



Minnesota 1115(a) Substance Use Disorder System Reform Demonstration Project Evaluation

Examining Potential Disparities in Medication-Assisted Treatment

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Table of Contents

Introduction.....	1
Background.....	1
Opioid Use Disorder in the United States	1
Federal Regulation of Opioid Use Disorder Treatment.....	2
Opioid Use Disorder in Minnesota	3
Methods	7
Data Sources.....	7
Findings.....	8
All Minnesota Prescribers.....	9
Active Minnesota Medicaid Prescribers.....	11
Discussion	19
Appendix 1: Research Questions.....	22
Appendix 2: Data Sources, Methods, and Limitations	24
Data Sources.....	24
Methods	25
Limitations	25
Appendix 3: Additional Data Tables	27
Appendix 4: ZIP Code Analyses for Three Counties.....	38

List of Exhibits

- Exhibit 1:** Opioid Overdose Deaths in Minnesota5
- Exhibit 2:** Number of Prescribers in Minnesota, by Patient Limit and Practitioner Type9
- Exhibit 3:** Average Number of Medicaid Enrollees per Prescriber, by Level of Segregation10
- Exhibit 4:** Average Number of Prescribers per Facility, Overall and by County11
- Exhibit 5:** Opioid Overdose Death Rate and Ratio of Medicaid Enrollees per Active Prescriber.....12
- Exhibit 6:** Ratio of Medicaid Enrollees to Active Prescribers for Buprenorphine, by County13
- Exhibit 7:** County-Level Segregation Index, for Counties with No and Any Active Prescriber14
- Exhibit 8:** Map of Prescriber Availability by Segregation Index15
- Exhibit 9:** Difference in the Number of Prescribers and the Number of Active Medicaid Prescribers, by Quintile of County-Level Segregation.....16
- Exhibit 10a:** Average Distance between Medicaid Enrollee and Nearest Buprenorphine Prescriber, Overall and by Enrollee Race/Ethnicity.....17
- Exhibit 10b:** Average Distance between Medicaid Enrollee and Nearest Buprenorphine Prescriber, by County Segregation Index Quintile17
- Exhibit 11:** Number of Methadone Programs by County, Ratio to Medicaid Enrollees, and County Demographics.....18
- Exhibit 12:** Average Distance between Medicaid Enrollees and Nearest Opioid Treatment Program (Methadone) Provider, by Enrollee Race/Ethnicity.....19
- Appendix Exhibit 1.1:** Research Questions and Measures for Assessment.....22
- Appendix Exhibit 2.1:** Data Sources for the Assessment of Provider Capacity for MAT24
- Appendix Exhibit 2.2:** Types of Services and Providers Analyzed in Claims/Encounter Medication Data25
- Appendix Exhibit 3.1:** Number of Prescribers and Ratio to Medicaid Enrollees, Overall and by County-Level Segregation.....27
- Appendix Exhibit 3.2:** Total Number of Prescribers in Each County, by Type and Level of Prescriber28
- Appendix Exhibit 3.3:** Number of Active Prescribers and Ratio to Medicaid Enrollees, Overall and by Quintile of County-Level Segregation (for counties with at least one prescriber)30

Appendix Exhibit 3.4: Enrollees per Active Prescriber and Value of Segregation Index	31
Appendix Exhibit 3.5: Average Segregation Index for Counties with Either No Prescriber or Any Prescriber.....	31
Appendix Exhibit 3.6: Percent of Black, Hispanic, American Indian, and White Residents, by County Quintile of Segregation Index.....	32
Appendix Exhibit 3.7: Average Distance between Medicaid Enrollees and Nearest Buprenorphine Prescriber, for All Counties	33
Appendix Exhibit 3.8: Average Distance between Medicaid Enrollees and Nearest OTP for Methadone, by ZIP Code Categories.....	34
Appendix Exhibit 3.9: Average Distance between Medicaid enrollees and Nearest OTP for Methadone for All Counties.....	34
Appendix Exhibit 3.10: Minnesota Map-Supporting Data Table	35
Appendix Exhibit 4.1: Category of Number of Active Prescribers, Ratio to Enrollees, and Race/Ethnicity for ZIP Codes in Hennepin, Ramsey, and St. Louis County	38
Appendix Exhibit 4.2: Average Number of Active Prescribers, for ZIP Codes with Average and Higher than Average Proportions of Race/Ethnicity in Hennepin, Ramsey, and St. Louis County	38
Appendix Exhibit 4.3: Average Distance between Medicaid Enrollees and Nearest Buprenorphine Prescriber, for Select Counties.....	39
Appendix Exhibit 4.4: Methadone Providers in Each County, Enrollee to OTP Ratio, and Race/Ethnicity of ZIP Code.....	40
Appendix Exhibit 4.5a: Hennepin County, Number of Providers and ZIP Codes with High Proportion of Black Enrollees	41
Appendix Exhibit 4.5b: Hennepin County, Number of Providers and ZIP Codes with High Proportion of Hispanic Enrollees.....	42
Appendix Exhibit 4.5c: Hennepin County, Number of Providers and ZIP Codes with High Proportion of American Indian Enrollees.....	43
Appendix Exhibit 4.5d: Hennepin County, Map-Supporting Data Table	44
Appendix Exhibit 4.6a: Ramsey County, Number of Providers and ZIP Codes with High Proportion of Black Enrollees	46
Appendix Exhibit 4.6b: Ramsey County, Number of Providers and ZIP Codes with High Proportion of Hispanic Enrollees	47

Appendix Exhibit 4.6c: Ramsey County, Number of Providers and ZIP Codes with High Proportion of American Indian Enrollees.....	48
Appendix Exhibit 4.6d: Ramsey County, Map-Supporting Data Table	49
Appendix Exhibit 4.7a: St. Louis County, Number of Providers and ZIP Codes with High Proportion of Black Enrollees	50
Appendix Exhibit 4.7b: St. Louis County, Number of Providers and ZIP Codes with High Proportion of Hispanic Enrollees.....	51
Appendix Exhibit 4.7c: St. Louis County, Number of Providers and ZIP Codes with High Proportion of American Indian Enrollees.....	52
Appendix Exhibit 4.7d: St. Louis County, Map-Supporting Data Table	53

Introduction

In Minnesota, as in other states, there is concern about the disproportionate impact of substance use disorder (SUD), including opioids, on communities of color. The state's most recent Opioid Dashboard Report for 2018 illustrates that American Indian and Black Minnesotans are much more likely to suffer from fatal overdoses than their White peers.¹ Therefore, access to comprehensive SUD treatment, including medication-assisted treatment (MAT), is essential to addressing these community needs. Recent research has highlighted the inequities associated with access to MAT for treatment of opioid use disorders (OUD). This research was national in scope and found that the capacity to provide methadone was lower in counties with more racial segregation.² Given these findings, the Minnesota Behavioral Health Division, Department of Human Services (DHS), requested a state-based analysis of access to MAT services. This analysis will increase the Department's understanding of the role that MAT provider distribution may have on access to this service for Medicaid enrollees under the 1115 Substance Use Disorder (SUD) System Reform Demonstration.³

Background

Opioid Use Disorder in the United States

Prevalence. According to the National Survey on Drug Use and Health (NSDUH), in 2018, 3.7 percent of all Americans age 12 and older had misused opioids in the past year.⁴ OUD is caused by the misuse and/or addiction to opioids, the class of drugs that includes prescription pain relievers, heroin, and synthetic opioids such as fentanyl. The associated national public health crisis emerged about 15 years after physicians increasingly prescribed prescription opioid pain relievers believing they were not addictive.⁵ Almost a third of patients prescribed opioids misuse them and, of those who do, between 8 and 12 percent develop OUD.⁶ The OUD crisis has led to a dramatic increase in overdose deaths over the past 10 years with a continued rise in

¹ Minnesota Department of Health. Deaths by Race Opioids Overdose Dashboard Data, July 17, 2020, pp. 2-3. Accessed at <https://www.health.state.mn.us/communities/opioids/documents/opioiddashboarddata.pdf>

² Goedel WC, Shapiro A, Cerdá M, Tsai JW, Hadland SE, Marshall BDL. Association of racial/ethnic segregation with treatment capacity for opioid use disorder in counties in the United States. *JAMA Network Open*. 2020;3(4):e203711. [doi:10.1001/jamanetworkopen.2020.3711](https://doi.org/10.1001/jamanetworkopen.2020.3711)

³ See Appendix 1 for more details on the Minnesota 1115 Substance Use Disorder System Reform Demonstration.

⁴ Center for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health: Detailed Tables. Table 1.93B Misuse of Opioids in Past Year among Persons Aged 12 or Older. Rockville, MD: Substance Abuse and Mental Health Services Administration; June 2020.

⁵ Van Zee A. The promotion and marketing of oxycontin: commercial triumph, public health tragedy. *American Journal of Public Health*. 2009;99(2):221-227. [doi:10.2105/AJPH.2007.131714](https://doi.org/10.2105/AJPH.2007.131714)

⁶ National Institute on Drug Abuse. Opioid Overdose Crisis. May 27, 2020. <https://www.drugabuse.gov/drug-topics/opioids/opioid-overdose-crisis>

overdose deaths involving synthetic opioids other than methadone (e.g., fentanyl). There was an increase of 10 percent nationally, from 9.0 in 2017 to 9.9 in 2018.⁷

Disparities. In 2018, disparities in drug overdose mortality in the United States were observed between American Indians, Blacks, and Whites. Although deaths attributable to synthetic opioids were the leading cause of overdose deaths from 2017-2019 across all races and ethnicities, more Blacks and American Indians died from synthetic opioids, at 64 percent of deaths, as compared to Whites at 53 percent.²²

Federal Regulation of Opioid Use Disorder Treatment

Treatment for OUD is regulated by two major pieces of federal legislation:

- **Drug Addiction Treatment Act (DATA) of 2000.** This law allowed certain practitioners to apply for a waiver to prescribe buprenorphine for MAT (hereafter “prescribers”). Prescribers complete a training course (between 8 and 24 hours, depending on prescriber type), and submit an application with their credentials to the Drug Enforcement Administration. The number of these prescribers that prescribe buprenorphine has increased significantly, likely driven by state and federal policy changes created with this intention.⁸
- **Controlled Substances Act (CSA).** This law regulates the prescription and use of certain substances. There are three medications approved for MAT for opioid use disorder: methadone, buprenorphine, and naltrexone. Methadone is a Schedule II controlled substance under the CSA, a designation that indicates a high risk of abuse, and therefore its dispensation is generally limited to opioid treatment programs (OTP). Buprenorphine is a Schedule III controlled substance, considered to be a lower risk of abuse than methadone, and therefore can be administered within an OTP or prescribed by a prescriber with a DATA-2000 waiver and dispensed in a physician’s office, clinic, or licensed pharmacy. Naltrexone is not a controlled substance under the CSA.
- **Use of MAT.** As noted under the CSA description above, there are three medications approved for MAT for OUD treatment: methadone, buprenorphine, and naltrexone, which vary in their regulatory oversight. Despite the recent increase in OUD, the number of OTPs in the United States has remained relatively stable since 2003. However, the number of prescribers with a DATA-2000 waiver that prescribe buprenorphine has increased significantly. This may be partly due to the lower risk of abuse with buprenorphine relative to methadone, and thus buprenorphine maintenance can be prescribed

⁷ Hedegaard H, Minino A, Warner M. Drug Overdose Deaths in the United States, 1999–2018 National Center for Health Statistics Data Brief, No. 365, January 2020. <https://www.cdc.gov/nchs/data/databriefs/db356-h.pdf>

⁸ Recent acts include the Substance Use Disorder Prevention that Promotes Opioid Recovery and Treatment for Patients and Communities or SUPPORT for Patients and Communities Act of 2018 (SUPPORT Act) and the Comprehensive Addiction and Recovery Act of 2016 (CARA).

with fewer clinical visits, compared to methadone maintenance, which requires daily or near daily clinic visits.^{9,10}

According to the 2019 NSDUH, only 18.1 percent of persons with an OUD received MAT for opioid addiction.¹¹ Nonetheless, during the opioid crisis of the last decade, the use of MAT for OUD among persons with Medicaid coverage has expanded rapidly. The number of Medicaid-covered prescriptions for buprenorphine prescriptions for OUD increased over five times between 2013 and 2018, from 1.8 million to 6.5 million.¹²

Opioid Use Disorder in Minnesota

Prevalence. As noted above, approximately 3.7 percent of the population in the United States is estimated to have an OUD.¹³ If this trend holds in Minnesota, approximately 209,000 Minnesotans have an OUD. In addition, a recent analysis of several states Medicaid population estimates that the Medicaid population's OUD prevalence may be around 5 percent.¹⁴ With approximately 1.1 million individuals enrolled in Minnesota's Medicaid program (about 20 percent of the state's total population), there may be about 55,000 Medicaid enrollees¹⁵ in Minnesota who also have an OUD.¹⁶

⁹ United States Government Accountability Office. Opioid Addiction: Laws, Regulations, and Other Factors Can Affect Medication-Assisted Treatment Access. GAO-16-833, a report to the Majority Leader, U.S. Senate. September 2016.

¹⁰ King JB, Sainski-Nguyen AM, Bellows BK. Office-based buprenorphine versus clinic-based methadone: a cost-effectiveness analysis. *Journal of Pain & Palliative Care Pharmacotherapy*. 2016;30(1):55-65. doi:10.3109/15360288.2015.1135847

¹¹ Substance Abuse and Mental Health Services Administration. Key Substance Use and Mental Health Indicators in the United States: Results from the 2019 National Survey on Drug Use and Health (HHS Publication No. PEP20-07-01-001, NSDUH Series H-55). Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, 2020. p. 59. <https://www.samhsa.gov/data/>

¹² Urban Institute Health Policy Center. Tracking Medicaid-Covered Prescriptions to Treat Opioid Use Disorder. August 2020. <https://www.urban.org/policy-centers/health-policy-center/projects/tracking-medicare-covered-prescriptions-treat-opioid-use-disorder>

¹³ Center for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health: Detailed Tables. Table 1.93B Misuse of Opioids in Past Year among Persons Aged 12 or Older. Rockville, MD: Substance Abuse and Mental Health Services Administration; June 2020.

¹⁴ This was a study of six states and did not include Minnesota. Donohue J, Cunningham P, Walker L, Garfield R. Opioid Use Disorder among Medicaid Enrollees: Snapshot of the Epidemic and State Responses. November 2019. <http://files.kff.org/attachment/Issue-Brief-Opioid-Use-Disorder-among-Medicaid-Enrollees>

¹⁵ This estimate only applies to the Medicaid population, and does include the Consolidated Chemical Dependency Treatment Fund.

¹⁶ Minnesota Department of Human Services. Who Medicaid and MinnesotaCare Serve. <https://mn.gov/dhs/medicaid-matters/who-medicare-and-minnesotacare-serves/#:~:text=Average%20monthly%20enrollment%20in%20Minnesota's,a%20million%20children%20each%20year>

Treatment. As described above, MAT with buprenorphine occurs mainly through office-based prescribing, while methadone treatment is given in an outpatient basis at clinics.¹⁷ Results from the 2019 National Survey of Substance Abuse Treatment Services showed that 6,868 Minnesotans received outpatient methadone/buprenorphine maintenance or naltrexone treatment in 64 facilities providing this type of care, or about 16 percent of the 403 facilities in the state that completed the survey.¹⁸

In Minnesota, recent trends showed improvements in fatal drug overdoses, with deaths dropping 17 percent from 733 in 2017 to 607 in 2018. This decrease was primarily driven by decreases in deaths from both heroin and prescription opioids. However, overdose rates remained high, and between 2016 and 2019, the annual number of emergency room visits for opioid-involved overdoses increased from 1,618 to 2,823, a 74 percent increase over this three-year period.¹⁹

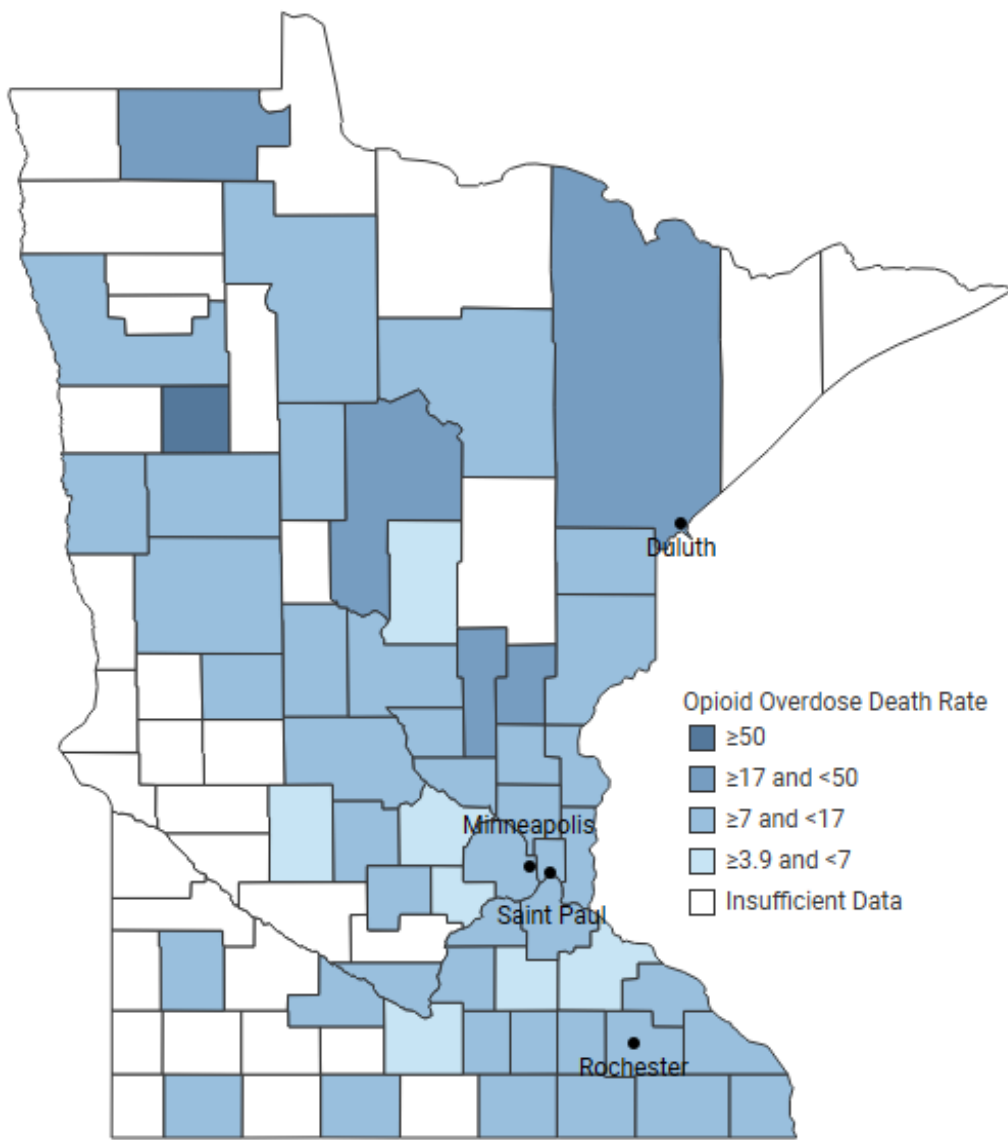
Exhibit 1 below shows the variation by county in the rate of opioid overdose deaths. The state average rate is 9.9 deaths per 100,000 across 54 reporting counties, with a range of 3.9 in Blue Earth County to 64.8 in Mahnommen County. As depicted on the map, there are 47 counties in Minnesota with opioid overdose death rates above 7 per 100,000 and 6 counties with rates above 17 per 100,000.

¹⁷ The forthcoming Provider Capacity Assessment will examine the number of individuals treated, and the number of MAT services rendered in an office-based or outpatient setting.

¹⁸ Data include all payers, not only Medicaid. National Survey of Substance Abuse Treatment Services (N-SSATS), published September 2020. N-SSATS Profile — Minnesota 2019. SAMHSA reports that 93.8 percent of Minnesota treatment providers responded to the survey. <https://www.samhsa.gov/data/report/2019-n-ssats-state-profiles>

¹⁹ Minnesota Department of Health Opioids Overdose Dashboard Data. July 17, 2020. <https://www.health.state.mn.us/opioiddashboard>

Exhibit 1: Opioid Overdose Deaths in Minnesota



Notes: Death Rate per 100,000 population. Data are available for 53 out of 87 Counties. Source: CDC National Center for Health Statistics (NCHS) National Vital Statistics System (NVSS) Multiple Cause of Death File— Multiple cause of death data, 2014-2018. See Exhibit 3.10 for more information.

Disparities. Among White, Black, and American Indian populations, opioids are the leading cause of drug overdose death. Across all U.S. states, White Medicaid enrollees have the highest rate of OUD compared to other racial and ethnic groups, but they are also more likely to receive MAT.²⁰ In Minnesota, Black and American Indian populations are dying from drug overdose deaths at rates of two and seven times that of White Minnesotans, respectively.²¹ In Minnesota, between 2004 and 2019, the rate of deaths per 100,000 population from synthetic opioids increased 11.4 times among Whites, 23 times among Blacks, and 29 times among American Indians.²²

Use of MAT. In 2018, Minnesota’s Opioid Action Plan acknowledged that access to OUD treatments in Minnesota—including MAT—has not kept up with the demand.²³ And the Plan articulated new investments through state monies and federal grants to expand access to MAT.²⁴ Minnesota is ranked 31st for OUD among its Medicaid population, and 35th among prescriptions for MAT per 1,000 Medicaid enrollees age 12 and over.^{25,26,27}

The following sections illustrate that potential disparities in capacity to provide MAT services may exist in Minnesota.²⁸ This analysis identifies where providers that administer MAT are located in relation to the race and ethnicity of the populations that may need this treatment.²⁹ For a full list of research questions, see Appendix 1 at the end of this report.

²⁰ Opioid Use Disorder among Medicaid Enrollees: Snapshot of the Epidemic and State Responses. Issue brief. Kaiser Family Foundation, 2019.

²¹ The Black population includes U.S.-born and African-born decedents. <https://www.health.state.mn.us/communities/opioids/data/racedisparity.html>

²² DeLaquil M. Differences in Rates of Drug Overdose Deaths by Race. Minnesota Department of Health, 2020. <https://www.health.state.mn.us/communities/opioids/documents/raceratedisparity2019prelimfinal.pdf>

²³ Minnesota Department of Human Services. Minnesota State Targeted Response to the Opioid Crisis. April 2017. https://mn.gov/dhs/assets/mn-opioid-str-project-narrative-april-2017_tcm1053-289624.pdf

²⁴ State of Minnesota. Minnesota Opioid Action Plan. 2018. https://www.mn.gov/gov-stat/pdf/2018_02_14_Minnesota_Opioid_Action_Plan.pdf

²⁵ Clemans-Cope L, et al. State Variation in Medicaid Prescriptions for Opioid Use Disorder from 2011 to 2018. August 2019. Accessed at: https://www.urban.org/sites/default/files/publication/100817/2019.08.19_av_state_medicaid_rx_oud_final_v3_1.pdf

²⁶ Medicaid. June 2020 Medicaid & CHIP Enrollment Data Highlights. <https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html>

²⁷ Substance Abuse and Mental Health Services Administration. 2017-2018 NSDUH Estimated Totals by State. February 2020. Accessed at: <https://www.samhsa.gov/data/report/2017-2018-nsduh-estimated-totals-state>

²⁸ This only includes any form of buprenorphine and naltrexone and methadone, not other types of services (e.g., counseling).

²⁹ Appendix 2 provides additional information on the research questions and data sources.

Methods

This analysis uses several analytic methods to examine the disparities in MAT prescribing and to understand where resources can be used to increase capacity for MAT services.

In order to ascertain how the populations of these geographic areas differ by race and ethnicity, we assess population variation at the census tract level. This paper builds on the method introduced by Goedel et al., by constructing measures of dissimilarity at the census tract level for the Black, Hispanic, and American Indian populations.^{2,30} Dissimilarity measures, or the segregation index (SI), are the percentage of a group's population that would have to change residence for each neighborhood to have the same percentage of that group as the overall percentage in the county. The index ranges from 0.0 (complete integration) to 1.0 (complete segregation).³¹ We use the term "segregation index" or "SI" when referring to dissimilarity in this analysis.

We then created quintiles by dividing the counties into five groups, according to the value of their SI. Counties were thus assigned to a quintile value of 1 to 5, where a "1" indicates the lowest 20 percent of all counties with respect to SI value, or the least amount of segregation, and "5" indicates that the county was in the top 20 percent of all counties with regard to segregation. See Appendix 2 for additional information on the methods used for this report.

Note that because the SI is constructed by comparing tracts *within* a county, counties that may have similar proportions of each race/ethnic group can have different SI scores. This outcome would occur because groups are distributed differently within each county. See Appendix Exhibit 3.6 for the proportion of each race/ethnicity, by SI quintile.

Data Sources

This analysis used Drug Enforcement Administration (DEA) data to identify all prescribers in Minnesota (i.e., all practitioners that had a DATA-2000 waiver).³² The use of DEA data is preferable to the use of Substance Abuse and Mental Health Services Administration (SAMHSA) treatment locator data because prescribers do not always report their waiver status to SAMHSA, whereas DEA registration is mandatory.

³⁰ In this report, NORC uses the term "American Indian," however Native American or Alaskan Native is the census categorization. Using census and enrollment data, it was not possible to use specific Tribal names, although we recognize distinct Tribes exist within this broad group.

³¹ United States Census Bureau. Appendix B: Measures of Residential Segregation. December 2016. <https://www.census.gov/topics/housing/housing-patterns/guidance/appendix-b.html>

³² Drug Enforcement Administration. DEA Registration Record Layout. October 2019. <https://dea.ntis.gov/recordlayout.pdf>

To identify *active* prescribers (those prescribers who are prescribing to Medicaid enrollees), we used two types of claims and encounter data:

1. prescription pharmacy and outpatient claims/encounter data for buprenorphine with or without naltrexone
2. outpatient claims/encounter data from OTP for methadone³³

For the purposes of this paper, we refer to individuals found in the DEA data as “prescribers” and individuals found in the Minnesota DHS data as “active prescribers.”

Medicaid enrollment data were used to determine the ratio of enrollees to the number of prescribers in each county, and the ratio of enrollees to the number of actual prescribers (in the claims data).³⁴ Note that in constructing the enrollee-to-provider ratios, counties where there are no prescribers cannot be included, since the ratio cannot be calculated. Using the inverse, the number of active prescribers per enrollees would prevent this, but could overstate the number of enrollees in a county.

The DEA data cover all prescribers with waivers as of March 30, 2020, whereas the Minnesota DHS data are from July 1, 2018 to June 30, 2019.³⁵ While there is a lag between the claims/encounter and DEA, the time gap is small, and valid comparisons between the two datasets can be made.³⁶

As mentioned above, we used the most recent five-year average (2014-2018) census tract and county data from the American Community Survey to construct the SI.

Additional information on the data sources, as well as other potential limitations, can be found in Appendix 2.

Findings

The following sections describe the findings related to the capacity to provide MAT services in Minnesota. Findings include the number of prescribers available to prescribe MAT (active and not active), how the number corresponds with enrollees in Medicaid, how the number of prescribers varies by county-level segregation, and distance of Medicaid enrollees to a MAT prescriber.

³³ There are 16 methadone providers in Minnesota, two of which (Mercy Hospital Unity Campus in Fridley and St. Joseph’s Hospital Chemical Dependency Program in St. Paul) are residential programs in hospitals). This assessment did not include claims from these providers since these services would be part of per diem payments. The Minneapolis VA Health Care System also provides a Methadone Maintenance Program but does not serve Medicaid enrollees.

³⁴ Appendix 2 provides additional information on the methods used to conduct this analysis.

³⁵ Data reflect time July 1, 2018 through June 30, 2019. Since then, St. Joseph in Ramsey County has closed.

³⁶ Treatments provided by the Minneapolis VA Health Care System Addictive Disorders Services are not included in the claims data and are therefore excluded from the analysis.

All Minnesota Prescribers

The following section uses DEA data to identify how many prescribers in Minnesota obtained a DATA-2000 waiver.

Number and type of prescribers

There are 1,195 prescribers in Minnesota with a county average of one prescriber per 1,759 enrollees.³⁷ The two largest counties—Hennepin and Ramsey—account for over half of all prescribers in the state (676 prescribers). When those counties are removed, the average decreases to six prescribers per county. The majority of prescribers are medical doctors (73 percent), and nurse practitioners are the second most common (21 percent); the remaining prescribers are physician assistants.

Prescribers in Minnesota have the capacity to treat 60,875 Minnesotans.³⁸ Each prescriber is approved to treat 30 patients initially, and then certain practitioners can increase their capacity up to 100 or 275 patients, depending on their professional license. As shown in Exhibit 2, the majority of prescribers are limited to providing MAT to 30 patients. Exhibit 2 reports the total number, average, and range of prescribers in Minnesota with waivers of each capacity type. See Appendix 3 for county-specific details.

Exhibit 2: Number of Prescribers in Minnesota, by Patient Limit and Practitioner Type

	Total Number of Prescribers	Total Number of Counties with Prescribers*	County-Level Average Number of Prescribers	County-Level Range Number of Prescribers
Patient Limit Level				
Patient Limit = 30	945	55	10.9	0-371
Patient Limit = 100	207	27	2.4	0-93
Patient Limit = 275	43	12	0.5	0-19
Type of Prescriber				
Medical Doctor	877	54	10.1	0-378
Nurse Practitioner	252	41	2.9	0-82
Physician Assistant	66	15	0.8	0-23
Overall	1,195	57	13.7	0-483

Notes: DEA data as of March 2020. *Minnesota has 87 counties; 57 have at least one prescriber with DATA-2000 waiver. This table includes all counties, even those without a prescriber. The ratio of 1:1,240 is the total number of prescribers divided by the total number of Medicaid enrollees as of June 30, 2019. See Appendix 4 for county-specific totals of each type.

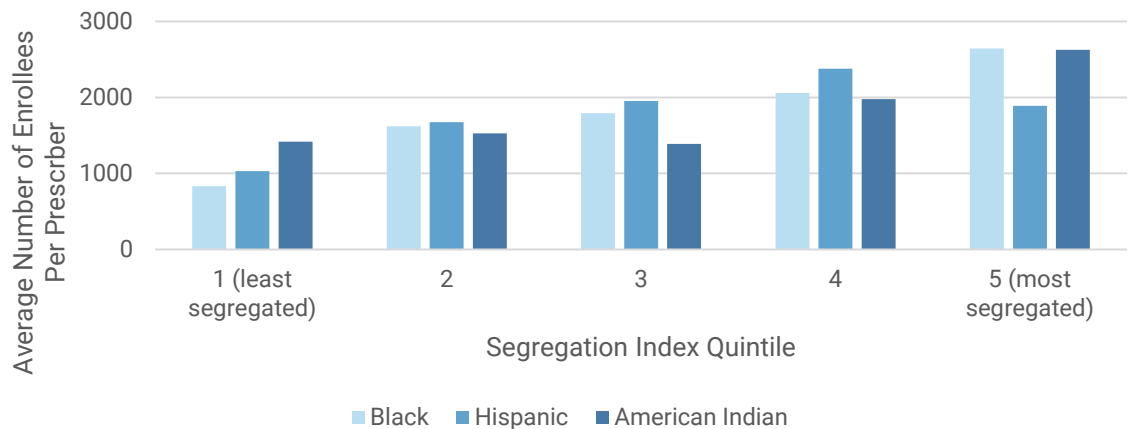
Counties with more segregation had larger enrollee-to-provider ratios when compared to less segregated counties. This outcome means there are fewer prescribers to serve enrollees in counties with more segregation.

³⁷ The average was calculated with all counties, including those counties without a prescriber. This calculation used the DATA-waived prescribers with data from the DEA. The term “prescriber” refers to DATA-waived practitioners.

³⁸ This is calculated by multiplying the number of practitioners with each patient limit by the maximum patient limit.

As described above, each of Minnesota’s 87 counties was grouped into one of five groups (quintiles) depending on the county’s level of segregation for three different groups—Black, Hispanic, and American Indian. Exhibit 3 depicts the number of Medicaid enrollees per provider by county-level segregation and racial and ethnic group. As shown below, counties with the highest level of Black and American Indian segregation had the largest number of enrollees per prescriber. This is significantly different from those counties with the lowest levels of segregation.³⁹

Exhibit 3: Average Number of Medicaid Enrollees per Prescriber, by Level of Segregation



Note: Quintile 1 of the Segregation Index represents the least segregated while Quintile 5 represents the most segregated. Source: DEA data as of March 2020 includes all prescribers; Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Prescribers working with a peer prescriber

Prescribers may be more likely to prescribe when they have mentorship or peer support in the provision of MAT, including a worksite colleague who also prescribes buprenorphine.^{40,41} In this study, we refer to that prescriber as a “peer prescriber.” Exhibit 4 below shows results from an analysis of DEA data on the average number of prescribers that work at the same facility.

Across all counties, the average number of prescribers that work at the same facility is 1.7, indicating that most prescribers work in a facility where there are less than two prescribers, i.e., the average prescriber lacks

³⁹ In Appendix 3, we show the county average percent of population for each race/ethnicity as well as the value of the segregation index for each quintile. Counties with greater segregation did not tend to have more or less of any type of prescriber (MD, NP, PA) or significant variation in practitioner with different patient limits.

⁴⁰ Haffajee RL, Bohnert AS, Lagisetty PA. Policy pathways to address provider workforce barriers to buprenorphine treatment. *American Journal of Preventive Medicine*, 2018;54(6):S230-S242.

⁴¹ Madden EF. Intervention stigma: How medication-assisted treatment marginalizes patients and providers. *Social Science & Medicine*, 2019;232:324-331.

a peer prescriber. Counties that have a higher proportion of Black residents are more likely to have a peer prescriber. However, counties with a high proportion of Hispanic and American Indian populations tend to have prescribers who lack at least one peer prescriber. This finding suggests that practice patterns may also influence access to MAT at the county level. Further research should analyze individual prescribing patterns.

Exhibit 4: Average Number of Prescribers per Facility, Overall and by County

	Average Number of Prescribers per Facility	Standard Deviation of Prescribers per Facility	Range of Prescribers per Facility
Counties with Average Proportion, by subpopulation			
Black (N=76)	0.8	1.7	0-13
Hispanic (N=81)	1.9	5.4	0-39
American Indian (N=81)	1.8	5.4	0-39
Counties with Higher than Average Proportion, by subpopulation			
Black (N=11)	8.5	12.4	0-39
Hispanic (N=6)	0	NA	NA
American Indian (N=6)	0.8	1.2	0-3
Overall	1.7	5.2	0-39

Notes: **N = Number of applicable counties.** County-level number of prescribers registered with DEA, grouped by address. Source: DEA data as of March 2020; Medicaid Claims/encounter data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018. Counties are considered to have higher than average populations of marginalized groups if the group’s population is greater than or equal to the average population of such groups plus 1 standard deviation.

Active Minnesota Medicaid Prescribers

The following section uses Medicaid claims/encounter, enrollment, and DEA data to identify how many prescribers in Minnesota are actively prescribing to Medicaid patients.

Number of active Medicaid prescribers

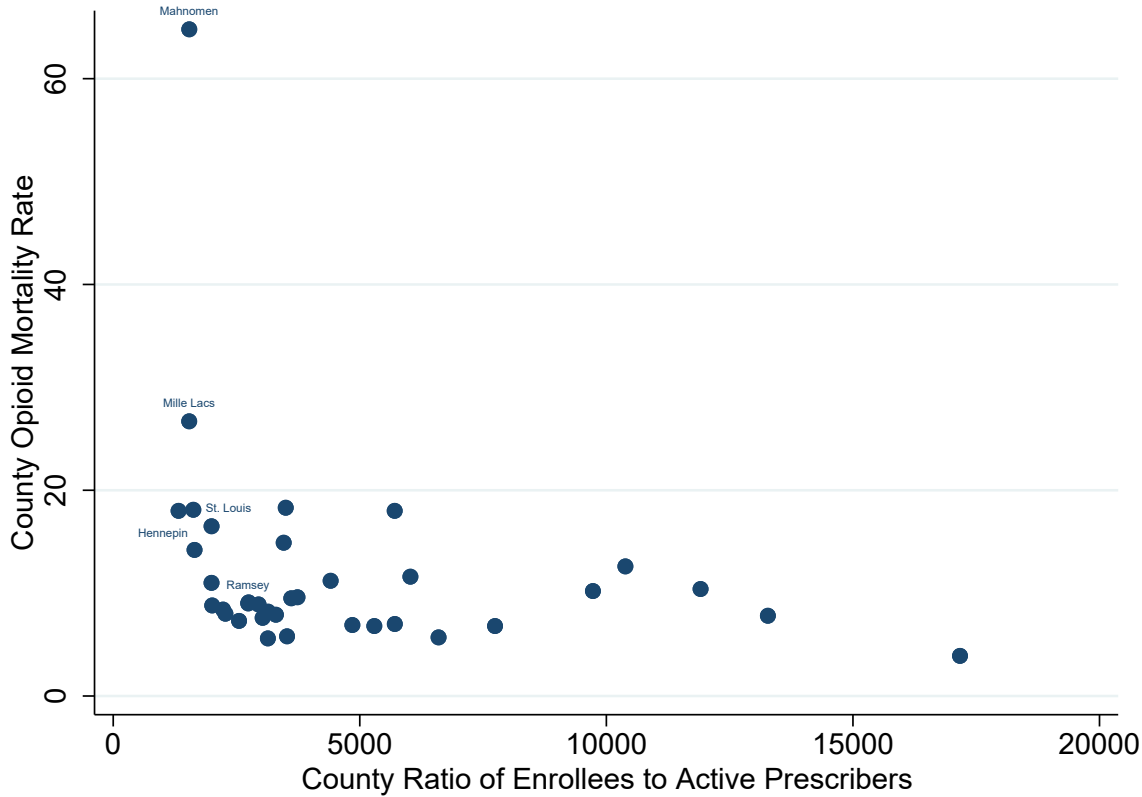
Of the 1,195 prescribers able to prescribe in Minnesota, less than half of prescribers (513) had prescribed MAT to Medicaid enrollees (between July 1, 2018 and June 30, 2019). This finding is consistent with prior national studies that have reported between 44 and 66 percent of registered prescribers actually prescribe buprenorphine.⁴²

There is some observable positive correlation between active prescribers and opioid mortality rate, such that prescribers were more likely to be in counties with a higher opioid mortality rate. However, among counties

⁴² Jones CM, Campopiano M, Baldwin G, McCance-Katz E. [National and state treatment need and capacity for opioid agonist medication-assisted treatment](https://doi.org/10.2105/AJPH.2015.302664), *American Journal of Public Health*. 2015 Aug;105(8):e55–e63. doi:10.2105/AJPH.2015.302664

with an active prescriber, there was no significant association between the opioid mortality rate and the enrollee-to-prescriber ratio (Exhibit 5).⁴³

Exhibit 5: Opioid Overdose Death Rate and Ratio of Medicaid Enrollees per Active Prescriber



Notes: Medicaid Claims/encounter data July 1, 2018 to June 30, 2019; Death Rate per 100,000 population. Data are available for 54 out of 87 Counties. Source: CDC National Center for Health Statistics (NCHS) National Vital Statistics System (NVSS) Multiple Cause of Death File– Multiple cause of death data, 2014-2018.

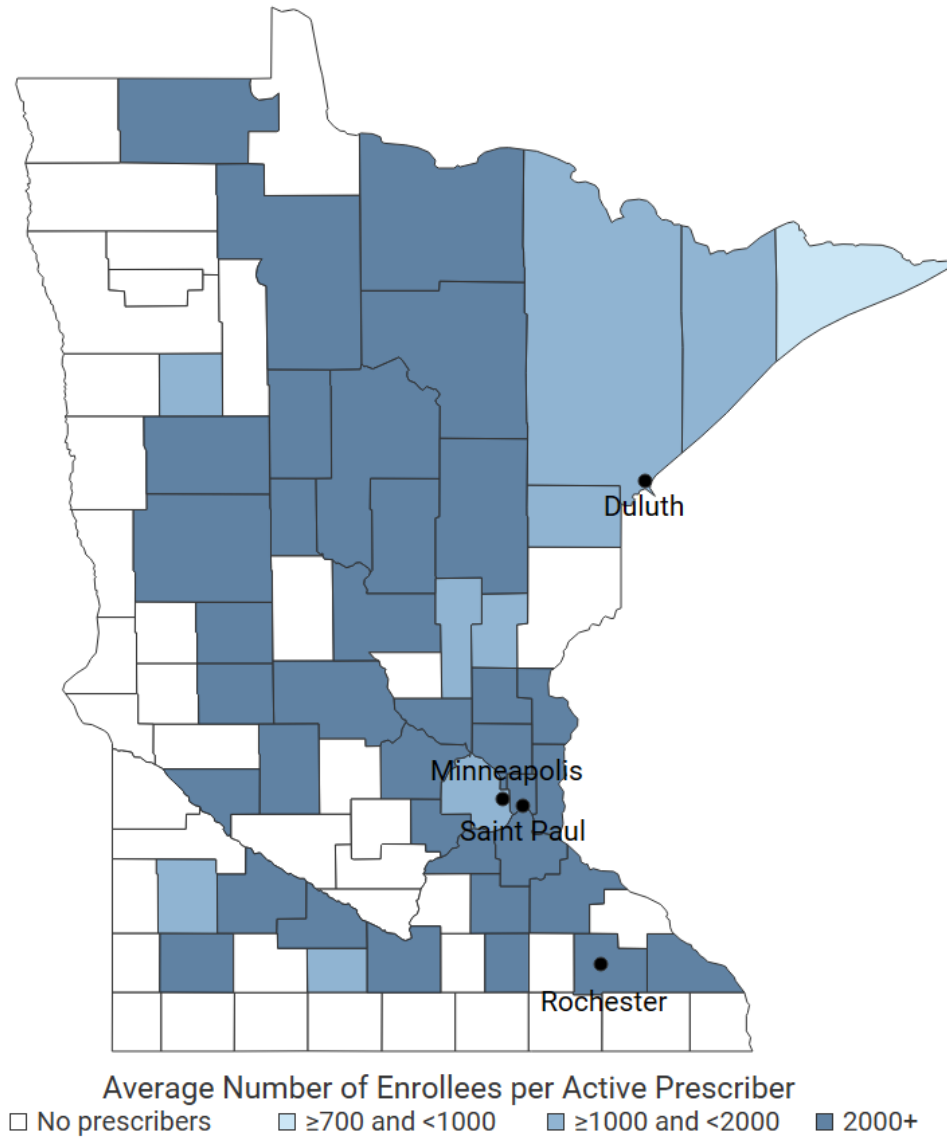
Variation in number of Medicaid enrollees per active prescribers

Of counties with active prescribers, there is an average of one active prescriber per 4,265 enrollees. In 30 out of Minnesota’s 87 counties, there is no prescriber, and in an additional 11 counties, there is no active prescriber. In total, 41 counties do not have any capacity, and 200,000 Medicaid enrollees lack a prescriber in their home

⁴³ A bivariate regression of the opioid overdose mortality rate on the county-level active prescriber per 10,000 enrollees showed a significant positive association at $p < .05$, suggesting active prescribers are more likely to be in counties with higher overdose rates. However, the enrollee-to-prescriber ratio did not significantly vary (at $p < .05$) by opioid mortality rate.

county. Exhibit 6 shows the county-level variation in the ratio of active prescribers who have written prescriptions for buprenorphine. See Appendix Exhibit 3.3 for details.

Exhibit 6: Ratio of Medicaid Enrollees to Active Prescribers for Buprenorphine, by County



Source: Medicaid Claims/encounter and enrollment data July 1, 2018 to June 30, 2019. See Exhibit 3.10 for more information.

There was no significant difference in segregation index values between counties with or without an active prescriber. Said differently, counties that had at least one active prescriber had similar levels of segregation compared to counties without an active prescriber. This finding was true for Black, Hispanic, and American

Indian segregation indices, respectively.⁴⁴ Exhibit 7 below provides the SI values, with values closer to 0 being the most integrated, for counties with and without at least one active prescriber. For more information, see Appendix Exhibit 3.5.

Exhibit 7: County-Level Segregation Index, for Counties with No and Any Active Prescriber

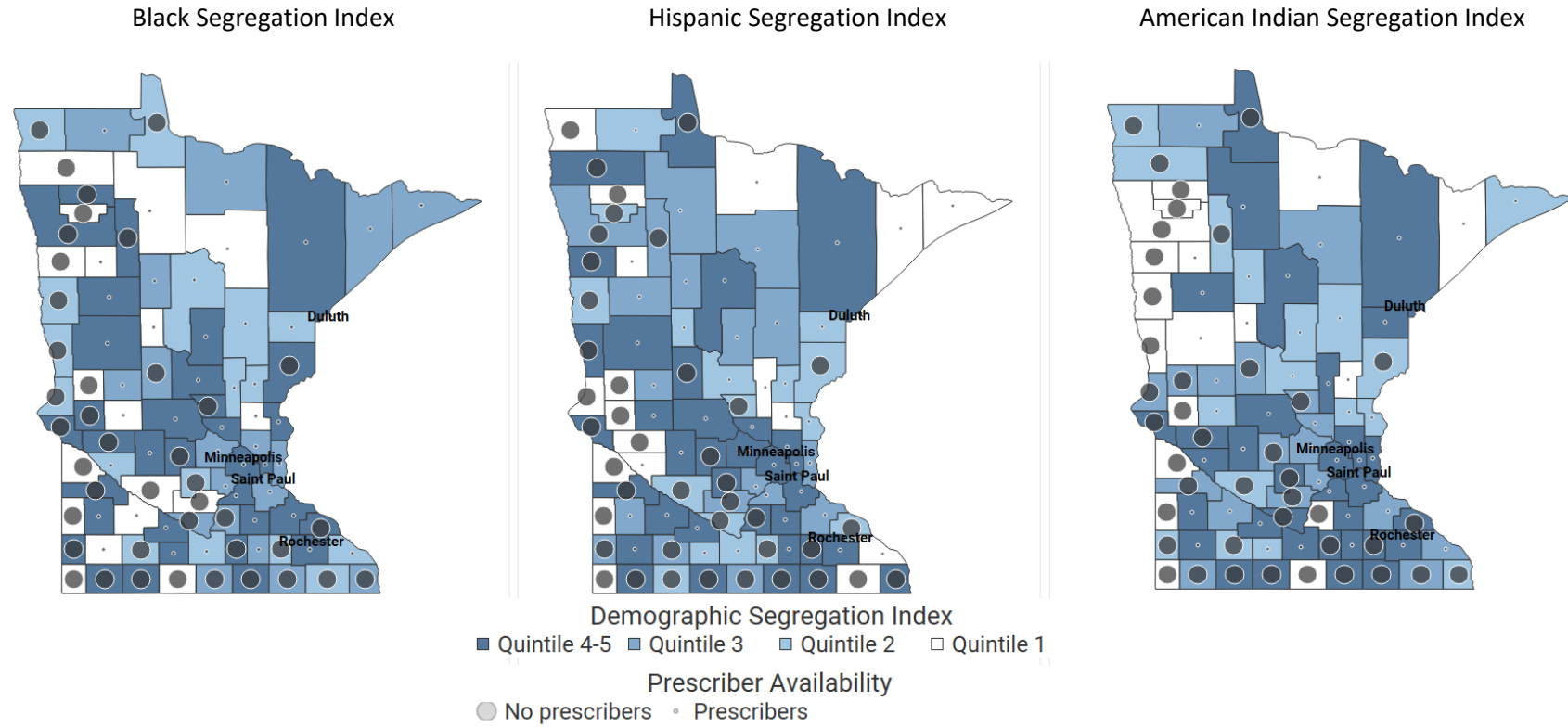
County Category	Segregation Index Value		
	Black	Hispanic	American Indian
No Prescribers (N=41)	0.420	0.300	0.445
Any Prescribers (N=46)	0.424	0.302	0.505
Overall County Average	0.422	0.301	0.477

Notes: Segregation Index values that are closer to 0 reflect that the census tracts in a county have proportions of each race/ethnic group that are about the same as the entire county (more integrated), while values that approach 1 indicate that tracts contain only members of 1 group. Source: Medicaid claims/encounter data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

As shown in Exhibit 8, counties with both high and low levels of segregation had similar numbers of prescribers. As a result, there appears to be no relationship between level of segregation and provider availability within a given county. In Exhibit 8, the SI (by quintile) for Black, Hispanic, and American Indian populations provides the backdrop for the dots indicating prescriber availability. Large dots correspond to counties that do not contain prescribers, small dots correspond to counties that do contain prescribers. When prescribers are not available, the dot is larger.

⁴⁴ At $p < .05$

Exhibit 8: Map of Prescriber Availability by Segregation Index

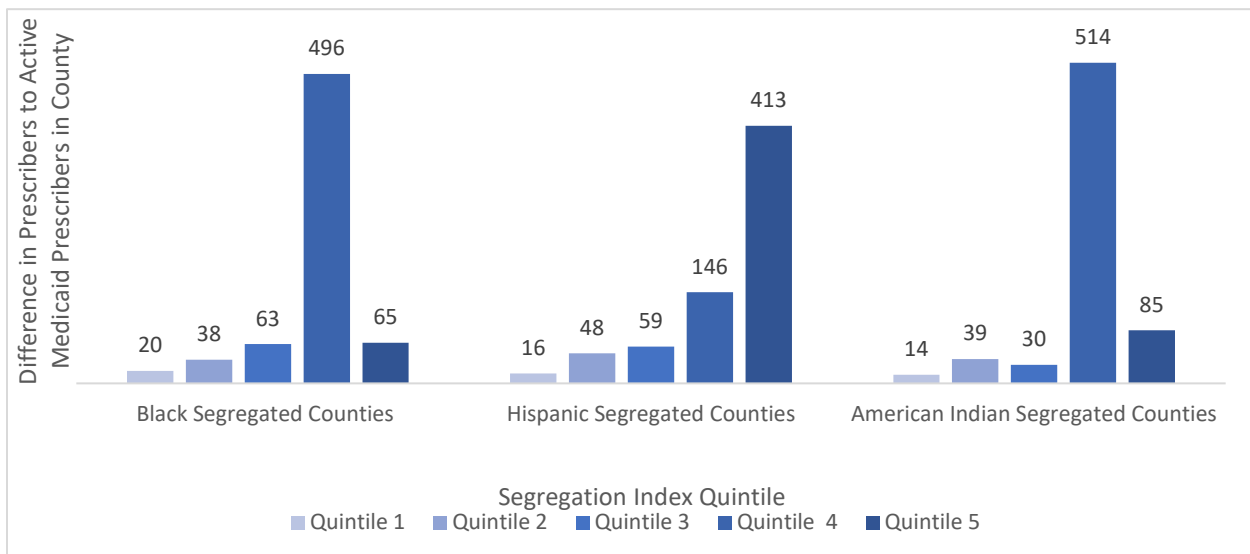


Notes: The Segregation Index (SI) is calculated as the proportion of Black, Hispanic, and American Indian residents who would need to move census tracts so that the county has a uniform distribution of the population by race/ethnicity (Goedel et al., 2020). Source: United States Census data, 2014-2018; Medicaid Claims/encounter data July 1, 2018 to June 30, 2019. See Exhibit 3.10 for more information.

Variation in inactive to active prescribers by segregation level

The difference between total prescribers and active Medicaid prescribers is larger in counties with greater segregation, suggesting there may be barriers to prescribing in these counties. Exhibit 9 shows the difference in the number of prescribers that are capable of prescribing, compared to the number of prescribers that actually prescribed to Medicaid enrollees, for each level of segregation. For example, in the least-segregated counties, the difference between inactive and active prescribers is between 14 (for American Indian least-segregated counties) and 20 (for Black least-segregated counties), while in the most-segregated counties, the difference is between 65 (for Black most-segregated counties) and 413 providers (for Hispanic most-segregated counties). Similarly, for each population there exists a larger difference in the number of prescribers (all and active Medicaid prescribers) for counties that are more segregated compared to less-segregated counties. For example, in American Indian counties, those with lower levels of segregation have a smaller difference in prescribers available than in counties with higher levels of segregation. The difference in Quintile 1 is 14 prescribers, while the difference in Quintile 5 is 85 prescribers. While the difference at the top quintile (most segregated) is lower than the fourth quintile for Black and American Indian populations, the difference is still larger than that of the lowest two quintiles.

Exhibit 9: Difference in the Number of Prescribers and the Number of Active Medicaid Prescribers, by Quintile of County-Level Segregation



Note: Quintile 1 of the segregation Index represents the least segregated while Quintile 5 represents the most segregated. Source: DEA data as of March 2020; Medicaid claims/encounter data July 1, 2018 to June 30, 2019; American Community Survey 2014-2018.

Distance from Medicaid enrollees to an active prescriber

The average distance to the nearest active prescriber is around six miles in a straight line, with a range up to 92.5 miles. This finding indicates that, in general, prescribers are not geographically far from where many enrollees live. There are significant differences in distances by race/ethnicity of the enrollees (Exhibit 10a). On

average, Black enrollees are located in neighborhoods closer to an active prescriber compared to all other race/ethnicities, while Hispanic enrollees are closer to an active prescriber compared to White and American Indian enrollees. American Indian enrollees live in zip codes farthest from an active prescriber compared to the average enrollee. See Appendix Exhibits 3.7-3.9 for additional results.

While the average distance to the nearest active prescriber varies by race/ethnicity, there is not a clear relationship between the SI and distance, meaning that distance is not greater with an increasing level of segregation (Exhibit 10b). For example, among Black and Hispanic enrollees, those in more-segregated neighborhoods are significantly closer to the nearest prescriber than those in least-segregated communities. The largest differences in distance are among the levels of the SI for American Indian enrollees, and communities where there is more segregation generally have shorter distances to the nearest active prescriber.

Exhibit 10a: Average Distance between Medicaid Enrollee and Nearest Buprenorphine Prescriber, Overall and by Enrollee Race/Ethnicity

	Overall County Average Distance	Standard Deviation in Distance	Range in Distance
Enrollee Race or Ethnicity	Miles	Miles	Miles
Black	1.8*	6.7	0 - 92.5
Hispanic	6.1*	12.1	0 - 92.5
American Indian	9.3*	13.1	0 - 88.6
White	7.8	12.1	0 - 92.5
Overall	5.8	11.1	0 - 92.5

Notes: This distance was calculated between enrollee ZIP code and the nearest active buprenorphine prescriber ZIP code centroids. The distance of 0 miles indicates both enrollee and prescriber are in the same ZIP code. Source: Medicaid enrollment data and prescribing physicians. * indicates significantly different from White enrollees at p<.05. Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019

Exhibit 10b: Average Distance between Medicaid Enrollee and Nearest Buprenorphine Prescriber, by County Segregation Index Quintile

	Quintile 1 Average (SD)	Quintile 2 Average (SD)	Quintile 3 Average (SD)	Quintile 4 Average (SD)	Quintile 5 Average (SD)
Enrollee Race or Ethnicity	Miles	Miles	Miles	Miles	Miles
Black	13.4 (15.2)	14.2 (14.8)*	4.9 (8.7) *	3.3 (9.4) *	8.8 (10.5) *
Hispanic	14.9 (17.5)	12.9 (13.1)*	9.7 (14.1)*	4.5 (7.8)*	3.0 (8.5)*
American Indian	25.1 (19.4)	12.5 (14.1)*	8.5 (9.9)*	2.6 (6.6)*	5.2 (9.0)*

Notes: This distance was calculated between enrollee ZIP code and the nearest active buprenorphine prescriber ZIP code centroids. The distance of 0 miles indicates both enrollee and prescriber are in the same ZIP code. Source: Medicaid enrollment data and prescribing physicians. * indicates significantly different from the lowest quintile in each segregation index at p<.05. Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019

Methadone Opioid Treatment Programs in Minnesota

Methadone can only be administered or dispensed at an OTP. **There are 16 OTPs in Minnesota, located in nine counties, and 78 counties do not have an OTP provider (Exhibit 11).** In addition, nine of the 16 OTPs are located in Hennepin and Ramsey counties. There is no consistent association between the number of OTPs and the proportion of each racial and ethnic groups' populations in the county. However, we do find that counties with an OTP have a significantly higher percentage of Black enrollees and a lower percentage of American Indian enrollees, compared to counties without an OTP.

Exhibit 11: Number of Methadone Programs by County, Ratio to Medicaid Enrollees, and County Demographics

	Number of OTPs	Enrollee-to-OTP Ratio	Percent of the County in Each Race/Ethnicity			
	Total		Black (%)	Hispanic (%)	American Indian (%)	White (%)
Anoka	1	83,763	5.8	4.4	0.6	82.0
Crow Wing	1	19,791	0.7	1.4	0.8	95.0
Dakota	1	45,552	5.8	7.0	0.3	79.0
Hennepin	6	57,426	12.9	6.9	0.6	69.2
Olmsted	1	35,633	5.8	4.8	0.2	80.6
Ramsey	3	97,175	11.5	7.5	0.5	62.4
St. Louis	1	56,842	1.5	1.6	1.8	91.2
Stearns	1	43,382	5.8	3.3	0.3	86.9
Washington	1	42,420	4.3	4.0	0.3	83.2
Overall	16	53,554	6.0	4.6	0.6	81.1
	Total Number of Providers					
Counties with an OTP (N=9)	16	53,554	6.0*	4.6	0.6	81.1
Counties without an OTP (N=78)	0	Not applicable	1.2	4.4	2.1	89.4

Notes: Distance was calculated between enrollee ZIP code and the nearest OTP ZIP code centroids. * Indicates significant differences between counties with and without an OTP at $p < .05$. Source: Medicaid Claims/Encounter and Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Distance from Medicaid enrollees to an Outpatient Treatment Program

The average distance to an OTP is 26 miles, but some enrollees would have to travel distances of over 220 miles. Over half of enrollees (55.9 percent) live within 10 miles of an OTP, while about 7 percent live over 100 miles from an OTP. American Indian enrollees live the farthest distance from an OTP, at an average of about 54 miles. Exhibit 12 below shows that the distances vary across enrollee subpopulations, and differences were significantly different (at $p < .05$). Compared to White enrollees, Black and Hispanic enrollees live in neighborhoods closer to an OTP, while American Indian enrollees live in communities further from an OTP. See Appendix Exhibit 3.8-3.9 for additional details.

Exhibit 12: Average Distance between Medicaid Enrollees and Nearest Opioid Treatment Program (Methadone) Provider, by Enrollee Race/Ethnicity

	Overall County Average Distance	Standard Deviation in Distance	Range in Distance
	Miles	Miles	Miles
Enrollee Race/Ethnicity			
Black	9.28*	22.1	0 - 213
Hispanic	25.7*	39.1	0 - 218
American Indian	53.7*	46.7	0 - 218
White	33.1	39.4	0 - 228
Overall	25.9	37.1	0 - 228

Notes: Distance was calculated between enrollee ZIP code and the nearest OTP ZIP code centroids. * Indicates significant differences between each race/ethnicity and White enrollees at $p < .05$. Source: Medicaid enrollment data and claims/encounter data July 1, 2018 to June 30, 2019.

Discussion

The findings in this report indicate that MAT availability and capacity in Minnesota are generally consistent with national trends. Our analysis suggests that if all Minnesota prescribers were prescribing to the top of their waiver, there is capacity to treat approximately 61,000 patients (Medicaid and non-Medicaid). The prevalence of OUD among the Medicaid population is estimated to be about 5 percent, which leads us to estimate that there are about 55,000 Medicaid enrollees in Minnesota who also have an OUD.⁴⁵ While there is capacity to provide MAT services to about 61,000 Minnesotans, as shown in our analysis, less than half of the eligible prescribers in Minnesota are actively prescribing to Medicaid enrollees. This suggests that the need for MAT services among Medicaid enrollees may exceed the availability of those services. This finding is also consistent with national trends. Additionally, with the exception of the two largest counties (Hennepin and Ramsey), there are few active buprenorphine prescribers in most Minnesota counties. In addition, there are 41 counties—home to about 200,000 Medicaid enrollees—that do not have a prescriber who is writing prescriptions for Medicaid enrollees for buprenorphine (as of June 30, 2019).

The Minnesota DHS has also noted that there may be limited capacity for buprenorphine-waivered prescribers to accept new patients.⁴⁶ This analysis found that 80 percent of all DATA-waived practitioners can only provide care for up to 30 patients, the lowest patient limit allowed by the DEA. In addition, there may be other barriers for prescribers to include MAT in their clinical care, such as the availability of a peer in their practice who is also

⁴⁵ Minnesota Department of Human Services. Who Medicaid and MinnesotaCare Serve. <https://mn.gov/dhs/medicaid-matters/who-medicaid-and-minnesotacare-serves/#:~:text=Average%20monthly%20enrollment%20in%20Minnesota's,a%20million%20children%20each%20year>

⁴⁶ Minnesota Department of Human Services. Minnesota State Targeted Response to the Opioid Crisis Project Narrative. April 2017. https://mn.gov/dhs/assets/mn-opioid-str-project-narrative-april-2017_tcm1053-289624.pdf

prescribing.⁴⁷ Our analysis also found that most facilities do not have at least two prescribers, leaving many prescribers without a peer prescriber in their workplace.

With regard to distance from a prescriber, our analysis found that, on average, enrollees lived about six miles from an active prescriber, indicating that enrollees and prescribers are generally within the same ZIP code. However, we found that there is substantial variation across the state and within communities of color. For example, American Indians tend to live in zip codes farthest from an active prescriber compared to the average enrollee.

The findings in this report do not explain the disparities in death rates among certain populations in Minnesota. We found that the level of segregation within a county is not directly correlated with the number of total prescribers available, the number of active Medicaid prescribers, or the number of enrollees per prescriber. Similarly, we found that while there are few OTPs for methadone administration, the availability of an OTP does not correlate with segregation. Despite this lack of correlation, access to methadone may be limited for some enrollees, with travel distances of over 200 miles to the nearest OTP.

A recent study from the U.S. Department of Health and Human Services Office of Inspector General identified only one county in Minnesota as “high-need” and which may lack adequate capacity.⁴⁸ While our analysis examined the number of enrollees per provider, we could not fully assess whether there is capacity at the county level in Minnesota for all persons who may seek treatment. The overall findings from our analysis—an average of one active prescriber for 4,265 Medicaid enrollees—and the county-specific ratios suggest potential areas for further examination of the resources available to encourage prescribing and address potential barriers.

In addition to having a peer prescriber in the same workplace, research suggests that other factors —such as individual training in managing complex patients, clinical staff training around OUD, allowing time to train clinical staff, and adequate reimbursement—can encourage prescribing.^{49,50,51,52} A national survey of clinicians who recently obtained their DEA waiver found that many prescribers register with the DEA for a waiver but do

⁴⁷ Jones CM, McCance-Katz EF. Characteristics and prescribing practices of clinicians recently waived to prescribe buprenorphine for the treatment of opioid use disorder. *Addiction*, 2019;114(3):471-482.

⁴⁸ Geographic Disparities Affect Access to Buprenorphine Services for Opioid Use Disorder 10 OEI-12-17-00240 Office of Inspector General, January 2020. In the OIG report, there were three opioid misuse and abuse measures (i.e., drug overdose mortality, nonmedical use of pain relievers, and opioid prescribing). High need was determined based on the distribution of opioid misuse and the county-level patient capacity.

⁴⁹ Andrilla CHA, Moore TE, Patterson DG. Overcoming barriers to prescribing buprenorphine for the treatment of opioid use disorder: recommendations from rural physicians: rural physicians’ buprenorphine recommendations. *Journal of Rural Health*. 2019;35(1):113-121. [doi:10.1111/jrh.12328](https://doi.org/10.1111/jrh.12328)

⁵⁰ Haffajee RL, Bohnert ASB, Lagisetty PA. Policy Pathways to Address Provider Workforce Barriers to Buprenorphine Treatment. *American Journal of Preventive Medicine*. 2018;54(6):S230-S242. [doi:10.1016/j.amepre.2017.12.022](https://doi.org/10.1016/j.amepre.2017.12.022)

⁵¹ Hutchinson E, Catlin M, Andrilla CHA, Baldwin L-M, Rosenblatt RA. Barriers to primary care physicians prescribing buprenorphine. *Annals of Family Medicine*. 2014;12(2):128-133. [doi:10.1370/afm.1595](https://doi.org/10.1370/afm.1595)

⁵² DeFlavio J, Rolin S, Nordstrom B. Analysis of barriers to adoption of buprenorphine maintenance therapy by family physicians. *Rural and Remote Health*. 2015(online);15:3019.

not register with the SAMHSA treatment locator. Failing to register with SAMHSA, a source of public information for MAT, could reduce the likelihood that patients seeking treatment would be able to find a provider.⁵³ Practitioners may also have concerns over diversion and misuse and the chronicity of patients' pain.⁵⁴

This analysis did not find significant correlation between the location of MAT services and segregation in those areas, and questions remain about why Black and American Indian Minnesotans are dying from drug overdose deaths at rates of two and seven times that of White Minnesotans, respectively.⁵⁵ It may be beneficial to conduct further analysis in a number of areas, such as the type of MAT an enrollee is using, where an enrollee is living (level of segregation), if the distance to a MAT-waivered provider and OTP is the same, as well as considering whether there is evidence that certain populations are more likely to be using buprenorphine versus methadone.

As the state begins implementation under the new 1115 SUD System Reform Demonstration waiver, this paper can be instrumental in providing a baseline for MAT services in Minnesota. Understanding the capacity for and availability of MAT services will be crucial to supporting providers and clinics in implementing best practices around MAT for OUD and will also ensure that any disparities in access are identified and addressed. Potential future work should continue to monitor levels of, and barriers to care, across communities of color in the Medicaid program to ensure that the improvements to care and access intended under the Demonstration are experienced by all groups.

⁵³ Substance Abuse and Mental Health Services Administration. 2017-2018 NSDUH Estimated Totals by State. February 2020. Accessed at: <https://www.samhsa.gov/data/report/2017-2018-nsduh-estimated-totals-state>

⁵⁴ Medicaid. June 2020 Medicaid & CHIP Enrollment Data Highlights. <https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html>

⁵⁵ The Black population includes U.S.-born and African-born decedents. <https://www.health.state.mn.us/communities/opioids/data/racedisparity.html>

Appendix 1: Research Questions

The following research questions informed the analysis in this report and were developed in discussion with Minnesota DHS stakeholders.

Appendix Exhibit 1.1: Research Questions and Measures for Assessment

Assessment Question	Measures
Goal: Characterize the availability of buprenorphine and opioid treatment programs throughout the state and the variation in providers by county-level segregation	
Hypothesis: Segregation may be associated with fewer buprenorphine prescribers and OTPs per enrollee	

Question	Measures	Source
<p>1. How many DATA-waived practitioners are in Minnesota?</p> <ul style="list-style-type: none"> How does the number vary by county and by county dissimilarity? What is the variation in the number of providers with waivers at each patient limit level? (i.e., 30, 100, or 275 patients) What is the number of providers with waivers by provider type (e.g., physician, nurse practitioner and physician assistant)? 	<ul style="list-style-type: none"> Total number of practitioners with a DATA waiver, by county Average number of practitioners with a DATA waiver by county-level of dissimilarity Total number of each type of provider, as determined by the number of DATA-waived practitioners in DEA data Total number of providers by license type as determined by the number of DATA-waived practitioners with each type of waiver in DEA data (DW-30, DW-100, or DW275) 	<ul style="list-style-type: none"> DEA data
<p>2. What is the variation in the ratio of Medicaid enrollees to DATA-waived practitioners across counties overall and by county, and by county quintile of dissimilarity index?</p>	<ul style="list-style-type: none"> Ratio of enrollees to DATA-waived practitioners by county and county quintile of dissimilarity index 	<ul style="list-style-type: none"> DEA data, ACS data, enrollment data
<p>3. How many practitioners have written a prescription during the 2018-2019 period baseline year?</p> <ul style="list-style-type: none"> How does this vary by county, and by county quintile of dissimilarity index? 	<ul style="list-style-type: none"> Ratio of enrollees to DATA-2000 waived practitioners who have written any prescription for buprenorphine or buprenorphine-naltrexone. Comparison of the number of DATA-waived practitioners (from the DEA data) to the number who wrote any prescription for MAT between 2018-2019 (claims data). 	<ul style="list-style-type: none"> DEA data; Claims/ encounter data on prescribers of buprenorphine; enrollment data; ACS data

Question	Measures	Source
<p>4. How many DATA-waived practitioners work an organization where they have a peer prescriber?</p> <ul style="list-style-type: none"> How does this vary by county, and by county quintile of dissimilarity index? 	<ul style="list-style-type: none"> Number of DATA-waived practitioners who work at the same facility location (using addresses in DEA data), overall and by county 	<ul style="list-style-type: none"> DEA and ACS data
<p>5. What is the average distance a Medicaid enrollee travels for a prescription for buprenorphine?</p> <ul style="list-style-type: none"> by county by race/ethnicity 	<ul style="list-style-type: none"> Average distance between Medicaid enrollee (mailing address ZIP) and prescribing provider ZIP Average distance for Black, Hispanic, White, and American Indian enrollees 	<ul style="list-style-type: none"> Claims/encounter data on prescribers of buprenorphine; enrollment data
<p>6. How many outpatient methadone providers are there in Minnesota?</p> <ul style="list-style-type: none"> How does the number vary by county, and by county quintile of dissimilarity index? 	<ul style="list-style-type: none"> Number of outpatient methadone providers in each county and by county quintile of dissimilarity index 	<ul style="list-style-type: none"> Claims/encounter data on OTP providers; ACS data
<p>7. What is the variation in the ratio of Medicaid enrollees to outpatient methadone treatment providers across counties, overall, and by county?</p> <ul style="list-style-type: none"> How does the ratio of Medicaid enrollees to the number outpatient methadone treatment providers vary by county quintile of dissimilarity index? 	<ul style="list-style-type: none"> Ratio of enrollees to outpatient methadone treatment providers by, county and by county quintile of dissimilarity index 	<ul style="list-style-type: none"> Claims/encounter data on OTP providers, enrollees and ACS data
<p>8. What is the average distance a Medicaid enrollee travels to visit an outpatient methadone treatment provider?</p> <ul style="list-style-type: none"> by county by race/ethnicity 	<ul style="list-style-type: none"> Average distance between Medicaid enrollee mailing address ZIP and OTP provider Average distance between Medicaid enrollee mailing address ZIP the prescribing provider ZIP, for Black, Hispanic, White, and American Indian enrollees 	<ul style="list-style-type: none"> Claims/encounter data on OTP providers

Appendix 2: Data Sources, Methods, and Limitations

Data Sources

Data for this report come from four sources that are primarily linked through county Federal Information Processing Standard Publication codes. We analyzed prescription pharmacy claims (for the period July 1, 2018 to June 30, 2019) for buprenorphine and buprenorphine/naltrexone, and methadone, and DEA data from the first quarter of 2020 on the number of DATA-2000 waived practitioners. We developed measures that examined the number and type of DATA-2000 waived practitioners that are *capable* of prescribing in Minnesota, the number of practitioners who had *actually* prescribed, and the average distance between enrollee and the nearest active prescriber, as well as the nearest DATA-2000 waived practitioner. Please note that since the end of the data timeframe used for this analysis, St. Joseph in Ramsey County has closed. Furthermore, treatment provided by the Minneapolis VA Health Care System Addictive Disorders Services are not included in the claims data and are therefore excluded from the analysis. Exhibit 2 briefly summarizes the sources.

Appendix Exhibit 2.1: Data Sources for the Assessment of Provider Capacity for MAT

Data Source	Description	Purpose
Medicaid enrollee claims/encounter data	Claims/encounter data for all enrollees who received MAT medication services between July 1, 2018 and June 30, 2019 (the 12 month period before the demonstration began) were used to compute the total number of enrollees for each type of service (outpatient or independent pharmacy fill). ⁵⁶	To construct the numerator (number of unique enrollees) and the denominator (number of unique providers) for the ratios of enrollees to providers.
Medicaid enrollee enrollment data	Enrollment data are for all enrollees enrolled between July 1, 2018 and June 30, 2019 (the 12 month period before the demonstration began).	To construct the numerator for the ratios of eligible enrollees to practitioners or providers (total population enrolled who may be eligible for services. Enrollee ZIP codes will be used to determine the average county-level distance between enrollee to nearest MAT prescriber or methadone provider
Drug Enforcement Agency database of all practitioners with Drug Addiction and	Contains contact information for practitioners who register with DEA in order to prescribe, dispense, or administer controlled substances (e.g., buprenorphine) for maintenance or detoxification treatment in an office-based setting. ⁵⁷ Practitioners may register to prescribe buprenorphine for 30, 100, or 275 patients. Data are for providers with waivers as	To count the number of practitioners with DATA-2000 waivers in each county, and to determine variation in patient limits (30, 100, or 275) and variation in types of providers (MD, PA, NP) in each county.

⁵⁶ Minnesota DHS claims and encounter data for SUD services are at the organizational NPI-level; claims/encounter data are not submitted by individual practitioners. Minnesota does allow for licensed professionals in private practice to bill for services outside of a licensed SUD facility.

⁵⁷ The database is available to the public for a fee.

Data Source	Description	Purpose
Treatment Act of 2000 waiver	of March 30 th , 2020 for any level (30, 100, or 275) of patients.	
American Community Survey	Contains tract-level data on populations race ethnicity, ACS 2018 5-year estimates	To provide county-level data on the racial and ethnic makeup of counties and tracts to calculate the dissimilarity index.

Methods

Distance Calculations. We developed a measure for the distance between Medicaid enrollees and prescribers and providers from enrollee ZIP codes and the nearest prescriber from claims data. To do so we used a SAS command, which computes the straight line distance between two ZIP code centroids.

We also used enrollee and prescriber ZIP codes to determine the average travel distance between enrollees and prescribers. We used enrollment data, as we are interested in understanding availability for the Medicaid population, not only those who have used services.

Data Notes. We excluded 330 prescriptions that did not have a prescribing National Provider Identification (NPI) number. While these had a county and zip code where the prescription was filled, this analysis was focused on where they obtain prescriptions, and thus these prescriptions were excluded. Buprenorphine provided at Indian Health Service facilities is billed as an outpatient claim, but these were considered prescriptions (715 claims) since this is where the prescription is obtained and filled. In these cases, we used the facility ZIP code, state, and county to attribute the claim to a county for analysis. 15,613 enrollees had out-of-state ZIP codes, and 2,456 had no ZIP code. Out-of-state ZIP codes were excluded, while those without ZIP codes but with county identifiers could only be included in the county-level analyses. We also computed the number of prescribers and providers in the states that border Minnesota, since Medicaid enrollees can seek care from providers participating in the Minnesota Medicaid program. There were 1,063 prescriptions written by 178 unique prescribers who were out of state for 874 Minnesota Medicaid enrollees. Among these 874 enrollees, 91 percent sought prescriptions from prescribers in border states; while 9 percent of these enrollees sought prescriptions from among 21 other states.

Appendix Exhibit 2.2: Types of Services and Providers Analyzed in Claims/Encounter Medication Data

Types of Services	Level of Provider
Buprenorphine, with or without Naltrexone	Prescribing Practitioner
Methadone	Opioid Treatment Program Outpatient Provider

Limitations

This analysis considers capacity, at a high level, using the number of providers and ratios of providers to enrollees. The analysis does not examine whether providers serve more or less of any enrollee race/ethnic group.

There is time difference in the DEA and claims data. The DEA data reflect the number of practitioners with a waiver as of March 2020, whereas the claims had service dates between July 1, 2018 and June 30, 2019. It is possible that in the nine-month period since the claims/encounter cut-off period, more DATA-2000 waived practitioners began prescribing.

To compare how many prescribers had a peer prescriber, we computed the number of prescribers in the DEA data that were working at the same facility (matched by work location name, address, city, and ZIP code). However, there was significant variation in how practitioners reported their addresses when registering.⁵⁸ Thus, although the matches went through two rounds of peer-review for quality checking and to ensure consistency in agreement, there may be some miscategorization as to whether the practitioner has a peer prescriber.

One limitation of this analysis is that we were not able to link DEA registered prescribers to Medicaid claims/encounter data to understand how many prescribers with a waiver actually prescribe.⁵⁹ We inferred the difference between active and inactive prescribers by comparing the number of prescribers in each county found in the two data sources (DEA versus claims/encounter data). That is, we compared the number of unique NPIs who wrote prescriptions for buprenorphine in the claims/encounter data in each county to the number of DATA-waived prescribers in the DEA data in each county.

While there is a benefit to looking at the distance to the nearest prescriber, there is some inherent inaccuracy in using straight line distance between ZIP code centroids, especially for large zip codes. A person may live on a border between ZIP code A and ZIP code B, and thus would travel to ZIP code B for services, but the calculation from mid-point of ZIP code A to a third ZIP code C is less. Straight lines do not also consider the existence of roads or traffic. Thus, distances are approximate and should be interpreted with these caveats in mind. The analysis does not include distances to prescribers who are out of state. Medicaid enrollees may seek care from prescribers out of state, and in this analysis, there were 178 prescribers in 21 other states from whom enrollees sought prescriptions. While these prescribers are valuable to providing care, they are excluded in order to examine more closely where access can be improved within Minnesota.

There are also unobserved reasons why an enrollee may seek care from a prescriber farther away, such as the quality of care or the acceptability or cultural appropriateness of care received. Finally, it is beyond the scope to understand reasonable access to care among vulnerable populations. Other structural and individual-level factors —such as lack of access to transportation, acceptance of treatment modality, and cost (although Medicaid patients have no copays)—can still reduce care-seeking.⁶⁰ These barriers can deter entry into MAT.

⁵⁸ For example, 3500 10th Avenue Suite 4 may be entered alternately as: 3500 Tenth Ave, Se 4; 3500 10TH AVE SUITE 4; 3500 Tenth Avenue, 4th Floor; and other variations.

⁵⁹ Linking these two sets requires a third-party set to match DEA numbers to NPI numbers. The DEA data lack the NPI number, which is generally how practitioners are uniquely identified in claims and encounter data.

⁶⁰ McLean K, Kavanaugh PR. “They’re making it so hard for people to get help”: motivations for non-prescribed buprenorphine use in a time of treatment expansion. *International Journal of Drug Policy*. 2019;71:118-124. [doi:10.1016/j.drugpo.2019.06.019](https://doi.org/10.1016/j.drugpo.2019.06.019)

Appendix 3: Additional Data Tables

This appendix contains tables with supplementary data referenced in the findings section above.

Appendix Exhibit 3.1: Number of Prescribers and Ratio to Medicaid Enrollees, Overall and by County-Level Segregation

	Total Number of DATA-waived providers	County-level range in waived providers	County-level average enrollee ratio
Black Segregation Index Quintile			
1	37	0-16	834.6
2	63	0-20	1,622.2
3	152	0-43	1,794.8
4	843	0-483	2,056.4
5	100	0-40	2,644.1
Hispanic Segregation Index			
1	36	0-10	1,032.0
2	68	0-20	1,676.9
3	108	0-28	1,952.3
4	280	0-81	2,379.8
5	703	0-483	1,890.3
American Indian Segregation index			
1	27	0-7	1,418.8
2	57	0-18	1,529.4
3	61	0-10	1,388.4
4	883	0-483	1,978.0
5	167	0-50	2,627.0
Overall	1,195	0-483	1,759.3

Notes: Source: DEA data as of March 2020; Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018. 1 indicates low dissimilarity or low segregation, the 5th quintile has the highest segregation.

Appendix Exhibit 3.2: Total Number of Prescribers in Each County, by Type and Level of Prescriber

County Name	Patient Cap: 30	Patient Cap: 100	Patient Cap: 275	Nurse Practitioner	Physician Assistant	Medical Doctor	Number of prescribers	Number of active prescribers
Aitkin	2	0	0	0	0	2	2	1
Anoka	28	7	0	11	1	23	35	19
Becker	5	0	1	0	0	6	6	4
Beltrami	16	0	0	7	0	9	16	5
Benton	2	0	1	0	0	3	3	0
Big Stone	2	0	0	1	0	1	2	0
Blue Earth	13	7	0	6	0	14	20	1
Brown	3	0	0	0	0	3	3	1
Carlton	8	1	0	3	1	5	9	5
Carver	5	2	0	1	2	4	7	4
Cass	3	1	2	2	0	4	6	2
Chippewa	2	0	0	1	0	1	2	2
Chisago	10	5	2	6	0	11	17	1
Clay	3	0	0	3	0	0	3	0
Clearwater	0	0	0	0	0	0	0	0
Cook	2	0	0	0	0	2	2	2
Cottonwood	0	0	0	0	0	0	0	0
Crow Wing	18	0	0	4	2	12	18	3
Dakota	26	13	3	10	4	28	43	29
Dodge	0	0	0	0	0	0	0	0
Douglas	7	1	0	2	0	6	8	4
Faribault	0	0	0	0	0	0	0	0
Fillmore	0	0	0	0	0	0	0	0
Freeborn	0	0	2	0	0	2	2	0
Goodhue	3	0	0	0	0	3	3	2
Grant	0	0	0	0	0	0	0	0
Hennepin	371	93	19	82	23	378	483	209
Houston	0	0	0	0	0	0	0	0
Hubbard	3	0	0	1	1	1	3	2
Isanti	3	3	1	2	0	5	7	1
Itasca	4	0	0	1	1	2	4	4
Jackson	0	0	0	0	0	0	0	0
Kanabec	1	2	0	0	0	3	3	4
Kandiyohi	1	0	0	0	0	1	1	2
Kittson	0	0	0	0	0	0	0	0
Koochiching	2	1	0	1	0	2	3	1
Lac qui Parle	0	0	0	0	0	0	0	0
Lake	1	1	0	0	0	2	2	2
Lake of the Woods	0	0	0	0	0	0	0	0

County Name	Patient Cap: 30	Patient Cap: 100	Patient Cap: 275	Nurse Practitioner	Physician Assistant	Medical Doctor	Number of prescribers	Number of active prescribers
Le Sueur	0	0	0	0	0	0	0	0
Lincoln	0	0	0	0	0	0	0	0
Lyon	3	0	0	1	0	2	3	4
McLeod	1	0	0	0	0	1	1	0
Mahnomen	1	0	0	1	0	0	1	2
Marshall	0	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0	0
Meeker	0	0	0	0	0	0	0	0
Mille Lacs	7	3	0	1	4	5	10	6
Morrison	1	2	0	1	0	2	3	5
Mower	2	0	0	1	0	1	2	0
Murray	0	0	0	0	0	0	0	1
Nicollet	0	0	0	0	0	0	0	0
Nobles	0	0	0	0	0	0	0	0
Norman	0	0	0	0	0	0	0	0
Olmsted	47	2	1	6	1	43	50	16
Otter Tail	7	0	0	1	0	6	7	3
Pennington	1	0	0	0	0	1	1	0
Pine	1	1	0	1	0	1	2	0
Pipestone	1	0	0	0	0	1	1	0
Polk	2	0	0	1	0	1	2	0
Pope	1	0	0	0	0	1	1	1
Ramsey	160	27	8	37	17	141	194	71
Red Lake	0	0	0	0	0	0	0	0
Redwood	3	0	0	1	0	2	3	2
Renville	0	0	0	0	0	0	0	0
Rice	1	2	0	2	0	1	3	3
Rock	0	0	0	0	0	0	0	0
Roseau	2	0	0	1	0	1	2	1
St. Louis	67	13	1	14	3	64	81	35
Scott	6	1	0	3	0	4	7	2
Sherburne	6	3	0	3	0	6	9	2
Sibley	0	0	0	0	0	0	0	0
Stearns	37	3	0	19	2	19	40	17
Steele	2	0	0	0	0	2	2	3
Stevens	0	0	0	0	0	0	0	0
Swift	1	0	0	1	0	0	1	0
Todd	5	0	0	2	0	3	5	0
Traverse	0	0	0	0	0	0	0	0
Wabasha	0	0	0	0	0	0	0	0
Wadena	5	0	0	1	0	4	5	1
Waseca	0	0	0	0	0	0	0	0

County Name	Patient Cap: 30	Patient Cap: 100	Patient Cap: 275	Nurse Practitioner	Physician Assistant	Medical Doctor	Number of prescribers	Number of active prescribers
Washington	18	8	2	6	3	19	28	14
Watsonwan	0	1	0	0	0	1	1	2
Wilkin	0	0	0	0	0	0	0	0
Winona	5	2	0	2	1	4	7	4
Wright	8	2	0	2	0	8	10	8
Yellow Medicine	0	0	0	0	0	0	0	0
Total	945	207	43	252	66	877	1195	513

Source: DEA data as of March 2020.

Appendix Exhibit 3.3: Number of Active Prescribers and Ratio to Medicaid Enrollees, Overall and by Quintile of County-Level Segregation (for counties with at least one prescriber)

Segregation Index Quintile	Total number of active Medicaid prescribers	County-level range in prescribers	County-level enrollee to prescriber ratio
Black			
1	17	0 - 5	4030
2	25	0 - 6	4713
3	89	0 - 29	2980
4	347	0 - 209	4304
5	35	0 - 17	5933
Hispanic			
1	20	0 - 6	3030
2	20	0 - 5	5628
3	49	0 - 14	4540
4	134	0 - 35	4047
5	290	0 - 209	3992
American Indian			
1	13	0 - 4	3212
2	18	0 - 5	5005
3	13	0 - 8	3956
4	369	0 - 209	4762
5	82	0 - 29	3991
Overall	513	0 - 209	4265

Note: 41 counties do not have an active prescriber. Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018. 1 indicates low dissimilarity or low segregation, the 5th quintile has the highest segregation.

Appendix Exhibit 3.4: Enrollees per Active Prescriber and Value of Segregation Index

Quantiles of Enrollee-to-Prescriber Ratio	Enrollee per Prescriber Ratio	Black Segregation Index	Hispanic Segregation Index	American Indian Segregation Index
1	1,539.6	0.416	0.237	0.430
2	2,330.5	0.419	0.323	0.546
3	3,235.4	0.404	0.311	0.551
4	4,686.3	0.354	0.309	0.490
5	9,838.2	0.527	0.335	0.515
Total	4,326.9	0.424	0.302	0.505

Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 3.5: Average Segregation Index for Counties with Either No Prescriber or Any Prescriber

Segregation Index Quintile	Counties with No Prescriber			Counties with Any Prescriber		
	Black	Hispanic	American Indian	Black	Hispanic	American Indian
Black	Black SI	Hispanic SI	American Indian SI	Black SI	Hispanic SI	American Indian SI
1	0.220	0.237	0.339	0.188	0.302	0.420
2	0.374	0.306	0.444	0.360	0.231	0.533
3	0.428	0.414	0.450	0.427	0.277	0.481
4	0.481	0.228	0.437	0.505	0.371	0.577
5	0.638	0.342	0.568	0.618	0.321	0.506
Hispanic						
1	0.325	0.126	0.385	0.354	0.150	0.372
2	0.459	0.231	0.489	0.444	0.224	0.411
3	0.449	0.279	0.389	0.417	0.301	0.530
4	0.456	0.366	0.481	0.478	0.361	0.591
5	0.441	0.507	0.479	0.406	0.471	0.584
American Indian						
1	0.347	0.257	0.229	0.326	0.230	0.205
2	0.435	0.265	0.404	0.459	0.249	0.387
3	0.420	0.309	0.500	0.408	0.306	0.498
4	0.440	0.38	0.584	0.471	0.322	0.587
5	0.528	0.336	0.710	0.413	0.359	0.687

Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 3.6: Percent of Black, Hispanic, American Indian, and White Residents, by County Quintile of Segregation Index

Quintile of Segregation Index	County average percent of population for each race/ethnicity			
	Black (%)	Hispanic/ (%)	American Indian (%)	White (%)
Black				
1 (N=18)	0.6	3.6	4.2	89.0
2 (N=17)	1.0	3.2	2.1	90.8
3 (N=18)	1.9	4.1	1.1	89.3
4 (N=17)	3.2	4.7	1.4	86.0
5 (N=18)	2.0	6.8	0.8	87.6
Hispanic				
1 (N=18)	0.8	2.9	3.8	89.8
2 (N=17)	1.5	4.5	1.0	90.3
3 (N=18)	1.3	4.1	2.8	88.1
4 (N=17)	2.5	4.6	0.6	88.8
5 (N=18)	2.6	6.3	1.3	85.6
American Indian				
1 (N=18)	0.9	3.5	3.2	89.7
2 (N=17)	0.8	4.3	1.7	90.8
3 (N=18)	1.2	4.6	1.1	90.0
4 (N=17)	3.4	4.9	1.3	85.1
5 (N=18)	2.3	5.1	2.3	86.9

Notes: Total will not sum to 100 percent as data exclude other race/ethnicities. Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 3.7: Average Distance between Medicaid Enrollees and Nearest Buprenorphine Prescriber, for All Counties

County Name	Average Distance	Standard Deviation	County Name	Average Distance	Standard Deviation	County Name	Average Distance	Standard Deviation
-	Miles	Miles	-	Miles	Miles	-	Miles	Miles
Overall	5.8	11						
Aitkin	18.4	10.4	Kandiyohi	2.3	4.8	Rock	29.9	9.7
Anoka	1.6	2.9	Kittson	62.6	17.9	Roseau	17.4	16.3
Becker	15.1	8.6	Koochiching	16.0	8.6	Scott	4.4	4.9
Beltrami	10.9	13.6	Lac qui Parle	21.1	10.1	Sherburne	3.4	3.9
Benton	6.5	4.3	Lake	8.6	13.1	Sibley	18.3	5.5
Big Stone	43.4	12.9	Lake of the Woods	33.2	14.1	St. Louis	6.5	9.2
Blue Earth	3.0	5.7	Le Sueur	13.5	5.9	Stearns	4.4	7.5
Brown	6.2	8.2	Lincoln	23.6	7.3	Steele	2.6	5.8
Carlton	7.6	9.8	Lyon	5.2	7.3	Stevens	25.2	8.1
Carver	4.1	3.7	Mahnomen	14.7	7.2	Swift	20.9	7.4
Cass	8.4	8.6	Marshall	67.6	21.6	Todd	18.4	6.2
Chippewa	5.7	7.5	Martin	22.3	6.6	Traverse	40.5	13.8
Chisago	10.2	5.8	McLeod	14.9	5.8	Wabasha	16.8	7.4
Clay	34.9	8.8	Meeker	14.0	5.7	Wadena	6.6	7.0
Clearwater	25.5	7.3	Mille Lacs	4.3	5.3	Waseca	14.3	4.4
Cook	7.0	11.1	Morrison	6.0	6.6	Washington	1.7	2.5
Cottonwood	21.2	7.5	Mower	29.5	7.3	Watowan	2.0	4.9
Crow Wing	6.4	4.5	Murray	7.2	7	Wilkin	22.3	7.3
Dakota	1.7	2.7	Nicollet	7.5	5.3			
Dodge	15.0	5.2	Nobles	25.1	5.5			
Douglas	4.2	6.6	Norman	26.8	10.2			
Faribault	30.2	9.7	Olmsted	2.4	4.7			
Fillmore	24.0	9.1	Otter Tail	11.8	10.4			
Freeborn	28.9	7.7	Pennington	62.1	15.3			
Goodhue	7.7	8.1	Pine	15.9	8.4			
Grant	20.6	7.2	Pipestone	25.4	6.8			
Hennepin	0.5	2.1	Polk	51.9	20			
Houston	25	7.4	Pope	5.8	6.8			
Hubbard	5.5	7.3	Ramsey	0.2	1.5			
Isanti	4.0	4.5	Red Lake	50.4	12.7			
Itasca	5.0	8.2	Redwood	9.1	9.1			
Jackson	29.1	7.7	Renville	16.8	6.5			
Kanabec	4.9	6.3	Rice	3.3	5.2			

Appendix Exhibit 3.8: Average Distance between Medicaid Enrollees and Nearest OTP for Methadone, by ZIP Code Categories

Enrollee Race/Ethnicity	Overall	Standard Deviation in	Range in Distance
	County Average Distance	Distance	
	Miles	Miles	Miles
Black			
Hennepin	0.3	2.1	[0 - 74.2]
Ramsey	0.2	1.3	[0 - 74.2]
St. Louis	3.5	7.3	[0 - 38.3]
Hispanic			
Hennepin	0.3	1.3	[0 - 52.6]
Ramsey	0.2	1.4	[0 - 74.2]
St. Louis	5.3	8.2	[0 - 31.8]
American Indian			
Hennepin	0.6	3.1	[0 - 82.8]
Ramsey	0.3	2.4	[0 - 74.2]
St. Louis	6.9	9.6	[0 - 74.2]
White			
Hennepin	0.8	2.2	[0 - 74.2]
Ramsey	0.3	1.8	[0 - 74.2]
St. Louis	6.8	9.3	[0 - 82.8]
Overall	25.7	37	[0 - 228.0]

Appendix Exhibit 3.9: Average Distance between Medicaid enrollees and Nearest OTP for Methadone for All Counties

County Name	Average Distance	Standard Deviation	County Name	Average Distance	Standard Deviation	County Name	Average Distance	Standard Deviation
-	Miles	Miles	-	Miles	Miles	-	Miles	Miles
Overall	25.7	37.0						
Aitkin	34.1	14.9	Kandiyohi	49.0	12.4	Rock	152.0	43.1
Anoka	7.7	7.2	Kittson	193.0	49	Roseau	178.0	38.9
Becker	82.9	20.4	Koochiching	128.0	28.8	Scott	11.1	7.6
Beltrami	94.2	19.6	Lac qui Parle	94.5	26.4	Sherburne	20.2	9.7
Benton	9.1	9.7	Lake	34.2	18.5	Sibley	44.8	14.0
Big Stone	103.0	25.5	Lake of the Woods	164	33.7	St. Louis	26.6	27.9
Blue Earth	53.8	13.7	Le Sueur	33.6	10.7	Stearns	9.1	13.7
Brown	67.9	21.6	Lincoln	124.0	28.5	Steele	37.4	9.2
Carlton	23.6	11.8	Lyon	106.0	24	Stevens	79.2	19.1
Carver	19.2	8.0	Mahnomen	103.0	15.8	Swift	69.3	19.9
Cass	45.4	24.8	Marshall	168.0	39.2	Todd	37.3	10.5
Chippewa	78.6	19.6	Martin	93.0	20.4	Traverse	107.0	26.6
Chisago	29.3	10.5	McLeod	42.1	13.8	Wabasha	21.0	9.9
Clay	121.0	24.7	Meeker	32.3	11.3	Wadena	44.9	12.6

County Name	Average Distance	Standard Deviation	County Name	Average Distance	Standard Deviation	County Name	Average Distance	Standard Deviation
Clearwater	102.0	18.2	Mille Lacs	28.4	10	Waseca	48.4	9.9
Cook	104.0	28.8	Morrison	24.4	7.9	Washington	7.2	7.0
Cottonwood	103.0	23.7	Mower	36.0	8.6	Watonwan	80.2	17.9
Crow Wing	7.9	11.9	Murray	125.0	31.1	Wilkin	109.0	24.1
Dakota	5.6	5.7	Nicollet	48.3	13.9	Winona	34.2	9.9
Dodge	19.6	7.8	Nobles	137.0	24.0	Wright	22.6	8.4
Douglas	57.4	17.2	Norman	124.0	26.2	Yellow Medicine	93.5	25.3
Faribault	75.2	19	Olmsted	4.9	7			
Fillmore	31.3	11.1	Otter Tail	76.2	22.2			
Freeborn	51.6	12.4	Pennington	147.0	32.2			
Goodhue	25.1	8.9	Pine	53.4	13.3			
Grant	82.4	20.0	Pipestone	144.0	30.2			
Hennepin	4.0	6.1	Polk	142.0	39.5			
Houston	52.4	11.5	Pope	56.4	16.1			
Hubbard	60.4	15.4	Ramsey	3.2	4.9			
Isanti	30.1	9.3	Red Lake	135.0	29.5			
Itasca	67.9	16.7	Redwood	87.3	23.9			
Jackson	112.0	25.8	Renville	66.0	16.5			
Kanabec	49.2	12.8	Rice	28.6	8.5			

Appendix Exhibit 3.10: Minnesota Map-Supporting Data Table

County	Active Prescribers	Enrollee to Active Prescriber Ratio	Enrollee to Prescriber Ratio	Overdose Rate
Aitkin County	2	2594.0	5188.0	Insufficient Data
Anoka County	35	2393.2	4408.6	11.2
Becker County	6	1964.7	2947.0	8.9
Beltrami County	16	1167.4	3735.8	9.6
Benton County	3	3968.0	NA	10
Big Stone County	2	868.5	NA	Insufficient Data
Blue Earth County	20	858.6	17171.0	3.9
Brown County	3	2008.7	6026.0	11.6
Carlton County	9	1107.9	1994.2	16.5
Carver County	7	2014.4	3525.3	5.8
Cass County	6	1902.5	5707.5	18
Chippewa County	2	2034.0	2034.0	Insufficient Data
Chisago County	17	700.6	11910.0	10.4
Clay County	3	6183.3	NA	8.6
Clearwater County	0	NA	NA	Insufficient Data
Cook County	2	783.5	783.5	Insufficient Data
Cottonwood County	0	NA	NA	Insufficient Data
Crow Wing County	18	1099.5	6597.0	5.7

County	Active Prescribers	Enrollee to Active Prescriber Ratio	Enrollee to Prescriber Ratio	Overdose Rate
Dakota County	43	2118.7	3141.5	8.2
Dodge County	0	NA	NA	13.6
Douglas County	8	1137.3	2274.5	8
Faribault County	0	NA	NA	Insufficient Data
Fillmore County	0	NA	NA	14.6
Freeborn County	2	4801.0	NA	9.8
Goodhue County	3	3232.7	4849.0	6.9
Grant County	0	NA	NA	Insufficient Data
Hennepin County	483	713.4	1648.6	14.2
Houston County	0	NA	NA	15.6
Hubbard County	3	2304.7	3457.0	14.9
Isanti County	7	1483.7	10386.0	12.6
Itasca County	4	3610.8	3610.8	9.5
Jackson County	0	NA	NA	Insufficient Data
Kanabec County	3	1766.7	1325.0	18
Kandiyohi County	1	15484.0	7742.0	6.8
Kittson County	0	NA	NA	Insufficient Data
Koochiching County	3	1298.3	3895.0	Insufficient Data
Lac qui Parle County	0	NA	NA	Insufficient Data
Lake County	2	1310.0	1310.0	Insufficient Data
Lake of the Woods County	0	NA	NA	Insufficient Data
Le Sueur County	0	NA	NA	10.2
Lincoln County	0	NA	NA	Insufficient Data
Lyon County	3	2657.7	1993.3	11
McLeod County	1	8637.0	NA	8
Mahnomen County	1	3085.0	1542.5	64.8
Marshall County	0	NA	NA	Insufficient Data
Martin County	0	NA	NA	15.1
Meeker County	0	NA	NA	12.8
Mille Lacs County	10	924.6	1541.0	26.7
Morrison County	3	3345.7	2007.4	8.8
Mower County	2	6678.5	NA	10.8
Murray County	0	NA	2156.0	Insufficient Data
Nicollet County	0	NA	NA	8
Nobles County	0	NA	NA	13.4
Norman County	0	NA	NA	Insufficient Data
Olmsted County	50	712.7	2227.1	8.4
Otter Tail County	7	2447.0	5709.7	7
Pennington County	1	3174.0	NA	Insufficient Data
Pine County	2	4462.5	NA	12.8
Pipestone County	1	2873.0	NA	Insufficient Data
Polk County	2	5177.0	NA	12.1
Pope County	1	3085.0	3085.0	Insufficient Data

County	Active Prescribers	Enrollee to Active Prescriber Ratio	Enrollee to Prescriber Ratio	Overdose Rate
Ramsey County	194	1001.8	2737.3	9
Red Lake County	0	NA	NA	Insufficient Data
Redwood County	3	1493.3	2240.0	Insufficient Data
Renville County	0	NA	NA	Insufficient Data
Rice County	3	5294.7	5294.7	6.8
Rock County	0	NA	NA	Insufficient Data
Roseau County	2	1749.0	3498.0	18.3
St. Louis County	81	701.8	1624.1	18.1
Scott County	7	3792.9	13275.0	7.8
Sherburne County	9	2161.6	9727.0	10.2
Sibley County	0	NA	NA	Insufficient Data
Stearns County	40	1084.6	2551.9	7.3
Steele County	2	4948.5	3299.0	7.9
Stevens County	0	NA	NA	Insufficient Data
Swift County	1	2913.0	NA	Insufficient Data
Todd County	5	1546.6	NA	12.3
Traverse County	0	NA	NA	Insufficient Data
Wabasha County	0	NA	NA	13.6
Wadena County	5	1097.4	5487.0	Insufficient Data
Waseca County	0	NA	NA	15
Washington County	28	1515.0	3030.0	7.6
Watsonwan County	1	3268.0	1634.0	Insufficient Data
Wilkin County	0	NA	NA	Insufficient Data
Winona County	7	1569.1	2746.0	9.1
Wright County	10	2508.9	3136.1	5.6
Yellow Medicine County	0	NA	NA	Insufficient Data

Appendix 4: ZIP Code Analyses for Three Counties

The following analysis presents ZIP code level analyses for three counties. ZIP codes show a more granular level of detail, and can be used to examine variation within counties. In looking at three areas with the largest number of prescribers, we find that the availability of buprenorphine is uneven, but it is not clear who is most disaffected. Less segregated areas may have less need for treatment, but OUD prevalence data are not available at the ZIP code level.

Appendix Exhibit 4.1: Category of Number of Active Prescribers, Ratio to Enrollees, and Race/Ethnicity for ZIP Codes in Hennepin, Ramsey, and St. Louis County

Total number of prescribers	Average Number of Prescribers Per 10K Enrollees	Number of Prescribers Per 10K Enrollees SD	Percent of Enrollees by Race/Ethnicity			
			Black	Hispanic	American Indian	White
0	0	0	11.1%	3.3%	4.5%	58.9%
1 to 2	3.6	3.6	22.9%	6.8%	2.1%	36.7%
More than 2	49.6	108.9	28.2%	7.3%	3.1%	31.9%
Average	10.8	51.8	17.4%	5.0%	3.7%	48.1%

Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.2: Average Number of Active Prescribers, for ZIP Codes with Average and Higher than Average Proportions of Race/Ethnicity in Hennepin, Ramsey, and St. Louis County

	Average Number of Active Prescribers	Standard Deviation	Range
ZIP Codes with Average Proportion of Racial/Ethnic Groups			
Black	1.4	2.8	0 -17
Hispanic	2.1	4.5	0 -29
American Indian	2.0	4.3	0 -29
White	2.6	5	0 -29
ZIP Codes with Higher than Average Proportion of Racial/Ethnic Groups			
Black	7.0	8.9	0 -29
Hispanic	3.8	6.2	0 -20
American Indian	5.2	7.6	0 -18
White	0.4	0.7	0 -2
Hennepin County Average	2.8	5.4	0 -29
Ramsey County Average	3.2	3.9	0 -15
St. Louis county Average	0.7	3.1	0 -20

Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.3: Average Distance between Medicaid Enrollees and Nearest Buprenorphine Prescriber, for Select Counties

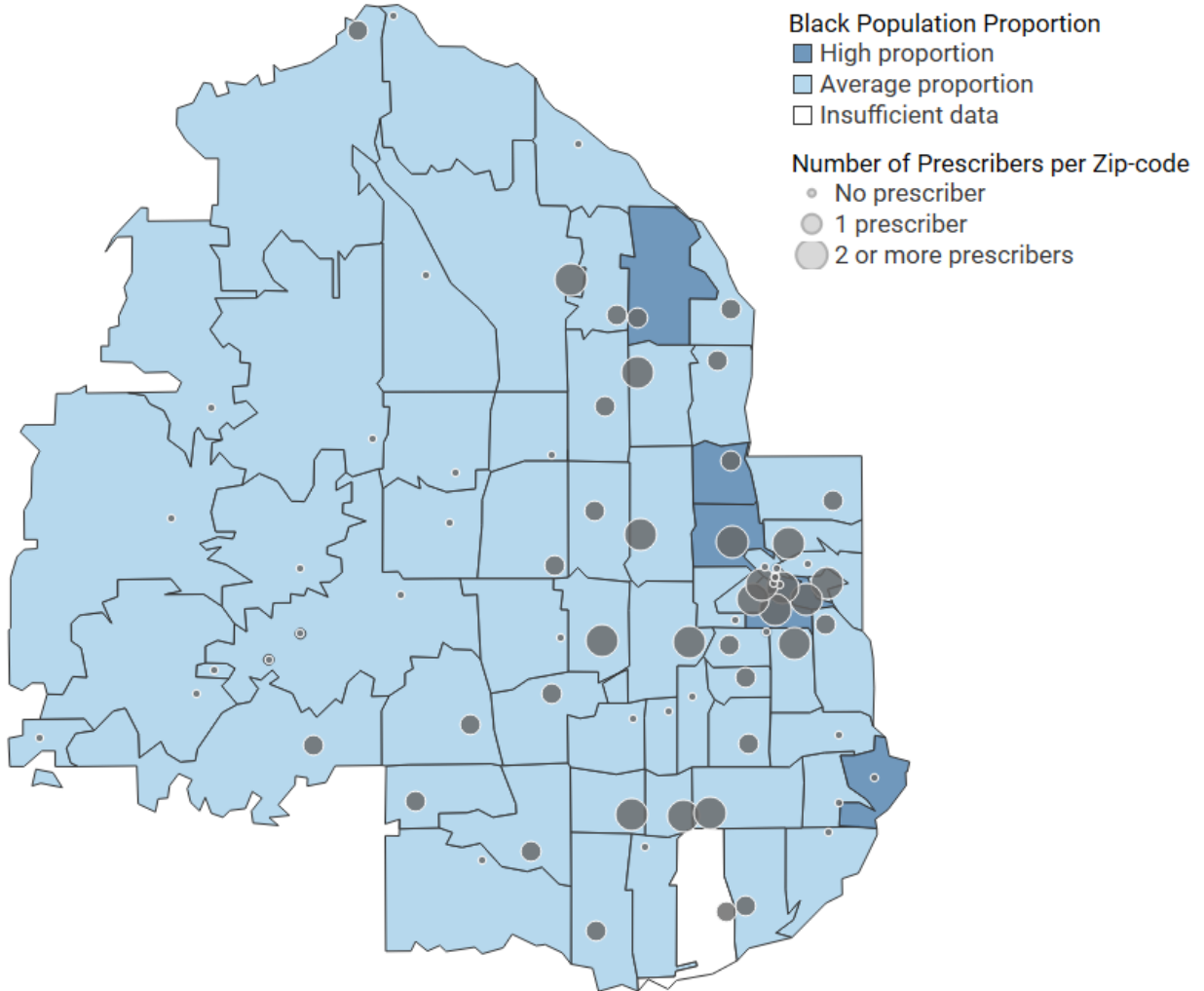
	Overall County Average Distance	Standard Deviation in Distance	Range in Distance
	Miles	Miles	Miles
Black			
Hennepin	0.3	2.1	[0-74.2]
Ramsey	0.1	1.3	[0-74.2]
St. Louis	3.5	7.3	[0-38.3]
Hispanic			
Hennepin	0.3	1.3	[0-52.6]
Ramsey	0.2	1.4	[0-74.2]
St. Louis	5.3	8.2	[0-31.8]
American Indian			
Hennepin	0.6	3.1	[0-82.8]
Ramsey	0.3	2.4	[0-74.2]
St. Louis	6.9	9.6	[0-74.2]
White			
Hennepin	0.8	2.16	[0-74.2]
Ramsey	0.3	1.8	[0-74.2]
St. Louis	6.8	9.3	[0-82.8]
Overall	5.8	11.0	[0-92.5]

Notes: County average distance to nearest buprenorphine prescriber. Source: Medicaid enrollment data and prescribing physicians. Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019

Appendix Exhibit 4.4: Methadone Providers in Each County, Enrollee to OTP Ratio, and Race/Ethnicity of ZIP Code

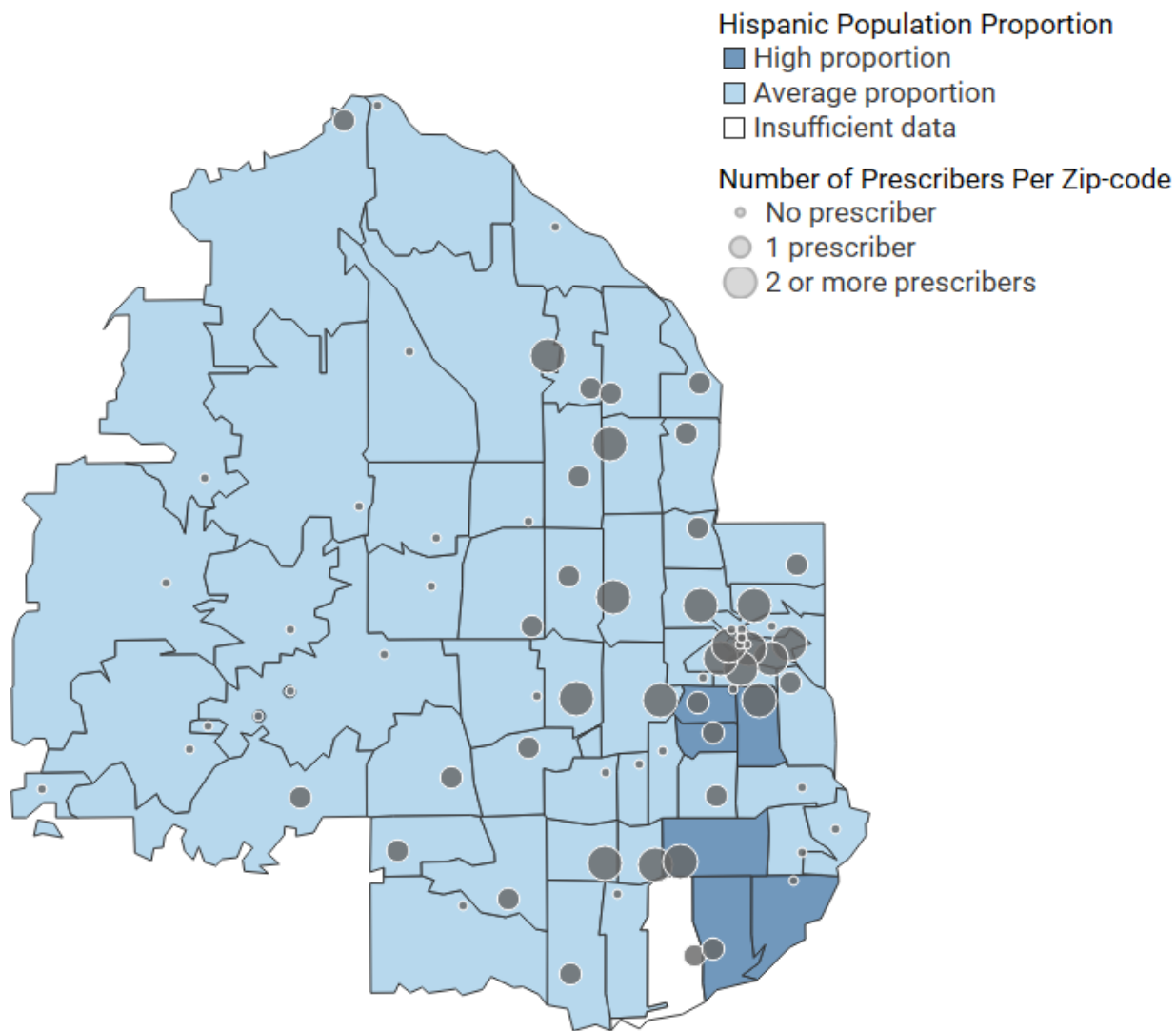
County	ZIP Code	Enrollee to OTP Ratio	Percent of Each Race/Ethnicity in ZIP Code			
			Black	Hispanic	American Indian	White
Ramsey	55101	4,402	42.8	5.0	3.4	28.7
Ramsey	55102	6,040	26.5	6.2	2.6	42.1
Ramsey	55113	9,352	22.1	6.3	1.1	32.8
Washington	55125	6,321	18.0	5.0	0.8	36.8
Dakota	55337	13,945	27.1	10.5	1.0	25.4
Hennepin	55413	3,723	25.0	9.7	3.1	38.3
Hennepin	55414	5,219	29.0	4.6	2.3	38.8
Hennepin	55415	1,368	45.0	5.3	6.5	17.5
Hennepin	55425	3,655	24.6	23.9	1.6	21.3
Hennepin	55428	11,647	37.2	9.5	1.2	21.2
Anoka	55432	10,893	25.7	10.1	1.5	31.8
Hennepin	55444	6,232	28.9	6.5	1.0	15.4
St. Louis	55805	3,906	14.9	2.4	11.1	51.9
Olmstead	55906	3,810	14.2	7.3	0.9	43.8
Stearns	56303	9,397	23.5	4.4	1.6	45.0
Crow Wing	56401	10,548	2.6	1.8	2.9	64.2
Average		6904	25.4	7.4	2.7	34.7

Appendix Exhibit 4.5a: Hennepin County, Number of Providers and ZIP Codes with High Proportion of Black Enrollees



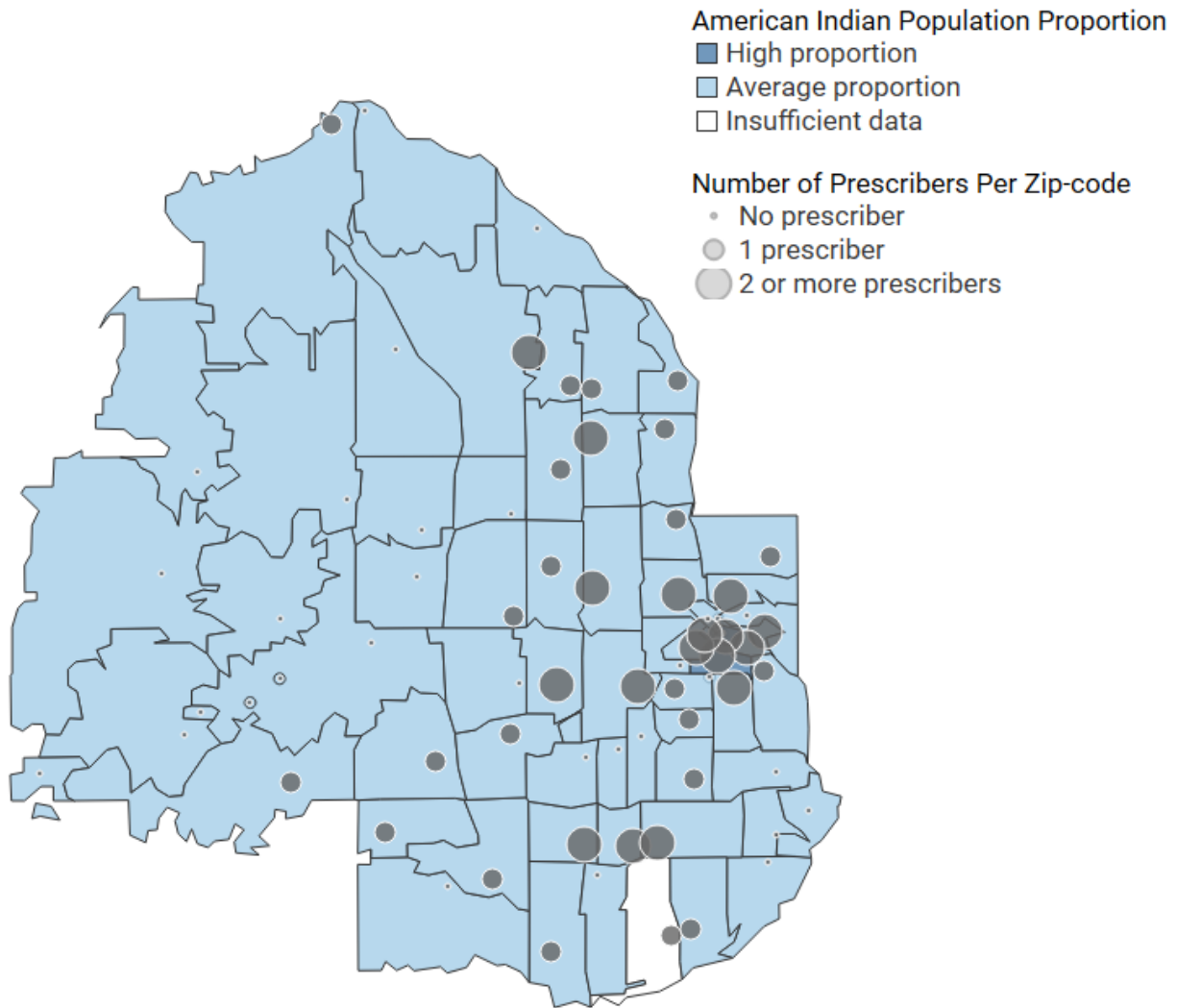
Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019; American Community Survey data, 2014-2018.

Appendix Exhibit 4.5b: Hennepin County, Number of Providers and ZIP Codes with High Proportion of Hispanic Enrollees



Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019; American Community Survey data, 2014-2018.

Appendix Exhibit 4.5c: Hennepin County, Number of Providers and ZIP Codes with High Proportion of American Indian Enrollees



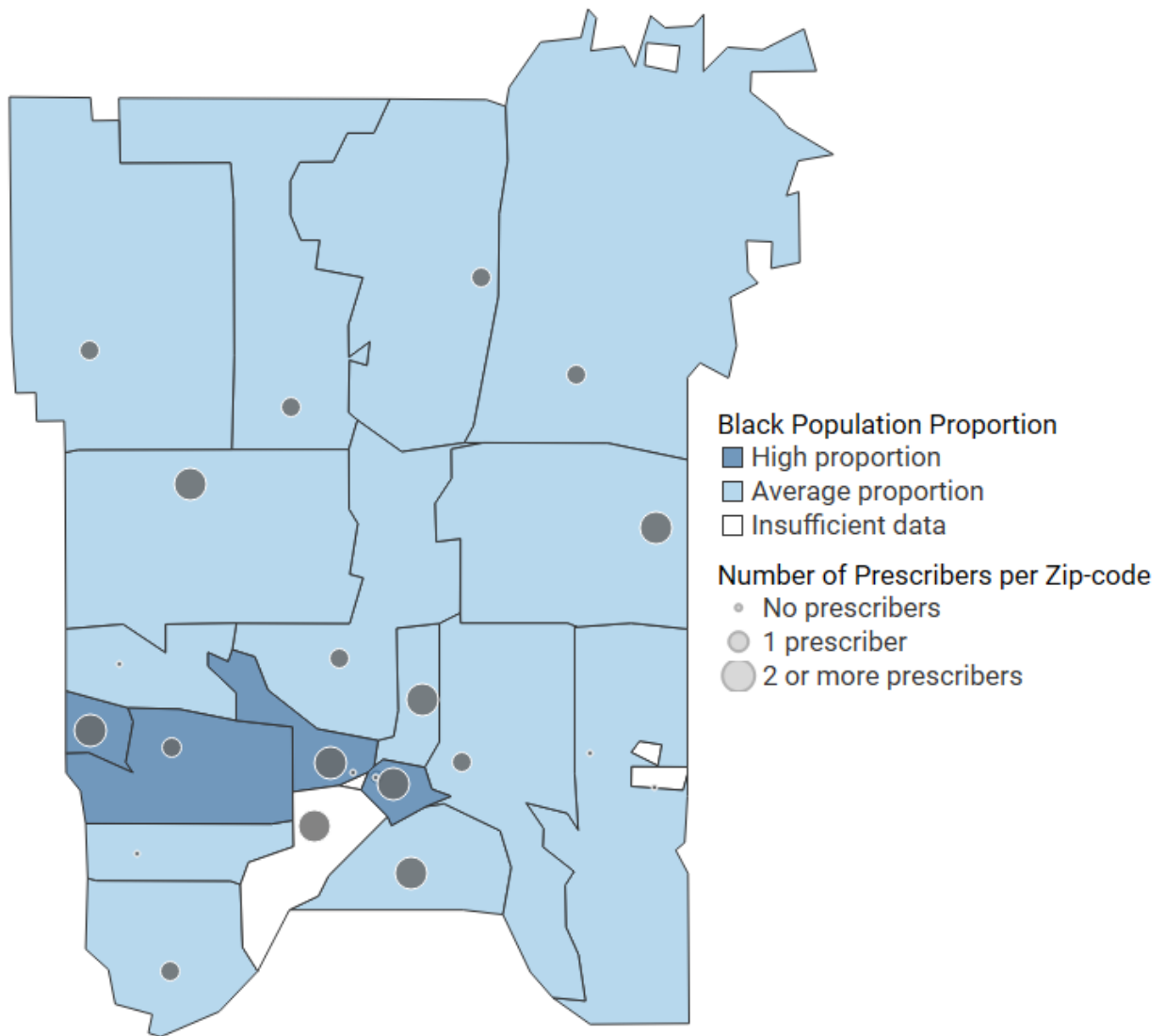
Source: Medicaid claims/encounter and enrollment data July 1, 2018 to June 30, 2019; American Community Survey data, 2014-2018. .

Appendix Exhibit 4.5d: Hennepin County, Map-Supporting Data Table

Zip-code	Number of Prescribers per Zip-code	Proportion Black	Proportion Hispanic	Proportion American Indian
55111	0	High	Average	Average
55305	0	Average	Average	Average
55311	0	Average	Average	Average
55316	0	Average	Average	Average
55323	0	Average	Average	Average
55327	0	Average	Average	Average
55331	1	Average	Average	Average
55340	0	Average	Average	Average
55343	1	Average	Average	Average
55344	1	Average	Average	Average
55345	1	Average	Average	Average
55346	1	Average	Average	Average
55347	0	Average	Average	Average
55356	0	Average	Average	Average
55357	0	Average	Average	Average
55359	0	Average	Average	Average
55361	0	Average	High	Average
55364	0	Average	Average	Average
55369	2+	Average	Average	Average
55374	1	Average	Average	Average
55375	0	Average	Average	Average
55384	0	Average	Average	Average
55391	0	Average	Average	Average
55401	0	Average	Average	Average
55402	2+	Average	Average	Average
55403	2+	Average	Average	Average
55404	2+	High	Average	High
55405	0	Average	Average	Average
55406	1	Average	Average	Average
55407	2+	Average	High	Average
55408	1	Average	High	Average
55409	1	Average	High	Average
55410	0	Average	Average	Average
55411	2+	High	Average	Average
55412	1	High	Average	Average
55413	2+	Average	Average	Average
55414	0	Average	Average	Average
55415	2+	High	Average	High
55416	2+	Average	Average	Average
55417	0	Average	Average	Average
55418	1	Average	Average	Average
55419	1	Average	Average	Average

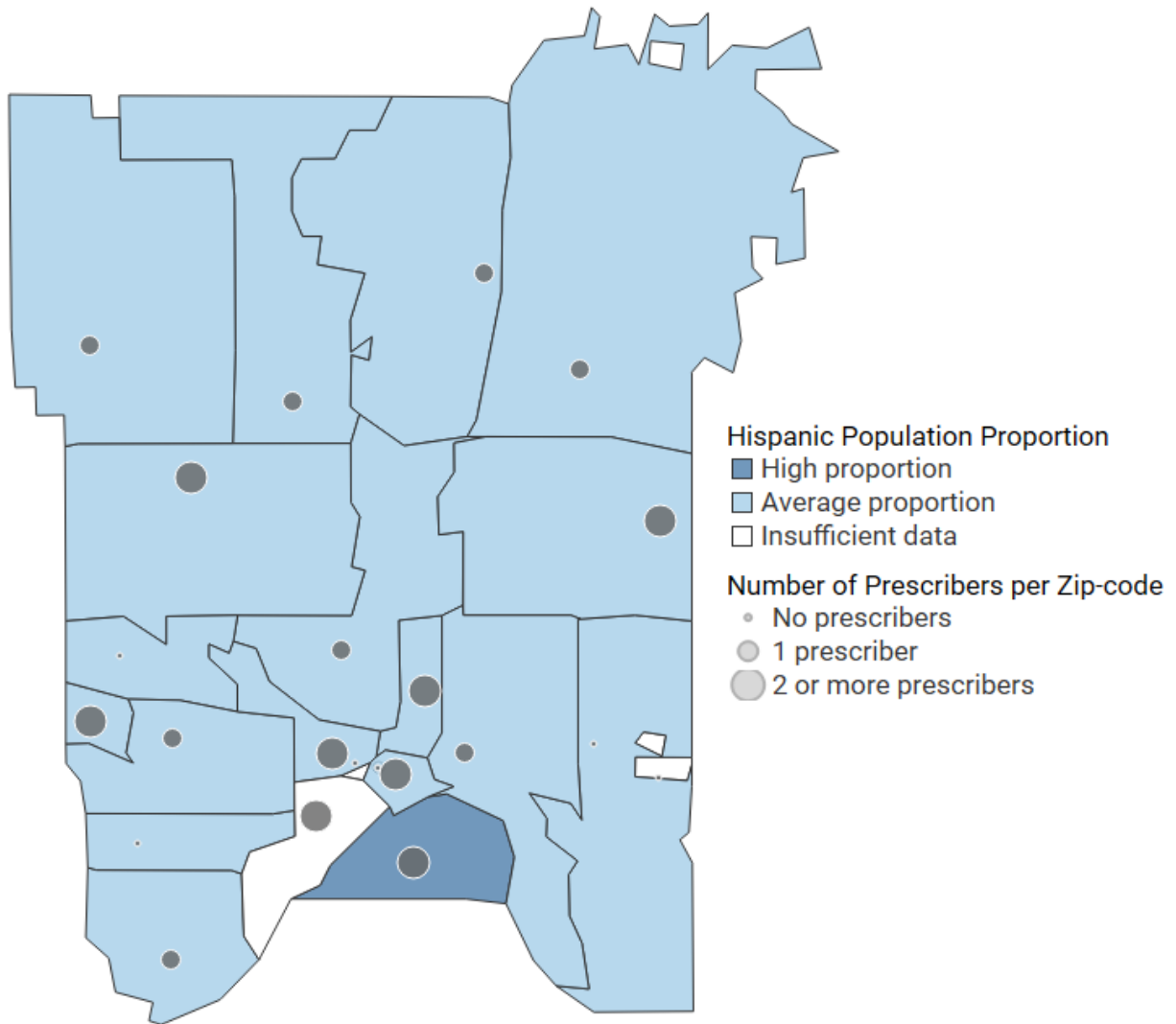
Zip-code	Number of Prescribers per Zip-code	Proportion Black	Proportion Hispanic	Proportion American Indian
55420	1	Average	High	Average
55422	2+	Average	Average	Average
55423	2+	Average	High	Average
55424	0	Average	Average	Average
55425	0	Average	High	Average
55426	2+	Average	Average	Average
55427	1	Average	Average	Average
55428	1	Average	Average	Average
55429	2+	Average	Average	Average
55430	1	Average	Average	Average
55431	1	Insufficient data	Insufficient data	Insufficient data
55435	2+	Average	Average	Average
55436	0	Average	Average	Average
55437	0	Average	Average	Average
55438	1	Average	Average	Average
55439	2+	Average	Average	Average
55440	0	High	Average	High
55441	1	Average	Average	Average
55442	0	Average	Average	Average
55443	1	High	Average	Average
55444	1	Average	Average	Average
55445	1	Average	Average	Average
55446	0	Average	Average	Average
55447	0	Average	Average	Average
55450	0	Average	Average	Average
55454	2+	High	Average	Average
55455	2+	Average	Average	Average
55458	0	High	Average	Average
55467	0	Insufficient data	Insufficient data	Insufficient data
55474	0	Insufficient data	Insufficient data	Insufficient data
55479	0	Insufficient data	Insufficient data	Insufficient data
55480	0	High	Average	Average
55487	0	High	Average	High
55488	0	Insufficient data	Insufficient data	Insufficient data

Appendix Exhibit 4.6a: Ramsey County, Number of Providers and ZIP Codes with High Proportion of Black Enrollees



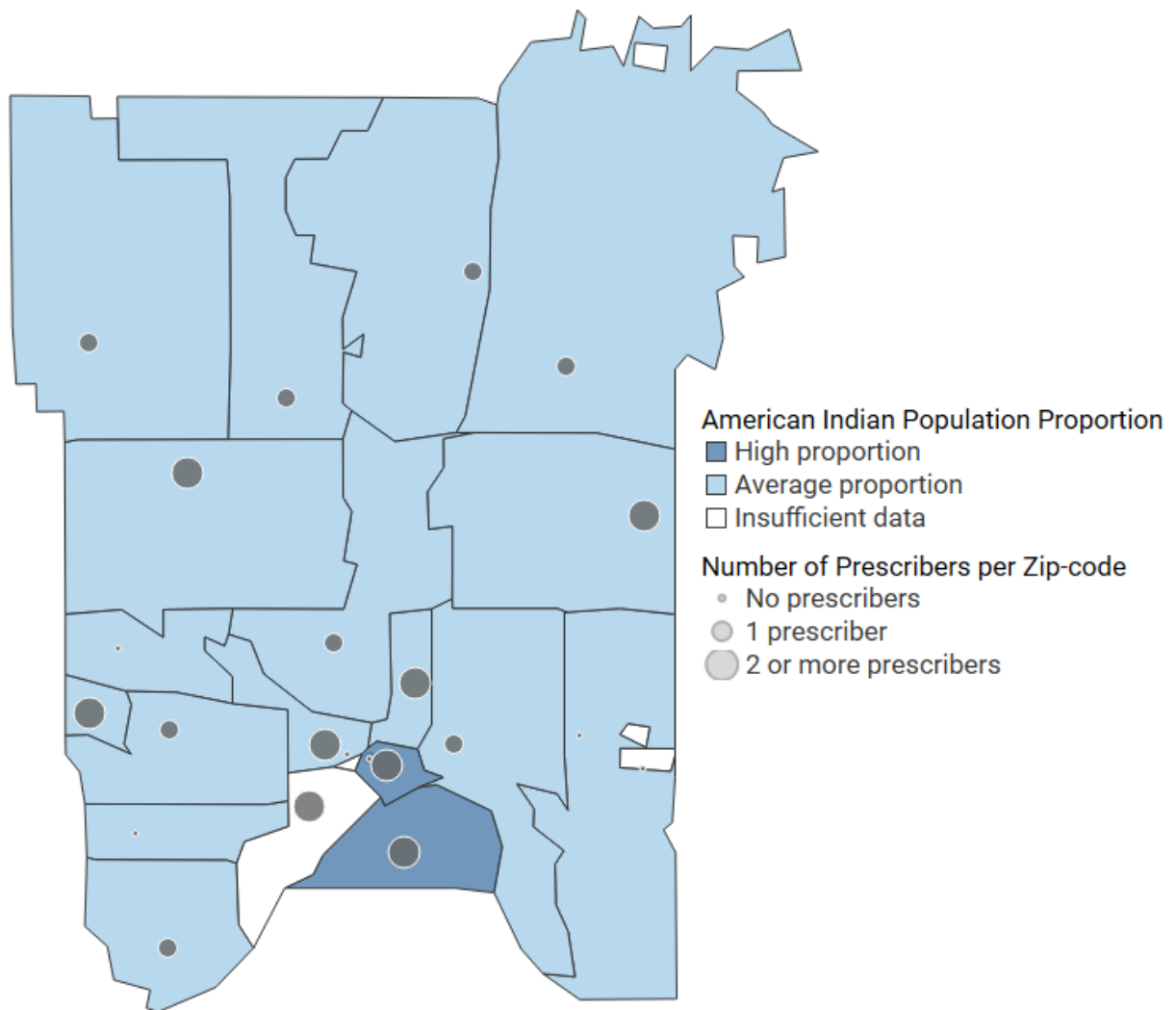
Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.6b: Ramsey County, Number of Providers and ZIP Codes with High Proportion of Hispanic Enrollees



Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.6c: Ramsey County, Number of Providers and ZIP Codes with High Proportion of American Indian Enrollees

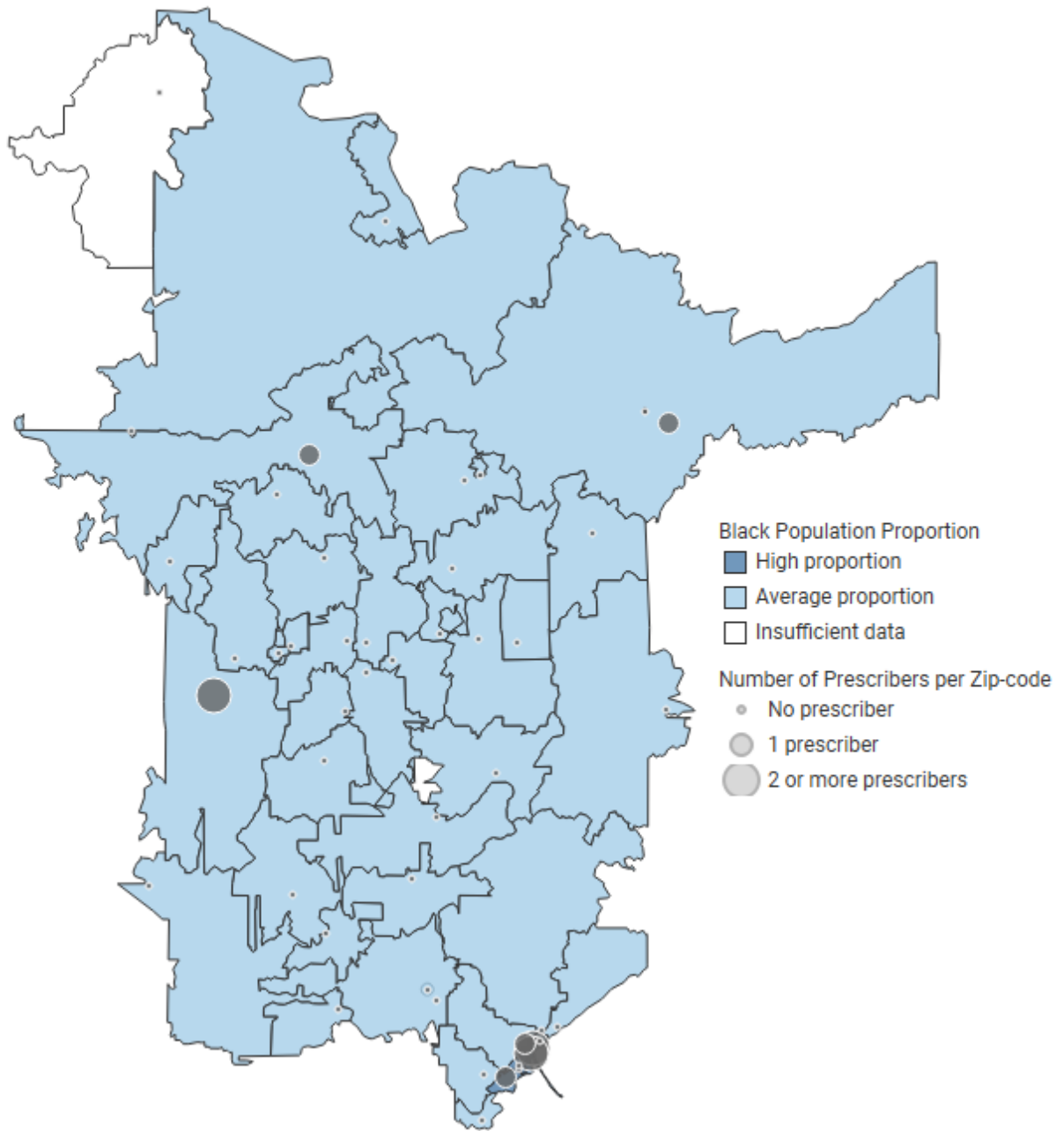


Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.6d: Ramsey County, Map-Supporting Data Table

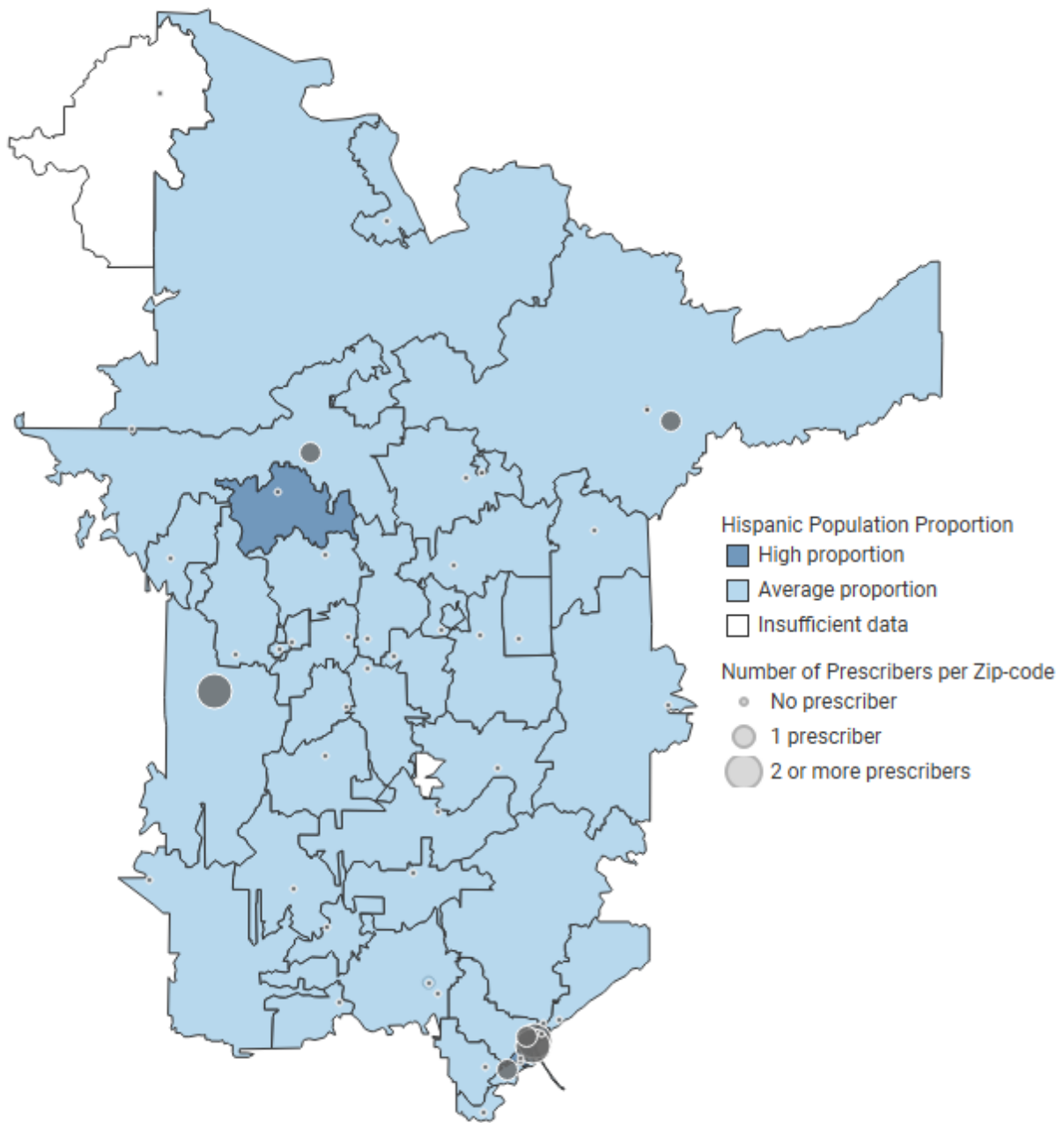
Zip-code	Number of Prescribers per Zip-code	Proportion Black	Proportion Hispanic	Proportion American Indian
55101	2+	High	Average	High
55102	2+	Insufficient data	Insufficient data	Insufficient data
55103	2+	High	Average	Average
55104	1	High	Average	Average
55105	0	Average	Average	Average
55106	1	Average	Average	Average
55107	2+	Average	High	High
55108	0	Average	Average	Average
55109	2+	Average	Average	Average
55110	1	Average	Average	Average
55112	1	Average	Average	Average
55113	2+	Average	Average	Average
55114	2+	High	Average	Average
55116	1	Average	Average	Average
55117	1	Average	Average	Average
55119	0	Average	Average	Average
55126	1	Average	Average	Average
55127	1	Average	Average	Average
55130	2+	Average	Average	Average
55144	0	Insufficient data	Insufficient data	Insufficient data
55146	0	Insufficient data	Insufficient data	Insufficient data
55155	0	Insufficient data	Insufficient data	Insufficient data

Appendix Exhibit 4.7a: St. Louis County, Number of Providers and ZIP Codes with High Proportion of Black Enrollees



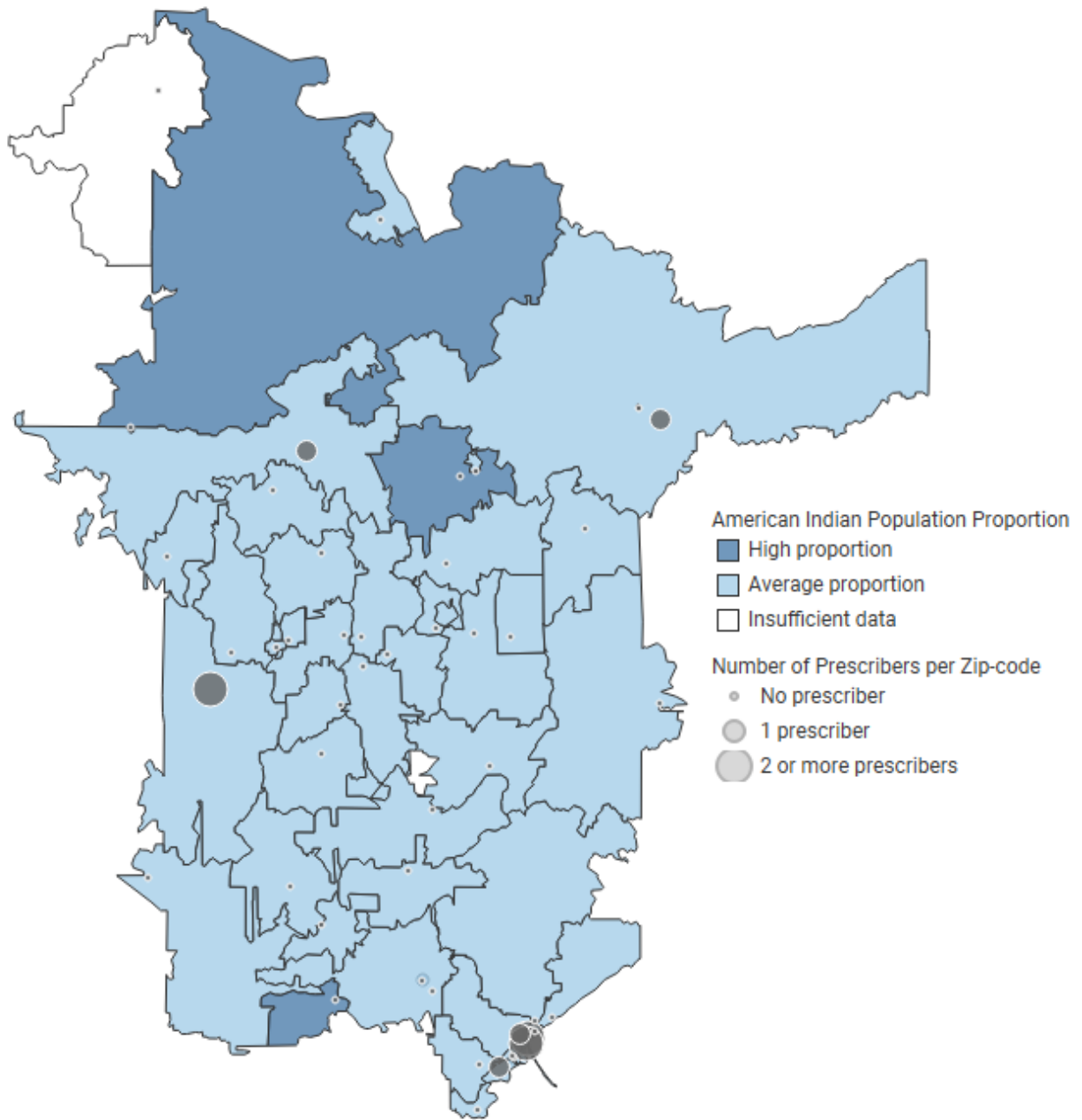
Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.7b: St. Louis County, Number of Providers and ZIP Codes with High Proportion of Hispanic Enrollees



Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.7c: St. Louis County, Number of Providers and ZIP Codes with High Proportion of American Indian Enrollees



Source: Medicaid Enrollment data July 1, 2018 to June 30, 2019; United States Census data, 2014-2018.

Appendix Exhibit 4.7d: St. Louis County, Map-Supporting Data Table

Zip-code	Number of Prescribers per Zip-code	Proportion Black	Proportion Hispanic	Proportion American Indian
55602	0	Average	Average	Average
55702	0	Average	Average	Average
55703	0	Average	High	Average
55705	0	Average	Average	Average
55706	0	Average	Average	Average
55708	0	Average	Average	Average
55710	0	Average	Average	Average
55711	0	Average	Average	High
55713	0	Average	Average	Average
55717	0	Average	Average	Average
55719	0	Average	Average	Average
55723	1	Average	Average	Average
55724	0	Average	Average	Average
55725	0	Average	Average	Average
55731	1	Average	Average	Average
55732	0	Average	Average	Average
55734	0	Average	Average	Average
55736	0	Average	Average	Average
55738	0	Average	Average	Average
55741	0	Average	Average	Average
55746	2+	Average	Average	Average
55750	0	Average	Average	Average
55751	0	Average	Average	Average
55758	0	Average	Average	Average
55763	0	Average	Average	Average
55765	0	Average	Average	Average
55768	0	Average	Average	Average
55771	0	Average	Average	High
55779	0	Average	Average	Average
55781	0	Average	Average	Average
55782	0	Average	Average	Average
55790	0	Average	Average	High
55791	0	Average	Average	High
55792	0	Average	Average	Average
55796	0	Average	Average	Average
55802	2+	High	Average	Average
55803	0	Average	Average	Average
55804	0	Average	Average	Average
55805	2+	High	High	Average
55806	0	High	High	Average
55807	1	High	Average	Average
55808	0	Average	Average	Average

Zip-code	Number of Prescribers per Zip-code	Proportion Black	Proportion Hispanic	Proportion American Indian
55810	0	Average	Average	Average
55811	1	Average	Average	Average
55812	0	Average	High	Average
55816	0	High	Average	Average
56669	0	Insufficient Data	Insufficient Data	Insufficient Data