

Patterns of Opioid Prescribing in Minnesota: 2012 and 2015

Introduction

Opioids are a class of drugs that include prescription opioid medications for pain relief —such as oxycodone (OxyContin®), hydrocodone (Vicodin®), codeine, morphine, and fentanyl—as well as illicitly produced drugs like heroin and fentanyl-related substances (also called fentanyl analogs).¹ While prescription opioids play a role in the management of some types of severe acute, cancer-related and end-of-life pain, increased opioid use since 1990, including for chronic pain unrelated to cancer, has resulted in sharply rising opioid addiction and overdoses, as well as increased healthcare utilization and costs. Recent Centers for Disease Control and Prevention (CDC) guidelines point out the limitations of the evidence base in support of opioid therapy for pain, recommend non-opioid therapy for chronic pain, and emphasize the risks associated with opioid therapy.² In Minnesota, opioids—both prescription and illicit—were responsible for 336 overdose deaths in 2015, more than a six-fold increase since 2000.³ In 2016, opioid use accounted for 395 overdose deaths in Minnesota—a one-year increase of nearly 18 percent.⁴ Forty-nine percent of the opioid overdose deaths in Minnesota in 2016 were from prescription opioids.⁵ In addition to overdose deaths, opioids play a causal role in other deaths, including automobile accidents.

As Minnesota, like other states, struggles with the economic, community and individual impacts of the opioid epidemic, this issue brief looks to bring new empirical evidence specific to Minnesota to discussions about the shape of the problem, contributing factors, and options for addressing them. This issue brief focuses on opioid prescription patterns among Minnesotans with private or public insurance coverage in 2012 and 2015. We explore opioid prescription trends by payer, patients' diagnoses preceding a prescription opioid fill, number of prescribers, and patients' geographic location. The results may offer insights to policy makers and payers about opportunities

Key Findings:

- Overall rates of opioid prescribing declined in Minnesota from 2012 to 2015, but the morphine milligram equivalents (MME) per prescription increased.
- Medicare and Medicaid, where eligibility is determined by age, disability status, and/or income, covered approximately one-third of Minnesotans with general health coverage and accounted for two-thirds of opioid prescriptions filled in 2015.
- Nearly one in three Minnesotans with an opioid prescription in 2015 had multiple prescribers.
- In both 2012 and 2015, 6 in 10 opioid prescriptions were filled within 15 days of the patient's last medical visit; however, 1 in 10 opioid prescriptions were filled without a medical visit in the past 90 days, suggesting closer patient-prescriber communication or opioid oversight may be needed in some cases.
- Prescription opioid use varied across counties. In some counties, prescription opioid use in 2015 was over 3 times the statewide average of 523 MME per resident.

to reduce unnecessary use and overuse of prescription opioids. They may also help identify additional analytic questions and contribute to assessments of the impact of policy changes currently debated by the Minnesota Legislature.

The research in this issue brief relies on the Minnesota All Payer Claims Database (MN APCD), a comprehensive state repository of health care transactions for Minnesota patients.⁶ The MN APCD is derived from health care claims records submitted by private insurers, Medicare,

and Medicaid and other state public programs such as MinnesotaCare (here, collectively called Medicaid).⁷ These unique data cover interactions with the health care system for nearly 90 percent of insured Minnesotans, thereby permitting analyses that are generalizable to most population groups and areas of the state. Nevertheless, opioid prescription rates in this issue brief somewhat underestimate the complete statewide burden because the MN APCD does not include claims from plans that do not cover general medical care (such as accident-only or dental plans) or from Workers' Compensation, Veterans Affairs, Indian Health Service, or Tricare; nor does it include services provided to uninsured persons. The MN APCD does include pharmacy claims for prescriptions written by dentists. Further, the analyses in this issue brief were limited to patient populations for whom current CDC and proposed Minnesota guidelines are intended to apply; thus, opioid prescribing for cancer patients or those in hospice care settings was excluded.

This issue brief includes prescriptions for all Schedule II-V opioids, which are identified by matching the National Drug Code (NDC) associated with the prescription to the CDC's list of Schedule II-V opioids.^{8,9} Clinically, Schedule II opioids have a greater potential for producing severe psychological or physical dependence, compared with other opioids. Examples of Schedule II opioids include hydrocodone, hydromorphone, oxycodone, and fentanyl.

Results

Overall rates of opioid prescribing declined from 2012 to 2015, but morphine milligram equivalents (MME) per prescription increased.

In 2015, 60.0 opioid prescriptions were dispensed for every 100 covered Minnesotans—a lower rate than in 2012 (Table 1) and consistent with the national trend.¹⁰ In both years, the rate of opioid prescriptions was highest among Minnesotans age 65 or older (103.3 per 100 covered persons in 2015) and adults age 45-64 (95.3), and lowest among children under age 12 (2.1) and adolescents age 12 to 19 (13.5).

Measures used in this issue brief:

Opioid prescription rate - The number of opioid prescriptions per 100 covered persons in the MN APCD. A lower opioid prescription rate indicates a reduced likelihood that covered Minnesotans fill an opioid prescription.

Schedule II opioid prescription rate - The number of prescriptions per 100 covered persons in the MN APCD for opioids classified by the U.S. Drug Enforcement Administration as having elevated potential for producing severe psychological or physical dependence, compared with other opioids.

Average morphine milligram equivalents (MME) per prescription - MME is a standard measure of opioid potency relative to morphine. An increase in average MME per prescription indicates an increase in opioid potency per day, the number of days prescribed, or both.

Average MME per covered person - Average opioid potency per covered person in the MN APCD. An increase in average MME per covered person indicates an increase in the potency of opioid fills per covered person, an increase in potency per prescription, or both.

Rate of high-dose opioid prescriptions - The number of opioid prescriptions of at least 90 MME per day, per covered person in the MN APCD. High-dose opioid prescriptions have been associated with a greater chance of opioid overdose and death.

Average MME per covered resident - Average opioid potency prescribed per person in the MN APCD, attributed to the person's county of residence.

TABLE 1: Total and Schedule II opioid prescriptions filled per 100 covered persons in 2012 and 2015

Age group	2012			2015		
	Opioid prescriptions per 100 persons	Schedule II opioids		Opioid prescriptions per 100 persons	Schedule II opioids	
		Prescriptions per 100 persons	Percentage of opioid prescriptions		Prescriptions per 100 persons	Percentage of opioid prescriptions
Total	67.8	51.5	76.0%	60.0	45.0	75.0%
2 – 11 years	2.5	0.8	33.4%	2.1	1.3	64.9%
12 – 19 years	17.2	13.7	79.7%	13.5	11.2	82.8%
20 – 44 years	69.5	54.2	77.9%	55.8	43.0	77.2%
45 – 64 years	103.9	80.9	77.9%	95.3	73.6	77.3%
65+ years	108.5	76.2	79.2%	103.3	70.1	67.9%

SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.

NOTES: Opioids and DEA Schedule (II-V) were identified using CDC’s list of opioids with oral MME conversion factors (2016). Available at www.pdmpassist.org/pdf/BJA_performance_measure_aid_MME_conversion.pdf, accessed April 19, 2018. Hydrocodone became a Schedule II opioid in 2014, after previously being designated Schedule III. For the purposes of this analysis, it was categorized as Schedule II for both 2012 and 2015.

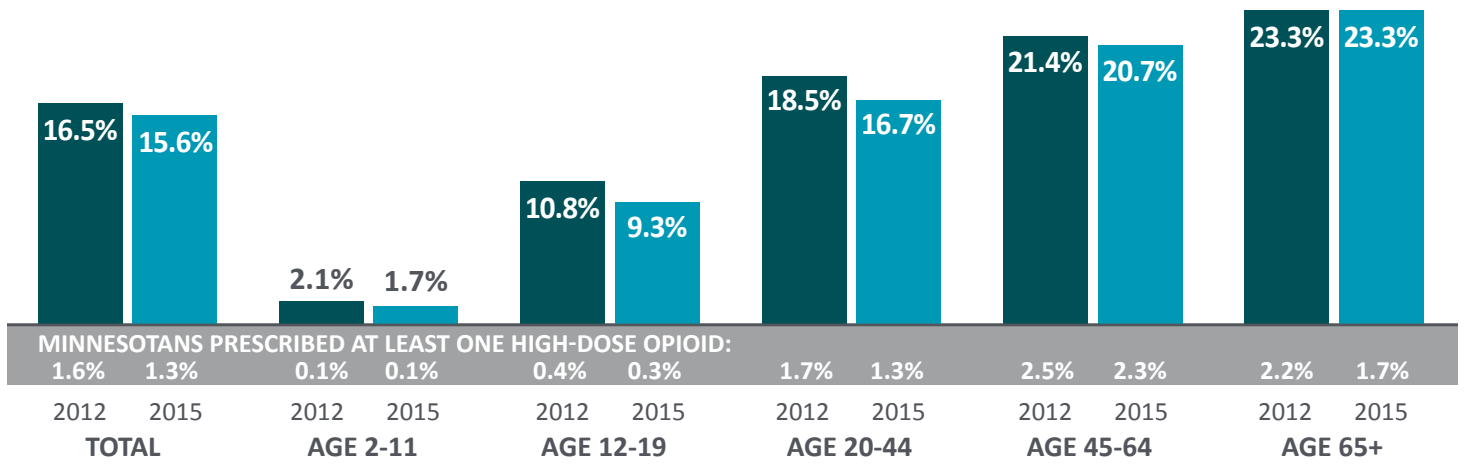
In 2015, three-quarters of opioid prescriptions in Minnesota were for Schedule II opioids (equal to 45.0 prescriptions per 100 covered persons) (Table 1). Schedule II opioids include hydrocodone,¹¹ hydromorphone and oxycodone, among others, and have a greater potential than other prescription opioids for producing dependence. From 2012 to 2015, Schedule II opioid prescription rates decreased for all age groups except for children age 2-11. The rescheduling of hydrocodone from Schedule III to Schedule II may have contributed to a reduction in prescriptions for hydrocodone during and after 2014.

The rates of opioid prescriptions shown in Table 1 reflect both the number of persons who were prescribed an opioid and the number of prescriptions filled per person.

In 2012, 16.5 percent of covered Minnesotans (or 626,470 individuals) were prescribed opioids (Figure 1). The percentage of persons with at least one opioid prescription increased with age—ranging from 2.1 percent of covered children age 2-11, to 23.3 percent of covered seniors age 65 or older.

The percentage of all covered Minnesotans with at least one opioid prescription declined slightly (1.0 percentage point) from 2012 to 2015 (n= 623,944 individuals in 2015), and it declined in most age groups. Only among seniors age 65 or older was the rate of opioid prescriptions stable: 23.3 percent of seniors were prescribed an opioid in 2015, the same rate as in 2012.

FIGURE 1: Percentage of covered Minnesotans with at least one opioid prescription in 2012 and 2015



SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.
 NOTE: High-dose opioid prescriptions are defined as prescriptions for at least 90 morphine milligram equivalents (MME) per day.

The CDC has calculated equivalency factors, called morphine milligram equivalents (MME), which allow researchers to compare the clinical impact of different opioids to a milligram of morphine.¹² Current CDC guidelines, published in 2016, recommend using the lowest effective dose of opioids, and avoiding increasing dosage to greater than 90 MME per day or carefully considering and justifying such a decision.¹³ However, this guideline was not in place during the study period (2012-2015).

In Minnesota, the percentage of persons with at least one high-dose opioid prescription decreased from 1.6 percent in 2012 to 1.3 percent in 2015 (Figure 1). Only among children age 2-11 were high-dose prescriptions slightly more likely in 2015 than in 2012, although the proportion of young children

prescribed any opioid (including high-dose) remained low.¹⁴

Although the proportion of Minnesotans prescribed at least one opioid decreased slightly from 2012 to 2015, the average number of days per prescription increased—driving growth in average MME per prescription. In 2015, the average length of opioid prescriptions was 15.1 days, compared with 14.0 days in 2012 (Table 2)—again, consistent with the national trend.¹⁵ In turn, average MME per opioid prescription in Minnesota increased 7.3 percent from 2012 to 2015. This increase, 59.3 MME per prescription, was equivalent to roughly two 30-mg tablets of oxycodone. Children age 2-11 and young adults age 20-44 showed the highest percentage increases in MME per prescription, 17.5 percent and 13.9 percent respectively.

TABLE 2: Average days and morphine milligram equivalents (MME) per opioid prescription in 2012 and 2015, and percent change

Age group	2012		2015		Percent change	
	Average days per prescription	Average MME per prescription	Average days per prescription	Average MME per prescription	Average days per prescription	Average MME per prescription
Total	14.0	813.2	15.1	872.5	7.6%	7.3%
2 – 11 years	6.0	134.9	6.0	158.4	-1.0%	17.5%
12 – 19 years	4.7	236.0	4.6	200.9	-2.9%	-14.9%
20 – 44 years	10.9	835.4	11.7	951.6	6.9%	13.9%
45 – 64 years	15.5	926.6	16.7	981.7	7.9%	5.9%
65+ years	17.5	663.2	17.9	671.9	2.7%	1.3%

SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.

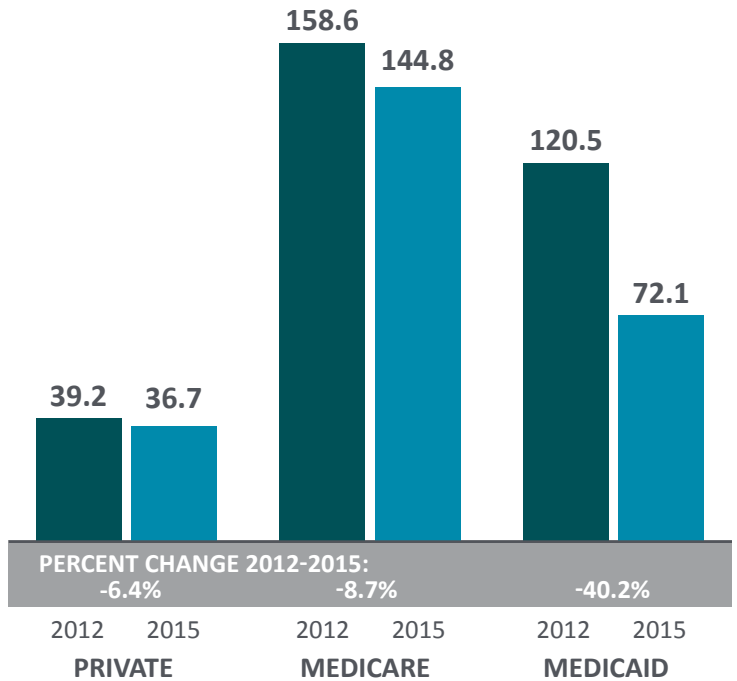
Public programs enrollees, including Minnesotans covered by Medicare and Medicaid, accounted for two-thirds of opioid prescriptions filled in Minnesota in 2015.

The rate of opioid prescribing among persons enrolled in Medicare or Medicaid greatly exceeded that among persons enrolled in private insurance. In general, higher rates of opioid prescribing are consistent with higher rates of disability and illness, including but not limited to age-related surgeries and diagnoses related to functional limitations such as rheumatoid arthritis, back pain and neck pain.^{16, 17} However, national studies suggest rates of inappropriate opioid prescribing may be higher as well^{18, 19, 20} In 2015, 144.8 opioid prescriptions per 100 persons were dispensed to Medicare enrollees, and 72.1 opioid prescriptions per 100 persons were dispensed to enrollees in Medicaid—compared with 36.7 opioid prescriptions per 100 persons with private insurance (Figure 2).

From 2012 to 2015, rates of opioid prescribing among Medicaid enrollees declined sharply (-40.2 percent). Among other covered Minnesotans, rates of opioid prescribing declined to a lesser degree: by 6.4 percent among those with private insurance, and 8.7 percent among Medicare beneficiaries.

Reflecting higher rates of opioid prescribing to enrollees, Medicare and Medicaid also accounted for most opioid prescriptions in Minnesota. In 2015, Medicare accounted for 33.2 percent of all opioid prescriptions, but just 13.8 percent of the study population. The proportion of opioid prescriptions accounted for by Medicaid in 2015 is closer to the representation of Medicaid enrollees in the MN APCD (28.5 percent and 23.7 percent, respectively). In total, Medicare and Medicaid paid for 59.1 percent of opioid prescriptions in 2012, and 61.7 percent of opioid prescriptions in 2015 (see Supplemental Table A.1 for these details).

FIGURE 2: Number of opioid prescriptions per 100 covered persons by source of coverage in 2012 and 2015



SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.

NOTE: Minnesotans are assigned to coverage categories based on their enrollment in coverage at the time of the prescription. Minnesotans with multiple, concurrent sources of coverage are assigned to a unique coverage category in the following order: (1) Medicaid (includes MinnesotaCare), (2) Medicare, and (3) private insurance. Dual-eligible Medicare/Medicaid beneficiaries are assigned to Medicaid.

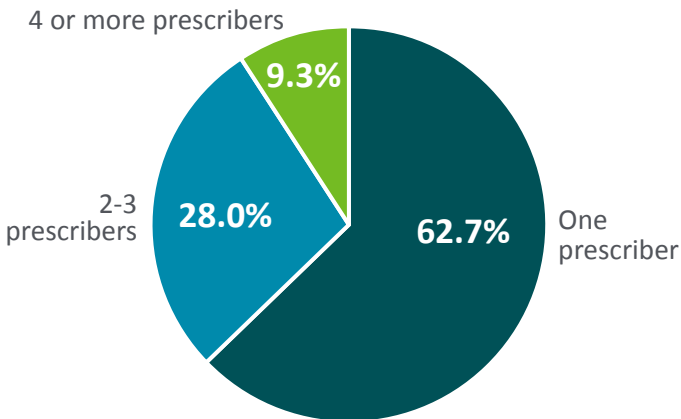
Nearly one in three Minnesotans with an opioid prescription had multiple prescribers in 2015.

A patient with multiple opioid prescribers may be at higher risk for misuse or accidental overdose than if a single prescriber managed the patient’s opioid use. In 2015, most Minnesotans with at least one opioid prescription had one prescriber (62.7 percent, Figure 3). Of the 37.3 percent of Minnesotans who had more than one prescriber, most (28.0 percent of all Minnesotans with an opioid prescription) had two or three prescribers. However, 9.3 percent of Minnesotans with an opioid prescription in 2015, or 61,562 individuals, had four or more prescribers. The relatively high rate of Minnesotans with more than one prescriber



merits further investigation to understand potential reasons underlying these patterns. These include reasons related to how providers are identified in data, care is delivered by multiple providers within a practice, and patients access health care services. In some instances, having a high number of prescribers may reflect inconsistent care or reduced access

FIGURE 3: Percentage of persons with prescriptions from multiple prescribers in 2015



SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.

NOTE: Multiple prescribers might include prescribers that use separate National Provider Identifiers (NPIs) within a group practice.

to care. Greater attention to care coordination might help to address opioid prescribing and use among patients who see multiple providers.

There are tools in place in Minnesota to help providers and pharmacists manage the care of their patients. For example, the Prescription Monitoring Program (PMP) is available for prescribers and pharmacists to query patients' recent opioid prescriptions as they consider writing or filling (or refilling) opioid prescriptions. In this way, the PMP supports patient care and public health, and can detect potential diversion, abuse, and misuse of opioids as well as for certain other prescription medications.

When opioids were prescribed, Minnesotans enrolled in Medicare or Medicaid were more likely to have multiple prescribers than those with private coverage in 2012 and 2015 (Table 3). In 2015, among those prescribed at least one opioid, 46.5 percent of Medicare-covered persons and 43.7 percent of Medicaid-covered persons had two or more prescribers, compared with 28.1 percent of persons with private insurance. The share of Minnesotans with five or more opioid prescriptions who had two or more prescribers was even greater (see Supplemental Table A.2).

TABLE 3: Percentage of covered persons with prescriptions by number of prescribers and source of payment in 2012 and 2015

	2012			2015		
	One prescriber	2-3 prescribers	4 or more prescribers	One prescriber	2-3 prescribers	4 or more prescribers
Total	63.3%	27.4%	9.4%	62.7%	28.0%	9.3%
Private insurance	70.8%	23.8%	5.5%	71.9%	23.3%	4.8%
Medicare	56.4%	32.2%	11.4%	53.5%	34.8%	11.7%
Medicaid	54.7%	31.0%	14.3%	56.3%	30.4%	13.3%

SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.

NOTE: Minnesotans are assigned to coverage categories based on their enrollment in coverage at the time of the prescription. Minnesotans with multiple, concurrent sources of coverage are assigned to a unique coverage category in the following order: (1) Medicaid (includes MinnesotaCare), (2) Medicare, and (3) private insurance. Dual-eligible Medicare/Medicaid beneficiaries are assigned to Medicaid.

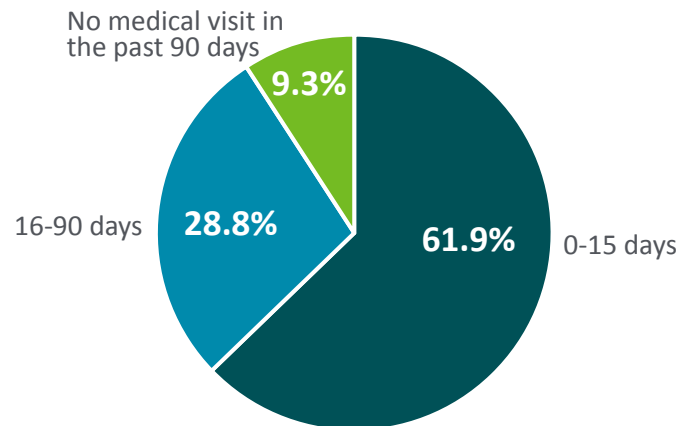
In both years, six in 10 opioid prescriptions were filled within 15 days of the patient’s last medical visit.

The time gap between patients filling an opioid prescription and a medical visit is a potential measure of medical oversight of opioid use. In 2015, most opioid prescriptions (61.9 percent) were filled within 15 days of a medical visit (Figure 4), and 28.8 percent were filled between 16 and 90 days following a medical visit.²¹ However, 9.3 percent of opioid prescriptions were filled without a medical visit in the prior 90 days. Closer patient-prescriber communication or opioid use oversight may be needed in some cases, particularly for Schedule II opioids. Proposed Minnesota opioid prescribing guidelines recommend face-to-face visits with the prescribing provider at least every 90 days to offer opportunities to reduce or discontinue opioids and to avoid initiating chronic opioid therapy.²² The rate of opioid prescriptions filled by proximity to a medical visit was about the same in 2012 as in 2015

Post-surgery pain management accounted for more than half of all opioid prescriptions in both 2012 and 2015 (Table 4). Other common medical circumstances preceding an opioid prescription fill included, in order of frequency: chronic pain

(other than back pain), back pain, and injury. For both back pain and other chronic pain, high-dose opioids were more likely to be prescribed than lower-dose opioids.

FIGURE 4: Proportion of opioid prescriptions filled by number of days since the last medical visit in 2015



SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extract 20v1.

NOTE: Prescriptions for opioids that may be used for both pain management and opioid withdrawal (e.g., buprenorphine, methadone) are excluded, equal to 2.5 percent and 3.0 percent of prescriptions in 2012 and 2015, respectively. In addition, persons without continuous medical coverage in the past 90 days are excluded, equal to 5.8 percent and 7.1 percent of covered persons in 2012 and 2015, respectively.

TABLE 4: Proportion of opioid prescriptions by prior procedure or diagnosis in 2012 and 2015

	2012		2015	
	Total	High-dose ^a	Total	High-dose ^a
Procedure or diagnosis within 90 days:				
Surgery	50.8%	51.1%	51.7%	50.7%
Injury	8.1%	6.1%	7.3%	5.7%
Back pain	9.5%	13.7%	9.4%	12.2%
Other acute pain	0.9%	1.0%	1.0%	1.0%
Other chronic pain	13.6%	17.0%	13.0%	18.2%
Long term opioid use	0.8%	0.7%	1.0%	1.1%
Other medical visit	7.0%	3.5%	7.4%	4.0%
No medical visit within 90 days	9.2%	6.9%	9.3%	7.1%

SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.

NOTE: Prescriptions for opioids that may be used for both pain management and opioid withdrawal (e.g., buprenorphine, methadone) are excluded, equal to 2.5 percent and 3.0 percent of prescriptions in 2012 and 2015 respectively. In addition, persons without continuous medical coverage in the past 90 days are excluded, equal to 5.8 percent and 7.1 percent of covered persons in 2012 and 2015 respectively. Percent change estimates may reflect rounding error.

^a High-dose prescriptions are defined as prescriptions of at least 90 MME per day.

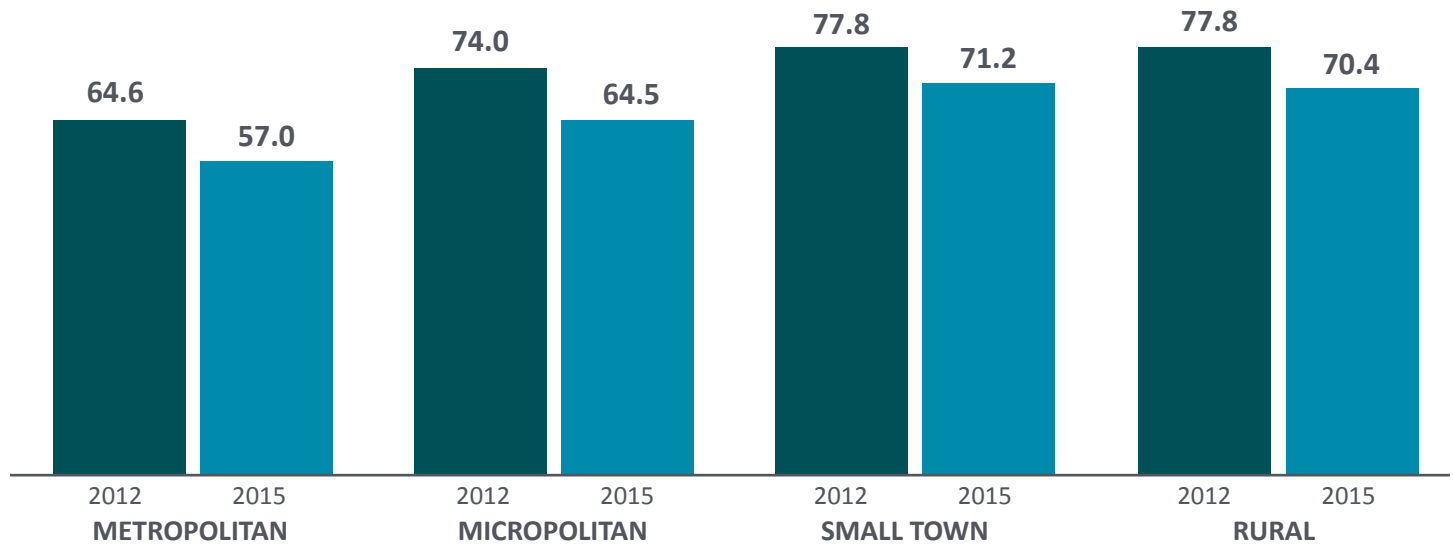
Prescription opioid use was higher in rural areas, and very high in some counties.

In 2012 and 2015, the volume of opioids prescribed in Minnesota varied widely by geographic location. In general, opioid prescription rates, rates of high-dose prescriptions, and average MME prescribed per person were much higher among rural and small town residents than among metropolitan or micropolitan residents (Figure 5 and Supplemental Table A.3). After adjusting for age and payer

differences across geographies, differences between areas remained but were somewhat reduced [data not shown].

In 2015, 70.4 opioid prescriptions per 100 covered residents were dispensed to patients in rural areas, compared with 57.0 prescriptions per 100 covered resident in metropolitan areas. Average MME per covered person was nearly 40 percent higher in rural areas (693 per 100 persons) than in metropolitan areas (495 per 100 persons).²³

FIGURE 5: Number of opioid prescriptions per 100 covered persons by geographic location in 2012 and 2015



SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extracts 19 and 20v1.

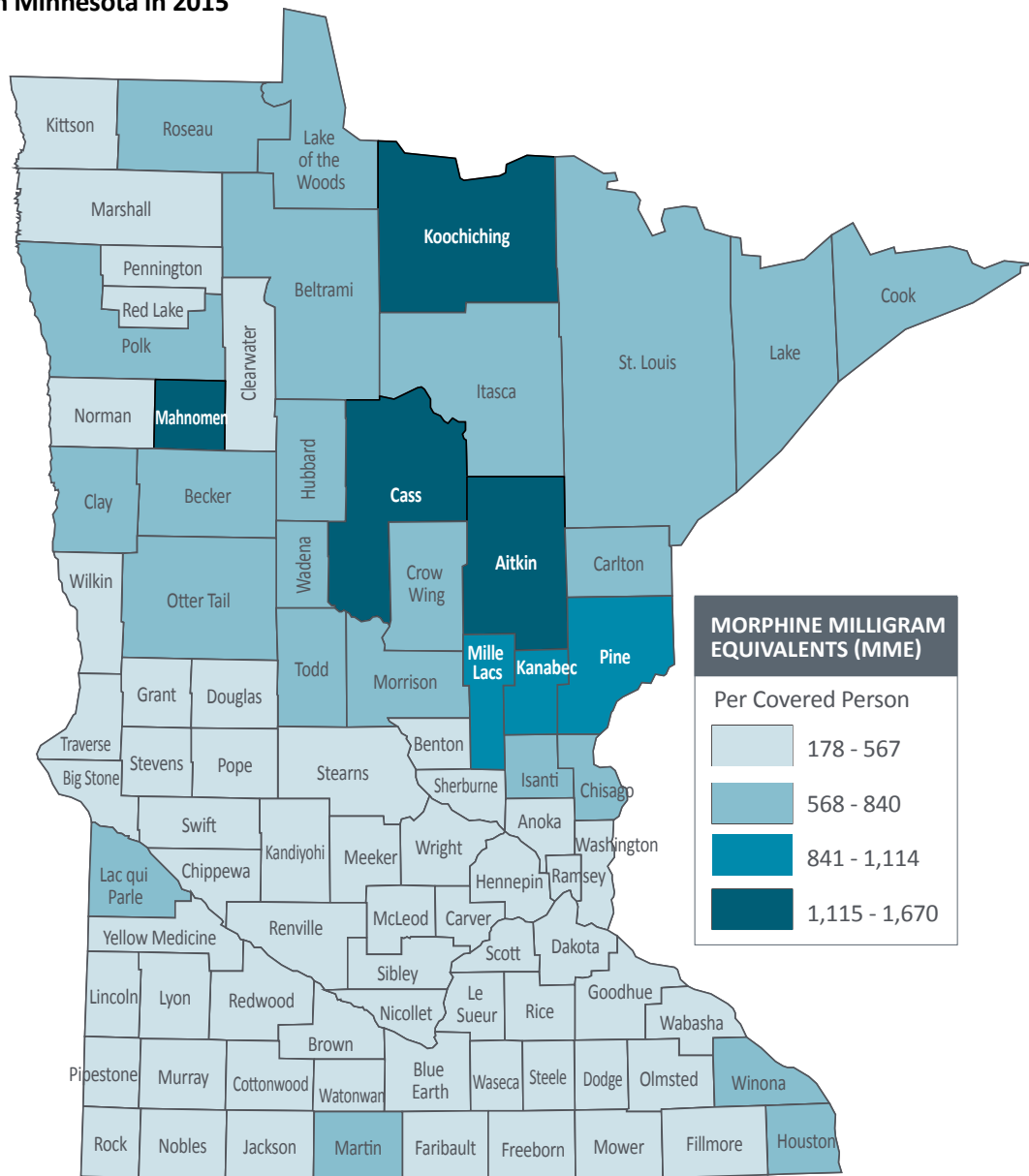
NOTE: Residential zip codes are assigned to metropolitan, micropolitan, small town, and rural areas as defined by the Rural-Urban Commuting Area Codes classification scheme of the University of Washington School of Medicine Rural Health Research Center depts.washington.edu/uwruca/ and depts.washington.edu/uwruca/ruca-codes.php accessed April 16, 2018.



While opioid use (measured as MME per covered resident) was higher in rural Minnesota than in other areas of the state, it was especially high in some rural counties (Figure 6). In both 2012 and 2015, counties in Minnesota with the highest MME per covered resident included Cass county (1,670 MME per covered resident in 2015), Mahnomer county (1,623 MME per covered resident), Koochiching county (1,594 MME per covered resident), and Aitkin county (1,367 MME per covered resident). Also in Mille Lacs, Kanabec, and Pine counties, prescription opioid use

ranged much higher than the statewide average (523 MME per covered resident in 2015). After adjusting for differences in the age and payer distributions among counties, 2015 opioid prescribing in these counties remained much higher than the statewide average (see Supplemental Table A.4 for these details). From 2012 to 2015, overall prescribing rates and high-dose opioid prescribing rates decreased in most counties, including most—but not all—of the Minnesota counties with the highest values for MME per covered resident.

FIGURE 6: Opioid prescriptions in morphine milligram equivalents (MME) per covered person by county in Minnesota in 2015



SOURCE: Mathematica Policy Research analysis of claims and encounters data from the Minnesota All Payer Claims Database extract 20v1.
 NOTE: Counties with MME per covered person at least one standard deviation (greater than 841 MME) or two standard deviations (greater than 1,115 MME) above the unweighted mean calculated among all counties in Minnesota are highlighted.

Conclusion

Opioid use and overuse is a source of great concern for families and communities in Minnesota and throughout the United States. Together with the increasing use of illicit opioids, overuse and misuse of prescription opioids represents an epidemic that contributes to dependency, addiction, overdose, and death. Much data have been reported on opioid use and misuse, including about volume of opioid prescriptions and opioid-related mortality. This issue brief, using granular data on health care use and prescribing patterns, offers findings that may help policymakers, payers, and clinicians identify opportunities to focus on one aspect of this epidemic: reducing unnecessary use and overuse of *prescription opioids*. Findings from this research may not extend to opioid use that includes use of illicit opioids, and geographic and other demographic patterns that include such use may differ from what is presented in this research brief.

At least four findings may warrant particular attention and further investigation to better understand patterns of opioid prescribing and the potential for addiction or misuse:

1. While overall opioid prescription rates dropped 11.6 percent in Minnesota from 2012 to 2015, the average number of days per prescription increased—driving an increase in MME per prescription.
2. Many Minnesotans received opioid prescriptions from more than one prescriber during the year—suggesting the potential for gaps in coordination of opioid prescribing.
3. Although most opioid prescriptions are filled in close proximity to a patient’s last medical visit, some are filled at least 90 days after the last medical visit—suggesting potential gaps in provider-patient communication or medical oversight of opioid use.
4. Prescription opioid use was much higher in several small-population counties compared with other areas of the state—suggesting that multiple factors might contribute to high opioid use in these areas.

Medicare and Medicaid accounted for most opioid prescribing in both 2012 and 2015—although the rate of opioid prescribing in Medicaid dropped sharply over this period. Still, public programs paid for 62 percent of prescriptions in 2015, and enrollees in public programs were more likely to have prescriptions from multiple prescribers.



These public programs might offer important perspectives to inform recommendations regarding the coordination of opioid prescribing and medical oversight of opioid use throughout the state. Minnesota’s Department of Human Services has played a leading role in the development of state prescribing guidelines and has engaged in innovative work to better understand how people transition from acute to chronic use of opioids. The aim of this recent work is to develop a tool for clinicians to identify and prevent patients at risk of becoming long-term opioid users.

A number of the findings about opioid prescribing patterns reported in this issue brief are already reflected in a range of current initiatives underway in Minnesota. With the goal to address opioid overuse and misuse, activities at the state and community levels aim to support patient and provider education, monitor prescribing practices, identify prescribing patterns that have the potential to place patients at risk for misuse and abuse, and increase access to medications used to reverse the toxic effects of opioid overdose. These and other activities emerged from Minnesota’s Opioid Action Plan,²⁴ which was released in 2018 and created the foundation for further legislative and budget proposals deliberated by the 2018 Legislature. The State Opioid Oversight Project (SOOP),²⁵ formed as part of the Minnesota State Substance Abuse Strategy, coordinates opioid-related activities across state government with participation from 12 state agencies. The Opioid Prescribing Improvement Program (OPIP),²⁶ a community-wide

effort, was created in 2015 to provide recommendations to address over-prescribing and misuse of opioids in Minnesota. With input from Minnesota's Opioid Prescribing Work Group (OPWG),²⁷ the OPIP is developing educational resources for providers, prescribing guidelines for acute, post-acute, and chronic pain, and an opioid prescribing quality improvement program for state public health care programs. The principles at the foundation of the prescribing guidelines include encouraging use of the lowest effective dose and shortest duration for acute pain, promoting close monitoring of patients during the post-acute pain period, and advising prescribers to avoid initiating chronic opioid therapy for new chronic pain patients and to carefully manage patients who remain on opioid medications.

Although the challenges related to stemming the opioid epidemic are substantial and multi-faceted, we are learning more about factors related to opioid use in Minnesota, including through research in this issue brief. In addition, an infrastructure is growing and resources are becoming available to assist health care providers, pharmacists, patients, family members and payers for health care services. Ongoing work to produce and share accurate information with stakeholders and decision-makers, educate prescribers and patients about opioid risks and alternative or complementary approaches to pain management, and monitor opioid prescriptions and prescribing patterns appears to be having an impact and will contribute to further progress toward opioid prescribing goals in Minnesota. Recent data suggest that the downward trend in opioid prescribing is continuing in Minnesota, likely influenced by national guideline recommendations in 2016, recent state guidelines, and other state and community level interventions. Further success will require ongoing empirical analyses to guide future work, evaluate outcomes of policy initiatives underway, and contribute to the monitoring of relevant measures of opioid use in Minnesota. Research using the MN APCD can be a valuable contribution, because of its unique ability to examine the interaction of medical diagnosis, health care service use, health care access and health care providers over time. Upcoming research, in which we extend work developed for state health care program populations to a broader Minnesota population to define and describe the transition of patients who become new chronic opioid users, will be one such contribution.

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- ⁴ Minnesota Department of Health. Indicator Dashboards: Opioid Dashboard. Available at www.health.state.mn.us/divs/healthimprovement/opioid-dashboard/, accessed February 8, 2018.
- ⁵ There were 194 prescription opioid overdose deaths in Minnesota in 2016, and 395 total opioid overdose deaths. See www.health.state.mn.us/divs/healthimprovement/opioid-dashboard/#DeathTrends, accessed April 19, 2018.
- ⁶ As used in this issue brief, claims refer to both claims and encounters reported to the MN APCD. Claims data comprise records of payment to a provider based on the provider's billing; encounter data comprise records of services provided regardless of the provider's payment arrangement with the payer. See: Minnesota Department of Health, Minnesota's All Payer Claims Database/Frequently Asked Questions. Available at www.health.state.mn.us/healthreform/allpayer/dataqualityQA10814final.pdf, accessed February 8, 2018.
- ⁷ Minnesota Department of Health. Minnesota All Payer Claims Database: State Repository of Health Care Claims Data (March 2016). Available at www.health.state.mn.us/healthreform/allpayer/mnapcdoverview.pdf, accessed February 8, 2018.
- ⁸ National Center for Injury Prevention and Control. CDC compilation of benzodiazepines, muscle relaxants, stimulants, zolpidem, and opioid analgesics with oral morphine milligram equivalent conversion factors, 2016 version. Atlanta, GA: Centers for Disease Control and Prevention; 2016. Available at www.pdmpassist.org/pdf/BJA_performance_measure_aid_MME_conversion.pdf. Accessed April 10, 2018.
- ⁹ Unless otherwise noted, opioid medications that may be used for both pain management and opioid withdrawal (e.g., buprenorphine, methadone) are included in the analysis, following practices by others. See CDC discussion about different options for grouping opioids to analyze overdose deaths, available at www.cdc.gov/drugoverdose/data/analysis.html.
- ¹⁰ Guy, G.P., Zhang, K., Bohm, M.K., Losby, J., Lewis, B., Young, R., . . . Dowellet, D. (2017, July 7). Vital Signs: Changes in Opioid Prescribing in the United States, 2006–2015. *Morbidity and Mortality Weekly Report* 66(26): 697–704.
- ¹¹ Hydrocodone became a Schedule II opioid in 2014, after previously being designated Schedule III. For the purposes of this analysis, it was categorized as Schedule II for both 2012 and 2015.
- ¹² Centers for Disease Control and Prevention. Data Resources. Available at www.cdc.gov/drugoverdose/resources/data.html, accessed February 8, 2018.

- ¹³ See CDC Guideline for Prescribing Opioids for Chronic Pain. Available at www.cdc.gov/media/dpk/prescription-drug-overdose/opioid-prescription-guidelines/dpk-opioid-prescription-guidelines.html# and, summarized at www.cdc.gov/drugoverdose/pdf/guidelines_at-a-glance-a.pdf, accessed April 5, 2018.
- ¹⁴ High-dose opioid prescriptions for children are reported using the same metric, although available evidence concerning the benefits and harms of long-term opioid therapy in children and adolescents is limited (CDC 2016).
- ¹⁵ Guy, G.P., Zhang, K., Bohm, M.K., Losby, J., Lewis, B., Young, R., . . . Dowellet, D. (2017, July 7). Vital Signs: Changes in Opioid Prescribing in the United States, 2006–2015. *Morbidity and Mortality Weekly Report*, 66, 697–704.
- ¹⁶ Kuo, Y.F., Raji, M.A., Chen, N.W., Hasan, H., & Goodwin, J.S. (2016). Trends in Opioid Prescriptions among Part D Medicare Recipients from 2007 to 2012. *American Journal of Medicine*, 129, 221.e21–221.e30.
- ¹⁷ Zhou C., Florence C.S., & Dowell D. (2016). Payments for opioids shifted substantially to public and private insurers while consumer spending declined, 1999-2012. *Health Affairs (Millwood)*. 35, 824-31.
- ¹⁸ Coolen, P., Best, S., Lima, A., Sabel, J., & Paulozzi, L. (2009). Overdose Deaths Involving Prescription Opioids among Medicaid Enrollees- Washington, 2004-2007. *Morbidity and Mortality Weekly Report*, 58, 1171-1175.
- ¹⁹ Mack, K.A., Zhang, K., Paulozzi, L., & Jones, C. (February 2015). Prescription Practices Involving Opioid Analgesics among Americans with Medicaid, 2010. *Journal of Health Care for the Poor and Underserved*, 26, 182–98.
- ²⁰ Sharp, M.J., & Melnik, T.A. (2015). Poisoning Deaths Involving Opioid Analgesics in New York State, 2003 – 2012. *Morbidity and Mortality Weekly Report*, 64, 377-380.
- ²¹ These results are generally consistent with Drug Enforcement Administration (DEA)'s strict guideline for prescribing opioids www.deadiversion.usdoj.gov/faq/prescriptions.htm. In general, schedule II controlled opioids cannot be refilled and a new prescription must be issued.
- ²² See summary of Minnesota's proposed opioid prescribing guidelines, available at mn.gov/dhs/assets/2017-opip-overview_tcm1053-320120.pdf, accessed April 16, 2018. The Opioid Prescribing Work Group (OPWG) is an advisory body of experts convened to forward DHS' Opioid Prescribing Improvement Program (OPIP).
- ²³ Other studies have also reported greater prescription opioid use in rural than in metropolitan areas, coincident with differences in age, income, employment status, insurance coverage, and other factors. See for example (a-c):
- a. Han B., Compton W.M., Blanco C., Crane E., Lee J., & Jones C.M. (2017). Prescription Opioid Use, Misuse, and Use Disorders in U.S. Adults: 2015 National Survey on Drug Use and Health. *Annals of Internal Medicine*, 167, 293-301.
- b. Keyes K.M., Cerdá M., Brady J.E., Havens J.R., & Galea S. (2014). Understanding the rural-urban differences in nonmedical prescription opioid use and abuse in the United States. *American Journal of Public Health*, 104,e52-9.
- c. Garcia M.C., Faul M., Massetti G., et al. (2017). Reducing Potentially Excess Deaths from the. *MMWR Surveill Summ*, 66(No. SS-2):1–7. DOI: [dx.doi.org/10.15585/mmwr.ss6602a1](https://doi.org/10.15585/mmwr.ss6602a1).
- ²⁴ Minnesota's Opioid Action Plan, released in 2018, provides an overview of Minnesota's government actions to address the opioid epidemic. Available at www.mn.gov/gov-stat/pdf/2018_02_14_Minnesota_Opioid_Action_Plan.pdf, accessed April 16, 2018.
- ²⁵ The State Opioid Oversight Project (SOOP), was formed as part of the Minnesota State Substance Abuse Strategy and with participation from 12 state agencies. See www.health.state.mn.us/divs/healthimprovement/working-together/state-plans/opioidstateplan.html, accessed April 16, 2018.
- ²⁶ Minnesota's Opioid Prescribing Improvement Program (OPIP) was created in 2015 at the direction of the governor and legislature to provide recommendations to address overprescribing and misuse of opioids; See mn.gov/dhs/assets/2017-opip-overview_tcm1053-320120.pdf, accessed April 16, 2018.
- ²⁷ The Opioid Prescribing Work Group (OPWG) is an advisory body of experts convened to forward Minnesota Department of Human Services' (DHS) Opioid Prescribing Improvement Program (OPIP). See mn.gov/dhs/partners-and-providers/news-initiatives-reports-workgroups/minnesota-health-care-programs/opioid-work-group/, accessed April 16, 2018.

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