

# **Key Takeaways**

## **Opioids**

9% decrease in opioid prescribing rates from 2021-2023

**46.4** opioid prescription per 100 Montanans (2023)

**19%** of patients were prescribed high opioid doses (>50 MME, 2023)

## **Stimulants**

21% increase in stimulant prescribing rates from 2021-2023

**37.4** stimulant prescriptions per 100 Montanans (2023)

Source: Montana Prescription Drug Registry, 2021-2023

# Montana Prescribing Trends 2021-2023

#### Introduction

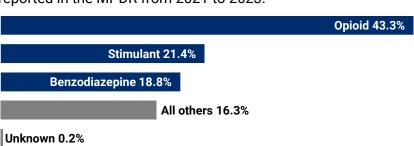
Prescription Drug Monitoring Programs (PDMPs) are electronic databases that track prescriptions categorized as controlled substances. These substances include opioids for pain management, benzodiazepines for the treatment of anxiety and seizures, and stimulants prescribed for attention deficit hyperactivity disorder. Some medications commonly used for treatment of opioid use disorder (OUD), such as buprenorphine, are also included. PDMPs provide prescribers information on their patient's current and past medications to prevent overprescribing or prescribing dangerous combinations of drugs. They also allow for analysts to view prescribing patterns at the state level.

The Montana Department of Public Health and Human Services (DPHHS) has partnered with the Montana Board of Pharmacy to analyze de-identified data from the Montana Prescription Drug Registry (MPDR) to describe opioid-related prescribing practices since 2012. Prior analyses followed <u>guidelines</u> set by the CDC that aimed to reduce negative outcomes from overprescribing opioids in an effort to reduce opioid overdose deaths. <sup>1</sup> This report summarizes prescribing practices for all substances in the MPDR from 2021-2023, in addition to opioids.

#### The Montana Prescription Drug Registry

The Montana Legislature authorized the MPDR in 2011.<sup>2</sup> In November 2012, the MPDR began as an online tool that requires all pharmacies with an active Montana license, both in-state and out-of-state, to submit detailed information on all controlled substances prescribed and dispensed to Montana patients.<sup>3</sup> Pharmacies under the auspices of the Indian Health Service began voluntarily reporting to the MPDR in 2014, and the Veterans Administration began in 2016.<sup>4</sup>

**Figure 1.** Opioids were the most common type of prescription drug reported in the MPDR from 2021 to 2023.



From 2021 to 2023, Montana licensed pharmacies reported 5,000,889 prescriptions for Montana residents to the MPDR. The most common type of substance prescribed was opioids (43.3%), followed by stimulants and benzodiazepines (21.4% and 18.8%, respectively; Figure 1).

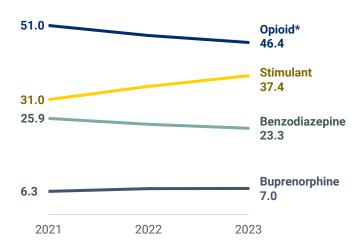
August 2024



### **Overall Prescribing Trends**

Figure 2. Opioid and benzodiazepine prescribing rates declined from 2021 to 2023, while stimulant prescribing rates increased.

Age-adjusted prescribing rates per 100 Montanans for opioids, stimulants, benzodiazepines, and buprenorphine



The **stimulant** prescribing rate **increased by 21%** from 31.0 prescriptions per 100 Montanans in 2021 to 37.4 in 2023.

The benzodiazepine prescribing rate declined by 10%, from 25.9 prescriptions per 100 Montanans in 2021 to 23.3 in 2023.

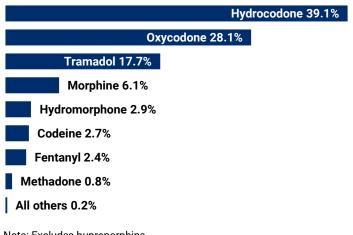
The **buprenorphine** prescribing rate **increased by 11%**, 6.3 prescriptions per 100 Montanans in 2021 to 7.0 in 2023.

#### **Opioid Prescribing Trends**

#### Top Opioids Prescribed

Hydrocodone, oxycodone, and tramadol collectively accounted for over 8 in 10 opioid prescriptions (excluding buprenorphine) in Montana from 2021 to 2023 (Figure 3). Trends in the types of opioids prescribed have generally remained stable during this time period.

Figure 3. Hydrocodone, oxycodone, and tramadol were the top opioids prescribed from 2021 to 2023.



Note: Excludes buprenorphine.



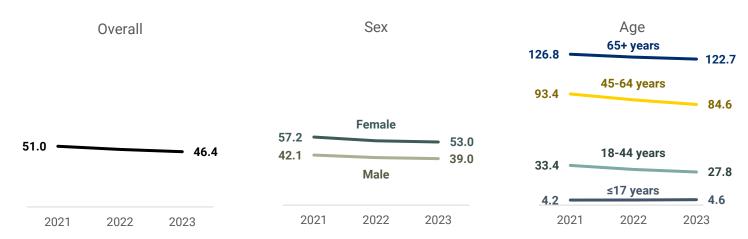
The **opioid** prescribing rate **declined by 9%**, from 51.0 prescriptions per 100 Montanans in 2021 to 46.4 in 2023. This excludes buprenorphine, which is commonly used to treat opioid use disorder.

<sup>\*</sup>The opioid prescribing rate excludes buprenorphine, which is shown separately. Source: Montana Prescription Drug Registry, 2021-2023



Figure 4. Opioid prescribing rates decreased for most gender and age groups.

Opioid prescribing rates per 100 Montanans by sex and age



The opioid prescribing rate excludes buprenorphine. Rates are age-adjusted for overall and sex groupings. Source: Montana Prescription Drug Registry, 2021-2023

#### **Opioid Prescribing Rates**

**Opioid prescribing rates for most sex and age groupings declined** from 2021 to 2023, continuing a downward trend seen in the overall opioid prescribing rates. Montanans in the 18-44 year-old age group had the biggest percentage decrease, with opioid prescribing rates decreasing by 17%. Female Montanans were prescribed opioids at a rate about 1.4 times greater than male Montanans (Figure 4).

Prescribing rates by age for opioids increased as age group increased, ranging from 4.6 opioid prescriptions per 100 Montanans under the age of 18 to 122.7 opioid prescriptions per 100 Montanans aged 65 and older in 2023. Agerelated differences may be in part because older populations are more likely to experience conditions associated with chronic pain, and because older patients may experience comorbidities that preclude the use of alternative treatments. These types of patients may receive multiple prescriptions over the course of a year so they can continue taking a medication when an existing prescription expires.

#### **MME**

MME stands for morphine milligram equivalent and corresponds to the equivalent amount of morphine in an opioid dose. MME is used to account for differences in drug type and strength in opioid prescribing. When a patient is prescribed a smaller MME, they are taking lower doses of opioids, which puts them at decreased risk of dependency and/or overdose. The 2022 CDC Clinical Practice Guideline for Prescribing Opioids for Pain provides updated guidance regarding MME, with a more nuanced approach to opioid dosing based upon the type of pain (chronic versus acute), whether the patient is opioid-naïve, and other factors.¹ The guidance states, "Many patients do not experience benefit in pain or function from increasing opioid dosages to ≥50 MME/day but are exposed to progressive increases in risk as dosage increases." Due to these guidance changes, this report presents data on the percentage of patients prescribed >50 MME. The previous threshold of 90 MME is presented for reference.



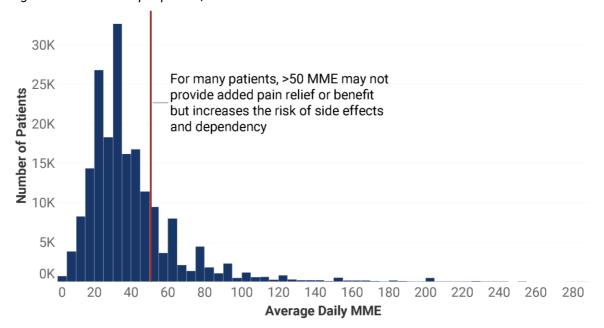


Analyses focused on average daily MME, or the average MME a patient was prescribed an opioid per day over all days in which they had a prescription. For example, if a patient was prescribed 30 MME for seven days and 50 MME for three days, their average daily MME would be  $((30 \times 7)*(50 \times 3))/10 = 36$  MME. Some opioids, such as buprenorphine, are excluded from MME analyses because the current CDC guidelines do not provide a conversion factor.

**Average daily MME declined slightly**, from 40.0 average daily MME in 2021 to 39.0 average daily MME in 2023. In addition, fewer patients were being prescribed higher opioid doses (over 50 MME/day), declining from 19.7% in 2021 to 18.5% in 2023 (Figures 5-6).

Although MME metrics declined overall from 2021 to 2023, there was a slight increase from 2021 to 2022 for many groups. Most of the decreases related to MME occurred from 2022 to 2023.

**Figure 5.** The majority of patients with an opioid prescription have an average dose that is less than 50 MME. *Histogram of mean MME per patient, 2023* 



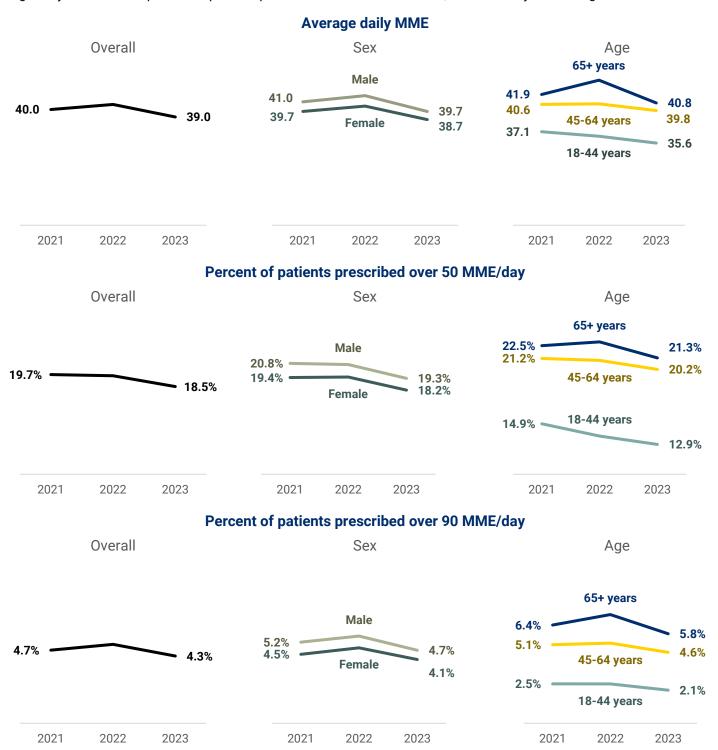
MME: Morphine Milligram Equivalent

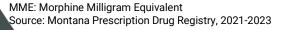




Figure 6. Opioid dosages, as reflected by MME, decreased for all sex and age groups from 2021 to 2023.

Average daily MME and the percent of patients prescribed over 50 and 90 MME, overall and by sex and age









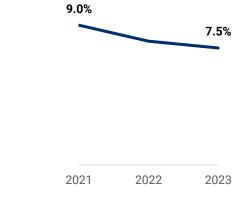
## Opioid and Benzodiazepine Overlap

Concurrent use of opioids and benzodiazepines is associated with an increased risk of opioid overdose, <sup>7,8</sup> making it important to minimize the number of days in which a patient has both an opioid and benzodiazepine prescription.

The percentage of days where a patient with an opioid prescription also had a benzodiazepine prescription decreased from 9.0% in 2021 to 7.5% in 2023 (Figure 7; Table 5).

**Figure 7.** The percent of days where a patient was prescribed both a benzodiazepine and opioid decreased from 2021 to 2023.

% of prescription days with concurrent benzodiazepine and opioid prescriptions, 2021-2023







## Buprenorphine Prescribing Trends

Buprenorphine is an opioid partial agonist, meaning it activates the same brain receptors as other opioids, but does so to a lesser degree. Buprenorphine can be used in the treatment of opioid use disorder as well as an analgesic. When used as prescribed, buprenorphine is an effective maintenance treatment for opioid use disorder and can be administered in a variety of long- and short-acting formulations.<sup>9</sup>

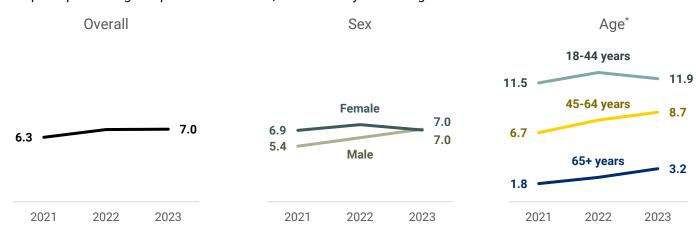
Until 2023, providers needed to obtain a special waiver through the DEA to prescribe buprenorphine for the treatment of opioid use disorder (OUD) in office-based settings outside of federally recognized opioid treatment programs. This waiver required that providers undergo additional training and which created an unintentional barrier to providing care for patients with an OUD. On June 21, 2023, the Waiver Elimination (MAT Act) was passed which removed the requirement for practitioners to acquire a waiver. This report shows buprenorphine prescribing rates before and shortly after the removal of the waiver requirement. While it is too soon to detect changes in buprenorphine prescribing as a result of MAT Act, these rates can serve as a baseline for future analyses.

The **buprenorphine prescribing rate increased slightly**, with 6.3 prescriptions per 100 Montanans in 2021 and 7.0 prescriptions per 100 Montanans in 2023 (Figure 8).

Buprenorphine prescribing increased for all adult age groups. The 18-44 years age group continued to have the highest buprenorphine prescribing rate at 11.9 per 100 Montanans in 2023.

**Figure 8.** Buprenorphine prescribing increased slightly from 2021 to 2023, with the biggest increase for people over age 45.

Buprenorphine prescribing rate per 100 Montanans, overall and by sex and age



\*People ≤ 17 years had a buprenorphine prescribing rate of less than 0.1 per 100; this rate is not shown. Source: Montana Prescription Drug Registry, 2021-2023

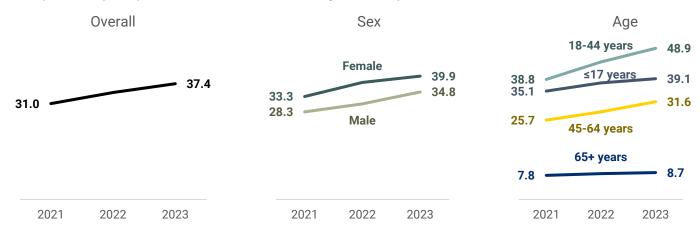




#### **Stimulant Prescribing Trends**

Figure 9. Stimulant prescribing increased by about 21% overall from 2021 to 2023.

Stimulant prescribing rate per 100 Montanans, overall and by sex and age



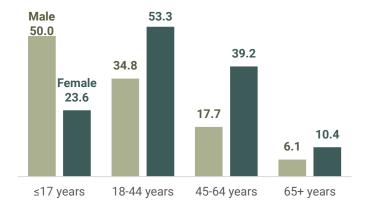
Source: Montana Prescription Drug Registry, 2021-2023

The **stimulant prescribing rate increased by about 21%**, with 31.0 prescriptions per 100 Montanans in 2021 and 37.4 prescriptions per 100 Montanans in 2023. Increases were seen across all sex and age groups, with the biggest percentage increase among the 18-44 year-old age group. For this group, the stimulant prescribing rate increased by 26% (Figure 9).

Stimulant prescribing rates by sex varied depending on the age of the patient. From 2021-2023, males under 18 had a higher prescribing rate of stimulants than females under 18 (50.0 prescriptions per 100 males vs. 23.6 prescriptions per 100 females). However, this trend changed for adult age groups—females had higher stimulant prescribing rates than males from age 18 onward (Figure 10).

**Figure 10.** Stimulant prescription rates are higher for males under 18, but higher for females in all adult age groups.

Stimulant prescribing rate by age/sex combination, 2021-2023







## **Multiple Provider and Pharmacy Episodes**

The proportion of patients with multiple provider and pharmacy episodes is an area of public health interest. Some patients require multiple specialists and/or pharmacies to meet treatment needs. However, multiple provider and pharmacy episodes may also indicate substance misuse and may increase risk of medication overlap or interactions. For this report, we present data on the number of patients with five or more prescribers, five or more pharmacies, or both.

There were **large decreases in the number of Montana patients with multiple provider and pharmacy episodes** from 2021 to 2023. The cause of the decrease is currently unclear and may be due to software transitions, COVID-19-related effects, or other factors.

Table 1. Count of patients utilizing five or more prescribers or pharmacies, 2021-2023

Year	2021	2022	2023
Total patients	274,444	350,037	354,817
≥ 5 prescribers	16,822	6,416	6,734
≥ 5 pharmacies	771	109	159
Both ≥ 5 prescribers and ≥ 5 pharmacies	591	47	36







#### Methods

For this report, data encompassed all scheduled prescriptions dispensed by Montana-licensed pharmacies from January 1, 2021 through December 31, 2023. The Montana Board of Pharmacy provided de-identified data from the MPDR through a memorandum of understanding between DPHHS and the Department of Labor and Industry. The Montana Board of Pharmacy began utilizing a new vendor for the MPDR, which provided data to DPHHS in a different format than prior years; the first full year of data using this new format was 2021. Due to this change, years prior to 2021 may not be directly comparable to this report.

Prescribing rates per 100 residents used Montana Department of Commerce, Census and Economic Information Center (CEIC) population estimates which were received in July 2023. Overall and sex-specific rates were age-adjusted to the US 2000 standard population using the direct method. Analyses examined prescribing rates overall, by age group, and by sex. Sex-stratified analysis excluded prescriptions for patients without a reported sex (n=69,575). Prescriptions included in analysis used the following inclusion criteria:

- The patient was a Montana resident
- The prescriber was physically based in Montana
- The prescription days supply was >0
- The prescription drug quantity was >0
- The prescription drug was not missing information on drug class, type, or dosage

MME analysis excluded prescriptions for patients under age 18 years (n=30,348) due to limited evidence and guidance regarding the use of opioids for pain management in children and adolescents.<sup>1</sup> It also excludes opioids for which an MME conversion value was not available (about 1% of opioid prescriptions). In addition, MME analysis removed the upper 1% of average daily MME calculated – during analysis we found anomalies in reporting on the quantity of drug prescribed which resulted in implausibly high average daily MME values. Removal of these values was done to avoid biasing results.

De-identified prescription data were analyzed using SAS 9.4. <u>VA National Formulary Drug File Extract</u> data provided information on drug classes based on National Drug Code (NDC).<sup>11</sup> The 2022 CDC Clinical Practice Guideline for Prescribing Opioids for Pain, Table 5 provided MME conversion factors for conducting MME analyses.<sup>1</sup>

#### Limitations

Each drug prescribed in the MPDR is associated with an NDC, a number that is a universal product identifier for drugs in the United States. This number provides information on the specific strength, dosage form, and formulation of a prescription. When matching MPDR prescriptions to VA National Formulary data using NDC codes, there was a possibility of misclassifying the NDC or missing it entirely. However, only 0.2% of MPDR records did not have a match in the VA National Formulary data.

There were some inconsistencies in reporting on drug quantity, particularly for liquid formulations. This may have had a minor influence on MME-related analyses.





#### References

- Centers for Disease Control and Prevention. (2022). CDC Clinical Practice Guideline for Prescribing Opioids for Pain — United States. Retrieved on 17 May 2024 from <a href="https://www.cdc.gov/mmwr/volumes/71/rr/rr7103a1.htm">https://www.cdc.gov/mmwr/volumes/71/rr/rr7103a1.htm</a>
- 2. Mont. Code. Anno §37-7-15 (2017). Retrieved on 17 May 2024 from <a href="https://www.leg.mt.gov/bills/mca/title\_0370/chapter\_0070/part\_0150/sections\_index.html">https://www.leg.mt.gov/bills/mca/title\_0370/chapter\_0070/part\_0150/sections\_index.html</a>
- 3. Mont. Code. Anno §37-7-1503. (2017) Retrieved on 17 May 2024 from <a href="https://www.leg.mt.gov/bills/mca/title\_0370/chapter\_0070/part\_0150/section\_0030/0370-0070-0150-0030.html">https://www.leg.mt.gov/bills/mca/title\_0370/chapter\_0070/part\_0150/section\_0030/0370-0070-0150-0030.html</a>
- 4. Montana Department of Labor & Industry (2024). Retrieved on 17 May 2024 from <a href="https://boards.bsd.dli.mt.gov/pharmacy/mpdr/">https://boards.bsd.dli.mt.gov/pharmacy/mpdr/</a>
- 5. Montana Department of Public Health and Human Services. (2019). Opioid Prescribing Practices in Montana, 2014-2019. Retrieved on 1 August 2024 from <a href="https://dphhs.mt.gov/assets/publichealth/EMSTS/Data/PDMPBurdenreport2014to2019.pdf">https://dphhs.mt.gov/assets/publichealth/EMSTS/Data/PDMPBurdenreport2014to2019.pdf</a>
- 6. Gazelka, H. M., Leal, J. C., Lapid, M. I., & Rummans, T. A.(2020). Opioids in Older Adults: Indications, Prescribing, Complications, and Alternative Therapies for Primary Care. *Mayo Clinic Proceedings* 95(4), P793-800. DOI: https://doi.org/10.1016/j.mayocp.2020.02.002
- 7. Sun, E. C., Dixit, A., Humphreys, K., Darnall, B. D., Baker, L. C., & Mackey, S. (2017). Association between concurrent use of prescription opioids and benzodiazepines and overdose: retrospective analysis. *BMJ* (356) j760. DOI: <a href="https://doi.org/10.1136/bmj.j760">https://doi.org/10.1136/bmj.j760</a>
- 8. Hernandez, I., He, M., & Brooks, M. M. (2018). Exposure-response association between concurrent opioid and benzodiazepine use and risk of opioid-related overdose in Medicare Part D beneficiaries. *JAMA Netw Open* 1:2, e180919. DOI: <a href="https://doi.org/10.1001/jamanetworkopen.2018.0919">https://doi.org/10.1001/jamanetworkopen.2018.0919</a>
- 9. Shulman, M., Wai, J.M., Nunes, E.V. (2019). Buprenorphine treatment for opioid use disorder: An overview. *CNS Drugs* 33, 567-580. DOI: <a href="https://doi.org/10.1007/s40263-019-00637-z">https://doi.org/10.1007/s40263-019-00637-z</a>
- 10. Substance Abuse and Mental Health Services Administration. (2024). Waiver Elimination Act (MAT Act). Retrieved 1 August 2024 from <a href="https://www.samhsa.gov/medications-substance-use-disorders/waiver-elimination-mat-act">https://www.samhsa.gov/medications-substance-use-disorders/waiver-elimination-mat-act</a>
- 11. US Department of Veterans Affairs. (2024). VA National Drug File Extract with NDC. Retrieved 19 July 2024 from <a href="https://www.pbm.va.gov/nationalformulary.asp">https://www.pbm.va.gov/nationalformulary.asp</a>

For further information, please contact:
Sandra Biller, MS
Epidemiologist
406.444.3170 | sandra.biller@mt.gov



**Table 1.** Drugs reported in the MPDR by drug class, 2021-2023

	2021	2022	2023	Total 2021-2023	Percent of Total 2021-2023
Opioid	731,514	721,284	710,575	2,163,373	43.3%
Stimulant	317,811	358,921	391,161	1,067,893	21.4%
Benzodiazepine	326,438	311,938	302,727	941,103	18.8%
Muscle relaxant	6,325	5,766	5,139	17,230	0.3%
All other drugs	255,215	266,594	277,161	798,970	16.0%
Missing/Unknown	7,407	2,562	2,351	12,320	0.2%
Total	1,644,710	1,667,065	1,689,114	5,000,889	100.0%

**Table 2.** Types of opioids prescribed in the MPDR, 2021-2023

	2021	2022	2023	Total	Percent of Total 2021-2023	Percent of Total without Buprenorphine 2021-2023
Hydrocodone	266,198	253,152	240,870	760,220	35.1%	39.1%
Oxycodone	178,911	181,495	185,561	545,967	25.2%	28.1%
Tramadol	118,364	113,861	111,695	343,920	15.9%	17.7%
Morphine	41,620	39,531	38,172	119,323	5.5%	6.1%
Hydromorphone	18,539	18,490	19,848	56,877	2.6%	2.9%
Codeine	18,685	17,317	16,196	52,198	2.4%	2.7%
Fentanyl	6,335	15,258	14,387	45,980	2.1%	2.4%
Methadone	5,201	4,900	4,531	14,632	0.7%	0.8%
Buprenorphine	66,231	75,894	78,196	220,321	10.2%	n/a
All others	1,430	1,386	1,119	3,935	0.2%	0.2%
Total	731,514	721,284	710,575	2,163,373	100.0%	n/a
Total without Buprenorphine	665,283	645,390	632,379	1,943,052	n/a	100.0%

Table 3. Prescribing rates per 100 Montanans by drug type, sex, and age, 2021-2023

Demographic         2021         2022         2023         2021-2023 combines           Opioid (excluding buprenorphine)           Overall         51.0 (50.9-51.1)         48.3 (48.2-48.4)         46.4 (46.3-46.5)         48.6 (48.5-48.4)           Female         57.2 (57.0-57.4)         54.1 (53.9-54.2)         53.0 (52.9-53.2)         54.7 (54.6-54.8)           Male         42.1 (41.9-42.2)         40.0 (39.8-40.1)         39.0 (38.9-39.2)         40.3 (40.2-40.4)           ≤ 17 years         4.2 (4.1-4.3)         4.3 (4.2-4.4)         4.6 (4.5-4.7)         4.4 (4.3-4.4)           18-44 years         33.4 (33.2-33.5)         30.0 (29.9-30.2)         27.8 (27.7-28.0)         30.4 (30.3-30.4)           45-64 years         93.4 (93.0-93.8)         88.5 (88.1-88.8)         84.6 (84.2-84.9)         88.8 (88.6-89.4)           65+ years         126.8 (126.3-127.3)         124.4 (124.0-124.9)         122.7 (122.3-123.2)         124.6 (124.3-124.8)		Estimate (95% Confidence Interval)				
Overall $51.0 (50.9-51.1)$ $48.3 (48.2-48.4)$ $46.4 (46.3-46.5)$ $48.6 (48.5-48.4)$ Female $57.2 (57.0-57.4)$ $54.1 (53.9-54.2)$ $53.0 (52.9-53.2)$ $54.7 (54.6-54.4)$ Male $42.1 (41.9-42.2)$ $40.0 (39.8-40.1)$ $39.0 (38.9-39.2)$ $40.3 (40.2-40.4)$ $\leq 17$ years $4.2 (4.1-4.3)$ $4.3 (4.2-4.4)$ $4.6 (4.5-4.7)$ $4.4 (4.3-4.4)$ $18-44$ years $33.4 (33.2-33.5)$ $30.0 (29.9-30.2)$ $27.8 (27.7-28.0)$ $30.4 (30.3-30.4)$ $45-64$ years $93.4 (93.0-93.8)$ $88.5 (88.1-88.8)$ $84.6 (84.2-84.9)$ $88.8 (88.6-89.4)$ $65+$ years $126.8 (126.3-127.3)$ $124.4 (124.0-124.9)$ $122.7 (122.3-123.2)$ $124.6 (124.3-124.6)$	Demographic	2021	•	•	2021-2023 combined	
Female $57.2$ ( $57.0$ - $57.4$ ) $54.1$ ( $53.9$ - $54.2$ ) $53.0$ ( $52.9$ - $53.2$ ) $54.7$ ( $54.6$ - $54.8$ )Male $42.1$ ( $41.9$ - $42.2$ ) $40.0$ ( $39.8$ - $40.1$ ) $39.0$ ( $38.9$ - $39.2$ ) $40.3$ ( $40.2$ - $40.8$ )≤ 17 years $4.2$ ( $4.1$ - $4.3$ ) $4.3$ ( $4.2$ - $4.4$ ) $4.6$ ( $4.5$ - $4.7$ ) $4.4$ ( $4.3$ - $4.8$ )18-44 years $33.4$ ( $33.2$ - $33.5$ ) $30.0$ ( $29.9$ - $30.2$ ) $27.8$ ( $27.7$ - $28.0$ ) $30.4$ ( $30.3$ - $30.8$ )45-64 years $93.4$ ( $93.0$ - $93.8$ ) $88.5$ ( $88.1$ - $88.8$ ) $84.6$ ( $84.2$ - $84.9$ ) $88.8$ ( $88.6$ - $89.8$ )65+ years $126.8$ ( $126.3$ - $127.3$ ) $124.4$ ( $124.0$ - $124.9$ ) $122.7$ ( $122.3$ - $123.2$ ) $124.6$ ( $124.3$ - $124.8$ )						
Male $42.1 (41.9-42.2)$ $40.0 (39.8-40.1)$ $39.0 (38.9-39.2)$ $40.3 (40.2-40.4)$ ≤ 17 years $4.2 (4.1-4.3)$ $4.3 (4.2-4.4)$ $4.6 (4.5-4.7)$ $4.4 (4.3-4.4)$ 18-44 years $33.4 (33.2-33.5)$ $30.0 (29.9-30.2)$ $27.8 (27.7-28.0)$ $30.4 (30.3-30.4)$ 45-64 years $93.4 (93.0-93.8)$ $88.5 (88.1-88.8)$ $84.6 (84.2-84.9)$ $88.8 (88.6-89.66)$ 65+ years $126.8 (126.3-127.3)$ $124.4 (124.0-124.9)$ $122.7 (122.3-123.2)$ $124.6 (124.3-124.6)$	Overall	51.0 (50.9-51.1)	48.3 (48.2-48.4)	46.4 (46.3-46.5)	48.6 (48.5-48.6)	
$\leq$ 17 years 4.2 (4.1-4.3) 4.3 (4.2-4.4) 4.6 (4.5-4.7) 4.4 (4.3-4.18-44 years 33.4 (33.2-33.5) 30.0 (29.9-30.2) 27.8 (27.7-28.0) 30.4 (30.3-30.45-64 years 93.4 (93.0-93.8) 88.5 (88.1-88.8) 84.6 (84.2-84.9) 88.8 (88.6-89.65+ years 126.8 (126.3-127.3) 124.4 (124.0-124.9) 122.7 (122.3-123.2) 124.6 (124.3-124.8)	Female	57.2 (57.0-57.4)	54.1 (53.9-54.2)	53.0 (52.9-53.2)	54.7 (54.6-54.8)	
18-44 years       33.4 (33.2-33.5)       30.0 (29.9-30.2)       27.8 (27.7-28.0)       30.4 (30.3-30.45-64 years)         45-64 years       93.4 (93.0-93.8)       88.5 (88.1-88.8)       84.6 (84.2-84.9)       88.8 (88.6-89.45-65-49)         65+ years       126.8 (126.3-127.3)       124.4 (124.0-124.9)       122.7 (122.3-123.2)       124.6 (124.3-124.9)	Male	42.1 (41.9-42.2)	40.0 (39.8-40.1)	39.0 (38.9-39.2)	40.3 (40.2-40.4)	
45-64 years 93.4 (93.0-93.8) 88.5 (88.1-88.8) 84.6 (84.2-84.9) 88.8 (88.6-89.0 65+ years 126.8 (126.3-127.3) 124.4 (124.0-124.9) 122.7 (122.3-123.2) 124.6 (124.3-124.9)	≤ 17 years	4.2 (4.1-4.3)	4.3 (4.2-4.4)	4.6 (4.5-4.7)	4.4 (4.3-4.4)	
65+ years 126.8 (126.3-127.3) 124.4 (124.0-124.9) 122.7 (122.3-123.2) 124.6 (124.3-124.9)	18-44 years	33.4 (33.2-33.5)	30.0 (29.9-30.2)	27.8 (27.7-28.0)	30.4 (30.3-30.5)	
	45-64 years	93.4 (93.0-93.8)	88.5 (88.1-88.8)	84.6 (84.2-84.9)	88.8 (88.6-89.0)	
	65+ years	126.8 (126.3-127.3)	124.4 (124.0-124.9)	122.7 (122.3-123.2)	124.6 (124.3-124.9)	
Buprenorphine			•			
	Overall				6.8 (6.7-6.8)	
Female 6.9 (6.9-7.0) 7.5 (7.4-7.6) 7.0 (6.9-7.0) 7.1 (7.1-7.5)	Female	6.9 (6.9-7.0)	7.5 (7.4-7.6)	7.0 (6.9-7.0)	7.1 (7.1-7.2)	
	Male				6.2 (6.2-6.3)	
$\leq$ 17 years 0.01 (.0.01-0.02) 0.01 (.0.01-0.02) 0.01 (.0.01-0.02) 0.01 (.0.01-0.02)	≤ 17 years	0.01 (.0.01-0.02)	0.01 (.0.01-0.02)	0.01 (.0.01-0.02)	0.01 (.0.01-0.02)	
18-44 years 11.5 (11.4-11.6) 12.5 (12.4-12.6) 11.9 (11.8-12.1) 12.0 (11.9-12.1)	18-44 years	11.5 (11.4-11.6)	12.5 (12.4-12.6)	11.9 (11.8-12.1)	12.0 (11.9-12.1)	
45-64 years 6.7 (6.6-6.8) 7.9 (7.8-8.0) 8.7 (8.6-8.8) 7.8 (7.7-7.5)	45-64 years	6.7 (6.6-6.8)	7.9 (7.8-8.0)	8.7 (8.6-8.8)	7.8 (7.7-7.8)	
65+ years 1.8 (1.7-1.8) 2.4 (2.3-2.4) 3.2 (3.1-3.3) 2.5 (2.4-2.1)	65+ years	1.8 (1.7-1.8)	2.4 (2.3-2.4)	3.2 (3.1-3.3)	2.5 (2.4-2.5)	
Stimulant			Stimulant			
Overall 31.0 (30.9-31.1) 34.6 (34.5-34.7) 37.4 (37.3-37.6) 34.4 (34.3-34.4)	Overall	31.0 (30.9-31.1)	34.6 (34.5-34.7)	37.4 (37.3-37.6)	34.4 (34.3-34.4)	
Female 33.3 (33.1-33.5) 37.8 (37.7-38.0) 39.9 (39.7-40.1) 37.1 (37.0-37.1)	Female	33.3 (33.1-33.5)	37.8 (37.7-38.0)	39.9 (39.7-40.1)	37.1 (37.0-37.2)	
Male 28.3 (28.2-28.5) 30.9 (30.8-31.1) 34.8 (34.6-34.9) 31.3 (31.2-31.4	Male	28.3 (28.2-28.5)	30.9 (30.8-31.1)	34.8 (34.6-34.9)	31.3 (31.2-31.4)	
≤ 17 years 35.1 (34.8-35.3) 37.7 (37.4-37.9) 39.1 (38.8-39.3) 37.3 (37.1-37.4-37.9)	≤ 17 years	35.1 (34.8-35.3)	37.7 (37.4-37.9)	39.1 (38.8-39.3)	37.3 (37.1-37.4)	
18-44 years 38.8 (38.6-39.0) 44.5 (44.3-44.7) 48.9 (48.7-49.1) 44.1 (44.0-44.5)	18-44 years	38.8 (38.6-39.0)	44.5 (44.3-44.7)	48.9 (48.7-49.1)	44.1 (44.0-44.2)	
45-64 years 25.7 (25.5-25.9) 28.3 (28.1-28.5) 31.6 (31.4-31.8) 28.5 (28.4-28.5)	45-64 years	25.7 (25.5-25.9)	28.3 (28.1-28.5)	31.6 (31.4-31.8)	28.5 (28.4-28.6)	
65+ years 7.8 (7.7-7.9) 8.4 (8.3-8.5) 8.7 (8.6-8.8) 8.3 (8.2-8.4)	65+ years	7.8 (7.7-7.9)	8.4 (8.3-8.5)	8.7 (8.6-8.8)	8.3 (8.2-8.4)	
Benzodiazepine			Benzodiazepine			
Overall 25.9 (25.8-26.0) 24.3 (24.2-24.4) 23.3 (23.2-23.4) 24.5 (24.4-24.4)	Overall	25.9 (25.8-26.0)	24.3 (24.2-24.4)	23.3 (23.2-23.4)	24.5 (24.4-24.5)	
Female 33.8 (33.6-33.9) 31.7 (31.6-31.8) 30.3 (30.2-30.4) 31.9 (31.8-32.4)	Female	33.8 (33.6-33.9)	31.7 (31.6-31.8)	30.3 (30.2-30.4)	31.9 (31.8-32.0)	
Male 17.4 (17.3-17.5) 16.4 (16.3-16.5) 16.0 (15.9-16.1) 16.6 (16.5-16.4)	Male	17.4 (17.3-17.5)	16.4 (16.3-16.5)	16.0 (15.9-16.1)	16.6 (16.5-16.6)	
	≤ 17 years	1.4 (1.4-1.5)	1.4 (1.4-1.5)		1.4 (1.4-1.4)	
18-44 years 22.1 (22.0-22.3) 20.5 (20.4-20.7) 19.3 (19.2-19.5) 20.6 (20.6-20.7)	18-44 years	22.1 (22.0-22.3)	20.5 (20.4-20.7)	19.3 (19.2-19.5)	20.6 (20.6-20.7)	
45-64 years 45.9 (45.7-46.2) 43.1 (42.8-43.3) 41.6 (41.3-41.8) 43.5 (43.4-43.3)	45-64 years	45.9 (45.7-46.2)	43.1 (42.8-43.3)	41.6 (41.3-41.8)	43.5 (43.4-43.7)	
65+ years 52.7 (52.3-53.0) 50.0 (49.7-50.3) 48.0 (47.7-48.3) 50.1 (50.0-50.3)	65+ years	52.7 (52.3-53.0)	50.0 (49.7-50.3)	48.0 (47.7-48.3)	50.1 (50.0-50.3)	
Muscle Relaxant						
		.5 (.55)	.4 (.44)	.4 (.44)	.4 (.44)	
Female .6 (.67) .6 (.66) .5 (.55) .6 (.67)	Female	.6 (.67)	.6 (.66)	.5 (.55)	.6 (.66)	
Male .3 (.33) .3 (.33) .2 (.22) .3 (.33	Male	.3 (.33)	.3 (.33)	.2 (.22)	.3 (.33)	
≤ 17 years	≤ 17 years	-	-	-	-	
					.2 (.22)	
	-	` ,			1.1 (1.1-1.1)	
65+ years 1.0 (1.0-1.0) 1.0 (.9-1.0) .8 (.89) .9 (.9-1.0	65+ years	1.0 (1.0-1.0)	1.0 (.9-1.0)	.8 (.89)	.9 (.9-1.0)	

Overall and sex-specific rates are age-adjusted to the US 2000 standard population using the direct method. No muscle relaxant prescriptions were made for the  $\leq$  17 year age group.

Table 4. MME prescribed per patient by sex and age, 2021-2023

Estimate (95% Confidence Interval)						
Demographic	2021	2022	2023			
Average Daily MME						
Overall	40.0 (39.8, 40.1)	40.6 (40.5, 40.8)	39.0 (38.9, 39.1)			
Female	39.7 (39.5, 39.9)	40.4 (40.2, 40.6)	38.7 (38.5, 38.8)			
Male	41.0 (40.7, 41.2)	41.8 (41.5, 42.0)	39.7 (39.5, 39.9)			
18-44 years	37.1 (36.9, 37.3)	36.5 (36.3, 36.7)	35.6 (35.4, 35.8)			
45-64 years	40.6 (40.4, 40.9)	40.7 (40.5, 40.9)	39.8 (39.6, 40.0)			
65+ years	41.9 (41.6, 42.2)	43.8 (43.5, 44.1)	40.8 (40.6, 41.0)			
	Percent of patients pres	scribed over 50 MME/day				
Overall	19.7 (19.5, 19.9)	19.6 (19.4, 19.7)	18.5 (18.3, 18.7)			
Female	19.4 (19.1, 19.6)	19.4 (19.2, 19.7)	18.2 (17.9, 18.4)			
Male	20.8 (20.5, 21.1)	20.6 (20.4, 20.9)	19.3 (19.0, 19.6)			
18-44 years	14.9 (14.6, 15.2)	13.7 (13.4, 14.0)	12.9 (12.6, 13.2)			
45-64 years	21.2 (20.9, 21.6)	21.0 (20.7, 21.4)	20.2 (19.9, 20.5)			
65+ years	22.5 (22.1, 22.8)	22.8 (22.5, 23.1)	21.3 (21.0, 21.6)			
Percent of patients prescribed over 50 MME/day						
Overall	4.7 (4.6, 4.8)	5.1 (5.0, 5.2)	4.3 (4.3, 4.4)			
Female	4.5 (4.3, 4.6)	4.9 (4.7, 5.0)	4.1 (4.0, 4.2)			
Male	5.2 (5.1, 5.4)	5.6 (5.5, 5.8)	4.7 (4.6, 4.9)			
18-44 years	2.5 (2.4, 2.7)	2.5 (2.4, 2.7)	2.1 (2.0, 2.3)			
45-64 years	5.1 (4.9, 5.3)	5.2 (5.0, 5.4)	4.6 (4.4, 4.8)			
65+ years	6.4 (6.2, 6.6)	7.0 (6.8, 7.2)	5.8 (5.6, 6.0)			
MME: Morphine Milligram Equivalent						

**Table 5.** Opioid-benzodiazepine overlap days, 2021-2023

Year	Total prescription days	Total days with overlapping opioid/benzodiazepine prescription	Percent of overlap days	Confidence Interval
2021	15,899,673	1,423,255	9.0%	(8.9-9.0)
2022	15,780,963	1,251,583	7.9%	(7.9-7.9)
2023	15,482,042	1,160,429	7.5%	(7.5-7.5)
Total	47,162,678	3,835,267	8.1%	(8.1-8.1)

Total prescription days refers to the total number of days in which a patient had an opioid or benzodiazepine prescription, across all patients. For example, say Patient A had an opioid prescription for three days and a benzodiazepine prescription for two days, one of which was the same date as their opioid prescription. Patient B had an opioid prescription for seven days but no benzodiazepine prescription. The total prescription days would be 12 (3+2+7) and the total overlapping days would be 1.