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## Does Tobacco Use Differ by Metropolitan Status Among Young Adults Males Ages 18-34?

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### Abstract

**Purpose:** With conflicting findings for the relationship between tobacco use and metropolitan status, the purpose of this study is to assess whether smoking cigarettes and chewing tobacco differs by metropolitan status for young adult males in the general population.

**Methods:** This cross-sectional analysis uses 2016 Behavioral Risk Factor Surveillance System (BRFSS) data for N=935 males ages 18 to 34 in Florida, Michigan, New York, and Washington. Ordered logistic regression was performed for combined state data to assess patterns in relationships between tobacco use (none vs chewing tobacco only vs smoking cigarettes only vs both) and metropolitan status while controlling health-related, demographic, and socioeconomic factors and state.

**Results:** Across states, about one-fourth of young adult males reported tobacco use (26%), with about one-fifth for smoking cigarettes only (18%), and very few for chewing tobacco only (6%) or both chewing and smoking cigarettes (3%). In this study, roughly one-third lived in urban (27%), suburban (41%) or rural (32%) areas. The results of adjusted analysis indicated that each successive level of tobacco use was moderately related to living in a suburban or rural area and moderately- to highly-related to moderate and excessive alcohol use.

**Conclusion:** The results of this study indicate that successive use of chewing tobacco and smoking cigarettes in young adult males in the general population is related to living in suburban or rural areas and to moderate and excessive alcohol use. In primary care, providers may expect up to one-fourth of young adult males to smoke cigarettes or chew and half to use alcohol. Because these are moderately to high-related, providers should continue to screen for tobacco and alcohol use in all young adult males, especially those living in suburban or rural communities. Clinicians should provide education and resources for tobacco cessation and substance abuse programs as necessary.

**Keywords:** Tobacco use; Metropolitan status; Rural; Urban; Suburban; Alcohol use; Young adults

### Introduction

Each year, 6 million people die from tobacco-related causes worldwide and this figure is predicted to increase to 8 million deaths in the next fifteen years [1]. In the U.S. alone, 480,000 people die from cigarette smoking annually, making it the leading cause of preventable disease and death [2,3]. Tobacco use is related to chronic diseases such as cardiovascular disease, cancer, diabetes, and stroke [1,4,5], and to mental health conditions such as anxiety, depression, substance abuse [6], and stress [7]. Medical costs for tobacco-related morbidities amount to \$170 billion annually [2].

Research shows that tobacco use differs by demographic factors. For example, more males smoke and chew tobacco than females [2,4-8]. In addition, minorities are more likely to smoke, with the exception of the Asian population [9,10], whereas Caucasian and Native American groups are more likely to use chewing tobacco [11]. In addition, socioeconomic factors, such as lower income levels [1,8,9,12] and lower education status [2,3,13] are also associated with tobacco use.

Tobacco use may also differ by metropolitan status, which can be categorized as urban, suburban, and rural; however, there are conflicting findings regarding tobacco use and metropolitan status [7,8,10,13,14]. While some studies found a higher prevalence of tobacco use in rural populations compared to urban populations [3,8,13,15], others found a higher prevalence of smoking in urban compared to rural populations [10] and some found no significant differences [7]. Furthermore, there is limited research on chewing tobacco use by metropolitan status [3-6,8,9,12] and limited research focusing on young adults [3,5,7,13]. Therefore, our research aims to assess whether tobacco use, including smoking and chewing tobacco, differs by metropolitan status among young adult males in the general population.

## Methods

### Design

This is a cross-sectional analysis using data from the 2016 Behavioral Risk Factor Surveillance System (BRFSS) from the Center for Disease Control and Prevention (CDC) [16]. BRFSS uses annual telephone surveys performed via random digit dialing techniques for landline and mobile phones across all 50 states, District of Columbia, and 3 U.S. territories to collect data from U.S. adults 18 and over about health-related risk behaviors, chronic health conditions, and use of preventative services. The CDC compiles all BRFSS data and makes de-identified data available to researchers for secondary data analysis. This study was given exempt status by the Institutional Review Board of The University of North Texas Health Science Center.

### Sample

The sample was comprised N=935 males ages 18-34 from Florida (N=279), Michigan (N=83), New York (N=456), and Washington (N=117) who had data for metropolitan status and tobacco use. These states were chosen because they showed higher prevalence rates for tobacco use among states with a diverse metropolitan distribution [16]. This age group was chosen because prior research focuses on older populations, while younger adults have higher rates of tobacco use and research shows that regular users of tobacco start at younger ages [3,5,7,17].

### Data

The outcome, tobacco use, was derived from combining two variables for current smoker (i.e., current use of cigarettes) and current user of chewing tobacco (i.e., current use of "chewing tobacco, snuff, or snus"), both measured as yes/no. The categories created were as follows: "none," "chewing tobacco only," "smoking cigarettes only," and "both chewing and smoking cigarettes." The factor of interest was metropolitan status, which was categorized as "urban" (living in the center city of a Metropolitan statistical area), "suburban" (living outside the center city of a metropolitan statistical area, but inside the county containing the center city OR inside a suburban county of the metropolitan statistical area), or "rural" (not living in a metropolitan statistical area).

The control variables included mental health, general health, alcohol use, age category, ethnicity/race, income level, education level, employment status. Mental health was categorized as "30 days of good mental health in the past 30 days" or "less than 30 days of good mental health in the past 30 days." General health was categorized as "good or better" or "fair or poor." Alcohol use was categorized as number of drinks per day: "none," "light (>1)," "moderate (1-4 for males)," or "excessive (5 or more for males)" [18]. Age was categorized as "18-24" and "25-34." Because most participants reported white race, ethnicity/race was categorized as "white, non-Hispanic" or "other." Income level was categorized as "less than \$25,000," "\$25,000 to less than \$50,000," and "\$50,000 or more." Education level was categorized as "graduated college or

technical school" or "did not graduate college or technical school." Employment status was categorized as "employed" or "not employed." Categories and responses for each variable are listed in **Table 1**.

### Analysis

Frequency distributions were used to describe the sample by state and to uncover any problems with the distributions of variables. Due to the small n for "chewing tobacco only" and "both smoking cigarettes and chewing tobacco" within states for the dependent variable, the final analysis utilized combined state data. Ordered logistic regression was used to assess tobacco use by metropolitan status, controlling for health-related, demographic, and socioeconomic factors and state. An ordered logistic regression model is used to estimate a relationship between an ordinal dependent variable and a set of independent variables. The proportional odds produced for each independent variable relates "proportionally" or applies equally to comparisons of dependent variable groups greater than k vs those who are in groups less than or equal to k, where k is any level of the response variable. Therefore, the interpretation of an associated odds ratio is that for one unit change in the predictor variable, the odds for a group that is greater than k vs less than or equal to k are the proportional odds times larger. Any observations with missing data for variables were excluded from the adjusted analysis. All analyses were conducted in STATA 15 (Copyright 1985-2017 StataCorp LLC).

## Results

### Descriptive Statistics

**Table 1** lists participant characteristics for young adult males ages 18-34. About one-fourth of young adult males reported tobacco use (26%), with about one-fifth for smoking cigarettes only (18%), and very few for chewing tobacco only (6%) or both chewing and smoking cigarettes (3%). For metropolitan status, roughly one-third lived in urban (27%), suburban (41%) or rural (32%) areas. For health-related factors, most reported 30 days of good or better general health in the past month (90%), almost two-thirds reported 30 days of good mental health in the past 30 days (64%), and over one-third reported no alcohol use in the past 30 days (44%). For demographic factors, the majority were 25-34 (64%) and most were white, non-Hispanic (75%). For socioeconomic status, roughly one-third reported annual incomes of less than \$25,000 (24%), \$25,000 to less than \$50,000 (30%), and \$50,000 or more (45%); and most reported not graduating college or technical school (77%) and being employed (68%).

### Adjusted Statistics

As shown in **Table 1**, the results of ordered logistic regression analysis for young adult males ages 18-34 indicated that after controlling for all the other variables in the model, tobacco use was significantly related to metropolitan status. Participants who reported living in suburban or rural areas were about 2 times more likely to report each successive level of tobacco use

(i.e., no tobacco use, chewing tobacco only, smoking cigarettes only, and both chewing and smoking cigarettes) compared to those who reported living in urban areas. In addition, compared to those who reported no alcohol use in the past 30 days, those who reported moderate alcohol use were about 2 times more likely to report each successive level of tobacco use, and those who reported excessive alcohol use were about 4 times more

likely to report each successive level of tobacco use. Also, white, non-Hispanic participants were about 2 times more likely to report each successive level of tobacco use, whereas those who graduated from college or technical school and those with an income greater than \$25,000 were about 2 times less likely to report each successive level of tobacco use.

**Table 1:** Descriptive statistics and adjusted results for combined state data.

Predicting Tobacco Use (Neither, Only chews, Only smokes, Both)	N	%	AOR	95% CI	
				Low	High
Metropolitan Status	935	100			
Urban	252	27	ref	-	-
Suburban	385	41	2.22	1.39	3.55
Rural	298	32	1.81	1.11	2.96
Mental Health	924	99			
Good in less than 30 days	332	36	ref	-	-
Good in last 30 days	592	64	0.95	0.66	1.36
General Health	934	100			
General health is fair or poor	92	10	ref	-	-
General health is good or better	842	90	0.67	0.37	1.19
Alcohol Use	904	97			
None	402	44	ref	-	-
Light	148	16	1.26	0.74	2.14
Moderate	216	24	1.92	1.23	2.99
Excessive	138	15	4.36	2.71	7.02
Age	935	100			
18-24	340	36	ref	-	-
25-34	595	64	1.39	0.93	2.08
Ethnicity/Race	918	98			
Not white	233	25	ref	-	-
White, non-Hispanic	685	75	1.95	1.21	3.12
Income level	775	83			
Less than \$25,000	187	24	ref	-	-
\$25,000 to \$50,000	236	30	0.62	0.39	0.98
More than \$50,000	352	45	0.41	0.26	0.65
Educational level	933	100			
Did not graduate college/technical school	718	77	ref	-	-
Graduated college/technical school	215	23	0.42	0.26	0.67
Employment status	925	99			
Not employed	296	32	ref	-	-
Employed	629	68	1.32	0.84	2.05

State	935	100			
Florida	279	30	ref	-	-
Michigan	83	9	1.54	0.81	2.93
New York	456	49	1.05	0.7	1.57
Washington	117	13	1.13	0.61	2.09

**Note:** AOR=adjusted odds ratio; 95% CI=95% confidence intervals; ref=referent group; boldface indicates significance (AORs with 95% CI that do not include 1.00 are significant)

## Discussion

The purpose of our research was to assess whether smoking cigarettes and chewing tobacco differs by metropolitan status among young adult males ages 18-34 in the general population. About one-fourth of the participants reported any tobacco use, with very few reporting chewing tobacco only (6%) or both chewing and smoking cigarettes (3%). The results of adjusted analysis indicated that tobacco use was moderately related to living in suburban and rural areas as compared to living in urban areas. Our findings for rural areas align with prior studies conducted in the U.S. that found a higher prevalence of tobacco use in rural areas [3,8,13-15]. However, existing research shows conflicting findings concerning the relationship between suburban areas and tobacco use despite having similar target populations and variable measures [7]. Furthermore, our research found that tobacco use was significantly related to moderate and excessive alcohol use in this target population, which is well known [18] and problematic as smoking cigarettes, chewing tobacco, and alcohol use contribute to chronic health issues [2,11,19].

## Limitations

Overall, this study analyzed statewide, population-based data. However, the tobacco use data did not include information for amount per day, length of use, or strength of product. In addition, there was no information on use of other tobacco/nicotine products such as hookah and e-cigarettes, the prevalence of which are rising in young adult populations and can contain similar or even higher levels of nicotine and other harmful chemicals [20,21]. Subsequent studies should assess this information as well as participants' attitudes toward quitting any substance use, all of which are related to effective cessation efforts [22], in order to help primary care providers incorporate effective cessation strategies into the context of patients' lives.

## Conclusion

Because this was a population-based study, these results may generalize to young adult males in primary care settings. Clinicians may expect up to one-fourth of this target population to report smoking cigarettes or chewing tobacco, with most reporting smoking cigarettes only. In addition, practitioners may expect up to half the target population to report alcohol use. Because the results of this study show that moderate and excessive alcohol use are moderately- to highly-related to successive levels of tobacco use, primary care providers should

be aware of patterns in tobacco use and metropolitan status in young adult males and continue to follow The U.S. Prevention Services Task Force (USPSTF) guidelines for screening all adults for tobacco use [23] and alcohol use [24] at each visit, with special attention to males ages 18 to 34 in rural and suburban areas. However, given the negative health effects of tobacco use, the multiple forms it can take from "traditional" smoking cigarettes and chewing tobacco to "newer" versions of hookah and e-cigarettes, and the propensity to "progress" from one tobacco product to another or multiple products, practitioners may need go beyond simply screening for "tobacco use." Instead of simply providing tobacco education and referrals to smoking cessation and substance abuse programs, providers may need to be aware of the different types of tobacco use and have readily available information for each and combinations that includes health risks and resources for cessation.

## Disclaimer

No author has any conflict of interest.

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