Analyzing Cigarette Smoking and Opioid Misuse in Relation to Geographic Area

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LOUISIANA TOBACCO CONTROL INITIATIVE

Introduction

- Cigarette smoking causes increased inflammation, rheumatoid arthritis, cancer, respiratory and cardiovascular diseases, and worsened bone health.[1]
- Opioid misuse causes risk of addiction, withdrawal, and overdose; increased risk of fractures, infections, and cardiovascular issues.[2]
- Use of cigarettes and opioids (i.e., poly-use) magnifies the risk of morbidity and mortality.[3]
- In 2021, about 11.5% of U.S. adults reported cigarette use.[4] In 2022, about 82,000 people in the U.S. died from opioid-related overdoses.[5]
- In 2017, current smokers were over 2.5 times more likely to use opioids.[6] In 2018, cigarette smoking quit ratios for those who misused opioids were less than half compared to those who did not.[7]
- Among those with substance use disorders, poly-use of cigarettes and opioids is higher, compared to co-use of other substances.[8]
- Researchers have found that tobacco use, opioid prescription rates, and opioid overdose rates are higher in rural areas of the U.S. In those regions, tobacco use is associated with medical opioid use.[4,8]
- A gap exists in understanding the overlap in tobacco use and opioid misuse, including illicitly made fentanyl (IMF), especially pertaining to differences between urban and rural areas.
- **Objective**: To examine the relationship between rurality and tobacco use, opioid misuse, and poly-use of tobacco and opioids for U.S. adults aged ≥18.

Methods

Study Design

- **Cross-sectional** study using 2023 National Survey on Drug Use and Health (NSDUH) data (N=45,133)
- NSDUH is an annual survey sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) which collects prevalence and correlates of drug use in sthe US.
- See **Figure 1** for this study's conceptual model.

Study Variables

- **Current Smoker**: Said "Yes" to smoked within the past 30 days.
- **Opioid Misuser**: Said "Yes" to misused opioids, including IMF, in the past year.
- **Poly-User**: Current smoker and opioid misuser.
- **Covariates (CV)**: Sex (at birth), Race/Hispanicity, Age, Education, Health Insurance, and Total Family Income.
- **Geography (DV)**
  - Urban (Large metro area with ≥1 million people).
  - Rural (Small metro or nonmetro area with <1 million people).

Data Analysis

- **Descriptive Statistics** to characterize the sample.
- **Chi-Square Test** to determine differences between groups.
- **Logistic Regression Modeling** to examine the relationships between use variables and rurality while controlling covariates.

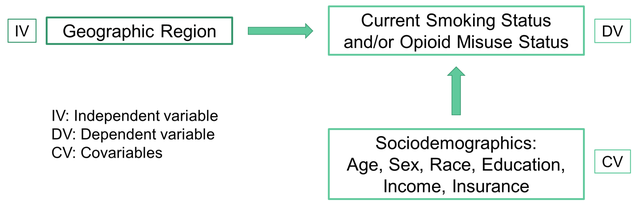


Figure 1. Conceptual Model

Main Finding: Rural residents have greater odds of cigarette use only and elevated risk of cigarette and opioid misuse, compared to urban residents.

Results

Table 1. Demographic Characteristics of the Sample

	No Use n=37,535	Current Smoker Only n=6,046	Opioid Misuser Only n=912	Poly-User n=640	Total n=45,133	p-value
Sex						<0.0001
Male	16,335 (43.5)	3,113 (51.5)	393 (43.1)	332 (51.9)	20,173	
Female	21,200 (56.5)	2,933 (48.5)	519 (56.9)	308 (48.1)	24,960	
Race/Hispanicity						<0.0001
White	21,522 (57.3)	3,662 (60.6)	485 (53.2)	385 (60.2)	26,054	
Black/African American	4,242 (11.3)	787 (13.0)	124 (13.6)	65 (10.2)	5,218	
Native Am/AK Native	497 (1.3)	197 (3.3)	22 (2.4)	25 (3.9)	741	
Native HI/Pacific Islander	174 (0.5)	40 (0.7)	5 (0.5)	4 (0.6)	223	
Asian	2,032 (5.4)	150 (2.5)	28 (3.1)	8 (1.3)	2,218	
More than one race	1,485 (4.0)	300 (5.0)	46 (5.0)	48 (7.5)	1,879	
Hispanic	7,583 (20.2)	910 (15.1)	202 (22.1)	105 (16.4)	8,800	
Age						<0.0001
18-25 years old	11,737 (31.2)	1,452 (24.0)	239 (26.2)	159 (24.8)	13,857	
26-34 years old	7,489 (20.0)	1,303 (21.6)	207 (22.7)	172 (26.9)	9,171	
35-49 years old	9,763 (26.0)	2,097 (34.7)	249 (27.3)	246 (38.4)	12,355	
50-64 years old	3,974 (10.6)	797 (13.3)	140 (15.4)	49 (7.7)	4,960	
65 or older	4,572 (12.2)	397 (6.6)	77 (4.4)	14 (2.2)	5,060	
Education						<0.0001
Less than High School	3,613 (9.6)	1,130 (18.7)	122 (13.4)	148 (23.1)	5,013	
High School Graduate	9,342 (24.9)	2,222 (36.8)	272 (29.8)	238 (37.2)	12,074	
Some Coll or Assoc Degree	10,734 (28.6)	1,832 (30.3)	267 (29.3)	196 (30.6)	12,029	
College Graduate	13,846 (36.9)	862 (14.2)	251 (27.5)	58 (9.1)	15,017	
Health Insurance						<0.0001
Yes	33,881 (90.3)	5,099 (84.3)	803 (88.0)	534 (83.4)	40,317	
No	3,654 (9.7)	947 (15.7)	109 (12.0)	106 (16.6)	4,816	
Total Family Income						<0.0001
Less than $20,000	5,485 (14.6)	1,634 (27.0)	187 (20.5)	240 (37.5)	7,546	
$20,000 - $49,999	9,779 (26.0)	2,036 (33.7)	254 (27.9)	201 (31.5)	12,270	
$50,000 - $74,999	5,541 (14.8)	867 (14.3)	141 (15.5)	77 (12.0)	6,626	
$75,000 or More	1,6730 (44.6)	1,509 (25.0)	330 (36.1)	122 (19.0)	18,691	
Geography						<0.0001
Urban	17,463 (55.0)	2,243 (47.9)	432 (56.0)	233 (47.8)	20,371	
Rural	14,277 (45.0)	2,447 (52.1)	339 (44.0)	254 (52.2)	17,317	

- Among the sample (n=45,133), 13.4% were current cigarette smokers, 2.0% were opioid misusers, and 1.4% were poly-users.
- Substance use patterns varied significantly by sex, race/ethnicity, age, education, insurance status, income, and geography (p<0.0001 for all groups).
- Current smoking only was more prevalent among white males aged 35–49 in rural areas with lower educational attainment, with health insurance, and with a total family income of less than $20,000.
- Opioid misuse only was more prevalent among white females aged 35–49 in urban areas with lower educational attainment, with health insurance, and with a total family income of $75,000 or more.
- Poly-use was more prevalent among white males aged 35–49 in rural areas with lower educational attainment, with health insurance, and with a total family income of less than $20,000.

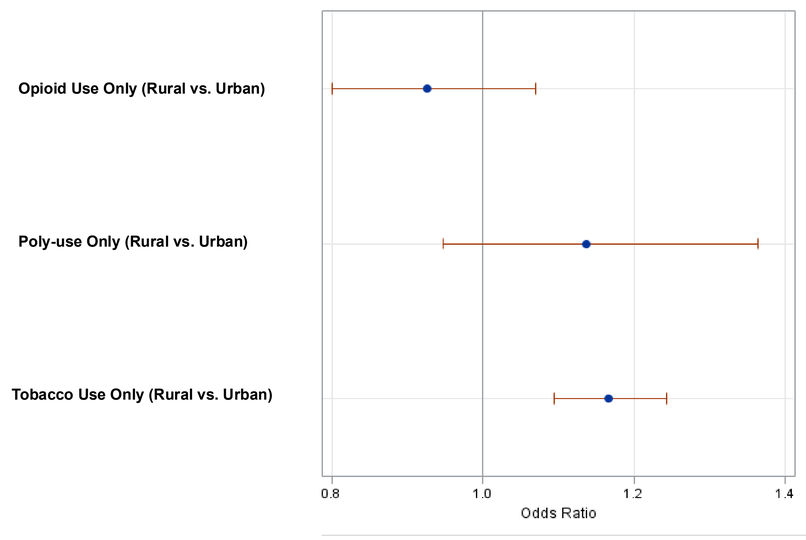
Results (cont.)

- Multinomial logistic regression analysis showed that, compared to urban residents, rural adults had significantly higher odds of tobacco-only use (OR = 1.166, 95% CI: 1.094–1.243).
- Rurality was also associated with elevated—but not statistically significant—odds of polysubstance use (OR = 1.136, 95% CI: 0.947–1.363).
- There was no significant association between rural residence and opioid-only use (OR = 0.926, 95% CI: 0.800–1.071).

Table 2. Odds Ratio Estimates and Wald Confidence Intervals for Association Between Rurality, Tobacco Use, Opioid Misuse, and Poly-Use

	Point Estimate	95% Confidence Limits
Opioid Use Only (Rural vs. Urban)	0.926	(0.800,1.071)
Poly-use (Rural vs. Urban)	1.136	(0.947,1.363)
Tobacco Use Only (Rural vs. Urban)	1.166	(1.094,1.243)

Figure 2. Odds Ratios and Wald Confidence Intervals for Association Between Rurality, Tobacco Use, Opioid Use, and Poly-use



Discussion/Conclusion

- This study examined tobacco use and opioid misuse, alone and combined, in relation to rurality.
- Findings provide evidence that rural residence is associated with elevated odds of tobacco use and potentially higher risk for tobacco-opioid co-use among U.S. adults.
- The association between rurality and polysubstance use—while not statistically significant—suggests a potentially important trend.
- This suggests the need for identifying integrated and tailored strategies to address cigarette and opioid use in rural communities.
- Study limitations included (1) a cross-sectional design, (2) reliance on self-reported data, and (3) the dichotomous definition of rurality.
- Strengths of the study included (1) the large nationally representative sample, (2) multivariable logistic regression analyses, and (3) consideration of comprehensive sociodemographic data for thorough characterization of subgroups and adjustment for potential confounders.
- Future research will investigate poly-use of opioids with other tobacco products, such as smokeless tobacco and e-cigarettes.

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