

Metropolitan Futures Initiative (MFI) Quarterly Report:

What makes housing accessible to everyday destinations in Southern California?



Presented by the Metropolitan Futures Initiative (MFI)

School of Social Ecology

University of California, Irvine

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Metropolitan Futures Initiative (MFI) • Quarterly Report
What makes housing accessible to everyday destinations in Southern California?

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About the Metropolitan Futures Initiative (MFI)



The Metropolitan Futures Initiative (MFI) in the School of Social Ecology at the University of California, Irvine aims to develop an improved understanding of communities and their potential for integrative and collaborative planning and action to ensure a bright future for the region. It approaches these goals by bringing together an interdisciplinary research team along with the insights and techniques of “big data” research.

By combining various large longitudinal and spatial data sources, and then employing cutting edge

statistical analyses, the goal is to come to a better understanding of how the various dimensions of the social ecology of a region move together to produce the outcomes observed within our neighborhoods.

With initial focus on Orange County and its location within the larger Southern California area, The Metropolitan Futures Initiative is a commitment to build communities that are economically vibrant, environmentally sustainable, and socially just by partnering the School of Social Ecology’s world class, boundary-crossing scholarship with expertise throughout Southern California.

The *MFI Quarterly Report* series presents cutting edge research focusing on different dimensions of the Southern California region, and the consequences for neighborhoods in the region. Reports released each quarter focus on issues of interest to the public as well as policymakers in the region. In addition, the MFI webpage (mfi.soceco.uci.edu) provides interactive mapping applications that allow policymakers and the public to explore more deeply the data from each Quarterly Report.

The MFI gratefully acknowledges the Heritage Fields El Toro, LLC for their funding support.

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Jae Hong Kim is a member of the MFI Executive Committee and a faculty member in the Department of Planning, Policy, and Design at the University of California, Irvine. His research focuses on urban economic development, land use change, and the nexus between these two critical processes. His academic interests also lie in institutional environments — how institutional environments shape urban development processes — and urban system modeling. His scholarship attempts to advance our knowledge about the complex mechanisms of contemporary urban development and to develop innovative urban planning strategies/tools for both academics and practitioners.



Kevin Kane is a postdoctoral research fellow in the Department of Planning, Policy and Design at the University of California, Irvine. He is an economic geographer interested in the quantitative spatial analysis of urban land-use change and urban development patterns, municipal governance, institutions, and economic development. His research uses land change as an outcome measure – in the form of changes to the built environment, shifting patterns of employment, or the socioeconomic composition of places – and links these to drivers of change including policy, structural economic shifts, or preferences for how we use and travel across urban space.



Young-An Kim is a Ph.D. student in the department of Criminology, Law and Society, at the University of California, Irvine. His research interests focus on crime patterns at micro places, effects of structural characteristics of street segments on crime, and immigration and crime. Besides criminology, he is interested in sociology of health, urban sociology, and quantitative research methods.

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Results in Brief

- We analyze the accessibility of roughly five million dwelling units across Southern California to 31 types of destinations, including grocery stores, service shops, drug stores, hospitals, banks, rail stations, and green space/open space.
- We then seek to understand what it is about buildings and neighborhoods that underlies accessibility, such as whether a home is larger, smaller, newer, or more expensive, and whether the neighborhood is older, wealthier, or more comprised of racial/ethnic minorities
- Los Angeles County has the largest share of multi-family housing, oldest homes, and smallest median home size in the region. San Bernardino County homes are the newest, while Riverside County's are most likely to be single-family and are the largest.
- While the abundance of destinations matters, so too does their location relative to housing. In particular, Orange County has the highest share of homes with a restaurant within one mile (90.8%) and open space within one mile (93.5%), but only 73.5% of homes have a gas station within a mile and only 3% are within a mile of passenger rail stations
- Older homes are closely associated with greater accessibility to destinations, including apparel retail, restaurants, and grocery stores
- Smaller home size is generally associated with better access. However, in 22 cities in the region, restaurants were actually closer to larger dwelling units
- Multifamily housing has one of the strongest relationships with access in Southern California, but this is not the case in some cities including San Marino, Mission Viejo, and San Juan Capistrano.
- High neighborhood incomes are generally associated with poorer accessibility to most destinations, though proximity to open space is usually associated with higher incomes
- The relationship between local senior citizen population and accessibility varies starkly: In 78 cities, the share of residents over age 65 is related to greater accessibility, but in 78 other cities, it is related to poorer accessibility.



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- Based on the share of homes which have destinations within one mile:
 - » Long Beach is Southern California's most serviced city
 - » Compton is Southern California's least serviced city
- Based on the abundance – or choice of many – destinations within one mile:
 - » Beverly Hills is the most abundantly serviced place in Southern California
 - » Valle Vista is the least abundantly serviced place in Southern California
- The impact of new multifamily developments in Orange County on regional accessibility depends on whether new homes are above or below the average levels of accessibility for the existing housing stock
 - » To reduce traffic congestion and pollution, new developments should prioritize being accessible to destinations frequented by potential residents, rather than clothing stores or boutiques which are visited infrequently anyways.



Introduction

Although rapid technological changes mean that we can now shop, work, and learn remotely, our everyday life is still heavily dependent on what constitutes our immediate surroundings. For most Southern Californians, this starts with sending children to school and/or commuting to work. Meanwhile, it would be difficult to imagine a week without visiting a grocery store, restaurant, shopping, or taking advantage of some outdoor or recreational opportunity. Heavy traffic flows, although often unpleasant, clearly demonstrate how often we move one place to another and how essential these destinations are.

Meanwhile, the development of new homes and commercial areas impacts the social and ecological footprint of cities and regions long after a developer has moved on to another project. In particular, urban sustainability, transportation energy use, and community well-being are largely determined by those development decisions that led to the way our cities are spatially organized. When a city or a neighborhood has a distinctive relationship with its character, its prospects for sustainability, and the way people travel from their homes to everyday destinations.

Southern California is in a time of transition where its built environment is changing – and this could have long-term implications. Figure 1 (below), shows a huge spike in the share of new housing in California that is multifamily – at least 54% in every year since 2011, after never being above 30% from 1991 to 2006¹. Put differently, a low rate of multi-family home construction during the nineties means that homes built then typically have fewer destinations – including retail businesses, schools, and potential jobs – within close proximity. These recent changes in housing type are reflective of socioeconomic trends as well, such as the increased desire for “city living” by millennials and retirees and increased preference for access by many in these groups, as well as the so-called smart growth movement which is increasingly advocated by academics, practitioners, and the general public.

New Dwelling Units in California, 1954-2015

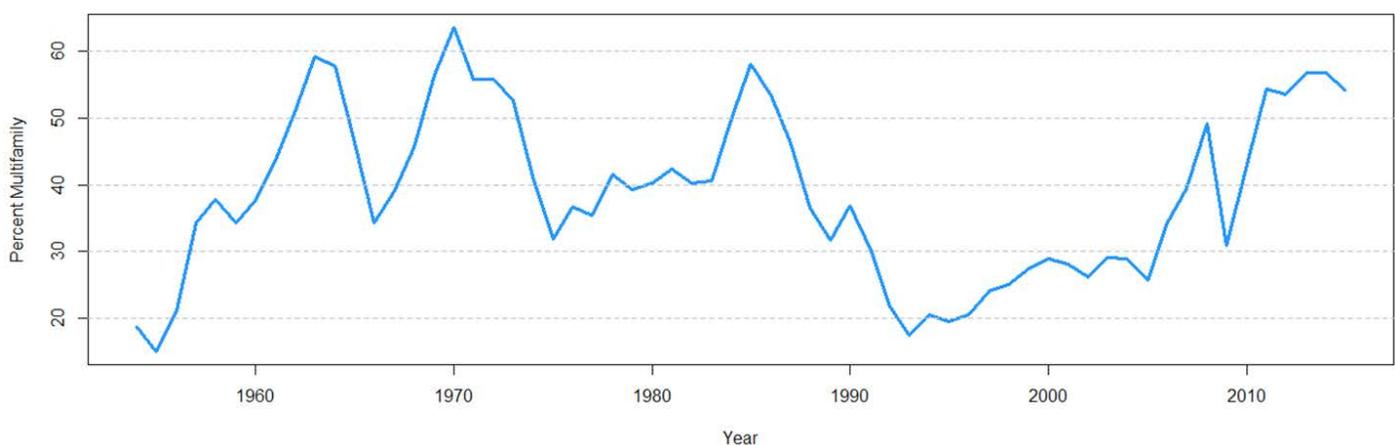


Figure 1: New homes in California by type: single-family versus multi-family. Data from the California Homebuilding Foundation (2016).

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While overall, building more homes that feature higher accessibility – and putting retail shops and public services nearer to homes – is a positive sign given concerns over congestion and pollution, the equity of accessibility to destinations is also important. For example, if lower income individuals increasingly occupy housing that is systematically further from job opportunities or grocery stores, this can cause a new problem. From a policy perspective, it is also crucial to understand how accessibility patterns vary across the region.

This study takes a comprehensive look at the proximity between roughly five million dwelling units in the urbanized 5-county area of Southern California and a wide range of destinations including grocery stores, service shops, drug stores, hospitals, banks, rail stations, and green space/open space (plus 24 more). In other words, for each home we develop a measure for how close it is to each type of destination along a street network. We then relate this measure to characteristics of the home – such as whether it is larger, smaller, newer, or more expensive, as well as the socioeconomic characteristics of the surrounding neighborhood – such as whether very nearby residents are older, wealthier, or racial/ethnic minorities.

This “big data” approach to measuring proximity in cities eliminates a number of possible sources for error that stem from using aggregate level statistics, such as city-wide or Census Tract measures of homes and businesses. In addition, since we use individual land parcels, we are able to much more sharply identify the role of property characteristics in urban spatial structure.ⁱⁱ

The availability of some of our data varies by county – preventing us from making perfect side-by-side comparisons – and some cities lying outside the extent of our street network database such as Oxnard and Barstow are omitted (see Technical Appendix A for data details). Many trends are clear nonetheless, and an interactive web mapping application corresponding with this Report is available at http://shiny.datascience.uci.edu/uciMetropolitanFutures/city_access



What is “accessibility” in an urban environment?

There are many ways to define accessibility in a city. One important characteristic, discussed in the MFI’s January 2017 Report, is the proximity between homes and work locations in a region, called jobs-housing balance. However, a large proportion of trips are for non-work purposes such as shopping or recreation. Many of these trips are discretionary – the location of a destination and the time it takes to reach it determine whether or not the trip is made. Thus, the ability to reach a destination in a short amount of time – or using a mode other than an automobile – can reflect the opportunity or equity of access. Most studies find that wealthier neighborhoods are actually further from most types of everyday destinations such as retail stores or healthcare providers, which makes sense given that wealthier individuals typically prefer larger homes and are more likely to have access to cars. However, given the recent trend toward multifamily housing and increasing traffic congestion in Southern California, we look at accessibility in terms of opportunity – meaning the spatial organization of homes and destinations across the region.

Distance to the Nearest Destination

The simplest measure of accessibility is the distance from a home to the nearest of a type of destination. Figure 2 shows two examples of homes and their nearest restaurants or grocery stores. The red line shows the straight-line, or Euclidean distance and the blue line shows the distance along a street network. In the first example, the nearest restaurant is 590 feet away using straight-line distance, but requires a trip of 1,314 feet (1/4 mile) along the street network, including exiting a cul-de-sac and making a U-turn on an arterial road. In the second example, the nearest grocery store is across the street, so the difference between straight-line distance (319 feet) and street network distance (614 feet) is negligible. The street network-based distance represents accessibility more precisely than Euclidean distance, and thus is used for the computation of accessibility measures explained below. Nearest distance measures are not used in this Report.



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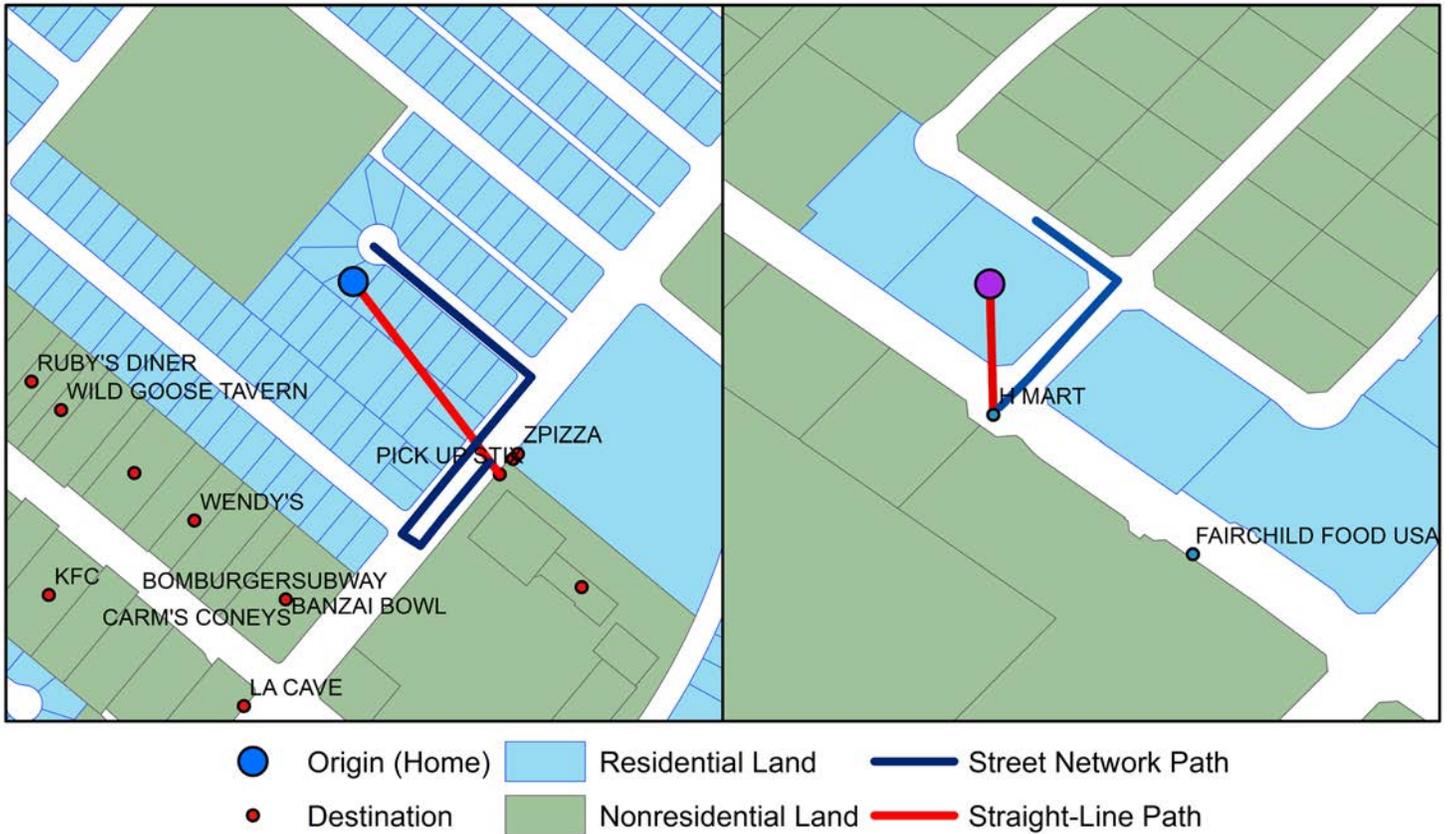


Figure 2: An example showing the street network and straight-line path between a home and its nearest destination.

Count of Destinations within one mile

For certain applications, the variety of options – the opportunity to choose between multiple restaurants or grocery stores – may be meaningful. Transportation planners usually use a ½-mile threshold as the distance people are willing to walk to a store or transit stop; however, since we are not studying walkability specifically, and because some destination types are fairly sparsely distributed (especially in Southern California), we use a 1-mile threshold.

In the first example in Figure 3, 60 restaurants can be reached within a 1-mile drive of this single-family home, with the routes shown in blue. Most restaurants are on a nearby arterial road and range from 1,314 to 5,263 feet away. 90 restaurants are within a 1-mile straight-line distance of this home, shown in red. The second example shows a starker contrast between Network and Straight-Line distances. While seven grocery stores are within a 1-mile radius of the apartment complex, only two are within a one-mile drive – both essentially across the street. In fact the Whole Foods, which is 3,901 feet away, would require a circuitous four-mile drive due to a series of right-only turns (dotted line).

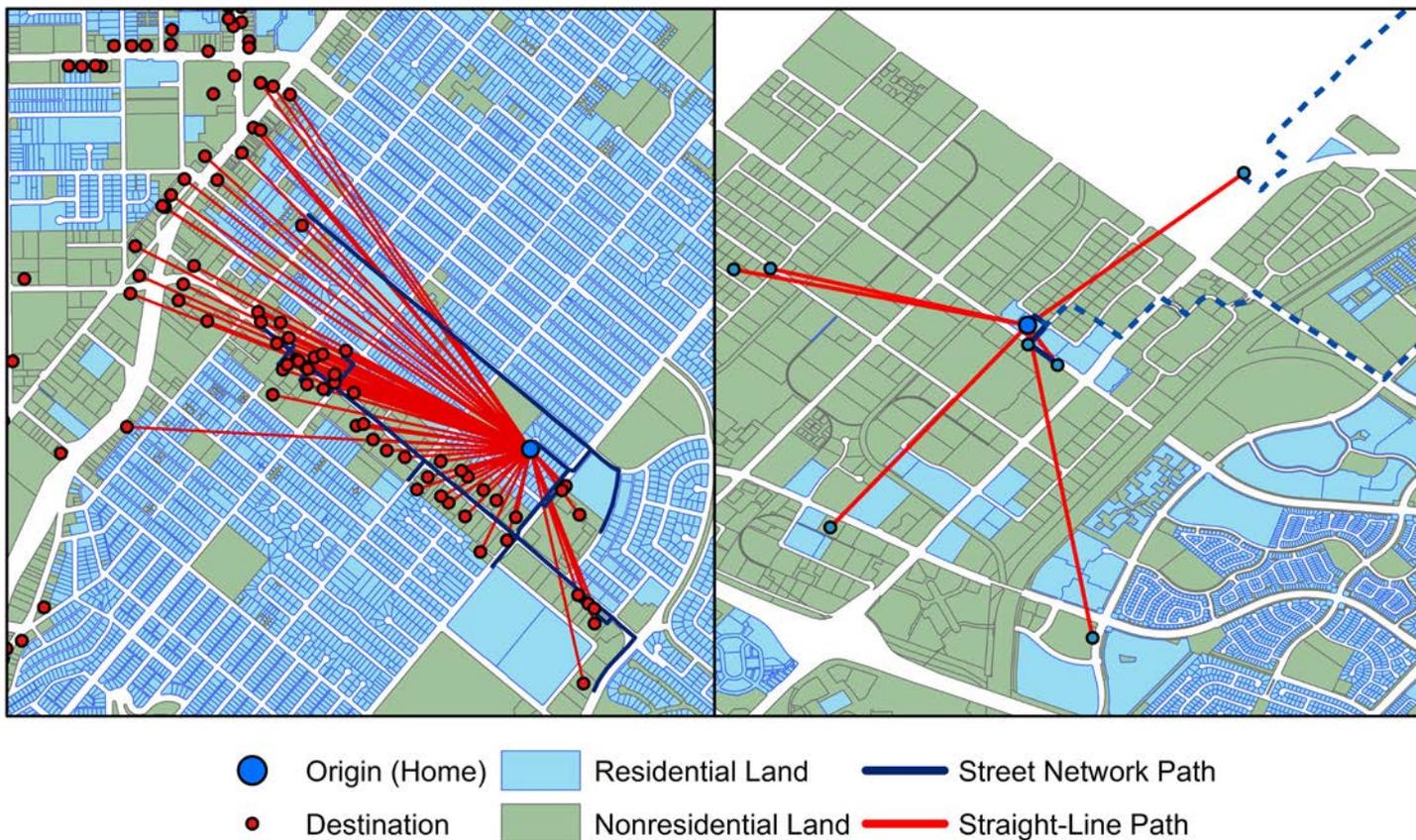


Figure 3: An example showing the street network and straight-line path between a home and all destinations within one mile (destination connected with dotted line is greater than one mile away).

Inverse Distance Weighting

A third way to think about access is a combination of the nearest establishment and a count of how many are nearby. In an inverse distance, or gravity measure, all businesses within a threshold (1 mile in this case) are multiplied by the inverse of their distance from the home: nearby restaurants earn a higher score, while those further away (but still within one mile) are weighted less¹. An example of this is shown in Figure 4, where all 73,597 residential parcels in the 3-city area of Irvine, Costa Mesa, and Newport Beach are shaded based on their inverse distance-weighted level of “accessibility” to grocery stores. This way, homes closer to a single grocery store – or homes fairly close to a variety of grocery stores – receive higher scores.

A prior paper by MFI authors (2) found that inverse distance weighting is an effective method of relating parcel-level characteristics to accessibility in statistical analyses; however, a shortcoming is that the actual score does not have a meaningful interpretation like the other measures. This Report uses inverse distance weighting for statistical analyses.

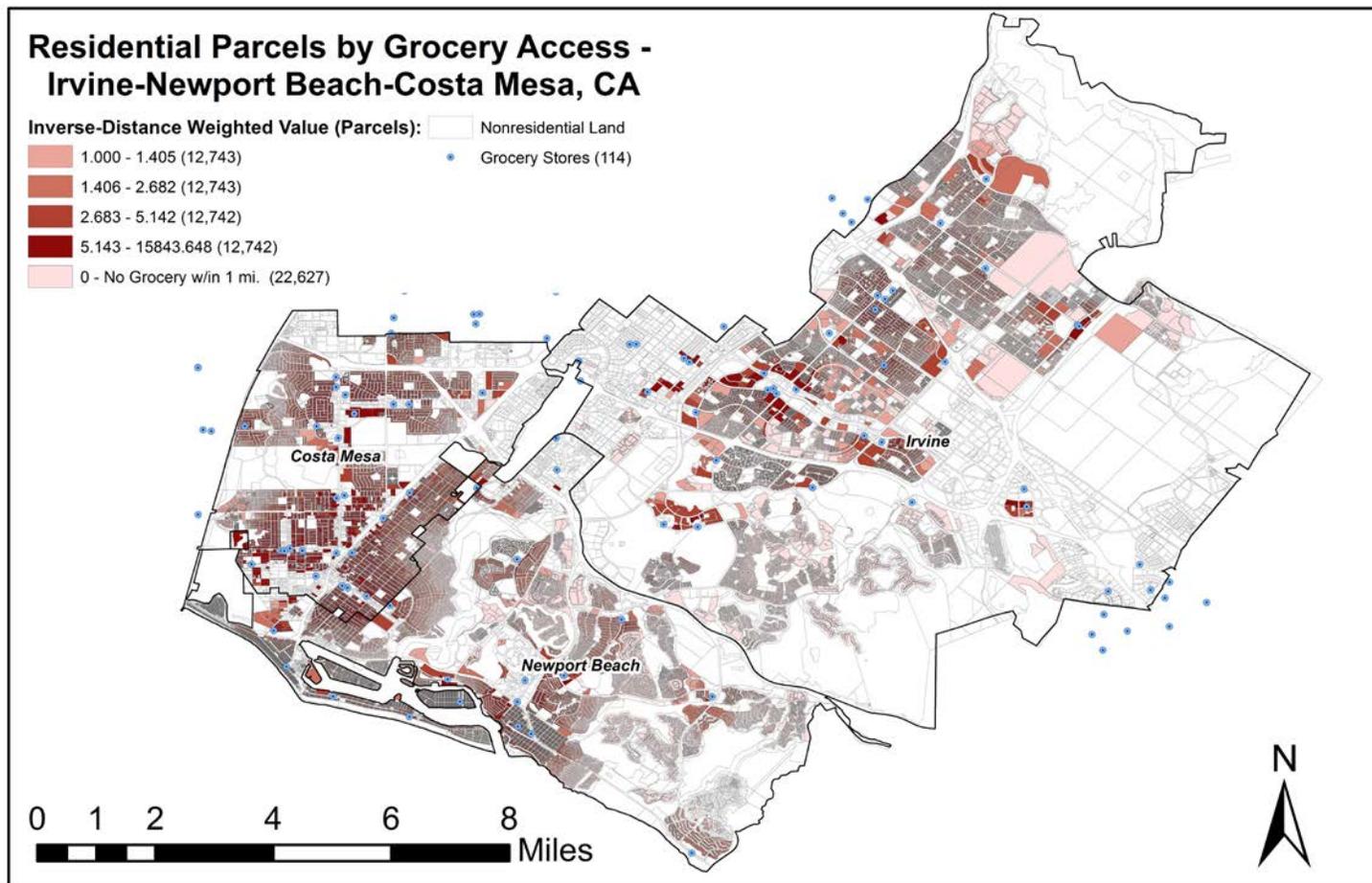


Figure 4: Illustration of inverse distance weighted measure of accessibility.

A final measure of access is a service percentage. In Figure 4, of the 73,597 parcels in the area, 50,970 (69.26%) have a grocery store within one mile while the remaining 22,627 (30.74%) do not have a grocery store within one mile. This is a useful way of measuring the level of service experienced in a larger area like a city or county.

1 Mathematically, the gravity measure is expressed as $\sum_j \frac{1}{d_{ij}^k} \forall k$ where d_{ij} is the distance in feet from parcel i to establishment j for all establishment types k .

2. The MFI published a study on accessibility evaluation using Long Beach as a case study, which can be found here: Kane, Kevin, John R. Hipp, and Jae Hong Kim. Analyzing accessibility using parcel data: Is there still an access-space trade-off in Long Beach, California? *The Professional Geographer*, available online 15 Feb 2017. <http://www.tandfonline.com/doi/full/10.1080/00330124.2016.1266951>

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County-wide accessibility patterns in Southern California

How the built environment varies across Southern California Counties

First, we examined variation in the built environment and in neighborhoods across Southern California. Table 1 shows statistics for dwelling units in Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties using the most recent available data from each tax assessor database. While not every data point is available in each county, some comparisons are notable:

- With 3.1 million dwelling units, Los Angeles County represents the majority of the 5.8 million homes in Southern California.
- Los Angeles County has the lowest share of housing that is comprised of single-family, detached homes (47%). The rest is a blend of apartments (30%), townhomes (14%) and condos (9%).
 - » Riverside County has the highest share of homes that are detached, single-family (91%).
 - » While many parts of Orange County are considered “bedroom communities,” fewer than 60% of the County’s dwelling units are single-family homes.
- The average dwelling unit in L.A. County was built in 1958 – substantially older than the average for San Bernardino County (1978) or Ventura County (1974)
- The median dwelling unit size is larger in Riverside County (1782 square feet) than Orange County (1350 square feet) or Los Angeles County (1110 square feet)
- At 22%, Riverside County has the highest share of dwelling units with swimming pools (either private pools or part of a multifamily complex), followed closely by Los Angeles County (18%).
- While the average fair market value for a home in Los Angeles County is greater than Riverside County (\$420,400 vs. \$376,400), the median home price is actually lower (\$293,400 vs. \$323,100), suggesting that high-end housing inflates the average values in Los Angeles County more than in Riverside County. For more information on how we determined fair market value using tax data, see Technical Appendix C.



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	Los Angeles (2015)	Orange (2012)	Riverside (2015)	San Bernardino (2016)	Ventura (2016)
Variable	# of Units % of total				
Condominium [^]	277,555 8.81%	207,181 22.83%	19,555 3.41%	27,837 4.10%	33,145 12.40%
Townhome or Apartment (< 5 units)	448,454 14.23%	154,956 17.08%	17,933 3.13%	27,473 4.04%	12,836 4.80%
Large Apartment (>= 5 units)	935,101 29.68%	-	12,080 2.11%	80,955 11.92%	29,920 11.20%
Mobile Home	-	3,890 0.43%	-	44,600 6.56%	11,646 4.36%
Detached, Single-Family Home	1,489,774 47.28%	541,415 59.66%	523,977 91.36%	498,548 73.38%	179,700 67.24%
Historic Building	4,256 0.14%	-	-	-	-
High-Rise	29,573 0.94%	-	-	-	-
Has Swimming Pool	576,442 18.29%	138,589 15.27%	123,550 21.54%	110,280 17.27%	28,973 10.84%
Total Number of Dwelling Units	3,150,884	907,442	838,492	679,413	267,247
Variable	Mean Median	Mean Median	Mean Median	Mean Median	Mean Median
Year Built	1958 1958	-	-	1978 1983	1974 1975
Unit size (square feet)	1,333 1,110	1,495 1,350	1,943 1,782	-	-
Lot Size (Acres - per unit)		0.133 0.115	-	1.320 0.170	0.160 0.442
Fair Market Value per unit	\$420,400 \$293,400		\$376,400 \$323,100	-	-
[^] category includes apartments in OC					

Table 1: This table shows characteristics of dwelling units by county from assessor parcel data in the year shown (2012-2016, depending on the county).

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	Los Angeles	Orange	Riverside	San Bernardino	Ventura
	Mean Median	Mean Median	Mean Median	Mean Median	Mean Median
Median Family income	\$64,202 \$56,544	\$91,559 \$85,735	\$65,297 \$60,907	\$60,956 \$56,125	\$88,047 \$84,396
Percent in poverty	16.90% 13.81%	11.05% 8.15%	15.36% 12.38%	17.79% 14.79%	9.95% 7.49%
Percent Black (non-hispanic)	8.48% 2.46%	1.45% 0.14%	5.42% 3.08%	7.19% 4.69%	1.51% 0.39%
Percent White (non-hispanic)	29.11% 19.58%	47.15% 50.30%	41.14% 40.46%	34.85% 29.62%	51.50% 58.35%
Population Density (pop/acre)	21.1 16.6	15.3 12.6	7.2 6.0	8.7 7.6	10.0 8.2
Percent Over 65 Years of Age	12.31% 10.96%	14.10% 11.46%	14.78% 9.57%	10.96% 9.29%	13.70% 11.54%

Table 2: This table shows the mean and median values for several demographic characteristics in each county. Data are from the US Census Bureau's 2015 American Community Survey, and census block groups are used as proxies for neighborhoods.

Table 2 provides the neighborhood-level demographic context in each County. We use Census Block Groups to represent neighborhoods – they have roughly 1500 people each, though this varies widely.³ For example, the median income across households in Orange County is \$75,998/year. However, if one were to pick the median neighborhood based on in Orange County, its median household income would be far higher: \$85,735/year. Overall,

- The typical Orange and Ventura County neighborhood has a far higher median household income (\$84-86,000/year) than Los Angeles, Riverside, or San Bernardino Counties, which are between \$56-61,000/year
- The poverty rate in a typical neighborhood in Orange and Ventura Counties is far lower (7-8%) than other counties, where it is between 12% and 15%.
- Riverside, Orange, and Ventura County neighborhoods have higher shares of retirement-age population – about 14% - compared to 11-12% for Los Angeles and San Bernardino County
- Population density in Los Angeles County is roughly double that of San Bernardino or Ventura Counties, and about 1/3 higher than Orange County. Riverside County is only about half as dense as Orange County.

³ While County-level demographic statistics may provide a broader picture of the socioeconomic composition of the region as a whole, our aim here is to understand more localized dynamics.

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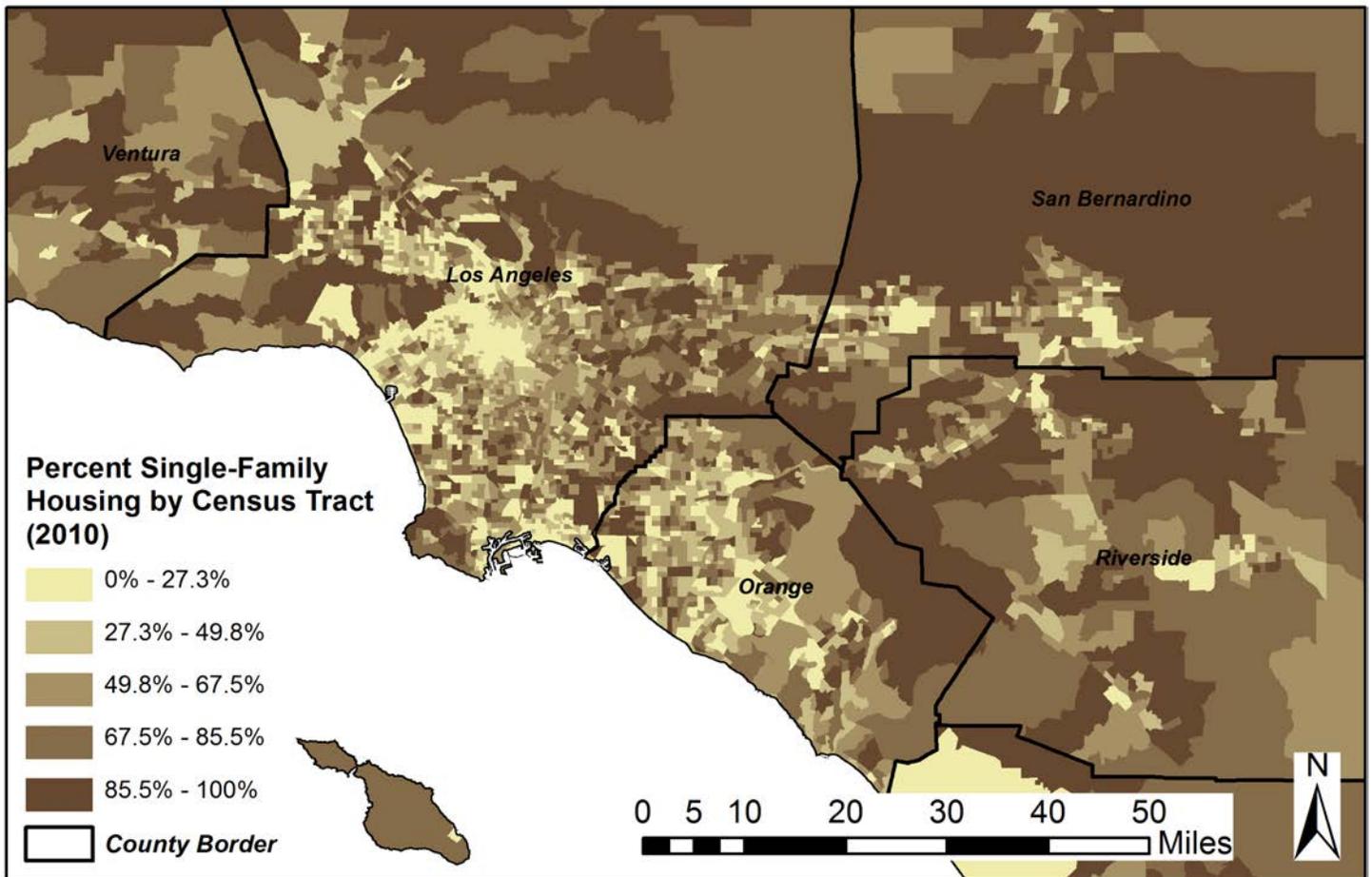


Figure 5: Housing types across Southern California



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How Accessibility varies across Southern California Counties

Next, we look at how accessibility to retail and service establishments varies across the five counties. Using a combination of industry codes and other economic classifications, we devised a method to classify 29 different types of establishments using business data¹. These include a wide array of retail such as grocery stores and gas stations as well as social services such as places of recreation and religious facilities. We also included passenger rail stations (Los Angeles Metro plus Metrolink commuter rail) as well as open space from the California Protected Areas Database, which tracks the location of parks, beaches, and other natural outdoor areas which are publicly accessible. A description of each of these 31 types of destinations can be found in Technical Appendix B and our web mapping application.



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Destination Type	Los Angeles	Orange	Riverside	San Bernardino	Ventura	TOTAL
Full-Service Restaurants	22,982	7,932	3,728	3,651	1,705	39,998
Specialty Retailing	17,259	7,404	2,502	2,465	1,534	31,164
Auto Services	15,852	5,559	3,156	3,612	1,303	29,482
Personal Financial	12,102	5,464	2,160	2,033	1,556	23,315
Hair Care Services	13,302	4,528	2,160	2,008	1,022	23,020
Home Products Retailing	10,288	4,661	2,191	1,977	1,194	20,311
Apparel Retailing	11,307	3,040	1,336	1,250	630	17,563
Social Service Organizations	8,189	2,544	1,343	1,342	878	14,296
Other Personal Services	7,323	3,131	1,500	1,290	829	14,073
Repair Services	6,951	2,595	1,177	1,211	623	12,557
Religious Organizations	6,927	1,919	1,335	1,514	577	12,272
Personal Products Retailing	5,627	2,108	1,135	1,038	580	10,488
Specialty Food	5,017	1,672	602	671	412	8,374
Elementary and Secondary Schools	4,169	1,261	812	915	409	7,566
General Merchandise Retailing	4,183	1,390	755	782	384	7,494
Recreational Facilities and Instruction	3,088	1,456	728	525	387	6,184
Groceries	3,568	857	514	586	250	5,775
Limited-Service Food and Beverage	2,752	1,019	483	484	234	4,972
Deposit-taking Institutions	2,622	1,019	452	397	251	4,741
Child Care Services	2,678	804	390	421	235	4,528
Laundry	2,690	946	317	294	202	4,449
Gas Stations	2,345	741	467	503	232	4,288
Drug Stores	2,242	781	382	347	181	3,933
Other Learning	2,139	774	324	275	191	3,703
Beer, Wine, and Liquor Stores	1,808	484	208	284	154	2,938
Medical Laboratories	1,403	700	258	193	132	2,686
Convenience Stores	1,162	355	240	299	76	2,132
Hospitals	926	332	118	173	65	1,614
Drinking Places (Alcoholic Beverages)	773	199	105	124	36	1,237
Rail Stations	124	12	6	8	5	155
Total:	181,798	65,687	30,884	30,672	16,267	325,308

Table 3: This table shows the total number of destinations of each type which exist in each county.

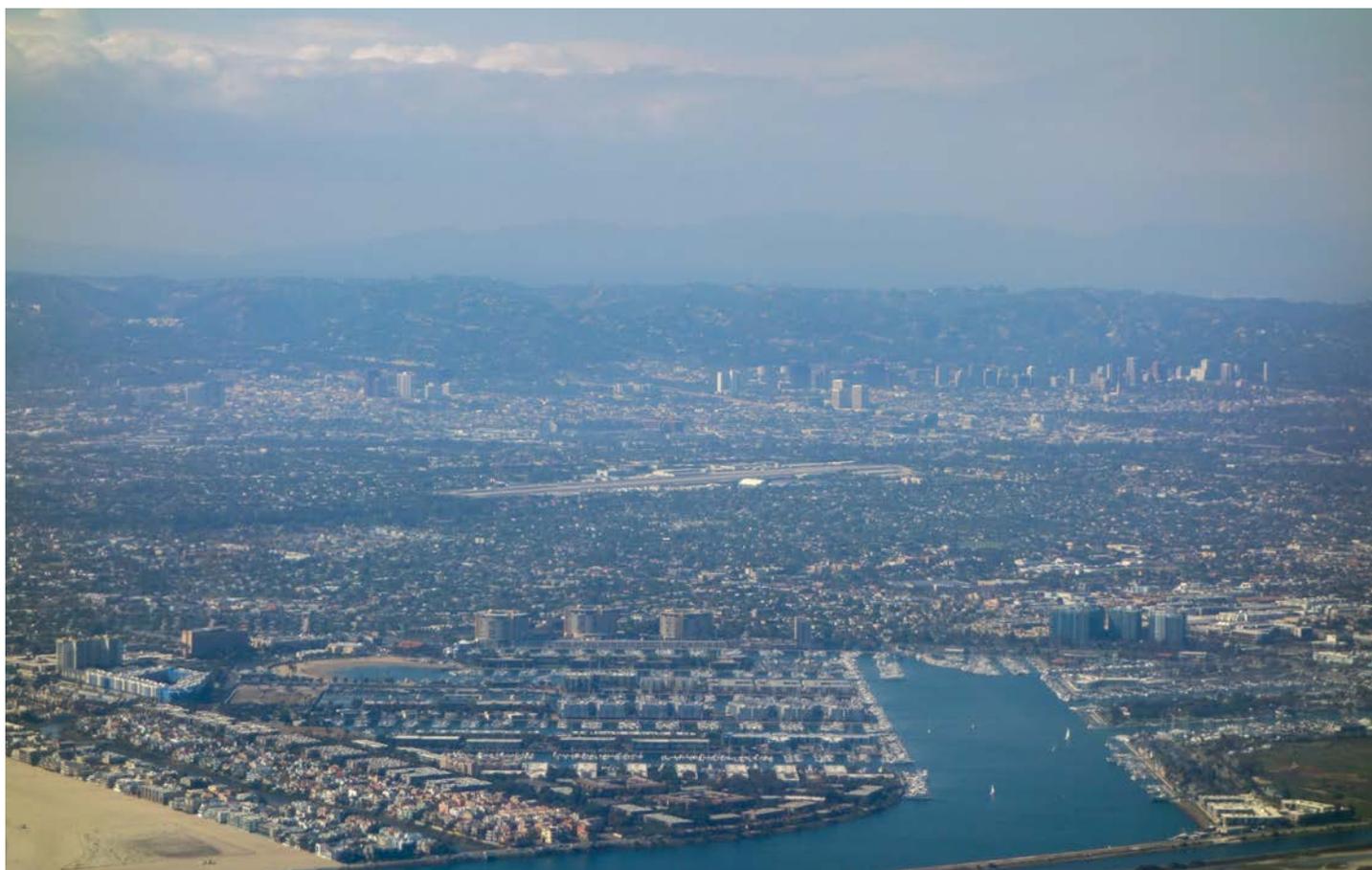
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Table 3 shows the 31 types of urban destinations by county and is sorted by total count⁴.

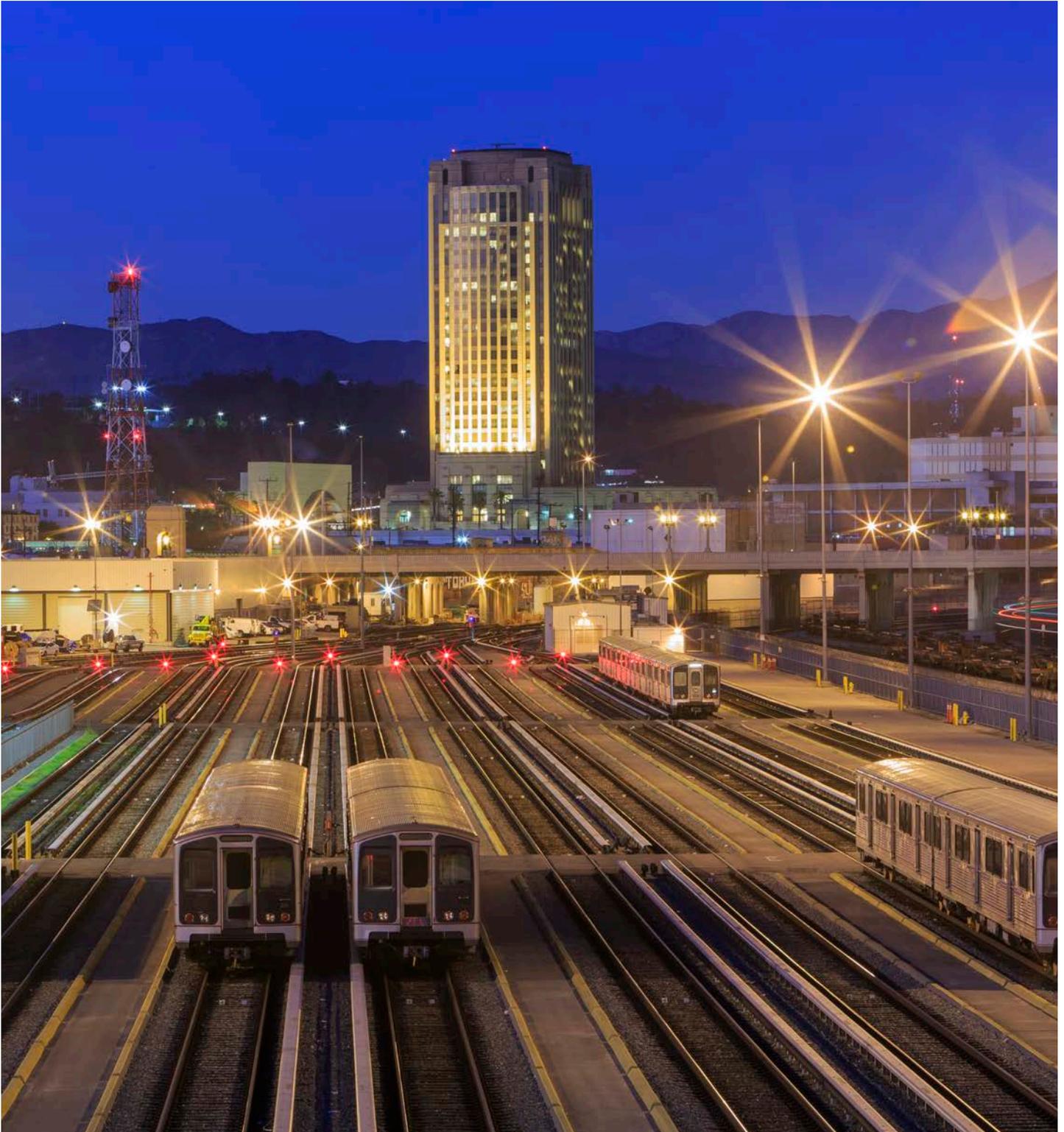
- Full-service restaurants, which include fast-food and dine-in, are the most prevalent type of establishment with nearly 40,000 present across the region
- Hospitals are among the least prevalent establishment types across the region, with 1,614 locations (this includes a variety of surgical centers and specialty hospitals)
- The region is serviced by 155 passenger rail stations, including recent extensions of the LA Metro Expo and Gold lines.

4 Open space is not included in Table 3. CPAD records open space by land area coverage rather than counting the number of parks, beaches, or other discrete open spaces. A technique was devised using the CPAD open space maps and street network to convert open space to discrete points. Each time an area of open space crossed a street network, it was converted to a “unit” of open space existing at that location. Thus, a “unit” of open space corresponds roughly to one city block’s worth of open space. This way, larger parks or long stretches of beachfront are counted multiple times if they are accessible to homes.



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Type of Destination	Los Angeles	Orange	Riverside*	San Bernardino*	Ventura*
Apparel Retailing	87.3%	89.2%	43.1%	58.4%	58.7%
Auto Services	90.0%	88.0%	62.0%	78.1%	68.2%
Beer, Wine, and Liquor Stores	82.5%	67.9%	26.6%	47.9%	43.3%
Child Care Services	86.0%	77.9%	47.2%	61.9%	62.3%
Convenience Stores	73.4%	64.4%	28.7%	50.7%	36.3%
Deposit-taking Institutions	71.3%	69.4%	31.9%	42.0%	45.2%
Drinking Places (Alcoholic Beverages)	54.9%	41.6%	11.1%	26.3%	14.7%
Drug Stores	77.5%	76.4%	38.5%	48.4%	58.2%
Elementary and Secondary Schools	91.4%	86.4%	62.8%	79.7%	74.6%
Full-Service Restaurants	89.7%	90.8%	59.5%	77.1%	77.3%
Gas Stations	84.0%	73.5%	34.0%	54.4%	52.9%
General Merchandise Retailing	86.6%	83.0%	43.1%	60.3%	59.3%
Groceries	85.8%	77.8%	44.7%	65.6%	56.3%
Hair Care Services	87.9%	90.5%	56.2%	74.0%	71.8%
Home Products Retailing	86.9%	94.1%	67.2%	78.2%	85.7%
Hospitals	53.0%	41.4%	13.5%	25.2%	22.8%
Laundry	81.2%	83.1%	34.8%	53.5%	60.4%
Limited-Service Food and Beverage	80.0%	78.1%	38.8%	55.2%	56.6%
Medical Laboratories	56.3%	62.6%	19.9%	26.7%	33.3%
Open Space	83.9%	93.5%	62.8%	73.0%	92.6%
Other Learning	73.7%	71.8%	28.4%	40.9%	52.7%
Other Personal Services	85.1%	94.0%	59.1%	76.2%	82.3%
Personal Financial	86.3%	92.4%	58.5%	73.2%	82.2%
Personal Products Retailing	84.2%	87.8%	53.0%	68.5%	68.5%
Rail Stations	16.3%	2.8%	0.0%	2.4%	2.2%
Recreational Facilities and Instruction	80.2%	85.3%	44.1%	50.0%	67.5%
Religious Organizations	85.8%	84.0%	59.7%	80.5%	73.0%
Repair Services	85.5%	88.9%	57.5%	72.9%	75.0%
Social Service Organizations	85.2%	89.7%	53.9%	68.0%	77.4%
Specialty Food	82.5%	82.2%	42.0%	60.7%	62.4%
Specialty Retailing	93.4%	97.5%	69.0%	83.9%	62.4%

Note: Service defined as "within one mile"

*Only the portion of these counties within the greater L.A. metro region are included.

Table 4: Percentage of dwelling units serviced in each county

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Type of Destination	Los Angeles	Orange	Riverside*	San Bernardino*	Ventura*
Apparel Retailing	23.5	8.5	1.9	3.2	3.1
Auto Services	27.7	17.4	5.2	10.0	7.1
Beer, Wine, and Liquor Stores	3.8	1.9	0.5	1.0	0.8
Child Care Services	5.0	2.6	0.9	1.4	1.7
Convenience Stores	2.1	1.5	0.4	0.9	0.5
Deposit-taking Institutions	5.0	2.7	0.8	1.2	1.6
Drinking Places (Alcoholic Beverages)	1.9	0.8	0.2	0.4	0.2
Drug Stores	4.6	2.5	0.8	1.1	1.3
Elementary and Secondary Schools	7.4	3.9	1.7	2.8	2.3
Full-Service Restaurants	49.7	26.4	6.8	10.5	10.1
Gas Stations	4.1	2.4	0.9	1.3	1.5
General Merchandise Retailing	8.7	4.6	1.4	2.3	2.0
Groceries	7.8	3.0	1.1	1.9	1.3
Hair Care Services	28.7	16.4	4.8	7.4	6.9
Home Products Retailing	17.1	12.8	3.2	4.9	7.2
Hospitals	1.9	1.0	0.2	0.5	0.3
Laundry	5.7	3.5	0.7	1.1	1.5
Limited-Service Food and Beverage	5.2	3.0	1.0	1.4	1.6
Medical Laboratories	2.7	2.1	0.5	0.7	0.8
Other Learning	4.5	2.2	0.5	0.8	1.2
Other Personal Services	14.6	9.6	2.7	3.8	5.7
Personal Financial	22.7	15.1	4.1	6.9	10.4
Personal Products Retailing	10.5	6.2	1.9	2.9	3.4
Rail Stations	0.2	0.0	0.0	0.0	0.0
Recreational Facilities and Instruction	5.6	3.9	1.1	1.5	2.4
Religious Organizations	13.5	6.2	2.8	4.8	3.1
Repair Services	12.6	7.8	1.8	3.5	3.5
Social Service Organizations	17.3	7.3	2.5	4.0	4.6
Specialty Food	9.5	5.2	1.1	1.9	1.9
Specialty Retailing	34.2	20.2	4.4	6.7	1.9

*Only the portion of these counties within the greater L.A. metro region are included.

Table 5: Average count of each destination within 1-mile of a home by county

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Even though some destinations may be more abundant than others, the level of accessibility between homes and destinations also depends on the spatial arrangement of both destinations and homes across the region. Tables 4 and 5 shows two measures of accessibility based on a one-mile threshold: (4) the service percentage, or share of homes in a county which have at least one of that destination type within one mile, and (5) the average count, which is the number of establishments within one mile of an average home⁵. Some notable trends include:

- While restaurants are the most prevalent destination across the region, the level of accessibility varies by county:
 - » 89.7% of homes in L.A. County and 90.8% of homes in Orange County have a restaurant within one mile. The average L.A. County home has 49 restaurants within one mile and the average Orange County home has 26, indicating a high level of accessibility in these more densely developed counties.
 - » Restaurant access is notably lower in Riverside County, where only 59.5% of homes have a restaurant within a mile.
- While there are only 7,566 elementary and secondary schools in the region – far lower than many other destination types, they are fairly accessible, perhaps because school location is determined in part by minimizing the distance students must travel, while private business establishments show a tendency to cluster in malls or retail strips:
 - » 91.4% of homes in LA County, 86.4% of homes in Orange County, 79.7% of homes in San Bernardino County, 74.6% of homes in Ventura County, and 62.8% of homes in Riverside County have a school within one mile
- Gas stations tend to be less aesthetically pleasing and carry more environmental risk than some other destination types, which is reflected in fairly low levels of accessibility:
 - » 73.5% of Orange County homes do not have a gas station within one mile, versus 84.0% of Los Angeles County homes
 - » Only about 1/3 of Riverside county residents could reach their nearest gas station with a one mile drive
- Open Space is a particularly important amenity to have near homes. While access to most destinations is greatest in LA County,
 - » Orange County has the highest share of homes serviced by open space at 93.5%, while Ventura County ranks second at 92.6%. 83.9% of Los Angeles county homes have a park, beach, or other public recreational space within one mile (see comparison in Figure 5).
- Rail transit, which we define here as LA Metro stations plus Metrolink, a regional commuter rail system, are sparse across the region:
 - » Only 16.3% of L.A. County homes have rail service within one mile
 - » The 25 stations across Orange, San Bernardino, and Ventura counties service are further than a mile away from 97% of those counties' homes
 - » While there are 6 stations in Riverside County, fewer than one percent of the county's dwelling units provide access within one mile

⁵ While nearly all of Los Angeles and Orange Counties are included in this analysis, only the parts of San Bernardino, Riverside, and Ventura Counties within the greater Los Angeles urbanized area are included in this analysis since street network distances were limited to this extent. The effect is most notable in Ventura County, of which only a small portion excluding major areas such as Ventura and Oxnard are included. Our web mapping application allows for visualization of which areas are included.

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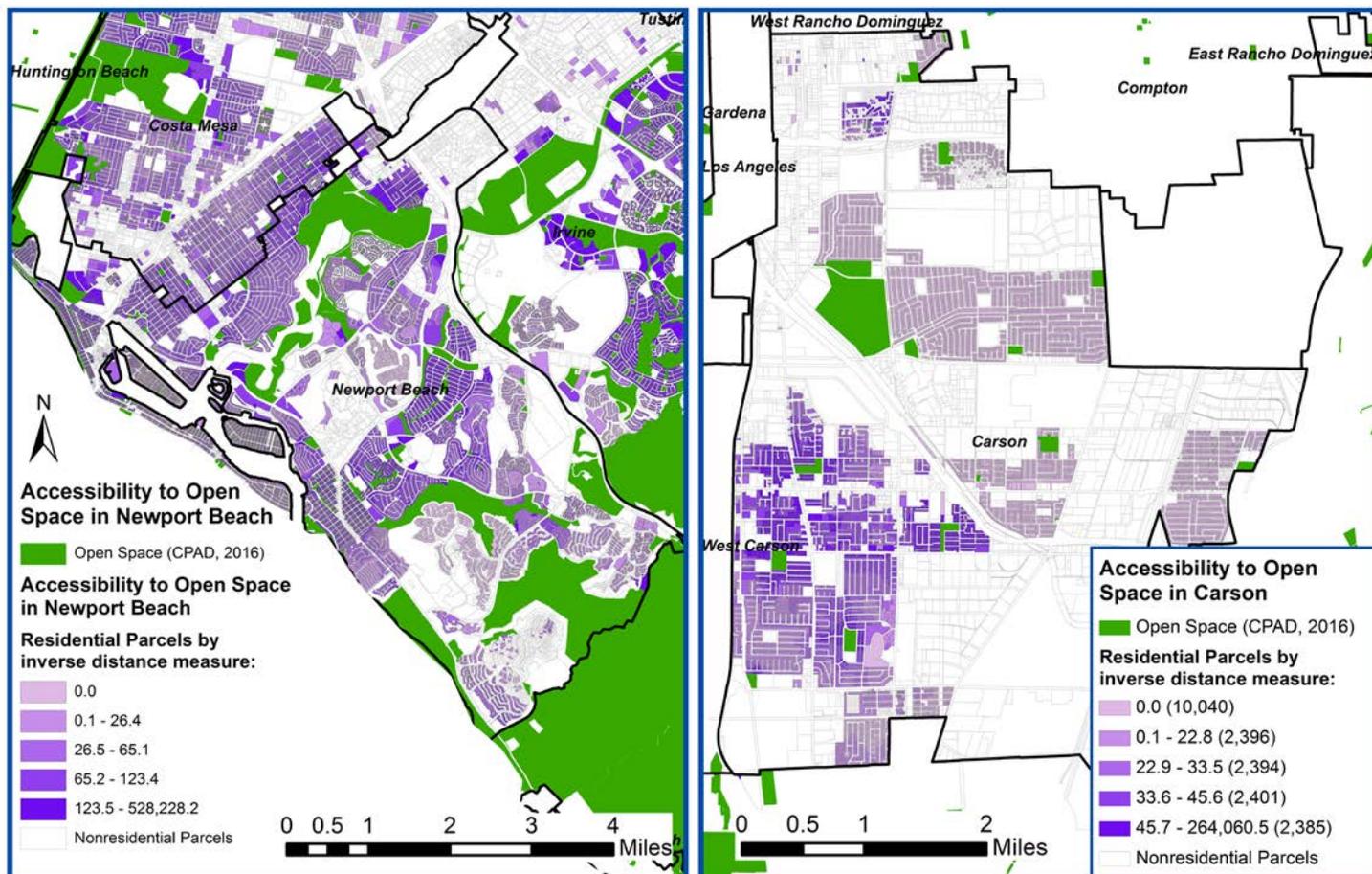


Figure 6: A comparison of a city that features high levels of accessibility to open space – Newport Beach – versus a city that features poor levels of accessibility between homes and open space – Carson.

What determines accessibility to clothing stores, restaurants, groceries, and green space in Southern California counties?

In this section, we attempt to determine which housing and neighborhood characteristics have a positive or negative relationship with accessibility. As mentioned previously, due to data availability differences, these characteristics were slightly different in each county. For example, we were unable to ascertain reliable data on the age of structures in Orange and Riverside counties, the size of individual homes in San Bernardino County (though lot size in acres is used as a substitute), and the home's fair market value in Orange, San Bernardino, and Ventura counties. Therefore, our statistical analysis is conducted separately for each county and shown in Figures 7 through 11 below. We focus on four types of destinations which capture a range of necessity and frequency of use: apparel retailing, restaurants, grocery stores, and open space. Details of our statistical analysis (regression) can be found in Technical Appendix D.

Each figure shows the relative impact of each characteristic on accessibility from our statistical model, which holds all other characteristics constant. For example, Figure 7 depicts accessibility in Los Angeles County. The first blue bar which reaches a value of roughly 0.7 indicates that, holding other factors constant, dwelling units with a higher value for “Bldg. Age” have better accessibility to apparel retailing. This indicates that an older building will have greater accessibility to apparel retailing than will a new building in Los Angeles County. The next blue bar, corresponding to “SQFT/unit,” has a value of about -0.13 and indicates that larger dwelling units have poorer accessibility to apparel retail – an effect which is about one-fifth as strong – and opposite – as the effect of building age. In the next section, we discuss the results for Figures 7 to 11 in order based on the dwelling unit characteristics and the neighborhood characteristics.

Los Angeles County: Impact of Home and Neighborhood Characteristics on Accessibility to:

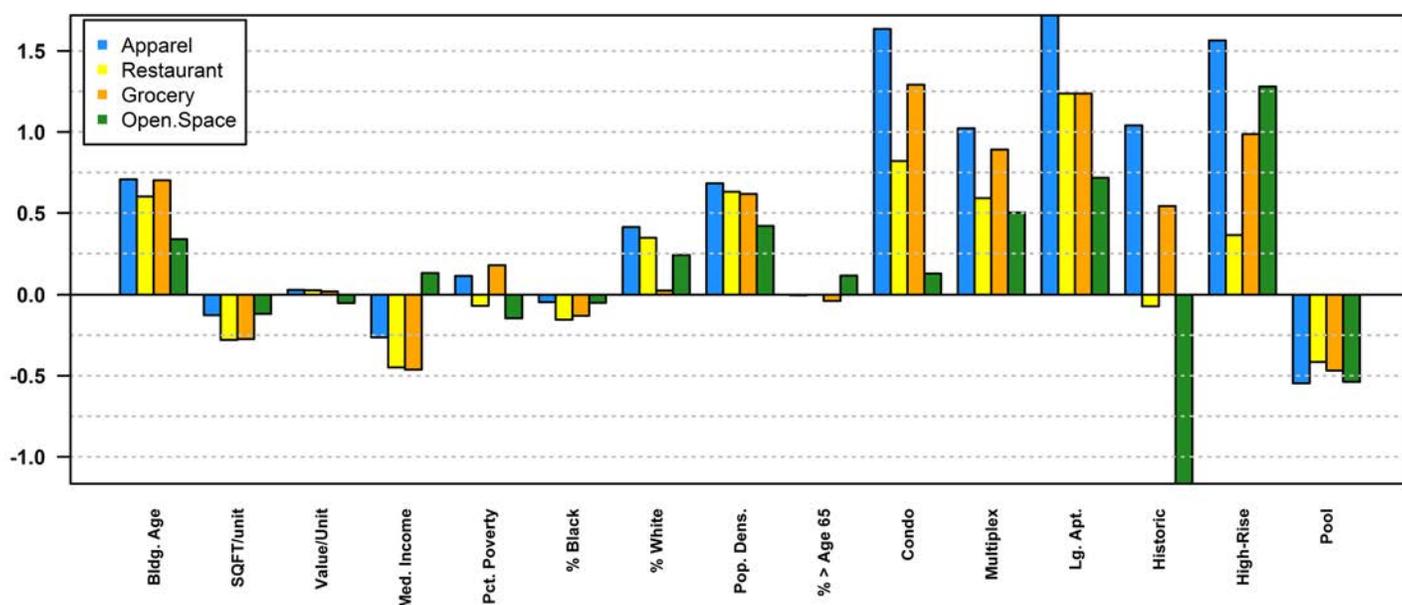


Figure 7: Los Angeles County. This figure shows, from our statistical model, the impact of various characteristics — listed at the bottom — to accessibility to four destination types, denoted by color. Values are standardized, meaning that even though the units measuring each characteristic is different, their impact – positive or negative – is reflected in the height of each bar.

Orange County: Impact of Home and Neighborhood Characteristics on Accessibility to:

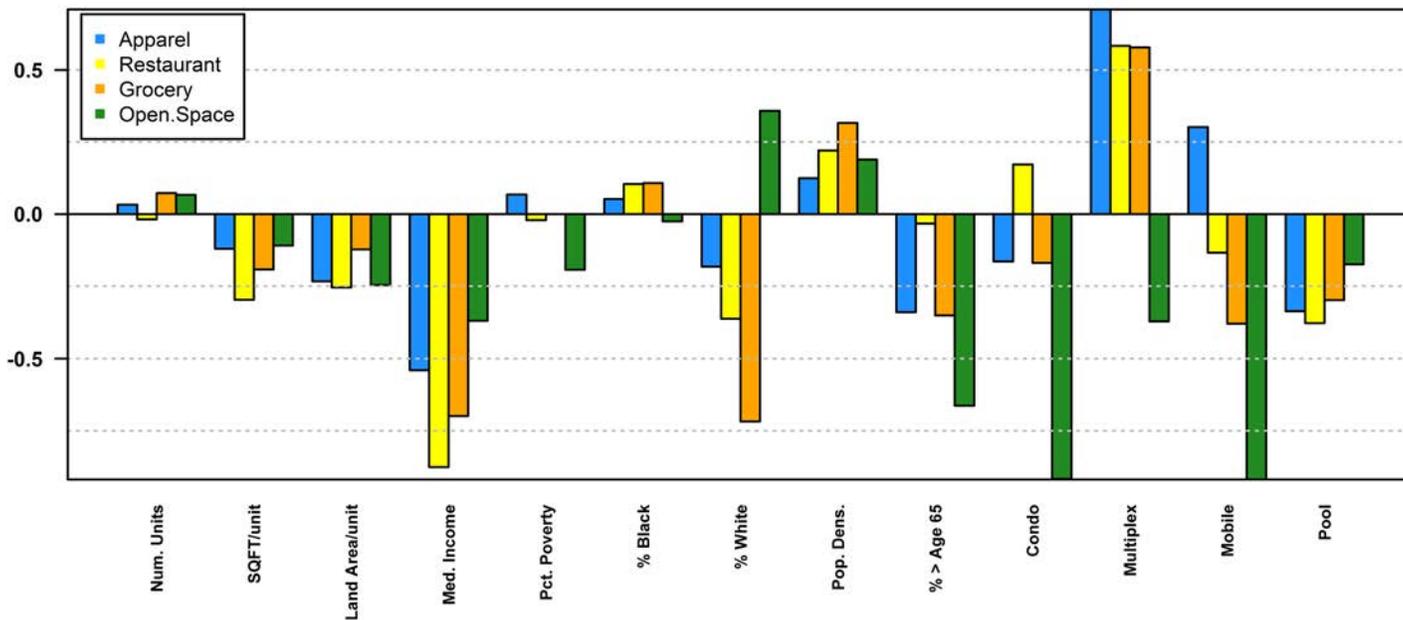


Figure 8: Orange County. This figure shows, from our statistical model, the impact of various characteristics – listed at the bottom – to accessibility to four destination types, denoted by color. Values are standardized, meaning that even though the units measuring each characteristic is different, their impact – positive or negative – is reflected in the height of each bar.

Riverside County: Impact of Home and Neighborhood Characteristics on Accessibility to:

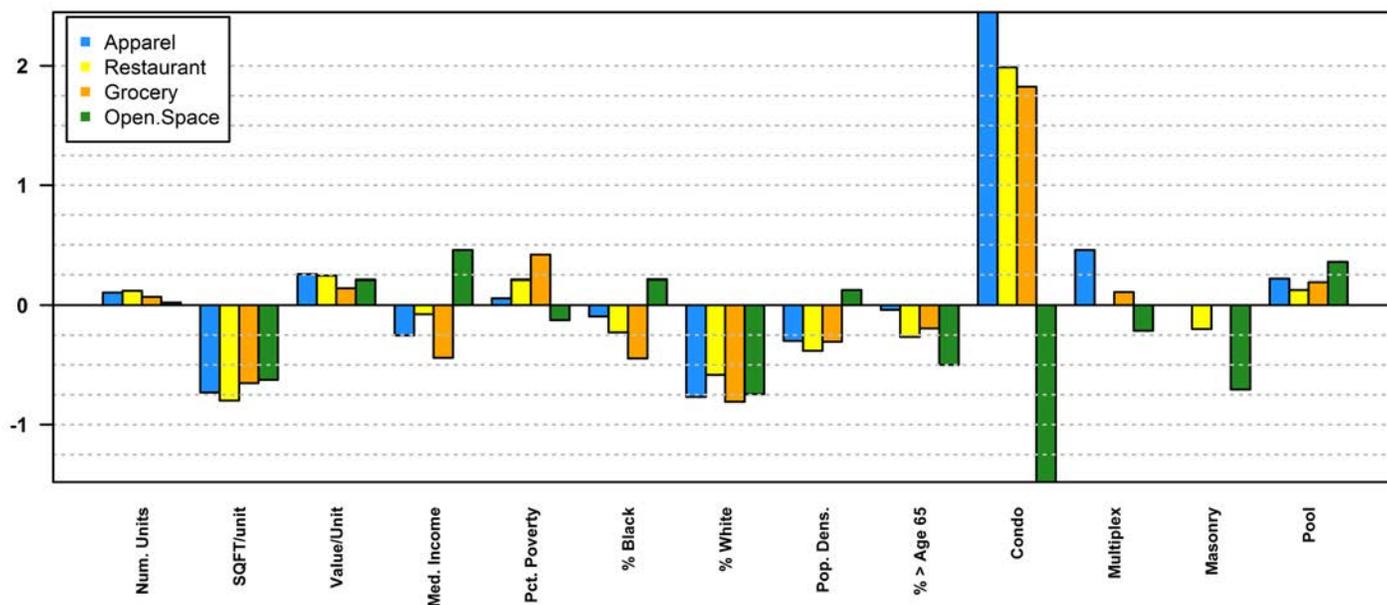


Figure 9: Riverside County. This figure shows, from our statistical model, the impact of various characteristics – listed at the bottom – to accessibility to four destination types, denoted by color. Values are standardized, meaning that even though the units measuring each characteristic is different, their impact – positive or negative – is reflected in the height of each bar.

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San Bernardino County: Impact of Home and Neighborhood Characteristics on Accessibility to:

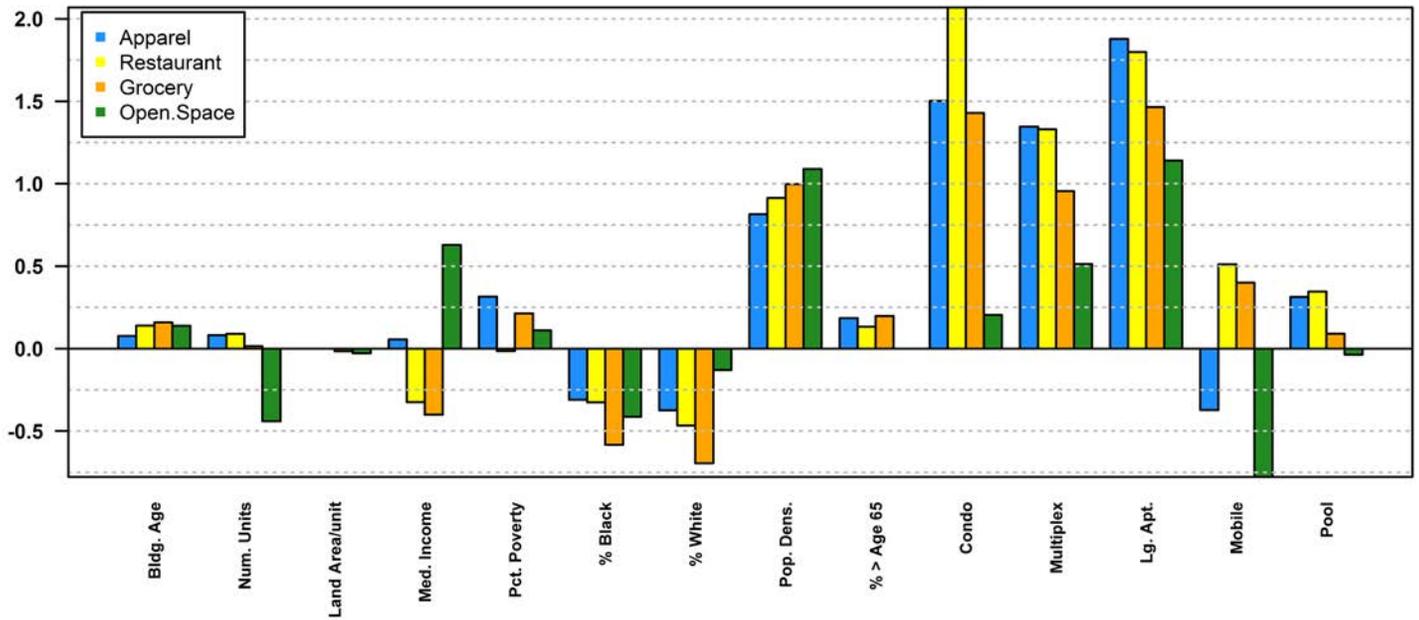


Figure 10: San Bernardino County. This figure shows, from our statistical model, the impact of various characteristics – listed at the bottom – to accessibility to four destination types, denoted by color. Values are standardized, meaning that even though the units measuring each characteristic is different, their impact – positive or negative – is reflected in the height of each bar.

Ventura County: Impact of Home and Neighborhood Characteristics on Accessibility to:

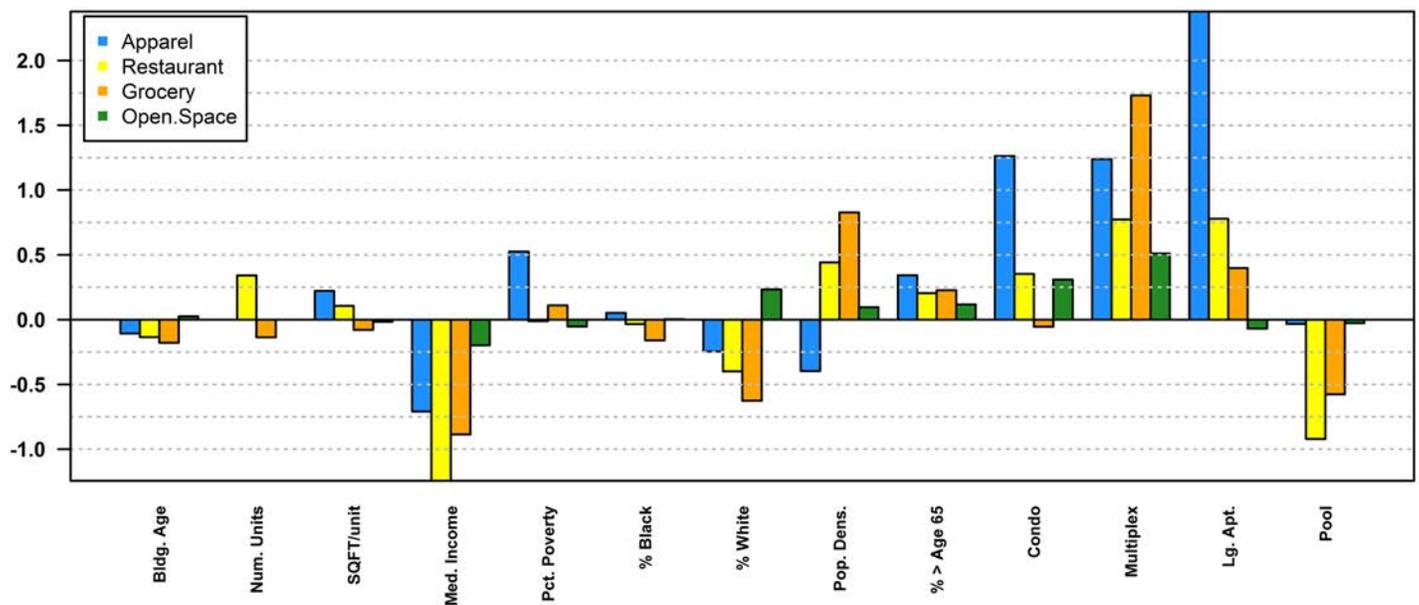


Figure 11: Ventura County. This figure shows, from our statistical model, the impact of various characteristics – listed at the bottom – to accessibility to four destination types, denoted by color. Values are standardized, meaning that even though the units measuring each characteristic is different, their impact – positive or negative – is reflected in the height of each bar.

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The role of older buildings

A major focus in this report is that accessibility is related to *when* homes were built. Design elements, development finance mechanisms, and zoning regulations – in addition to the preference to be near or far from destinations – change over time and can become “locked in” when structures are built.

- In Los Angeles County, older homes are closer to all four categories: clothing stores, restaurants, groceries, and open space. The effect is strongest for apparel and groceries, and weaker for open space.
- In San Bernardino County, a weaker, but still positive relationship (only about 1/5 as strong as LA County) is seen between older buildings and accessibility. The effect is modest for clothing stores; restaurants, groceries, and open space access have slightly stronger relationships with building age.
- While Ventura County’s sample is limited to the communities in our street network grid, a different relationship emerges. Apparel, restaurants, and groceries are all *further* from older buildings, while open space is marginally more accessible to those living in older homes.

The role of building size

Building size data were available everywhere except San Bernardino County. Typically, larger homes are further from most destinations because the supply of buildable land is higher in outlying areas. However, the construction of multi-story and high-rise buildings effectively changes the supply of land – and can change this relationship. This is particularly relevant when high-rise, or higher-density development is also higher-priced and larger, and can make it so that some larger homes actually have higher levels of accessibility (see, for example, the final section of this Report on accessibility scenarios in Orange County). We find that:

- In Los Angeles, Orange, and Riverside Counties, smaller dwelling units have better accessibility to apparel retail, restaurants, groceries, and open space.
- In Los Angeles and Orange Counties, this effect is strongest for restaurants and grocery stores. While having nearby apparel retail and grocery stores is still dependent on having a smaller home, a smaller home is less related to accessibility to these destinations.
- In Riverside County, an additional one percent increase in unit size decreases accessibility to restaurants by about 0.8% and open space by 0.6%.
- In Ventura County, larger homes are actually closer to apparel retail and restaurants. They are slightly further from grocery stores, and very slightly further from open space.

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The role of housing type

Multifamily homes are generally closer to more destinations due to their density. In addition, they are more likely to be developed in tandem with other types of land use, such as office or retail uses. We compare several housing types against single-family, detached homes. While categories vary slightly by county, accessibility and density generally go together:

- In Orange County, condos and apartments are actually less likely to be near apparel retail and grocery stores. Condos are 92% less likely than single family homes to be near open space. However, they are closer to restaurants.
- The same is true in Riverside County, where both condos and duplex/townhomes are further from open space than are single-family homes
- Los Angeles County apartments and condos are far more likely to be near apparel retail than are single-family homes

The role of home value and income

Most research shows that higher-valued homes and higher-income individuals prefer larger lots and adequate distance from nonresidential land uses which may be considered a nuisance. This perspective is supported by traditional Euclidean, or hierarchical zoning codes which tend to separate uses, though mixed-use zoning and a preference for increased accessibility is thought to be on the rise.

Home value information is only available in Los Angeles and Riverside counties. In our models, higher property values are associated with better access to apparel retailing, restaurants, and grocery stores in both counties, when the effects of other variables are controlled for. However, while open space accessibility is associated with higher property values in Riverside County, it is actually associated with lower property values in Los Angeles County. While this may be counterintuitive, the Los Angeles City and County are known for having a fairly short supply of public parks⁶, and private open spaces (such as golf courses and homeowners' association common areas) are not included in this analysis.

In terms of neighborhood income levels, we find that:

- In all five counties, higher neighborhood family incomes are associated with poorer access to restaurants and grocery stores.
- In Los Angeles, Orange, Riverside, and Ventura counties, higher incomes are associated with poorer access to apparel retailing. However the opposite is true in San Bernardino County, where higher income predicts greater access to clothing stores.
- The relationship between open space access and income varies by county. A strong positive relationship is seen in San Bernardino and Riverside Counties, while a slightly weaker positive effect is seen in Los Angeles County, i.e. higher incomes are related to greater open space access.
 - » However, in Orange and Ventura Counties, higher income is associated with poorer access to open space

⁶ A variety of recent reports have highlighted how access to parks and recreational facilities in Los Angeles is well below national average figures, see www.lacountyparkneeds.org

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The role of neighborhood demographics

One common perspective, given changing demographic trends and “back to the city” movements is that retirees increasingly will prefer central cities. This is somewhat facilitated by a one-time California state tax allowance which permits seniors to maintain their homeowner’s property tax benefits even if they move⁷. Seniors may choose to age in-place, possibly in more characteristically single-family home neighborhoods where they raised their children. We find mixed results, suggesting that both of these phenomena may occur in different places:

- In Orange and Riverside counties, neighborhoods with a high share of seniors had poorer access to clothing stores, restaurants, grocery stores, and open space.
- This was entirely the opposite in Ventura County, where access to all four destination types was related to a higher share of seniors. San Bernardino County exhibited a similar pattern for clothing stores, restaurants, and grocery stores, but no relationship between seniors and public open space access.
- In Los Angeles County, the relationship between seniors and access varied by destination: a positive relationship with open space access, no relationship to restaurant access, and a negative relationship with clothing store or grocery store access.

We also investigated the relationship between accessibility and the racial/ethnic composition of neighborhoods. While “back to the city” movements are usually associated with retail growth and accessibility gains, a related concern over gentrification is its potential to displace existing populations – particularly African-American communities in central cities. We find:

- In Los Angeles County, a higher share of black (non-Hispanic) population is associated with poorer access to clothing stores, restaurants, grocery stores, and open space. A higher share of white (non-Hispanic) residents is associated with greater access to all four destination types, though this relationship is stronger than the negative relationship for black residents.
- In Orange County, a higher share of black population is associated with greater access to clothing stores, restaurants, and grocery stores and poorer access to open space. White population share shows the opposite relationships: greater access to open space but poorer access to retail.
- In San Bernardino and Riverside counties, white, non-Hispanic and black, non-Hispanic shares are both associated with poorer access to retail businesses. This suggests that heavily Hispanic, or mixed-race areas – which this study does not investigate explicitly – have higher relative accessibility there.

7 Propositions 60 and 90 allow the one-time transfer of Proposition 13 tax relief benefits for seniors over age 55.

See <http://www.lao.ca.gov/reports/2016/3497/common-claims-prop13-091916.pdf> for details.

How does accessibility vary by cities in Southern California?

The previous section investigated county-level variation in accessibility patterns. But different cities within the same county are likely to exhibit distinctive accessibility traits for a number of reasons, including historical development trajectories, current zoning practices, and the prevalence of certain types of destinations.

Top and bottom cities for access

In this section, we analyze cities by two different measures of accessibility: (1) service percentage and (2) abundance of destinations nearby. Service percentage refers to the percentage of dwelling units in a city which have at least one of that type of destination within one mile, along a street network. This approach is most useful for identifying underserved areas (e.g. so-called “food deserts”) in which residents do not have the ability to access to a basic need within a short distance. The abundance of destinations nearby is the number of establishments of a particular type that the average dwelling unit in a city has within one mile. This is more meaningful for evaluating the variety of choices of a destination which are available, such as in comparison shopping.

Service Percentages

Table 6 shows service percentages for the Top 10 and Bottom 10 of the 167 cities in our analysis which have a 2010 census population of at least 10,000.

- In several cities, all dwelling units are within one mile of apparel retail, restaurants, grocery stores, and open space
- In only very rare instances do fewer than 10% of a city’s population have access, within 1 mile, to these destinations
- Taking the average of the “percent serviced” level for all 31 establishment types provides a composite measure for access to all destinations considered in this Report. Using this measure, which is highly sensitive to the delineation of destination types, we can identify which city has the highest and lowest overall service shares:
- With an average of 97% of dwelling units within 1-mile of 31 types of destinations, **Long Beach is the most serviced place in Southern California** (Figure 12).
- With an average of 11% of dwelling units within 1-mile of 31 types of destinations, **Compton is the least serviced place in Southern California** (Figure 13).

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	Apparel Retail	Pct*	Restaurants	Pct*	Grocery Stores	Pct*	Open Space	Pct*	All 31 Destinations	Avg. % Serviced
1	Long Beach	100.0%	Long Beach	100.0%	Long Beach	100.0%	Long Beach	100.0%	Long Beach	96.9%
2	Huntington Park	100.0%	Cypress	100.0%	Florence-Graham	100.0%	La Palma	100.0%	Walnut Park	95.3%
3	Bell Gardens	100.0%	La Puente	100.0%	Huntington Park	100.0%	Walnut Park	100.0%	San Gabriel	94.8%
4	West Hollywood	100.0%	Stanton	100.0%	Bell Gardens	100.0%	Artesia	100.0%	Santa Monica	94.7%
5	Westmont	100.0%	West Puente Valley	100.0%	Stanton	100.0%	Huntington Beach	100.0%	Bellflower	94.1%
6	Maywood	100.0%	Artesia	100.0%	West Hollywood	100.0%	Aliso Viejo	100.0%	Los Alamitos	93.8%
7	West Puente Valley	100.0%	Walnut Park	100.0%	Westmont	100.0%	Oak Park	100.0%	Gardena	92.7%
8	Artesia	100.0%	Vincent	100.0%	Maywood	100.0%	Laguna Hills	100.0%	Hawthorne	92.7%
9	Walnut Park	100.0%	Hawaiian Gardens	100.0%	Cudahy	100.0%	Cypress	99.9%	Artesia	92.6%
10	Hawaiian Gardens	100.0%	Signal Hill	100.0%	West Puente Valley	100.0%	Rancho Santa Margarita	99.9%	Lawndale	92.6%
10	Woodcrest	27.1%	Carson	48.4%	Santa Clarita	32.6%	East Hemet	36.9%	Woodcrest	38.3%
9	Beaumont	26.6%	Beaumont	46.1%	Valle Vista	27.1%	East San Gabriel	29.0%	Muscoy	37.0%
8	Canyon Lake	23.6%	Santa Clarita	45.4%	Coto de Caza	26.4%	Muscoy	28.4%	Santa Clarita	36.8%
7	Wildomar	23.4%	Lake Arrowhead	43.6%	Crestline	25.5%	Wildomar	22.5%	Malibu	35.1%
6	Lake Elsinore	23.2%	Crestline	43.2%	Lake Arrowhead	22.8%	Sierra Madre	22.2%	Beaumont	34.6%
5	Lakeland Village	22.7%	Valle Vista	37.5%	Canyon Lake	21.8%	Monrovia	13.8%	Lake Arrowhead	32.7%
4	Compton	13.4%	Monrovia	21.2%	Aliso Viejo	16.5%	Compton	13.3%	Canyon Lake	28.8%
3	Lake Arrowhead	11.9%	Compton	13.4%	Malibu	16.3%	Pico Rivera	11.4%	Valle Vista	25.2%
2	Muscoy	8.7%	Lakeland Village	13.2%	Compton	13.4%	Woodcrest	10.2%	Coto de Caza	24.2%
1	Valle Vista	7.7%	Coto de Caza	1.8%	Oak Park	0.0%	Home Gardens	0.1%	Compton	11.5%

^Cities are U.S. Census Bureau-defined “places” with a year 2010 population of at least 10,000

*Where multiple cities have 100% access, the list is sorted by population.

Table 6: Dwelling units serviced by destinations within 1-mile -top and bottom ten cities

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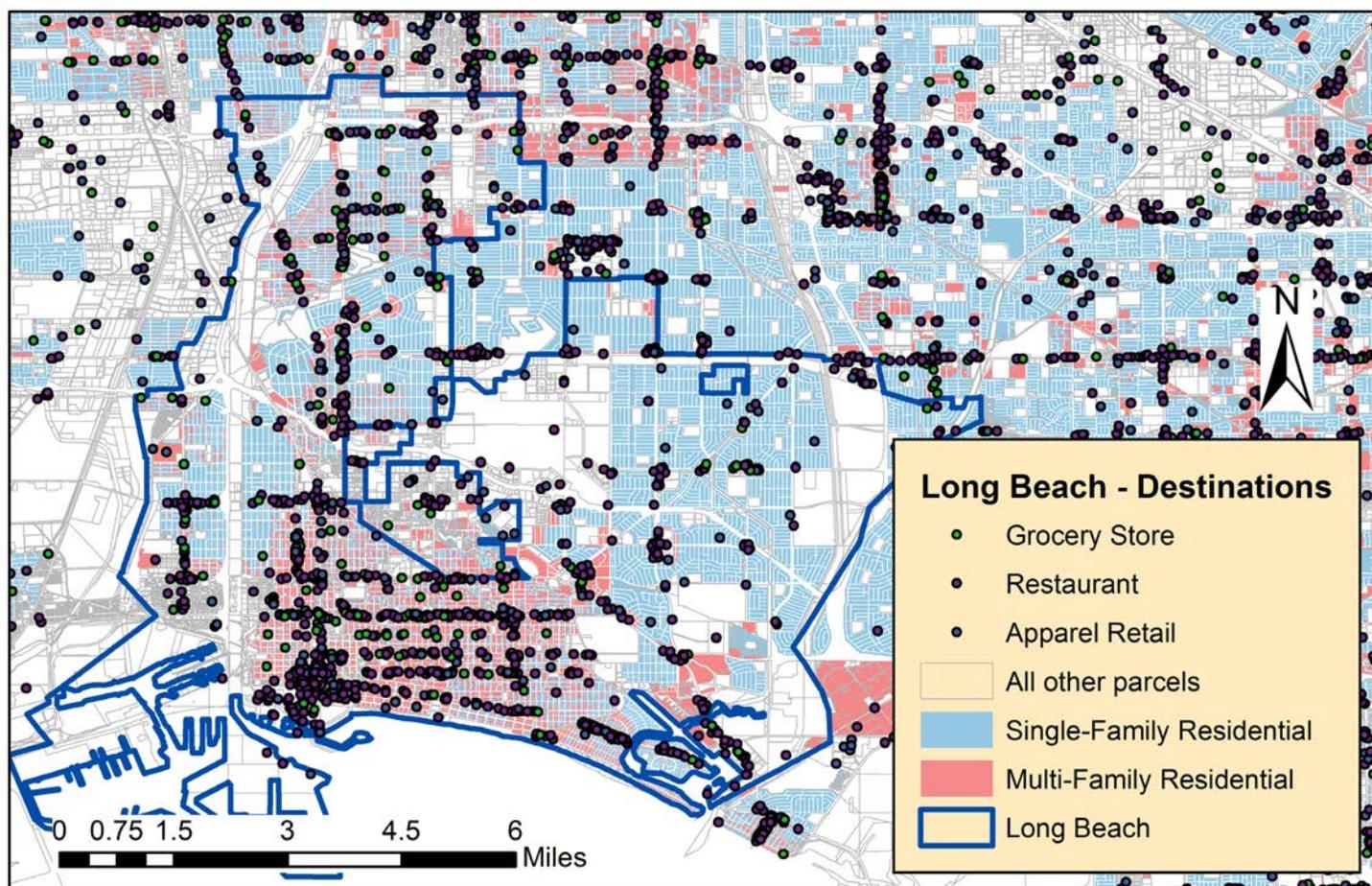


Figure 12: Long Beach – housing and everyday destinations.

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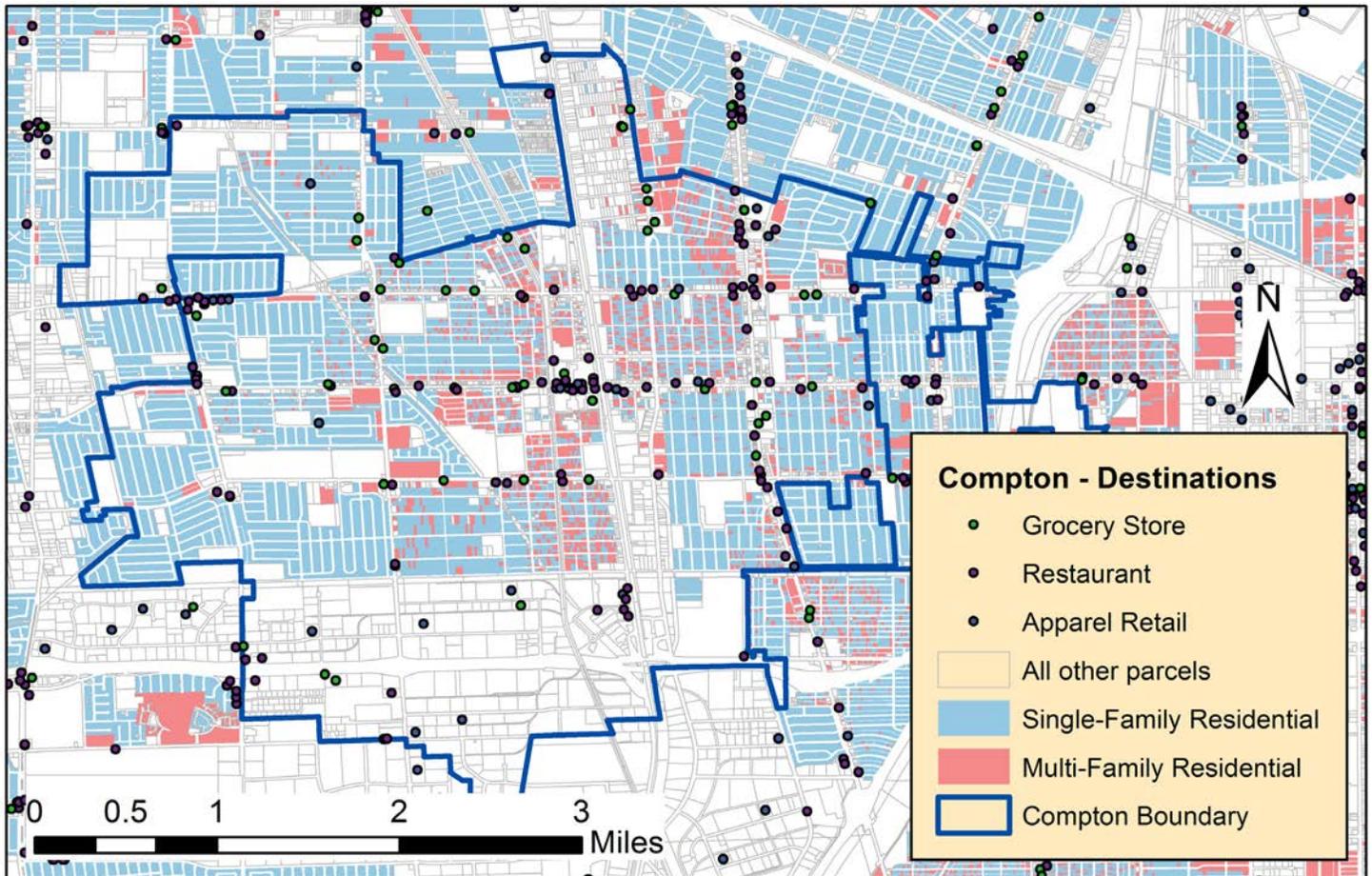


Figure 13: Compton – housing and everyday destinations.

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Abundance of destinations nearby

Table 7 shows the average number of destinations within one mile for the Top 10 and Bottom 10 of the 167 cities in our analysis which have a 2010 census population of at least 10,000.

- The average resident of Beverly Hills has 188 clothing stores, 138 restaurants, and a total of 1,573 destinations within one mile, thus using this measure **Beverly Hills is the most abundantly serviced place in Southern California** (Figure 14).
- The average resident of Valle Vista has 3 restaurants, a 12% chance of having one clothing store, a 33% chance of having one grocery store, and a total of 10 destinations within one mile, thus using this measure **Valle Vista is the least abundantly serviced place in Southern California** (Figure 15).
- We present maps (Figures 16-21) that show the percent of the population of each city that are serviced by a particular type of destination. These maps provide a visual demonstration of how this access varies across the Southern California landscape.



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	Apparel Retail	<i>Avg. # Nearby</i>	Restaurants	<i>Avg. # Nearby</i>	Grocery Stores	<i>Avg. # Nearby</i>	Open Space	<i>Avg. # Nearby*</i>	All 31 Destinations	<i>Avg. # Nearby</i>
1	Beverly Hills	188.4	West Hollywood	166.2	Walnut Park	31.6	Hermosa Beach	136.1	Beverly Hills	1573.1
2	West Hollywood	132.4	Beverly Hills	138.5	Florence-Graham	26.9	Oak Park	89.8	West Hollywood	1204.1
3	Huntington Park	100.1	Artesia	106.7	Huntington Park	26.3	Manhattan Beach	83.9	Santa Monica	928.9
4	Walnut Park	77.9	Santa Monica	104.6	Lennox	20.2	Beverly Hills	83.0	Hermosa Beach	723.3
5	Santa Monica	75.7	Hermosa Beach	86.6	East Los Angeles	17.1	Signal Hill	59.1	Walnut Park	692.5
6	Artesia	44.0	Walnut Park	77.7	Bell Gardens	15.2	Newport Beach	57.5	Glendale	671.1
7	Glendale	37.2	Huntington Park	76.2	Bell	14.3	Santa Monica	57.0	Huntington Park	651.2
8	Los Angeles	33.5	San Gabriel	71.2	Maywood	14.3	Rancho Santa Margarita	54.8	Artesia	573.3
9	Florence-Graham	29.5	Los Angeles	69.2	Westmont	13.1	Redondo Beach	54.2	Los Angeles	550.4
10	South El Monte	28.7	Glendale	68.4	Lynwood	12.3	South Pasadena	49.4	Lawndale	533.9
10	Coto de Caza	0.7	Compton	3.1	Laguna Woods	0.5	East San Gabriel	2.5	Beaumont	38.8
9	Canyon Lake	0.7	Oak Park	3.0	Woodcrest	0.5	Glen Avon	2.4	Compton	38.2
8	Beaumont	0.7	Valle Vista	2.9	Valle Vista	0.3	Lakeland Village	2.3	Coto de Caza	36.2
7	Camarillo	0.6	Malibu	2.6	Lake Arrowhead	0.3	Bloomington	2.2	Woodcrest	24.7
6	Crestline	0.6	Palos Verdes Estates	2.0	Aliso Viejo	0.3	Valle Vista	2.1	Wildomar	18.5
5	Lakeland Village	0.3	Lake Arrowhead	1.8	Coto de Caza	0.3	Monrovia	1.9	Lake Arrowhead	17.4
4	Woodcrest	0.3	Canyon Lake	1.4	Crestline	0.3	Wildomar	1.1	Canyon Lake	16.0
3	Wildomar	0.2	Muscoy	1.3	Canyon Lake	0.2	Muscoy	1.0	Muscoy	15.9
2	Valle Vista	0.1	Coto de Caza	0.3	Malibu	0.2	Woodcrest	0.4	Lakeland Village	12.2
1	Muscoy	0.1	Lakeland Village	0.3	Oak Park	0.0	Home Gardens	0.0	Valle Vista	10.0

^Cities are U.S. Census Bureau-defined “places” with a year 2010 population of at least 10,000

*Count refers to roughly “one block’s worth of” open space, not an actual count of parks, beaches, or other open spaces.

Table 7: Average number of establishments within one mile of a home, by city^

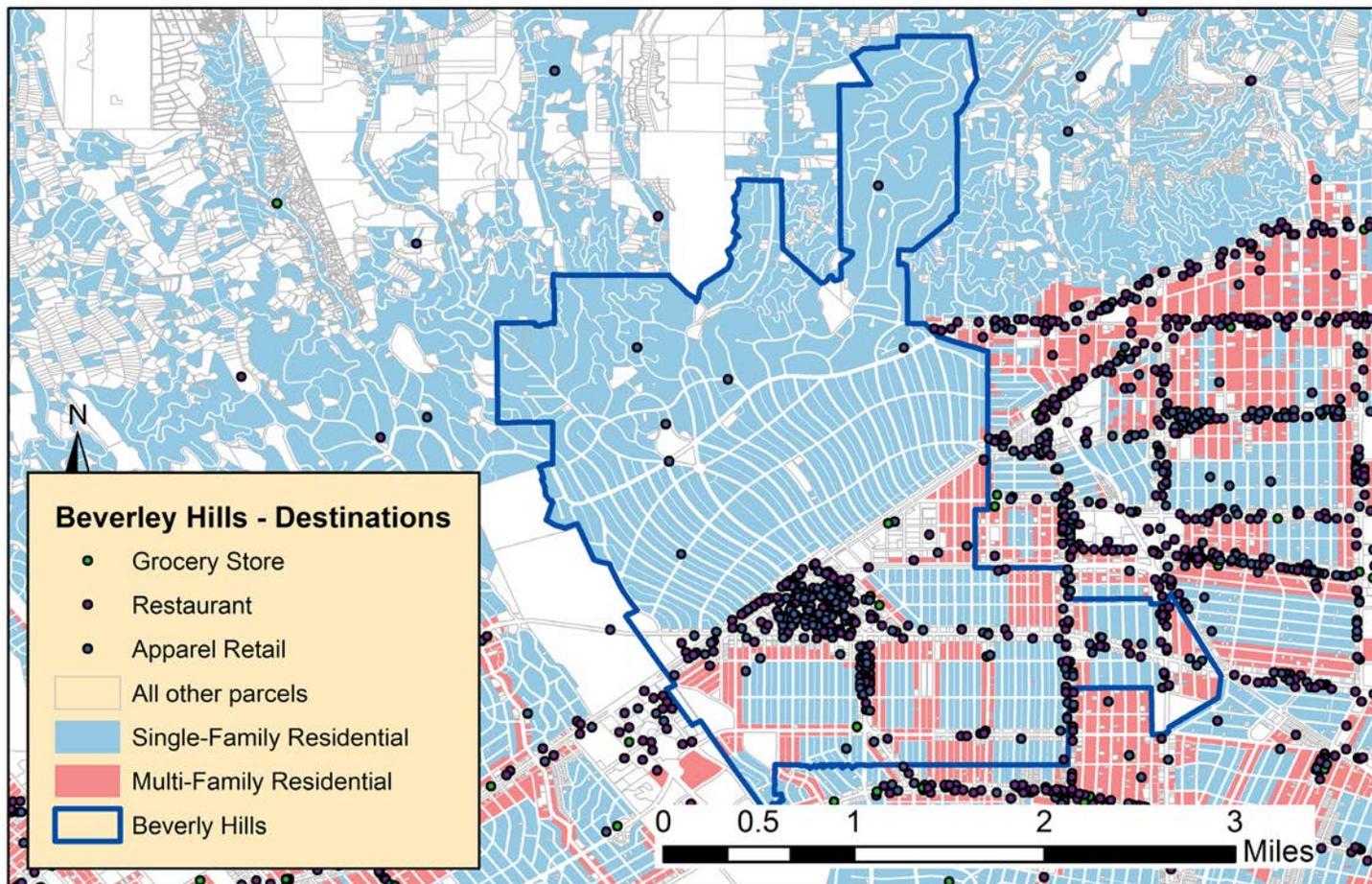


Figure 14: Beverly Hills – housing and everyday destinations.

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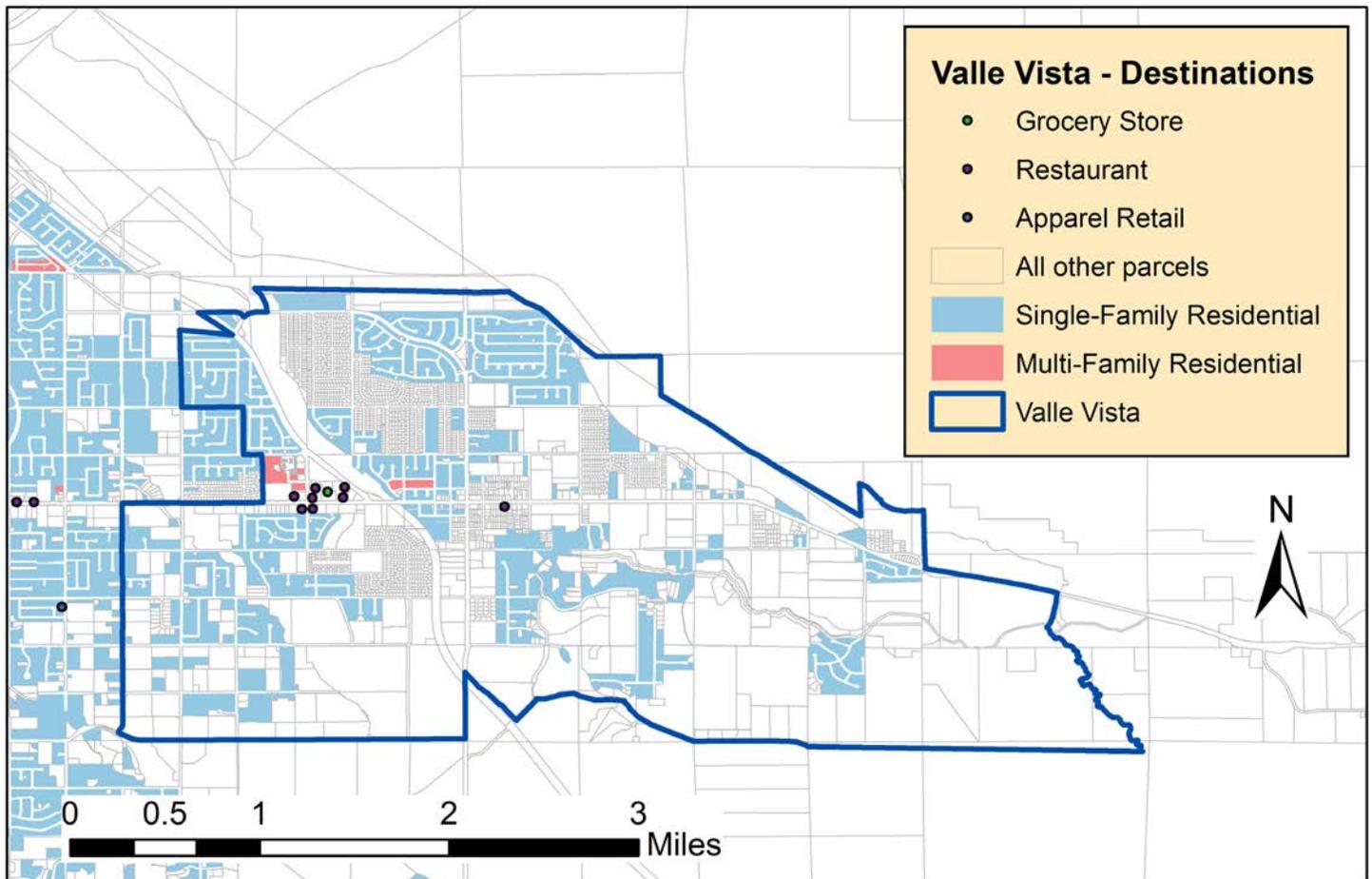


Figure 15: Valle Vista – housing and everyday destinations.

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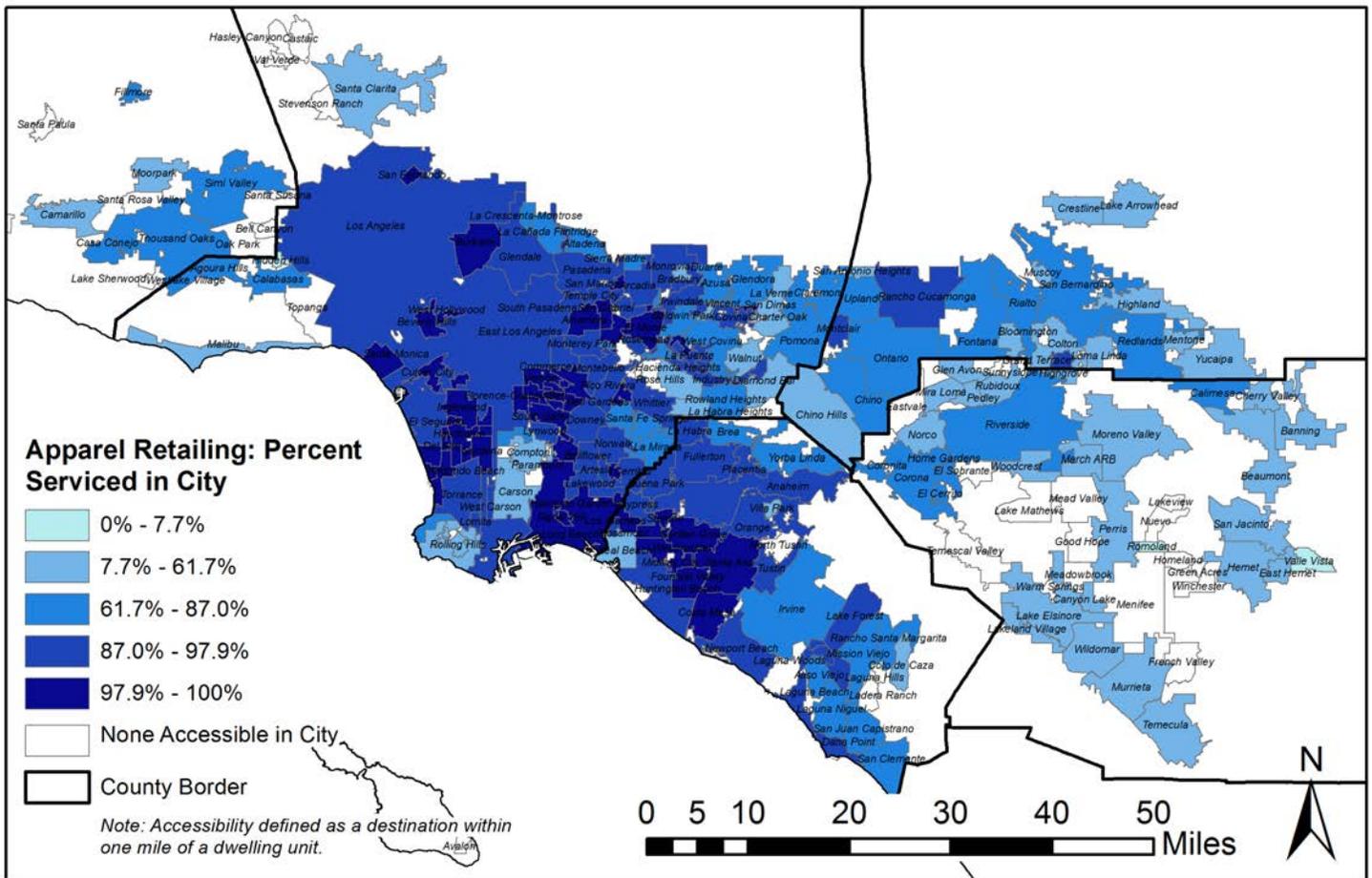


Figure 16: Percent of dwelling units which are within one mile of an apparel store in cities across Southern California. Value ranges shown are quantiles, i.e. $\frac{1}{5}$ of the cities in the region are each color.

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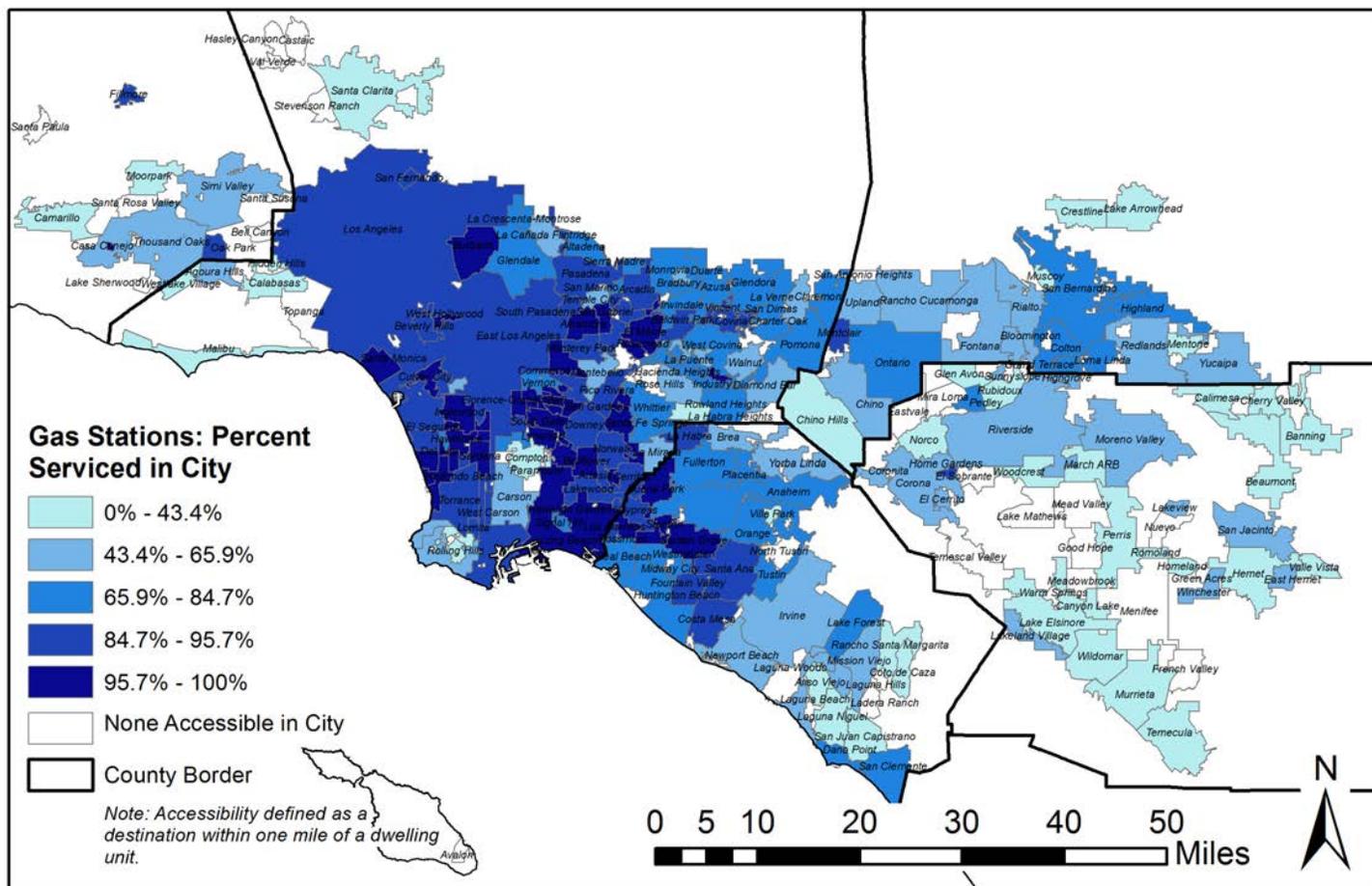


Figure 17: Percent of dwelling units which are within one mile of a gas station in cities across Southern California. Value ranges shown are quantiles, i.e. $1/5$ of the cities in the region are each color.

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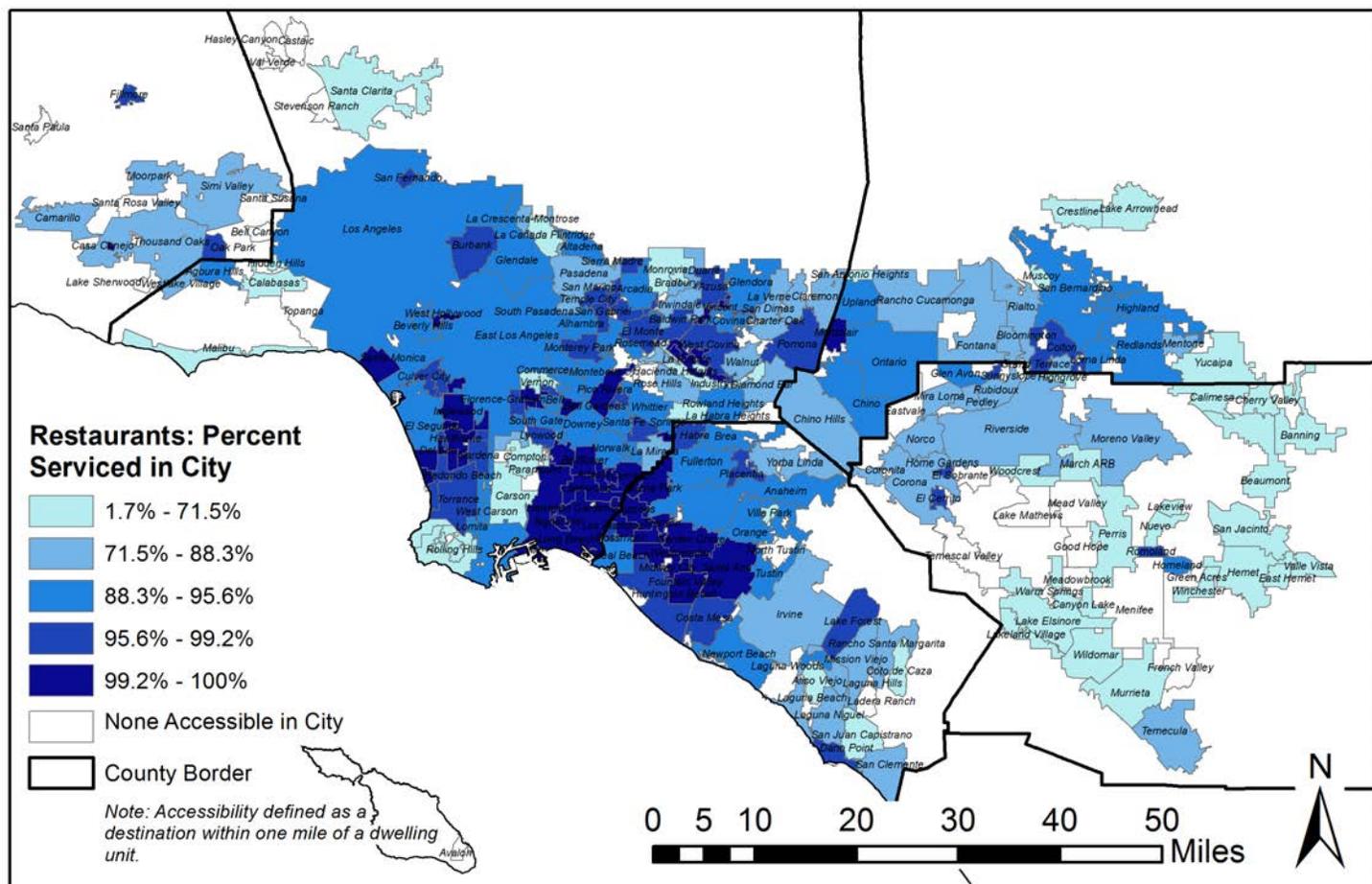


Figure 18: Percent of dwelling units which are within one mile of a restaurant in cities across Southern California. Value ranges shown are quantiles, i.e. $\frac{1}{5}$ of the cities in the region are each color.

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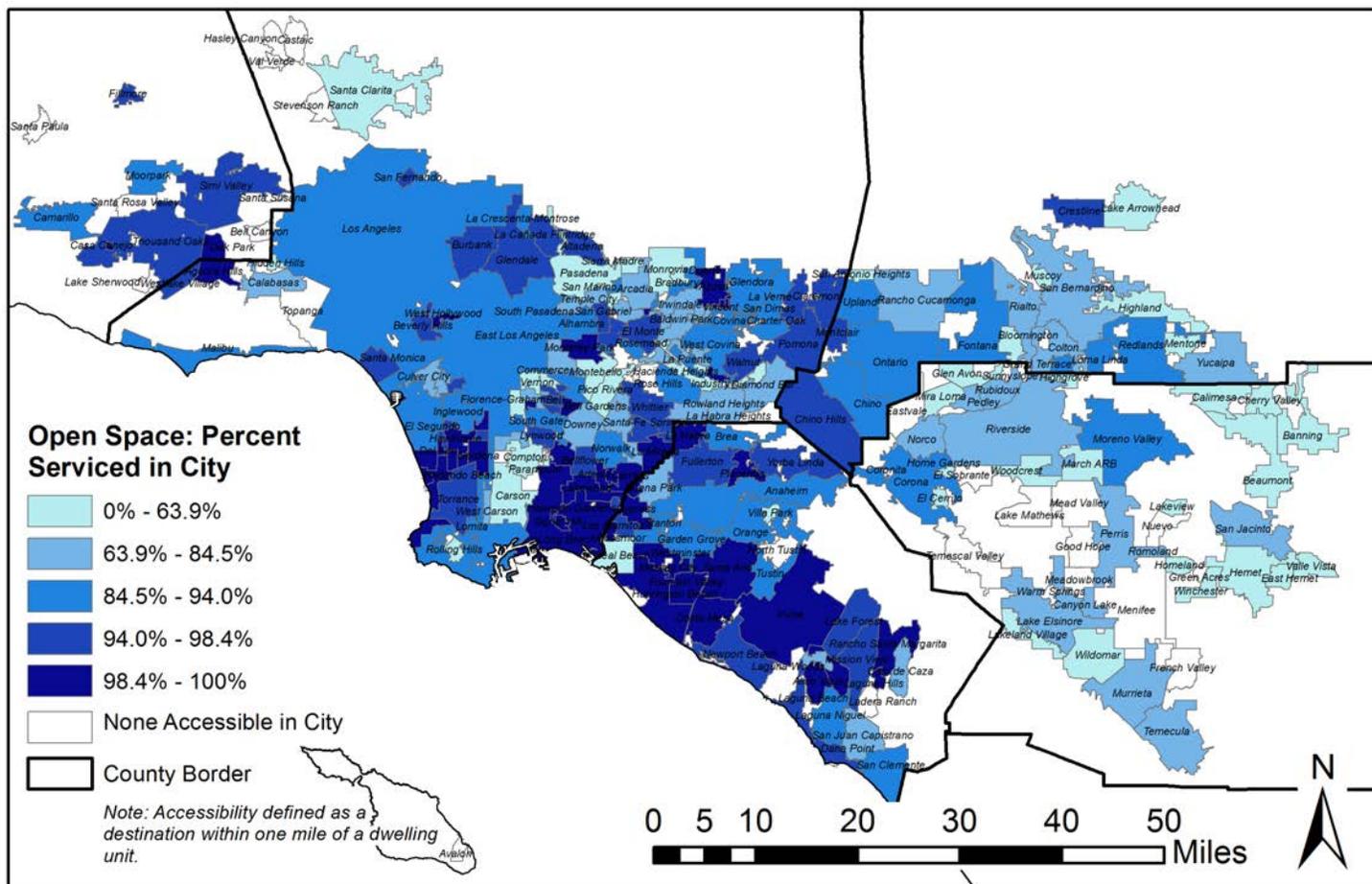


Figure 19: Percent of dwelling units which are within one mile of open space in cities across Southern California. Value ranges shown are quantiles, i.e. 1/5 of the cities in the region are each color.

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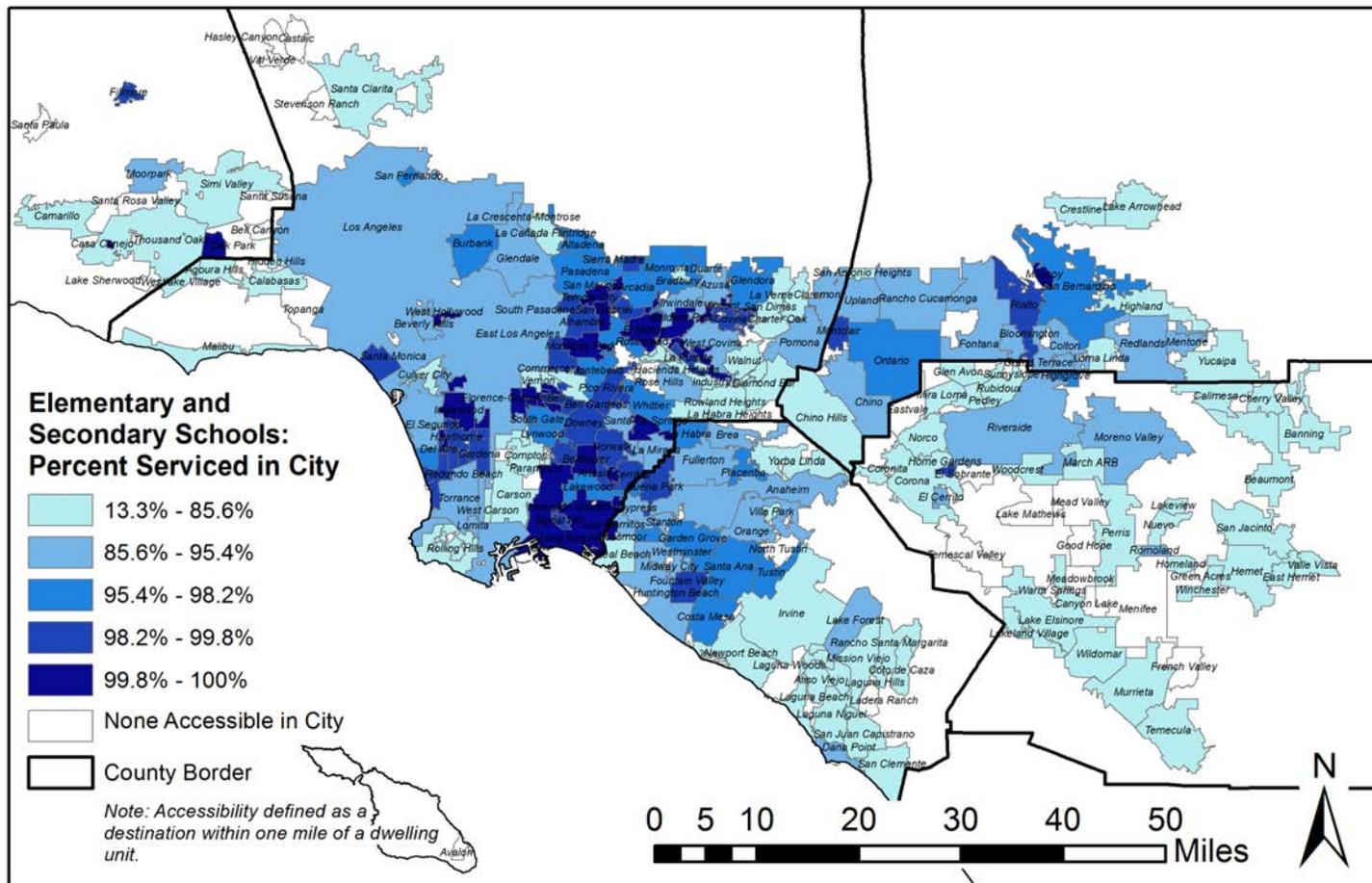


Figure 20: Percent of dwelling units which are within one mile of an elementary or secondary school in cities across Southern California. Value ranges shown are quantiles, i.e. $1/5$ of the cities in the region are each color.

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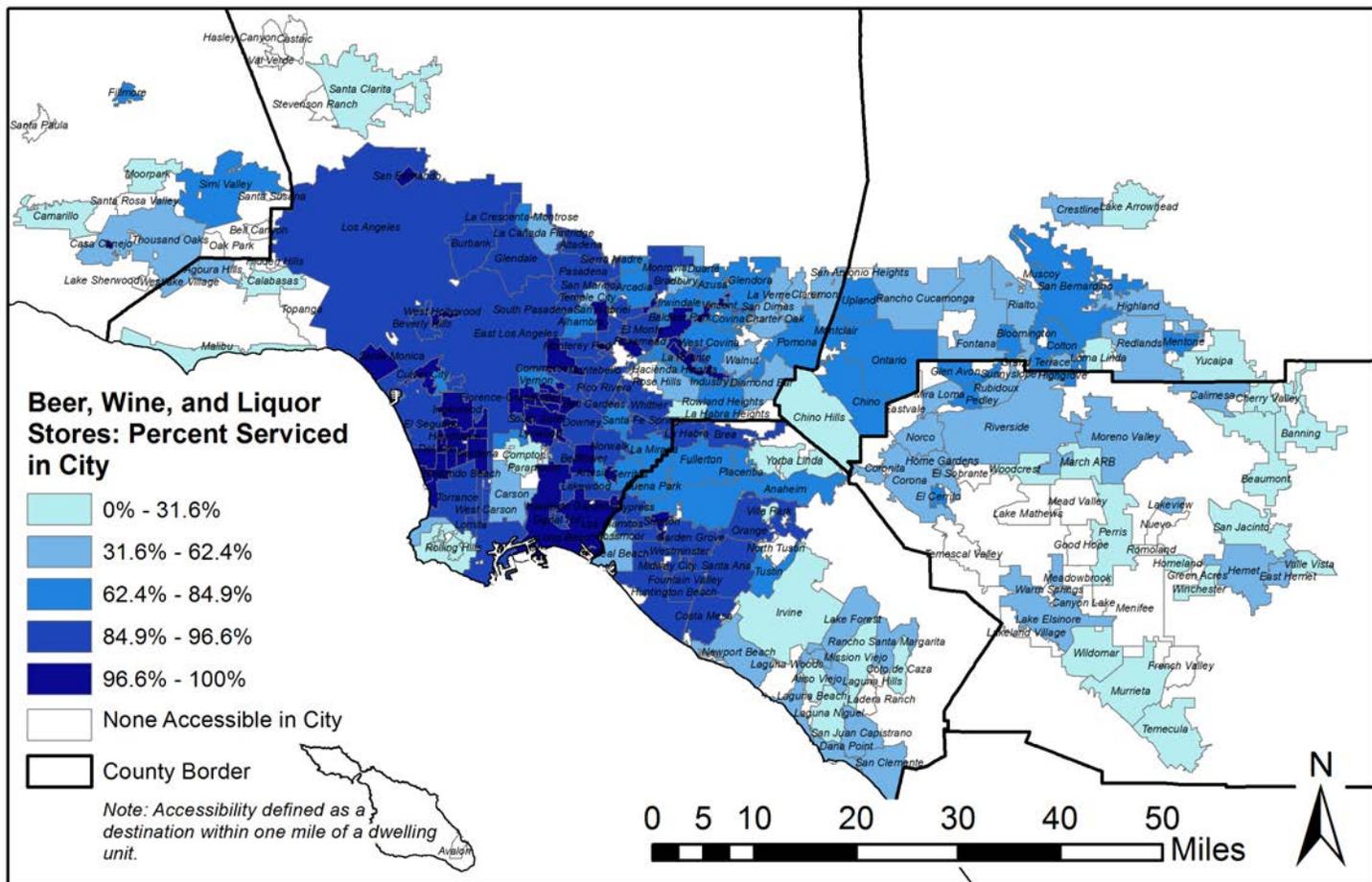


Figure 21: Percent of dwelling units which are within one mile of a beer, wine, or liquor store in cities across Southern California. Value ranges shown are quantiles, i.e. $\frac{1}{5}$ of the cities in the region are each color.

What determines accessibility to restaurants in Southern California cities?⁸

Previously we considered the relationship between accessibility and building age, size, type, value, and neighborhood demographic characteristics across counties in the region. However, these relationships may be stronger or weaker in certain cities. Here we only focus on restaurants – among the most abundant of destinations (where there are restaurants, there is usually other retail). In this section, all effects that are discussed come from models that control for other important characteristics of the parcel or the neighborhood. Full results for each city and each destination type can be found in our web mapping application at http://shiny.datascience.uci.edu/uciMetropolitanFutures/city_access.

The role of older buildings

While older buildings are generally closer to most destination types,

- 17 cities in LA County, 5 cities in San Bernardino County, and 2 cities in Ventura County showed a negative relationship – older buildings were further from restaurants:
 - » In LA County, this negative relationship is strongest in South San Jose Hills, and the largest city with a significant negative relationship is Santa Clarita.
 - » A one percent increase in building age increases accessibility by 2.9% in Diamond Bar, 1.75% in La Mirada, 1.25% in South Pasadena, and 1.2% in Rancho Palos Verdes
 - » In San Bernardino County, Mentone has the strongest *negative* relationship between building age and access – a one percent increase in building age decreases access 0.64%. Chino Hills is the largest city with a negative relationship.
 - » An additional one percent *increase* in building age increases access by 0.19% in Yucaipa – the strongest positive relationship in San Bernardino County
 - » In Ventura County, a one percent increase in building age is associated with a 0.21% *decrease* in access in Thousand Oaks and a 0.10% *decrease* in Simi Valley.

The role of building size

Typically, smaller homes have better accessibility to most destination types. In several cities, this relationship was so strong that a one percent increase in home square footage decreased accessibility by over one percent. These cities include Cudahy, Lomita, West Carson, Commerce, Orange, and Murrieta.

This is the case for 109 of the 160 cities with a population over 10,000 for which home size data were available. In 22 cities, larger homes actually had a significant relationship with *greater* access:

- In Monrovia, Sierra Madre, and South Pasadena in Los Angeles County, a one percent increase in dwelling unit square footage increases accessibility by about 0.2 percent.

⁸ We define cities as census places within the urbanized areas of the 5-county region with a 2010 population greater than 10,000. There are 167 such cities in our data, though some data was not available in all of these cities.

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- In Orange County, a one percent increase in unit size increased accessibility 0.9% in Mission Viejo and 0.25% in Dana Point.
- In Riverside County, a one percent increase in unit size increased accessibility 0.3% in Wildomar and 0.2% in Glen Avon
- In Ventura County, a one percent increase in unit size increased accessibility roughly 0.25% in Oak Park, Fillmore, and Thousand Oaks.

The difference between single-family and multi-family housing

Typically, multifamily housing – whether it is large apartment complexes, townhomes, or condo buildings – show greater accessibility than single-family homes, which tend to be more separated from non-residential land uses. Since the definition of housing types varies by county, we provide only some highlights of this trend, including a few cities that showed a reversed pattern:

- Apartments and condos are over 40 times as accessible in Palos Verdes Estates as single-family homes there, while apartments and condos in Diamond Bar are over 10 times more accessible than single-family homes.
- Apartments and condos in San Marino are over 100 times less accessible than single-family homes there.
- In Mission Viejo, San Juan Capistrano, and Aliso Viejo, apartment and condo units are over one hundred times less accessible than single-family homes there. A total of eleven Orange County cities also have poorer access for multifamily dwellings than single-family homes.
 - » In contrast, in Rancho Santa Margarita and Laguna Niguel, apartments and condos are over 60 times more accessible than single-family homes. This is the case for 18 of the 35 cities investigated in Orange County.

The role of home value and income

Although in Los Angeles County there was a positive relationship between home values and accessibility, this relationship was fairly weak with a one percent increase in home value being associated with only a 0.03% increase in accessibility. When looking at this relationship across individual cities, it's clear that this varies strongly across municipal boundaries: in 38 cities, higher home values are associated with greater access while in 43 cities higher home values are associated with lower access:

- A one percent increase in home value increases access by 12% in South San Jose Hills, 3.4% in Walnut Park, and 3.2% in Lomita and Vincent.
- In the larger cities of Long Beach and Los Angeles, a one percent increase in home value had modestly positive impacts on access – 0.12% and 0.07%, respectively.
- A one percent increase in home value decreases access by 28% in Florence-Graham, 10% in Sierra Madre and Walnut, and 8% in Avocado Heights.

In Riverside County, the only other county with available home value information, the overall positive association between home value and access was slightly stronger – a 0.25% increase in access results from a one percent increase in home value.

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However, only three individual cities showed a positive relationship (Lakeland Village, Murrieta, and Corona) whereas ten cities showed a negative relationship – the highest being Perris and Moreno Valley.

We find across-the-board inverse relationships between median family income in a neighborhood and accessibility, with effects on restaurant access from a one percent increase in wealth ranging from a high of -1.2% in Ventura County to -0.08% in Riverside County.

- Of the 175 cities in our analysis, 115 also showed a significant negative relationship – i.e. higher incomes mean lower restaurant access – while 37 actually demonstrated a positive relationship:
- In the following cities, a one percent increase in neighborhood family income is associated with a *two percent or greater* increase in accessibility: Fillmore, Mentone, San Antonio Heights, Rancho Santa Margarita, Avocado Heights, Del Aire, and Santa Fe Springs. These are mostly smaller cities.
- In the following cities, a one percent increase in neighborhood family income is associated with a *four percent or greater* decrease in accessibility: Running Springs, Muscoy, Pedley, Home Gardens, Aliso Viejo, Laguna Woods, San Dimas, and Calabasas

The role of neighborhood demographics

The share of retirement-aged population in a neighborhood had a mixed relationship with accessibility across counties, with a positive relationship in San Bernardino and Ventura Counties, a negative relationship in Riverside and Orange Counties, and no significant relationship in Los Angeles County.

- In 78 cities a higher share of residents over 65 was associated with greater accessibility to restaurants, while in 78 *other* cities, a higher share of residents over 65 was associated with poorer accessibility to restaurants.
- In the following cities, a one percent increase in share of seniors is associated with a *two percent or greater* increase in accessibility: Walnut, Del Aire, Malibu, Rosmoor, Rancho Santa Margarita, Laguna Hills, Corona, Valle Vista, Big Bear Lake, and Barstow.
- In the following cities, a one percent increase in the share of seniors is associated with a *two percent or greater decrease* in accessibility: La Crescenta-Montrose, Laguna Niguel, Mira Loma, Home Gardens, Woodcrest, Lakeland Village, San Jacinto, Lake Elsinore, Rubidoux, and Wildomar

The share of black (non-Hispanic) population in a neighborhood is associated with better access to restaurants in Orange County but poorer access everywhere else, while the share of white (non-Hispanic) population is associated with better access to restaurants in Los Angeles County, but poorer access everywhere else.

- In 67 cities, neighborhoods with a higher share of black population are associated with greater restaurant access, while in 77 cities a lower share of black population is associated with greater restaurant access

In 79 cities, neighborhoods with a higher share of white population are associated with greater restaurant access, while in 75 other cities a lower share of white population is associated with greater restaurant access.

Local Focus: Accessibility Scenarios in central Orange County

In this section we analyze the impact of new developments on accessibility in the 3-city area of Irvine, Costa Mesa, and Newport Beach.

Accessibility in central Orange County

Table 8 shows the level of access for this 3-city area, which houses a population of 407,521 (2010 data) in 114,941 dwelling units across 73,597 residential land parcels. Despite central Orange County’s newer, automobile-oriented development patterns, this 3-city area is fairly comparable with the rest of the region in terms of service percentage and the average count of establishments within one mile. This area has slightly better apparel retail access, poorer grocery store access, and better open space access than the median value for all cities in the region. Dwelling units in Irvine, Newport Beach, and Costa Mesa have on average more restaurants within one mile, but a lower percentage of dwelling units have at least one restaurant within one mile.

	Percent Served		Average Count	
	3-city area	Median across SoCal Cities*	3-city area	Median across SoCal Cities*
Apparel Retail	89.8%	88.5%	11.7	5.7
Restaurants	88.6%	93.6%	28.1	20.4
Grocery Stores	76.0%	85.4%	2.0	2.8
Open Space	96.5%	91.9%	50.3	16.8
All 31 destinations	–	–	295.4	234.4

*includes cities in study area with a 2010 population of 10,000 or greater

Table 8: Accessibility in 3-city area of Newport Beach, Irvine, and Costa Mesa

Impact of New Development on Accessibility

Similar to the rest of California, Orange County is undergoing a high rate of construction of multifamily housing units. A number of development proposals challenge central Orange County’s reputation as an area dominated by detached, single-family homes.

In particular, several recent development proposals include large, rental apartment and condominium buildings in historically nonresidential portions of Irvine and Newport Beach (roughly similar in appearance to Figure 22). Some, including the proposed Koll Center near Newport Beach’s Fashion Island shopping mall include space for ground-level retail or public parks,

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which would result in greater accessibility for residents in and nearby the new development. However, these developments can be met with resistance from local planning boards due to the zoning variances required to accommodate additional density and the possibility for additional traffic congestion.



“The Elan” in Huntington Beach



“The Apex” in Laguna Niguel

Figure 22: Two recently completed luxury rental apartments in Orange County. Photographs by author.

The California Environmental Quality Act (CEQA) requires certain large-scale projects to undergo thorough Environmental Impact Reports (EIR) which forecasts the impact of new developments on future traffic in the surrounding area, though not all developments are independently analyzed⁹. While such reports comprehensively analyze land use changes such as increased density, they do not typically account for the potential for increased or decreased accessibility that density can provide. Depending on where they are located relative to existing business establishments (and especially if they are mixed-use or adjacent to shopping districts), these new kinds of developments have the potential to reduce travel as well.

Table 9 shows thirteen recently completed, under construction, or proposed multifamily developments in Irvine, Newport Beach, and Costa Mesa.¹⁰⁻¹¹ Their 4,656 combined units would represent a fairly substantial 4.1% increase in the number of existing dwelling units in the 3-city area, and our aim is to understand the impact they would have on overall accessibility levels.

Table 10 shows the number of establishments within one mile of each of these new developments. Note that this does not include the any new businesses contained in or near the developments; however, some research has shown that retail within principally multifamily residential developments can be subject to above-average vacancy and thus may not actually provide accessibility benefits to those living nearby.¹² In this Report, no consideration is given to the possible competition stemming from increased demand for services, as this analysis focuses on how the accessibility measures we have used would change as a result of these new development projects.

9 For example, while the Irvine Gateway Apartments project would typically be subject to environmental review, it was not subject to a separate EIR. Instead, the EIR conducted for the redevelopment of the entire Irvine Business Complex area was substituted, making the individual impact of the apartment project difficult to discern. See http://irvine.granicus.com/MetaViewer.php?view_id=&event_id=1095&meta_id=70057.

10 Since Orange County parcel data is the oldest in our sample – 2012 – even the recently completed developments in this list were not included in our prior analysis of Orange County accessibility.

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Name	Status*	Intersection/Address	Residential Units
Sterling at Parasol Park	Construction	375 Magnet, Irvine	747
The Residences at Newport Place	Planned	Scott & Dove, Newport Beach	384
Museum House	Planned	850 San Clemente Dr., Newport Beach	100
Irvine Gateway	Construction	17150 Von Karman, Irvine	434
The Alton	Completed	Alton & Millikan, Irvine	344
Vireo at Park Place	Construction	Jamboree & Michelson, Irvine	520
360 Fusion	Construction	2852 McGaw, Irvine	280
Koll Center	Planned	Birch & Von Karman, Newport Beach	260
Superior Pointe	Completed	1690 Shoreline Way, Costa Mesa	49
Villas Fashion Island	Completed	1000 San Joaquin Plz., Newport Beach	524
Trilogy at Irvine Business Center	Planned	Martin & Von Karman, Irvine	876
Meridian	Completed	1001 Santa Barbara Dr., Newport Beach	89
150 Newport Center	Planned	Newport Ctr Dr & Anacapa Dr, Newport Beach	49
Total:			4,656

Table 9: Selected new developments in Orange County

*Estimate; based on local news reports and online listings

Sterling at Parasol Park, which is a Greenfield development adjacent to the Irvine Great Park area, stands out for having few nearby establishments. However, this development is part of a master plan which aims to build nearby retail uses as well, which are not yet reflected in our destination data. Most other developments are at or above the local average for apparel retail and restaurants nearby, though 9 of the 12 have two or fewer grocery stores nearby and all but two have less nearby open space than average.

Name	Apparel Retail	Restaurants	Grocery Stores	Open Space	All 31 Destination Types
Sterling at Parasol Park	0	0	0	1	4
The Residences at Newport Place	15	63	2	4	325
Museum House	67	39	1	6	389
Irvine Gateway	13	52	5	1	402
The Alton	9	44	2	43	419
Vireo at Park Place	4	46	0	54	447
360 Fusion	6	52	4	90	468
Koll Center	15	72	1	12	498
Superior Pointe	65	123	11	26	657
Villas Fashion Island	64	34	1	6	729
Trilogy at Irvine Business Center	14	83	1	9	850
Meridian	68	39	1	10	943
150 Newport Center	89	57	4	30	1318
Average for 3-city area	12	28	2	50	295

Table 10: Count of destinations within one mile of new development

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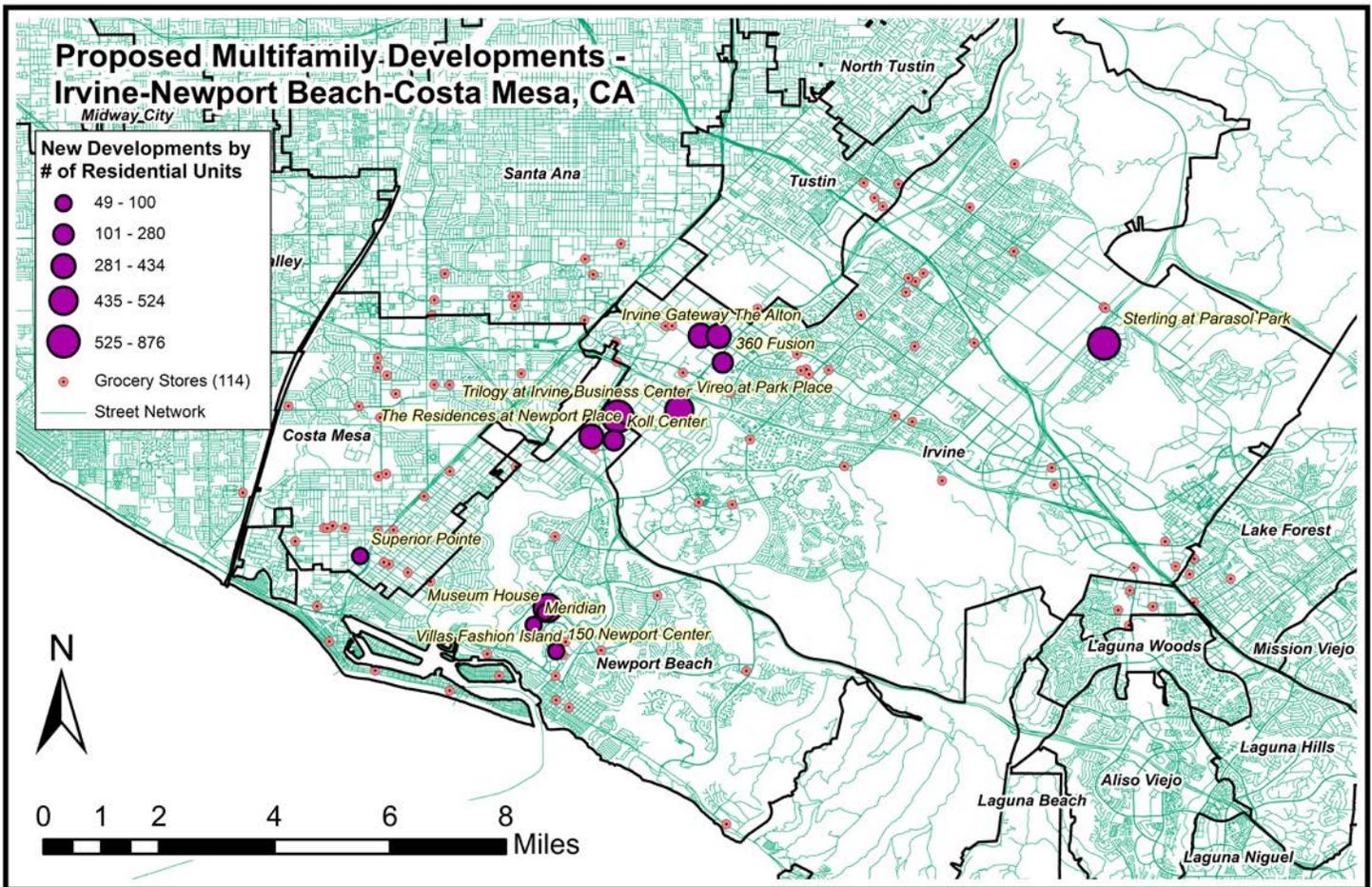


Figure 23: Location and size of a selection of proposed multifamily residential developments in Orange County.

We can now consider the aggregate impact of these new developments on accessibility in the 3-city area in Table 11.

	Percent Served		Average Count	
	3-city area	Median across SoCal Cities*	3-city area	Median across SoCal Cities*
Apparel Retail	89.8%	89.5%	11.7	12.0
Restaurants	88.6%	88.4%	28.1	28.9
Grocery Stores	76.0%	75.9%	2.0	2.0
Open Space	96.5%	96.7%	50.3	49.1
All 31 destinations	-	-	295.4	303.8

*includes cities in study area with a 2010 population of 10,000 or greater

Table 11: Impact of developments on accessibility in 3-city area

11 The location and size of these developments was assembled from a variety of sources, mainly Orange County Register newspaper articles and the LA OC Development Buzz blog at www.laocdb.com. The information contained in this Report on individual developments is intended to demonstrate their potential impacts on accessibility. It is not intended to be an accurate source of information about these specific projects.

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The impact on percent serviced is negligible, and is largely associated with the 747 units at the Parasol Point development near the Great Park, which does not have apparel retailing, restaurants, or grocery stores within one mile (though, this will likely change when surrounding developments are completed). Overall, each of these three measures decreases slightly region-wide due to the addition of low-serviced units, though the slight uptick in open space access is due to all 4,656 new units having open space nearby.

The impact on average counts also appears quite small, though it depends on the relative accessibility of the new homes compared to existing homes. New homes on average are more accessible than existing homes to apparel retail and restaurants, but less accessible than existing homes to grocery stores and open space. **Thus, new developments' contribution to city-wide accessibility depends on whether *their* level of accessibility is greater or lower than the average accessibility of existing dwelling units in a city.** While we do not investigate it in this Report, the opening of new destinations near exiting homes – particularly those that are under-serviced – would increase these values as well.

This analysis highlights the importance of siting new developments near existing infrastructure such as transit nodes, existing downtowns or commercial strips. Developments near Fashion Island increase accessibility to clothing stores and restaurants, but do little to improve access to grocery stores, parks, schools, or social services – which are not traditionally located near shopping malls. Irvine Business Center area developments are similar in that nearby destinations are not typical of residential areas. Superior Pointe in Costa Mesa takes advantage of its proximity to a more established commercial corridor on 17th street, which backs up to existing residential neighborhoods and has grocery stores, drug stores, and recreational facilities, which typically serve local populations regularly. In contrast, the Fashion Island shopping mall was designed to draw less frequent shoppers from a wider area, which is reflected in the uptick in restaurant and apparel retail access for developments near there.

Any accessibility goals across a city or region, therefore, should strive to take frequency of travel and the service's necessity into account. Traffic and pollution impacts for Fashion Island developments could be substantial if residents need to visit a faraway grocery store twice a week (there currently is just one grocery store – Whole Foods – in this mall), while they likely only visit nearby specialty boutiques on rare occasions. Finally, this analysis does not take into account the cost of housing in these new developments. Though some of these developments have designated affordable units in order to satisfy affordable housing program requirements, market rate prices are generally prohibitively expensive for most families. Accessibility benefits of new housing developments will only accrue to those individuals who can afford to live in them. However, as discussed in the introduction, as properties age and their prices decrease, accessibility benefits should “filter” down, so long as prices are not kept artificially high or premiums on access increase

12 A discussion of the viability of mixed-use retail was provided here:

Hernandez, Tony and Maurice Yeates. Evolving commercial strips and public policy: The ethics of obsolescence. *Meeting of the Association of American Geographers*, San Francisco, CA. March 29-April 2.

Conclusions

The number of Southern Californians traveling from their homes to “everyday destinations” has numerous social and environmental implications, including pollution, congestion, and spending on road infrastructure. It is also costly in terms of both money, time, and opportunities spent doing activities other than traveling. While internet shopping, telecommuting, and ride hailing apps can change some of our travel patterns, we still spend our lives in cities and need to be able to get around them. The way our cities are spatially arranged – and decades worth of development decisions that led to homes and businesses being placed where they are – determines a huge portion of our lives.

This report examined how these immediate surroundings are spatially organized in the present day. More specifically, we investigated the accessibility of roughly five million housing units across the five-county Southern California metropolitan region to 31 essential destinations, including grocery stores, service shops, hospitals, rail transit stations, and public open space. In accomplishing this, we used a massive dataset of geo-coded homes, establishments, and public amenities, constructed based on multiple sources of information, which enabled us to analyze the complex housing – destination accessibility patterns much more comprehensively than previous studies. We used this approach to evaluate some proposed changes in the built environment in Orange County to show how the placement of developments can impact a region’s level of accessibility.

There is great variability — at the county and city level — in the relationship between housing and everyday destinations in Southern California:

- Accessibility to most destinations tends to be higher in Los Angeles and Orange Counties than elsewhere in the region.
- In general, older homes, smaller homes, and multifamily homes are associated with greater accessibility to most everyday destinations. Simply put, *density* is important for accessibility.
- The density alone, however, does not account for the full extent of the accessibility variation. Building age is also important, i.e. older dwelling units are systematically closer to more everyday destinations, which makes the siting of these destinations particularly important since it’s not possible to build old buildings.
- It is important to note that substantial variation also exists across cities and counties. For instance, the share of senior citizens in a neighborhood is associated with greater accessibility in 78 cities, and poorer accessibility in 78 other cities.
- Some of our findings also suggest that the accessibility distribution needs to be carefully assessed on the basis of social equity. While there is a negative relationship between income and accessibility to most destinations, open space access is strongly associated with wealth, while in Los Angeles county a higher share of black (non-Hispanic) population is associated with poor accessibility
- New development proposals – especially mixed-use ones – can be evaluated based on their impact on accessibility to everyday destinations, not just their impact on traffic. The impact of new housing developments on city-wide access on how those units score relative to existing ones. It is also important to maximize accessibility to the most frequented of destinations like schools and grocery stores.

Technical Appendix A: Data Sources Used

- Business establishment data are current as of 2014 and were provided by:
 - Infogroup. (2015). *Reference USA Historical Business Dataset*.
- Rail station data was provided by LA Metro and Caltrans:
 - » *California Passenger Rail System: Commuter Routes and Stations*. (2013). Retrieved from: http://www.dot.ca.gov/hq/tsip/gis/datalibrary/Metadata/RR_Commuter_13.html
 - » *Metro Rail Stations*. (2016). Retrieved from: <http://developer.metro.net/introduction/gis-data/download-gis-data/>
- Open space data was provided by the California Protected Areas Database (CPAD):
 - » *California Protected Areas Database*. (2016). Retrieved from: <http://www.calands.org/>
- Parcel-level tax assessor data was retrieved from:
 - » *Los Angeles County Assessors Parcel Data 2006-2016*. (2016). Los Angeles County Open Data. Retrieved from: <https://data.lacounty.gov/Parcel-/Assessor-Parcels-Data-2006-thru-2016/9trm-uz8i>
 - » *Orange County Parcel Level Land Use Data*. (2012). Southern California Association of Governments.
 - » *Assessor General Table*. (2016). Riverside County GIS. Retrieved from: https://gis.countyofriverside.us/arcgis_public/rest/services/OpenData/AssessorTables/MapServer/2
 - » *San Bernardino County Parcel Basemap*. (2016). County of San Bernardino GIS Services. Retrieved from: <http://cms.sbcounty.gov/gis/Home.aspx>
 - » *Ventura County Assessor Books*. (2016). Retrieved from: <http://www.ventura.org/gis-mapping/gis-data-downloads-mapping-base>
- Neighborhood demographic characteristics were retrieved from the US Census Bureau's 2015 American Community Survey. www.factfinder2.census.gov

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Metropolitan Futures Initiative (MFI) • Quarterly Report
 What makes housing accessible to everyday destinations in Southern California?

Technical Appendix B: Categorization of Destinations

A description of category types can be found on our web mapping application at http://shiny.datascience.uci.edu/uciMetropolitanFutures/city_access and in the table below.

NAICS CODES WHICH COMPRISE EACH NEIGHBORHOOD BUSINESS TYPE

Number	Business Category Name	6-digit NAICS Codes (2012 Series)
1	Apparel Retailing	448110, 448120, 448130, 448140, 448150, 448190, 448210, 532111, 441310, 441320, 811111, 811112, 811113, 811118, 811121, 811122, 488410, 811191, 811192, 811198
2	Auto Services	811121, 811122, 488410, 811191, 811192, 811198
3	Beer, Wine, and Liquor Stores	445310
4	Child Care Services	624410
5	Convenience Stores	445120
6	Deposit-taking Institutions	522110, 522130
7	Drinking Places (Alcoholic Beverages)	722410
8	Drug Stores	446110
9	Elementary and Secondary Schools	611110
10	Full-Service Restaurants	722511, 722513, 722514
11	Gas Stations	447110, 447190
12	General Merchandise Retailing	452111, 452112, 452910, 452990, 453310
13	Groceries	445110
14	Hair Care Services	611511, 812111, 812112, 812113, 621111, 621112, 621210, 621310, 621320, 621330, 621340, 621391, 621399, 621410, 621420, 621491, 621492, 621493, 453210, 443141, 442110, 442210, 442291, 442299, 444210, 444220, 444130, 444110, 444120, 444190
15	Healthcare Provider Offices*	621391, 621399, 621410, 621420, 621491, 621492, 621493, 453210, 443141, 442110, 442210, 442291, 442299, 444210, 444220, 444130, 444110, 444120, 444190
16	Home Products Retailing	444220, 444130, 444110, 444120, 444190
17	Hospitals	622110, 622210, 622310
18	Laundry	812320, 812310
19	Limited-Service Food and Beverage	722515
20	Medical Laboratories	339116, 621511, 621512
21	Open Space	Provided by CPAD: California Protected Areas Database
22	Other Learning	611519, 624310, 611610, 611692, 532220, 532299, 541940, 812191, 812199, 812910, 812990, 541921, 812921, 812922
23	Other Personal Services	541921, 812921, 812922
24	Personal Financial	524210, 541213
25	Personal Products Retailing	453991, 446120, 446199, 453910, 453998
26	Recreational Facilities and Instruction	611620, 713910, 713940, 713950
27	Religious Organizations	813110, 561622, 811212, 811310, 811411, 811412, 811211, 811213, 811420, 811430, 811490, 624110, 624120, 624190, 624210, 624221, 624229, 624230, 813212, 813219, 813311, 813312, 813319, 813410, 813990, 311811, 445210, 445220, 445230, 445291, 445292, 445299, 446191, 451211, 451212, 443142, 451140, 451110, 451120, 532230, 446130, 453220, 453110, 448310, 448320, 451130
28	Repair Services	811420, 811430, 811490, 624110, 624120, 624190, 624210, 624221, 624229, 624230, 813212, 813219, 813311, 813312, 813319, 813410, 813990, 311811, 445210, 445220, 445230, 445291, 445292, 445299, 446191
29	Social Service Organizations	813212, 813219, 813311, 813312, 813319, 813410, 813990, 311811, 445210, 445220, 445230, 445291, 445292, 445299, 446191
30	Specialty Food	446191, 451211, 451212, 443142, 451140, 451110, 451120, 532230, 446130, 453220, 453110, 448310, 448320, 451130
31	Specialty Retailing	446130, 453220, 453110, 448310, 448320, 451130
32	Rail Stations	LA Metro plus Metrolink stations

* This category is not included in network distance results due to computing power constraints.

Technical Appendix C: Calculating Fair Market Value from Assessor Data

This report calculates a property's market value based on county assessor data, rather than recent sales. Assessor data has the advantage of covering all properties, not just those which sold. However, values are not directly based on actual sales, and thus may be less representative of current market conditions. The year used in this study varies between 2012 and 2016 by county, based on data availability; however both Los Angeles and Riverside Counties – the only entities which provided comprehensive assessment data – are both from 2015.

In addition, Proposition 13, a tax relief measure passed by California voters in 1978, dramatically changes the manner in which real property is assessed for tax purposes. A more complete discussion can be found at <http://www.lao.ca.gov/reports/2016/3497/common-claims-prop13-091916.pdf>. As a result of the proposition, the assessor only appraises the market value of a property when a sale is completed. Using the Federal Housing Finance Agency (FHFA) index for home price appreciation in the Los Angeles–Long Beach–Glendale metropolitan area, we estimated the appreciation expected of homes since their last tax assessment year based on region wide trends.¹ Removing the Proposition 13–based appreciation formula of 2 percent per year or the level of inflation (whichever is lower in a given year) yields an estimate of fair market value for properties that have not been reassessed since their last sale.

Technical Appendix D: Statistical Models

This Report's sections on "What determines accessibility in Southern California Counties" and "What determines accessibility to restaurants in Southern California Cities" are based on regressions using residential dwelling units as observations. We used ordinary least squares regression with cluster-robust standard errors at the block-group level to account for the use of both parcel-level and block-group level (neighborhood) covariates. Coefficients are standardized in both independent and dependent variables to facilitate side-by-side comparisons between coefficients in a model (i.e., the impact of building age vs. the impact of square footage on accessibility to restaurants in Los Angeles County) but also between business categories (i.e. the impact of building age on access to restaurants vs. access to grocery stores). Estimates where the statistical significance was below a threshold of $p < 0.05$ are excluded from the results — i.e. a zero value indicates either a significant coefficient estimate of zero, or a standard error too high for determining whether the parameter estimate is significantly different from zero – which occurs in a substantial number of cases in city models. Variables are log transformed so as to facilitate percentage change interpretations.

In the county models a separate regression was run for each county in the region; note that the included covariates differ slightly by county, therefore marginal effects should be careful when comparing across counties since other factors may or may not be included in either model.

In the city models, a separate regression was run for each city in the region. Full results are available in our web mapping application at http://shiny.datascience.uci.edu/uciMetropolitanFutures/city_access.

Additional References

- i California Housing Units. *California Homebuilding Foundation*, www.myCHF.org. 1 Sept 2016.
- ii Kane, K. and Young-An Kim. Under Review. Big data as individual data: How can parcels and establishments improve the measurement of proximity in cities? *Environment and Planning B*.
- iii Kane, K., Hipp, J.R. & Kim, J.H. Analyzing accessibility using parcel data: Is there still an access-space tradeoff in Long Beach, California? *The Professional Geographer*. Available online 15 February
- iv FHFA. 2016. *All-transactions house price index for Los Angeles-Long Beach-Glendale, CA (MSAD)* [ATNHPIUS31084Q], Retrieved from <http://research.stlouisfed.org/fred2/series/ATNHPIUS38060Q>



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