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Addressing Commuting as a Public Health Issue: Strategies Should Differ by Rurality

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Key Findings

- More than three-quarters of all US workers drive alone to work, regardless of geographic location. Of those, nearly one-quarter or more drive for more than 30 minutes each way, with rates of long, solo car commutes highest in metropolitan counties (35%; p<0.001).
- Counties with higher educational attainment have fewer long, solo commutes.
- Socio-demographic factors correlated with long, solo commutes differ by rurality. For example, having a higher unemployment rate is associated with more long, solo commutes in metropolitan and urban-adjacent counties, but not in smaller or more remote counties. Also, having more older adults living in the county is associated with more long, solo commutes in non-adjacent micropolitan counties and fewer long, solo commutes in urban-adjacent non-core counties.

Purpose

Car commuting is a known risk factor for poor health, by contributing to sedentary behavior and air pollution; prevention efforts to reduce car commuting—especially long, solo commutes—are important to improving public health. This brief estimates the rate of solo car commuting and long (>30 minutes) solo car commutes by rurality and urban adjacency, and identifies differences in socio-demographic factors that relate to commuting behavior by geographic location.

Background and Policy Context

Transportation, including commuting behavior, is a social determinant of health.[1] Car commuting in particular is associated with elevated rates of sedentary behavior, physical inactivity, disability, air pollution, stress, and lower quality of life.[1-4] Those findings are most relevant for longer car commutes. In contrast, shorter commutes may be associated with better quality of life and greater appeal for jobs and locations that make shorter commutes possible.[5] Car commuting also contributes to climate change, an urgent and serious threat to public health, making it important to identify alternatives to long, solo car commuting, including public transportation, carpooling, and telecommuting.[6]

Active commuting, such as walking, taking public transit, or biking to work, is associated with positive health outcomes,[7–9] but the ability to commute actively is unequally distributed by socio-demographic characteristics and geography.[8,10,11] Likewise, recent increases in telecommuting present opportunities to decrease car commuting, but reliable broadband access and occupation types vary by rurality.[12] Carpooling is also a good option to reduce transportation costs, increase socialization, and decrease the environmental impact of commuting, however driving alone to work remains the primary form of commuting for most employed people in the U.S,, and the feasibility of carpooling also varies by geographic location and rurality.[13]

Commuting behavior happens within the broader economic context. In rural areas, employment rates have lagged behind those in metropolitan areas since the recession of 2008. Rural areas have also had more people dropping out of the labor force entirely due, partly, to more rapidly aging populations.[14] As a result, factors associated with commuting are likely to differ by rurality and strategies to reduce the negative impacts of solo car commuting require detailed information about risk factors in different geographic locations. This brief describes differences in socio-demographic characteristics associated with car commuting by rurality.

Approach

Data and measures. We used 2017 County Health Rankings data on all 3,136 counties and county-like equivalents in the U.S.[15] to examine two county-level measures of commuting behavior: 1) the percentage of employed (full or part-time) individuals age 16 and older who drive alone in a car to work in the past week, and 2) among employed individuals who drive alone to work, the percentage who commute more than 30 minutes each way.[16,17] These data are five-year estimates originally derived from the American Community Survey and are compiled along with other population, environmental, and health characteristics into the County Health Rankings by the University of Wisconsin Population Health Institute.[15] Rurality is categorized into three groups: metropolitan (urban counties with population clusters of at least 50,000 people or outlying counties that are closely linked, economically, with core urban counties), micropolitan (rural counties with population centers of 10,000-49,999 people), and non-core (rural counties with no population center of 10,000 people or more), based on definitions from the Federal Office of Management and Budget;[18] additionally, we separated rural counties by adjacency to metropolitan counties.

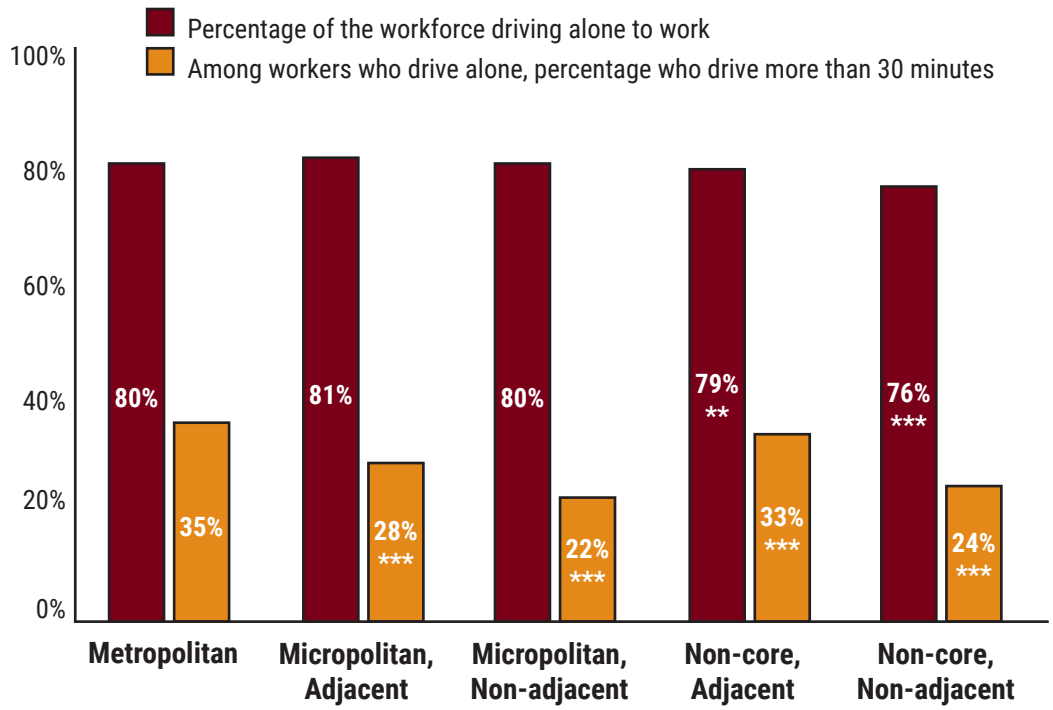
Statistical analyses. We analyzed bivariate differences in commuting behavior at the county level using t-tests by rurality and urban-adjacency. The main outcome of interest was long, solo commuting to one's primary place of employment among workers who drive alone. We conducted regression analysis at the county level, stratified by rurality and adjacency, and adjusted for county-level uninsured rate, percentage of residents with some college, percentage of children in poverty, per-capita social associations (e.g., number of civic groups, clubs, religious organizations per capita), median household income quartiles, age composition (percentage under 18 and ≥ 65), race and ethnicity (percentage Hispanic, non-Hispanic Black, non-Hispanic White), and percentage female. We included state fixed effects in all regression models to account for differences in employment patterns and transportation policies across states.

Results

Across all county types, over three-quarters of workers drive alone to work; however, residents of rural non-core areas were less likely than metropolitan residents to do so (79% of non-core, urban-adjacent workers and 76% of non-core, non-adjacent workers vs 80% of metropolitan workers, $p<0.01$; Figure 1). Among those who drive alone to work, metropolitan residents are the mostly likely to spend more than 30 minutes commuting each way (35%; $p<0.001$, compared with all other locations). Residents of non-adjacent micropolitan and non-core counties have the lowest rates of long commutes (22% and 24%, respectively).

In stratified analyses by rurality and urban adjacency, having more social associations per capita and higher educational attainment within a county were both associ-

Figure 1. Commuting Behavior by Rurality and Urban Adjacency



*Analysis of all 3,136 U.S. counties, 2017. Significantly different than metropolitan counties at **p<0.01, ***p<0.001.*

ated with lower rates of long, solo commutes, regardless of rurality (Table 1). Other factors differ by location; for example, higher child poverty rates were associated with lower rates of long, solo car commutes in metropolitan counties (b=-0.77, p<0.001), but higher rates of long, solo car commutes in rural non-core counties (b=0.23/0.18, p<0.05/0.01). Higher unemployment rates were associated with higher rates of long commutes in metropolitan and urban-adjacent micropolitan counties (b=0.66, p<0.05 and b=1.10, p<0.01, respectively), while higher uninsurance rates were associated with higher rates of long, solo car commutes in non-adjacent micropolitan counties (b=0.67, p<0.001).

We also observed differences by race, ethnicity, and age. In non-core urban-adjacent counties, having a higher percentage of younger residents (<18 years old) was associated with fewer long, solo commutes (b=-0.82, p<0.001), as was having a higher percentage of older adults (≥65 years old) (b=-0.47, p<0.01). In contrast, in micropolitan non-adjacent counties, having more older adults was associated with more long, solo commutes (b=0.74, p<0.001). Having a higher percentage of non-Hispanic Black residents was associated with more long, solo car commutes in all county types except micropolitan non-adjacent counties. Also, having a higher percentage of non-Hispanic White residents was associated with more long, solo car commutes in urban-adjacent micropolitan counties (b=0.20, p<0.01), non-core urban-adjacent counties (b=0.19, p<0.001), and non-core non-adjacent counties (b=0.29, p<0.001). Meanwhile, having a greater percentage of Hispanic residents was associated with fewer long, solo car commutes in micropolitan non-adjacent counties (b=-0.21, p<0.5) and more long, solo car commutes in non-core non-adjacent counties (b=0.09, p<0.05).

Discussion and Implications

Finding alternatives to solo car commuting, especially when commuting distances are long, is an important public health priority in all communities, regardless of geo-

Table 1. Adjusted Regression Results Predicting Long, Solo Commutes by Rurality and Urban Adjacency

County-Level Rates	Metropolitan	Micropolitan, Adjacent	Micropolitan, Non-adjacent	Non-core, Adjacent	Non-core, Non-adjacent
Uninsured rate	0.19	0.13	**0.67*** **	0.13	-0.04
Percent with some college	**-0.62*** **	**-0.35*** **	**-0.30*** **	**-0.15** **	**-0.12** **
Unemployment rate	**0.66***	**1.10** **	0.41	0.39	0.22
Child poverty rate	**-0.77*** **	-0.13	-0.15	**0.23***	**0.18** **
Number of social associations	**-0.01*** **	**-0.01*** **	**-0.005*** **	**-0.004*** **	**-0.001*** **
Household income (quartiles by county) (Reference=1st quartile)					
2nd	-0.02	0.01	-0.01	**0.05*** **	**-0.03** **
3rd	-0.02	0.03	0.01	**0.06*** **	**-0.03***
4th	0.04	**0.07** **	0.02	**0.07*** **	-0.02
Percent below 18 years old	-0.27	-0.30	-0.12	**-0.82*** **	0.12
Percent 65 years old and older	0.12	0.001	**0.74*** **	**-0.47** **	0.09
Percent non-Hispanic, Black	**0.22** **	**0.18** **	0.07	**0.15** **	**0.26*** **
Percent Hispanic	-0.06	0.01	**-0.21***	-0.05	**0.09***
Percent non-Hispanic, White	0.07	**0.20** **	0.10	**0.19*** **	**0.29*** **
Percent Female	0.41	0.38	-0.12	**0.57** **	-0.07
N	**1,166**	**372**	**269**	**655**	**674**

*Analysis of all 3,136 U.S. counties, 2017. Results shown are adjusted coefficients from ordinary least squares regression analyses, stratified by rurality and urban adjacency, adjusted for all variables listed above in the column titled "County-Level Rates." Boldface indicates statistical significance (*p<0.05, **p<0.01, ***p<0.001).*

graphic location. More than three-quarters of U.S. workers drive alone to work; many for more than 30 minutes each way. Such behavior is associated with financial expense, sedentary behavior, and increased environmental pollutants.[1,2,16] Our findings indicate that solo car commuting is pervasive across metropolitan and rural counties, but interventions to address this behavior must take into account various factors associated with long, solo commutes and to acknowledge differences in economic, occupational, and demographic structures by location.

These findings also signal opportunities to intervene on upstream socio-demographic factors associated with commuting behavior; for example, improving access to higher education and increasing opportunities for community connections and collaborations. While we cannot determine why these factors were associated with lower rates of long, solo car commutes using cross-sectional, county-level data, it is possible that those with higher education attainment may have more opportunities to telecommute, and social associations may facilitate connections for carpooling or local employment opportunities.

Other factors correlated with long, solo commutes depend on rurality. Higher unemployment rates are associated with more long, solo commutes for metropolitan counties and for metropolitan-adjacent rural micropolitan counties. Workers in these counties may be more likely to drive farther for available employment, whereas it may not be feasible for workers in non-adjacent and noncore counties to do so. We found further variation in the relationship between socio-demographic factors (income, poverty, race and ethnicity, and age and sex composition) and commuting behavior by geographic location.

This brief cannot illuminate causality or directionality of these associations, and we relied on a blunt measure of commuting distance (>30 minutes). Still, these findings indicate the need to tailor public health interventions on commuting by geographic location and to conduct further research on factors related to commuting that may be amenable to intervention. For example, future research should investigate the role of gas prices and financial cost of driving, individual demographic characteristics (e.g., marital status and personal income), and occupation on commuting behavior. Research is also needed to evaluate the efficacy of specific interventions designed to increase alternatives to solo car commuting, such as active commuting and/or telecommuting by rurality.

Above all, these results highlight the complex nature of commuting behavior and the importance of designing public health prevention efforts that are collaborative and multisectoral, as well as tailored to the needs of different communities in different geographic locations. In the case of commuting, the public health and medical fields should seek partnerships with representatives of the transportation, employment, and social services sectors, among others.

Implications

Transportation availability and infrastructure is strongly associated with geographic location, with effects on commuting options in different communities. Additionally, these findings indicate that commute length may differ by socioeconomic status. In urban areas, where public transportation is more readily available, wealthier individuals may choose to drive alone for long distances for reasons of personal preference. In rural areas, long, solo car commutes may be the only way to get to available jobs.

Ultimately, policy-makers could work with employers and transportation professionals to design effective interventions that reduce long, solo car commutes, with the ultimate goal of reducing air pollution and sedentary and solitary behavior. Public health interventions toward these ends may take on different, complimentary approaches:

First, state and federal policy-makers could work to improve job availability in rural areas, so that people have employment available to them closer to home. Doing so effectively will require careful consideration of the geographic and socio-demographic landscapes of individual communities.

Second, interventions could focus on limiting the necessity of long, solo commutes. Working hand-in-hand with economic development activities, solutions here may identify alternatives to long, solo commutes that are tailored to different geographic settings, including telecommuting, active commuting, public transportation, ride sharing, and flexible work arrangements. Clearly, the viability of each option will differ by geographic location and socio-demographic characteristics, as well as community transportation infrastructure and the local industries and occupations.

Recognizing that cultural norms may also contribute to higher rates of long, solo commuting, public health interventions may also focus on spreading awareness of the importance of these issues. It may be worthwhile to encourage local health departments and health care providers to present evidence to long, solo commuters that this practice may be detrimental to their health and financial well-being over time and encourage them to look for possible ways to mitigate this behavior.

Although commuting behavior and other transportation challenges are complex issues without straightforward solutions, there is reason for optimism, as the smaller scale of rural communities may facilitate collaborative efforts to address long, solo commutes and other complex transportation challenges. Local public health, economic development, and transportation services and organizations may be fewer and more well-known to one another, compared to metropolitan communities in which the numbers of people and organizations add complexity to coalition-building. ■

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