedules of Opioid Medications Reported in ILPMP	
Schedule II	Codeine Fetanyl- Ublimaze® Hydrocodone- Vicodin®, Lortab®, Lortab ASA®, Hycomine®, Vicoprofen® Hydromorphone-Dilaudid® Meperidine- Demerol® Methadone Morphine- MSContin® Opium- Opium tincture (laudanum) Oxycodone- OxyContin®, Percocet®, Percodan® Oxymorphone- Numorphan® Tapentodol
Schedule III	Codeine (mixed with aspirin or acetaminophen)-Tylenol #3® Buprenorphine- Buprenex® Buprenorphine/naloxone- Suboxone®, Subutex® Morphine (some combination products)
Schedule IV	Butorphanol- Stadol® Dihydrocodeine Pentazocine- Talwin injectable Propoxyphene- Darvon®, Darvocet® Tramadol
Schedule V	Codeine cough suppressant Hydrocodone cough suppressant

Source: ILPMP data showing the top 20 most commonly prescribed opioids.
Note: Schedule I opioid drug is heroin and not available by prescription; Schedule II drugs are not able to be prescribed with refills but can be obtained with a new prescription; Schedule III-V are available to be prescribed with refills.
Note: Methadone is approved by the U.S. Food and Drug Administration for treatment of pain when written as a prescription. It can be dispensed from federally monitored programs for the treatment of opioid use disorder. When dispensed from those programs, is not captured in the ILPMP. Buprenorphine comes in a variety of formulations and some are approved for pain (i.e. butrans patch).Others are approved for treatment of opioid use disorder (i.e. Suboxone and Subutex).

Figure 7 shows the five most commonly filled opioid prescriptions in Illinois from 2008 through 2016. The overall decrease in opioid prescription in the state can be largely attributed to reductions in hydrocodone prescribing, which accounted for nearly 90 percent of the statewide reduction from 2014 to 2016. The U.S. Drug Enforcement Administration (DEA) reclassified hydrocodone from Schedule III to a more restrictive Schedule II controlled substance because of its high addictive potential. The notable increase from 2011 to 2012 in opioid prescriptions was driven primarily by a prescribing surge in the drug tramadol. However, Illinois pharmacies and dispensers were not required to report tramadol prescriptions until January 1, 2012.[41]

It is important to note that data on methadone administered for opioid use disorder treatment through certified opioid treatment programs is not captured by the ILPMP. Data on methadone prescribed for pain is captured by the ILPMP. The category “other opioids” combines all other types of opioid prescriptions.

Figure 7
Number of Opioid Prescriptions Filled in Illinois by Drug Type, 2008-2016



Data Source: Illinois Prescription Drug Monitoring Database

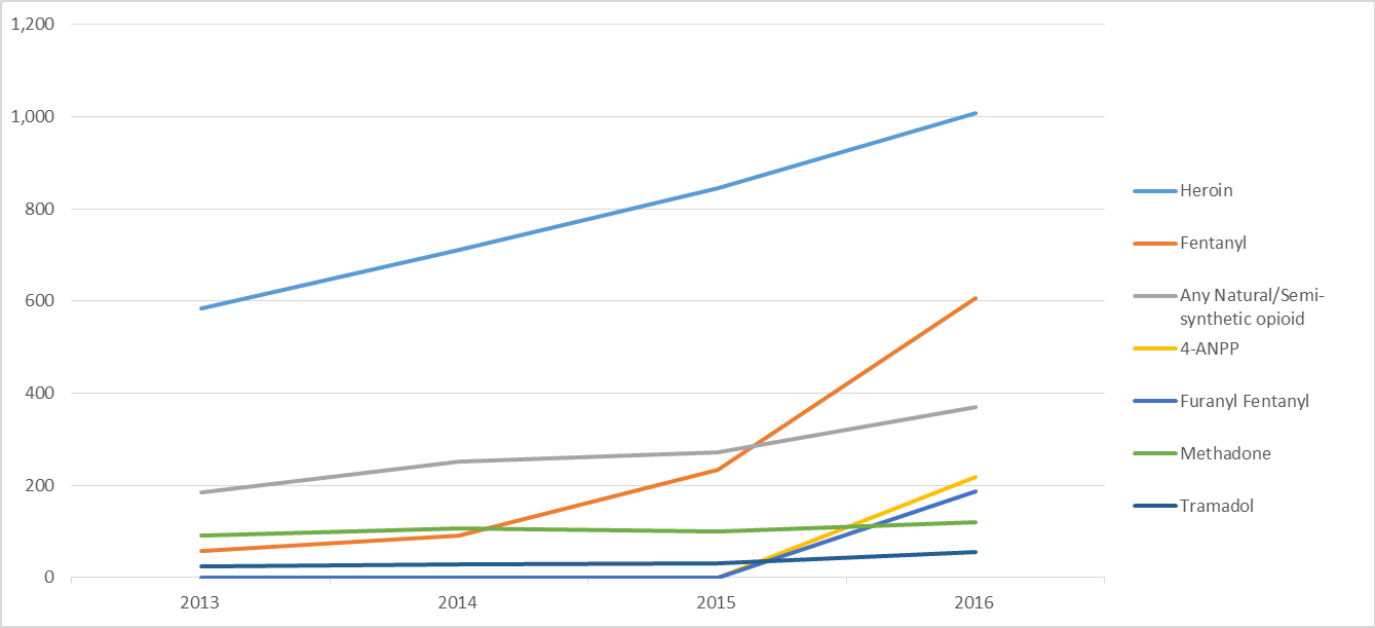
Over the nine year period examined, hydrocodone accounted for about 60 percent of all opioids prescribed in Illinois. Hydrocodone is available in multiple generic and brand name drug versions, including Lortab, Norco, and Vicodin. In 2011, the Drug Abuse Warning Network (DAWN) indicated 100,000 emergency department visits in the United States were related to misuse of hydrocodone pain relievers.[42] In 2014, hydrocodone was reclassified from a Schedule III to a more restrictive Schedule II.[43] In Illinois, Schedule III, IV, and V prescriptions are allowed to be written with refills, but Schedule II are not. The hydrocodone prescription reduction in Illinois after the rescheduling was consistent with national trends. Nationally, there were 26.3 million fewer hydrocodone prescriptions and 1.1 billion fewer hydrocodone pills dispensed one year after the rescheduling.[44] In Illinois, there were 703,221 fewer prescriptions for hydrocodone in the year following the rescheduling.

In 2012, tramadol prescriptions started being reported in the ILPMP (*Figure 7*). In the past five years, tramadol has accounted for nearly 20 percent of all opioids prescribed in Illinois. The FDA originally considered tramadol to be safer than other opioid pain medications, approving it for use in 1995 without recommending controlled substance classification. Prescribers viewed tramadol as having limited misuse potential.[45] However, after evidence increased regarding its misuse potential, the DEA made tramadol a Schedule IV drug in 2014. DAWN data indicate that roughly 20,000 emergency department visits in the United States were related to tramadol misuse in 2011.[46] According to the National Survey on Drug Use and Health, in 2012, 3.2 million people in the United States aged 12 or older misused tramadol.[47]

Prescription Opioids and Overdose Deaths

The CDC reported in 2017 that approximately 116 Americans die from opioid-related overdoses every day. Of those, nearly half involve a prescription opioid. Drug overdose deaths in Illinois have risen, with a marked increase from 2015 to 2016 (*Figure 8*). The 2016 Illinois rate of opioid overdose was higher than the national rate, at 15.2 per 100,000 residents and 12.1 per 100,000 residents, respectively.[48] In 2014, 61 percent of all U.S. overdose deaths involved some type of opioid compared to 70 percent in Illinois.[49]

Figure 8
Illinois Drug Overdose Deaths by Drug Type, 2013-2016[50]



Data Source: Illinois Department of Public Health Comprehensive Opioid Data Report

Figure 8 illustrates Illinois opioid-related overdose deaths by opioid type. These data were collected from death certificates. Because more than one type of opioid could have been a contributing factor in an overdose at the time of death, categories are not mutually exclusive. The category "Any Natural/Semi-synthetic Opioid" indicates overdose deaths involving buprenorphine, hydrocodone, hydromorphone, morphine, oxycodone, or oxymorphone. After a heroin overdose, the most commonly found substance on toxicology is morphine (a breakdown product of heroin), causing some overdose deaths to be incorrectly categorized as morphine-related deaths and included in the natural/semi-synthetic opioid category.[51] Therefore, the number of heroin-related overdoses may be higher than what the data indicate. In addition, the data suggest the vast majority of fentanyl overdoses are due to illicitly manufactured fentanyl rather than fentanyl originating from a prescription/pharmacy.[52]

Conclusion

Illinois medical practitioners prescribed fewer opioids compared to many other states.[53] Moreover, ILPMP data indicate opioid prescriptions are declining in Illinois, although the drop is still somewhat small relative to prescription growth over the past decade. The number of opioid prescriptions filled increased 25 percent from 2008 to 2014 and then decreased 21 percent from 2014 to 2016. A more recent decline in the number of individuals filling opioid prescriptions was also found, with the number of individuals filling at least one opioid prescription slightly decreasing from 2015 to 2016.

Prescription rates in Illinois varied by county, and counties with higher prescription rates between 2008 and 2016 tended to be rural and located in the southern part of the state. Hydrocodone and tramadol were the most commonly prescribed opioids in Illinois during the period examined.

Heroin and illicit fentanyl-related overdoses are increasing in Illinois and available data suggest fentanyl overdoses are from illicit markets rather than prescriptions.[54] Despite modest reductions in prescription rates, the state's criminal justice, public health, and human services departments should continue to work on prescription drug safety and reducing opioid overprescribing, especially considering that most people who misuse opioids report obtaining them from friends and family for free.[55] To tackle issues related to prescribing and the opioid crisis, the State of Illinois Opioid Action Plan recommends increased use of the ILPMP by providers in conjunction with provider education and promotion of prescribing guidelines, such as the CDC's guidelines for prescribing opioids for chronic pain.

Implications for the Criminal Justice System

The following are some implications for the criminal justice system related to opioid misuse and prescribing practices.

Ensure Safe Disposal of Prescription Medications

Public awareness of the dangers of prescription drugs can help prevent opioid misuse, opioid use disorders, overdose, and death.[56] Citizens are encouraged to take their unused, unwanted, and expired opioid and other prescription medicine to authorized collectors for disposal to reduce chances they will be accidentally or purposely misused or sold. The DEA's website lists public disposal locations. The DEA also holds a National Prescription Drug Take Back Day each April and October through local law enforcement departments. In October 2017, 456 tons of prescription drugs were collected at the 4,200 law enforcement sites nationwide.

In state fiscal year 2018, ICJIA administered Prescription Pill and Drug Disposal (P2D2) program funds to the Illinois Sheriff's Association. Illinois' Prevention First organization offers free materials through their Guard and Discard campaign to raise public awareness of the importance of safe use, storage and disposal of prescription drugs in preventing opioid misuse.

Enhance and Continue Current Law Enforcement Efforts

Law enforcement personnel have embraced new roles as the opioid crisis continues in the United States. Officers are carrying and using naloxone, a medication that can be administered at the time of an opioid overdose to save a life. Law enforcement agencies across the country are connecting community members suffering from opioid use disorders to substance use treatment.[57] Some jails and prisons are offering effective medication-assisted treatment for opioid use disorders prescribing buprenorphine, methadone, and injectable extended-release naltrexone in conjunction with behavioral therapy.

Medical professionals suspected of inappropriately prescribing medication can and should be investigated and prosecuted. Prescribers who are engaging in unethical behavior, such as prescribing high volumes of controlled substances without providing appropriate medical examinations or offering alternative therapies, like physical therapy, can face charges or lose their licenses if outside of appropriate medical practice.[58] The Department of Justice recently arrested 120 health care and treatment providers for opioid-related crimes. State and local law enforcement should investigate all reports or indications of illegal medical practice.

PDMP data is available to law enforcement to aid in active investigations of suspected controlled substance diversion for profit, as well as questionable prescribing and dispensing practices.[59] Law enforcement may be unaware of how they can use PDMP data in their work. According to the PDMP Center of Excellence at Brandeis University, "education initiatives targeted to law enforcement agencies on the value and use of PDMPs are also needed to help encourage increased utilization in diversion investigations."[60]

Research suggests fentanyl overdoses are due to illicit, non-prescription fentanyl.[61] Rather than focus on the diversion of prescription fentanyl, efforts should be concentrated on illicitly-manufactured fentanyl primarily. Much of the global supply is produced in China and brought in through Mexico. A Schedule II drug, fentanyl is lethal and 50 times stronger than heroin. Individuals buying illicit heroin are often unaware that the drug they receive contains fentanyl. Fentanyl is cheap, easy to produce, and smaller in volume than heroin, which makes it easier to transport.[62] Collaborative efforts between federal and local law enforcement and with public health officials to investigate the illegal trafficking and sale of fentanyl could curb its misuse in communities. Law enforcement personnel, canine units, and drug crime lab workers who come into contact with fentanyl should take precautions against exposure, as fentanyl can be absorbed through the skin or accidentally inhaled and with large volumes can cause overdose. The DEA offers a brief guide to officers on how to reduce threat of fentanyl exposure.

Utilize Illinois Prescription Monitoring Data for Research Purposes

Researchers, as well as public health officials, should continue to examine data and share prescribing trends with criminal justice professionals. In some states, such as Massachusetts, PDMPs have provided identifiable data that can be linked to other data for a more in-depth and nuanced understanding of prescribing practices. However, states typically provide de-identified data, such as those used in this article, to researchers for analysis. Regularly providing all available, non-identifiable PDMP data variables to researchers for analysis can provide early

indicators of problems related to prescription drugs and guide community prevention efforts.[63] As stated in the State of Illinois Opioid Action Plan, a "future step is to facilitate increased sharing of ILPMP data with relevant stakeholders, including researchers, to allow for better-informed policymaking, program evaluations, and other data-driven activities at all levels."[64]

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