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Publication Date

2018-07-01



National Center
for Sustainable
Transportation

Accessibility to Jobs Outside Employment Sub-Centers Has a Larger Impact on VMT Reduction than Accessibility to Jobs Inside Employment Sub-Centers

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Issue

To achieve the greenhouse gas (GHG) emission reduction goals established by California Assembly Bill 32 (AB 32) and California Senate Bill 375 (SB 375) will require policy approaches that address the link between land use and vehicle travel. The extensive literature on land use and travel behavior has documented the association between employment access and vehicle miles traveled (VMT) as having one of the largest magnitudes among land use variables.^{i,ii} Yet the employment access variables in the research literature have not differentiated between whether drivers have access to jobs dispersed throughout a region or jobs that are clustered in an employment sub-center. Clustering jobs in employment sub-centers can alter the economic geography of a region in ways that could affect trip generation and trip chaining.

California metropolitan areas have highly sub-centered employment patterns. Unfortunately, California's policy makers currently have to use a literature that does not distinguish how access to employment sub-centers might influence VMT differently from access to jobs that are not in sub-centers. This is a policy shortcoming given California's highly polycentric metropolitan structure. This study helps close the gap by examining how access to jobs in employment sub-centers influences household VMT, using the five-county Los Angeles Combined Statistical Area (CSA)ⁱⁱⁱ as an example.

Key Research Findings

Forty percent of the total jobs in Southern California are clustered in 46 employment sub-centers. Following the "95% – 10k" method, we identified 46 employment sub-centers in the Los Angeles CSA using employment data from National Employment Time Series (NETS).^{iv} The Los Angeles CSA was divided into 34,527 square-mile hexagons. According to the "95% – 10k" method, each employment sub-center only contains hexagons with more than 1,115 jobs per square mile (the 95th percentile for the region) and sub-centers must have a total of no less than 10,000 jobs.^v The 46 employment sub-centers contain 3,331,205 total jobs, 39.8% of the total 8,366,369 jobs in the Los Angeles CSA in 2009. Of these 46 employment sub-centers in Los Angeles CSA, 37 are located in the two most urbanized counties – Los Angeles and Orange. The largest employment sub-center is a corridor extending from downtown Los Angeles westbound to Santa Monica through the Wilshire Corridor. This largest sub-center has 1,107,139 total jobs, or 13.2% of the total jobs in the Los Angeles CSA.

Accessibility to jobs outside employment sub-centers has a larger impact on VMT than accessibility to jobs inside the sub-centers. A 1% increase in accessibility to jobs in the largest employment sub-center is associated with a 0.05% decrease in household VMT; a 1% increase in accessibility to jobs in the second-largest employment sub-center is associated with a 0.02% decrease in household VMT; a 1% increase in accessibility to jobs in the remaining (combined 3rd through 46th) employment

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sub-centers is associated with a 0.08% decrease in household VMT; a 1% increase in accessibility to jobs outside employment sub-centers is associated with a 0.16% decrease in household VMT.

The effect of accessibility on household VMT varies in core counties and periphery counties.

Household VMT for households in Los Angeles County and Orange County is more sensitive to accessibility to jobs than for those in peripheral counties (Ventura, San Bernardino and Riverside). In both sets of counties, access to non-centered jobs has a larger magnitude of association with VMT than does access to jobs inside employment sub-centers. For a typical resident in coastal counties, a 1% increase in accessibility to jobs outside the employment sub-centers is associated with a 0.31% decrease in household-level VMT. In contrast, for a typical resident in inland counties, a 1% increase in accessibility to jobs outside the employment sub-centers is associated with a 0.26% decrease in household-level VMT.

Accessibility to jobs within five miles from one's residence has a larger association with household VMT than accessibility to jobs beyond five miles from the residence.

For coastal counties, the effect of accessibility to jobs on household-level VMT is primarily a short-distance phenomenon. However, in the peripheral counties, access to non-centered jobs has a larger association with reduction of household-level VMT. In sum, increasing access to jobs outside employment sub-centers within five miles of a household's residence has the largest association with decreasing household-level VMT.

Moving a representative household from the centroid of an exurban area to the urban core is associated with as much as a 45.3% reduction for household-level VMT.

We used our model results to examine how a hypothetical household might change its VMT if it were moved from exurban to more central locations, holding the household's demographics and income constant. The largest VMT difference comes from moving a representative household from Moreno Valley, Riverside County to Koreatown, Los Angeles – a move associated with a change from an average of 42.37 miles per household per day to an average of 23.17 miles per day (a 45.3% reduction). Moving the same household from Simi Valley to Culver City is associated with a smaller reduction in average daily VMT, from 41.87 to 35.39 miles per day (a 15.5% reduction).

Further Reading

This policy brief is drawn from “Urban Spatial Structure and the Potential for Vehicle Miles Traveled Reduction,” a report prepared for the California Department of Transportation (Caltrans) by Marlon Boarnet and Xize Wang of the University of Southern California. To download the report, visit: <https://ncst.ucdavis.edu/project/usc-ct-to-005/>.

ⁱ Ewing, R., and R. Cervero. 2010. “Travel and the Built Environment—A Meta-Analysis.” *Journal of the American Planning Association* 76 (3):265-294.

ⁱⁱ Salon, Deborah, Marlon G. Boarnet, Susan Handy, Steven Spears, and Gil Tal. 2012. “How do local actions affect VMT? A critical review of the empirical evidence.” *Transportation Research Part D: Transport and Environment* 17 (7):495-508.

ⁱⁱⁱ *The Los Angeles Combined Statistical Area includes five counties: Los Angeles, Orange, Riverside, San Bernardino and Ventura.*

^{iv} Walls and Associates. 2008. *National Establishment Time-Series (NETS) Database: Database Description*, Oakland, CA.

^v Giuliano, Genevieve, Yuting Hou, Sanggyun Kang, and Eun-Jin Shin. 2015. *Accessibility location, and employment center growth. Los Angeles, CA: METRANS Transportation Center.*

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