Introduction

Background

- The overall rate of opioid prescribing in the United States (US) has steadily decreased since its peak in 2012¹.
- Despite steady improvements in prescription rates, dentists remain one of the nation's highest prescribing healthcare specialities²⁻⁴. Dentists account for the second most opioid prescriptions written amongst specialty groups (15.8%), second only to internal medicine $(16.4^{\%})^5$.
- Previous studies have primarily found higher opioid prescription rates in rural areas⁶⁻⁸, but studies investigating dental opioid prescriptions have found no rural/urban differences.
- Rural areas have been subject to many oral health challenges, with previous reports documenting higher rates of edentulism and poorer self-reported oral health scores for children^{9,10}. In addition, there are several structural challenges that rural areas face, such as less access to dental care, higher rates of poverty, transportation difficulties, and lack of dental insurance^{11,12}.
- Studies have identified similar structural challenges as reasons for higher opioid prescriptions and misuse in rural areas^{13,14}.

Goals

- Few studies have investigated how the association between patient demographic factors and dental opioid prescriptions varies across urban and rural settings.
- Several studies have investigated the complex interplay between beneficiary- and/or county-level factors within urban and rural settings and their associations with general opioid prescription rates¹³⁻¹⁶. To our knowledge, no studies exist examining these associations for dental opioid prescriptions.
- This study aims to address these gaps in the literature by examining the factors associated with receiving a dental opioid prescription, considering both beneficiary and county characteristics.
- These characteristics will be examined separately for adolescents and adults, and how these characteristics differ across rural and urban areas will be considered.

Methodology

Data Sources

- This study utilized multiple data sources, including the Centers for Medicare & Medicaid Services (CMS) unredacted Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAF) Research Identifiable Files (RIF).
- The Economic Research Service Rural-Urban Commuting Area Codes were used to determine the rural/urban status of the beneficiary's residence.¹⁷
- The US Census Bureau's American Community Survey (ACS) 5-year estimates were used to calculate the county characteristics measures.¹⁸

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Cohort Design and Population

- This study includes Medicaid and CHIP adolescent and young adult beneficiaries aged 12 to 20 and adults aged 21 to 64. All beneficiaries included in this study are non-dually eligible for Medicare.
- Beneficiaries must have had a dental visit in 2021. Beneficiaries are considered to have had a dental visit if they have a billed claim with a CDT code for a dental procedure.
- To be included in this study, beneficiaries must live in a state that is not excluded for data quality concerns, according to the CMS DQ Atlas, resulting in 8 states being excluded.¹⁹ Beneficiaries from 20 states with high concern or unusable race and ethnicity data were excluded from all analyses stratified by race and ethnicity, 3 of which were already excluded for claims data quality concerns.
- This resulted in 6,659,554 adolescent/young adult beneficiaries and 5,755,792 adult beneficiaries included in the analyses that were not stratified by race and ethnicity. **Outcome, Demographic, Clinical, and Residential Covariates**
- The outcome variable for this study is a dichotomous measure of whether a beneficiary received a dental opioid prescription.
- This study includes beneficiary characteristics, including age, sex, race and ethnicity, and county characteristics, including rural/urban status, percentage of NH Black population, percentage of Hispanic population, concentrated disadvantage, and residential stability. **Statistical Analysis**
- Chi-square tests were used to test for significant differences in the rates across categories within each group and whether the category-specific rates significantly differ across rural and urban areas.
- Multilevel logistic regression models were used to predict the odds of receiving a dental opioid prescription.
- Pooled t-tests were implemented to test whether the estimates significantly differ across the rural and urban models.

Rural-Urban Differences in Dental Opioid Prescribing Among Adolescent/Young Adult and Adult Medicaid Beneficiaries Carla Shoff, PhD¹; Alex Sheen, DDS, MPH²; Natalia I. Chalmers, DDS, MHSc, PhD¹ DENTISTRY ¹ Office of the Administrator, Centers for Medicare & Medicaid Services, Baltimore, MD ² Department of Pediatric Dentistry, New York University College of Dentistry, New York, NY



Opioid Prescription, 2021					
	Rural Model	Urban Model			
Adolescent/Young Adult Beneficiaries	N=773,733	N=3,723,157	T-test		
Age Group (Ref: Age 12 to 14)					
Age 15 to 17	6.4x	7.4x	NS		
Age 18 to 20	13.8x	16.7x	Sig		
Sex (Ref: Male)					
Female	20%	16%	Sig		
Race and Ethnicity (Ref: Non-Hispanic White)					
Non-Hispanic Black	-7%	-11%	Sig		
Asian/Pacific Islander	-12%	-17%	NS		
American Indian/Alaskan Native	NS	NS	NS		
Multiracial/Other Race/Unknown	-4%	-9%	NS		
Hispanic	-24%	-19%	NS		
County Characteristics					
Percentage Non-Hispanic Black	0.5%	NS	NS		
Percentage Hispanic	-0.4%	-1%	Sig		
Concentrated Disadvantage	11%	18%	Sig		
Residential Stability	-9%	NS	Sig		
 All model estimates are statistically significantly The T-test tests if the estimates significantly differently differently 	unless noted wi	th NS. ural and urban	modele		

 The odds of receiving a dental opioid prescription are 20% higher for females than they are for males among beneficiaries living in rural areas and 16% higher for females compared to males among beneficiaries living in urban areas.

Prescription, 2021

	Rural Model	Urban Model				
Adult Beneficiaries	N=626,167	N=3,119,173	T-test			
Age Group (Ref: Age 21 to 34)						
Age 35 to 49	-11%	-8%	NS			
Age 50 to 64	-24%	-16%	Sig			
Sex (Ref: Male)						
Female	-12%	-4%	Sig			
Race and Ethnicity (Ref: Non-Hispanic White)						
Non-Hispanic Black	10%	18%	Sig			
Asian/Pacific Islander	-37%	-47%	Sig			
American Indian/Alaskan Native	-9%	-9%	NS			
Multiracial/Other Race/Unknown	-14%	-22%	Sig			
Hispanic	-27%	-25%	NS			
County Characteristics						
Percentage Non-Hispanic Black	2%	1%	Sig			
Percentage Hispanic	-1%	-1%	Sig			
Concentrated Disadvantage	23%	31%	NS			
Residential Stability	-6%	NS	Sig			
 All model estimates are statistically significant unless noted with NS. The T-test tests if the estimates significantly differ across the rural and urban models 						

Compared to adults aged 21 to 34, older beneficiaries are significantly less likely to receive a dental opioid prescription.

- Adolescents/Young Adults (Figure 9)
- areas.
- Adults (Figure 10)
- areas

their surrounding environment²⁰.

- level but also at a population level.
- prescribing of opioids in dental settings.
- residence.
- of the opioid epidemic.

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Multivariate Results Continued

• Compared to NH white beneficiaries, all racial and ethnic groups are significantly less likely to receive a dental opioid prescription, except for AI/AN beneficiaries whose odds of receiving a dental opioid prescription are not significantly different from NH whites. The effect for NH black beneficiaries is significantly different across rural and urban areas, with rural NH black beneficiaries being 7% less likely to receive a dental opioid prescription and urban NH black beneficiaries being 11% less likely.

• For every percentage point increase in the percentage of NH black residents, the odds of receiving a dental opioid prescription increase by half of a percentage point in rural areas. However, with every percentage point increase in the Hispanic population, the odds of receiving a dental opioid prescription decrease by 0.4% in rural areas and 1% in urban

• With every unit increase in the concentrated disadvantage index, the odds of receiving a dental opioid prescription increase by 11% in rural areas and 18% in urban areas. In rural areas, adolescents and young adults who live in counties with more residential stability have 9% lower odds of receiving a dental opioid prescription.

• Adult female beneficiaries are less likely to receive a dental opioid prescription compared to males. The odds are significantly lower for females living in rural areas than urban

• The results showed differences in the relationship between race and ethnicity and receiving a dental opioid prescription for adults than for adolescents and young adults. Among adults, compared to NH white beneficiaries, all racial and ethnic groups are significantly less likely to receive a dental opioid prescription with one exception: NH black beneficiaries are 10% more likely to receive a dental opioid prescription if they live in rural areas and 18% more likely if they live in urban areas.

• The effect of concentrated disadvantage is much stronger for adult beneficiaries than it was for adolescent/young adult beneficiaries. With every unit increase in the concentrated disadvantage index, the odds of receiving a dental opioid prescription increase by 23% among rural adults and 31% among urban adults.

Discussion

• Previous studies have primarily shown that overall opioid prescription rates are higher in rural areas⁶⁻⁸. Our findings provide additional perspective by demonstrating that the likelihood of receiving a dental opioid prescription in an urban vs rural setting can significantly vary depending on beneficiary-level factors such as sex, age, and race and ethnicity. For example, for NH black adults, the odds of receiving a dental opioid prescription were significantly greater in urban areas, but for adolescents/young adults, the odds were significantly less in urban areas. These findings suggest that successfully addressing disparities in dental opioid prescribing must be sensitive to both individuals and

• County-level predictors showed consistent effects across both adolescents/young adults and adults, but opposite effects were observed between areas with a higher percentage of NH black residents (higher odds) and a higher percentage of Hispanic residents (lower odds). This finding suggests that race and ethnicity are not only significant at a beneficiary

• When considering the impact of county-level factors across urban and rural areas, we found that the protective effect of residential stability is significantly greater in rural areas. • Studies have shown that residential stability is more common in rural settings, with better health outcomes mediated through communal benefits such as greater social cohesion and community support²¹⁻²³. Our findings suggest that these social benefits may also facilitate a lower likelihood of receiving a dental opioid prescription.

• Yang et al. hypothesized that increased residential stability may not only decrease patient demand for opioids but may also disincentive providers from prescribing opioids in these communities due to the stronger communal ties¹⁶. Future studies that further identify and investigate unique urban and rural characteristics that influence opioid prescribing may help better guide local and community-based initiatives seeking to curb the over-

Conclusion

• Our findings augment the existing literature on rural-urban disparities in opioid prescriptions and suggest that these prescription patterns in dental settings are significant and inequitable across various beneficiary- and county-level factors as well as

• These variations in prescription patterns indicate that there is not one panacea that can address the disparities in opioid prescribing; in fact, developing interventions and policies that have identified targeted factors that account for the local populations and community structure may provide a more efficacious strategy that acknowledges the complex nature

Rural Health. Jan 2019;35(1):97-107. doi:10.1111/jrh.12300 Prescribing Rates Among Medicare Part D Beneficiaries 65 Years of Age and Older. J Rural Health. Jan 2021;37(1):5-15. doi:10.1111/jrh.1249