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Mobility, Accessibility and Disadvantaged Neighborhoods: Assessing Diversity in Transportation-Related Needs and Opportunities

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Mobility, Accessibility and Disadvantaged Neighborhoods:

Assessing Diversity in Transportation-Related Needs and Opportunities

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A Research Report from the Pacific Southwest Region University Transportation Center

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This project examines commonalities and differences among disadvantaged neighborhoods in mobility and access to opportunities. Our approach is based on the concept of spatial-transportation mismatch (STM), which asserts that spatial distance and poor transportation are potential barriers to opportunities beyond one's immediate location. The project analyzes variations in transportation resources and accessibility to employment, quality elementary schools, and health care. The study compares two regions in California, one highly urbanized (Los Angeles County) and one more agriculture based (San Joaquin County). This allows us to compare disadvantaged neighborhoods with nondisadvantaged neighborhoods within each region, and to compare disadvantaged neighborhoods in one county versus another. The project uses policy-based definitions of disadvantaged neighborhoods and bivariate tabulations. The project's empirical findings are partially consistent with the existing literature: residents of disadvantaged neighborhoods suffer from some STM in multiple arenas, especially those in rural areas. The analysis also finds considerable heterogeneity in the magnitude of inaccessibility in the two regions. Residents in disadvantaged San Joaquin tend to fare worse. The diversity of outcomes at the neighborhood level points to the need to be flexible so programs and investments can address the diversity in transportation challenges and investment opportunities of disadvantaged communities.</td></tr>
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About the Pacific Southwest Region University Transportation Center

The Pacific Southwest Region University Transportation Center (UTC) is the Region 9 University Transportation Center funded under the U.S. Department of Transportation's University Transportation Centers Program. Established in 2016, the Pacific Southwest Region UTC (PSR) is led by the University of Southern California and includes seven partners: Long Beach State University; University of California, Davis; University of California, Irvine; University of California, Los Angeles; University of Hawaii; Northern Arizona University; and Pima Community College.

The Pacific Southwest Region UTC conducts an integrated, multidisciplinary program of research, education, and technology transfer aimed at *improving the mobility of people and goods throughout the region.* Our program is organized around four themes: (1) technology to address transportation problems and improve mobility; (2) improving mobility for vulnerable populations; (3) improving resilience and protecting the environment; and (4) managing mobility in high-growth areas.

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Disclosure

Principal investigator and others conducted this research titled "Mobility, Accessibility and Disadvantaged Neighborhoods: Assessing Diversity in Transportation-Related Needs and

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CNK at UCLA acknowledges the Gabrielino/Tongva peoples as the traditional land caretakers of Tovaangar (Los Angeles basin, So. Channel Islands) and pay our respects to the Honuukvetam (ancestors), 'Ahiihirom (elders), and 'Eyoohiinkem (relatives/ relations) past, present, and emerging.

Abstract

This project examines commonalities and differences among disadvantaged neighborhoods in mobility and access to opportunities. Our approach utilizes the concept of spatial-transportation mismatch (STM), which hypothesizes that spatial distance and poor transportation are potential barriers to opportunities beyond one's immediate location. The project analyzes if and how transportation resources and accessibility to employment, quality elementary schools, and health care vary across and within regions. The study compares two regions in California, one highly urbanized (Los Angeles County) and one more agriculture based (San Joaquin County). This allows us to compare disadvantaged neighborhoods with disadvantaged neighborhoods within each region, and to compare disadvantaged neighborhoods in one county versus another. The project uses policy-based definitions of disadvantaged neighborhoods and bivariate tabulations. The project's empirical findings are consistent with the existing literature: residents of disadvantaged neighborhoods suffer from some STM in multiple arenas, especially those in rural areas. The analysis also finds considerable heterogeneity in the magnitude of inaccessibility in the two regions. Residents in disadvantaged San Joaquin tend to fare worse. The diversity of outcomes at the neighborhood level points to the need to be flexible so programs and investments can address the diversity in transportation challenges and investment opportunities of disadvantaged communities.

Mobility, Accessibility and Disadvantaged Neighborhoods: Assessing Diversity in Transportation-Related Needs and Opportunities

Executive Summary

Background: This project examines the nature, pattern, and magnitude of commonalities and differences among disadvantaged neighborhoods in mobility and access to opportunities. The project constructs and analyzes small areas (census tracts) transportation-mode-specific accessibility indicators to employment, quality elementary schools, and health care. Because of the pandemic, the health-care analysis focuses on the current COVID-19 crisis. The project is designed to produce insights that can enable California to meet its climate-change and social-justice goals. The former is articulated in Senate Bill 535 and other legislation. Racial equity has recently become more pressing. David S. Kim, California Secretary of Transportation (CalSTA), has stated that "CalSTA firmly embraces racial equity, inclusion and diversity." California Air Resources Board's (CARB) Resolution 20-33 commits the agency "to establish and enhance proactive measures to ensure racial equity permeates all of CARB's activities." This includes policies, programs, and investments that promote social equity, including prioritizing efforts to assist the most disadvantaged neighborhoods. This project contributes to those efforts by providing empirical information to assist state agencies develop analytical methods that strengthen equity knowledge in transportation and land-use planning.

Methods: Our approach utilizes the concept of spatial-transportation mismatch (STM), which hypothesizes that spatial distance and poor transportation are simultaneous barriers to opportunities beyond one's immediate location. The study uses a comparative approach utilizing two regions in California, one highly urbanized (Los Angeles County) and one relatively more agriculture based (San Joaquin County). To maximize real-world application, we adopted two policy-based indicators to create three classes of neighborhoods: disadvantaged, partially disadvantaged, and not disadvantaged. This allows us to compare disadvantaged neighborhoods with nondisadvantaged neighborhoods within each region, and to compare disadvantaged neighborhoods in one county versus another. The project uses bivariate tabulations to describe the variation in accessibility among policy-based definitions of disadvantaged neighborhoods. The project has five tasks: (1) access, assess, geocode, clean, and assemble research dataset; (2) utilize and test alternative STM indicators; (3) quantitatively examine heterogeneity among neighborhoods; (4) post the nonproprietary components of the dataset on a website; and (5) produce a final report, policy brief, and a paper to submit to an academic or professional journal. Some tasks have been modified because of the unexpected and significant disruptions caused by the COVID-19 pandemic, as well as new opportunities to examine STM.

Results: The broad results are not surprising and confirm what experts already believe: residents of disadvantaged neighborhoods suffer from some aspects of STM in multiple arenas, especially those in areas that are more rural. This study contributes to the literature by

quantifying the differences. There is, as documented in the empirical chapters, noticeable heterogeneity in the magnitude of inaccessibility in the two regions. For example, residents in disadvantaged San Joaquin fare worse in employment outcomes, and young students fare worse in reaching quality education. Both of these outcomes are partially the product of larger structural factors: a relative lack of geographic compactness and density, as well as a lower-wage and less stable labor market and lower-performing school system. One interesting observation is that households respond to the more dispersed spatial configuration is a greater reliance on automobiles, both in terms of higher ownership and more vehicle miles traveled (VMT). San Joaquin's geographic structure, however, is not always a negative for disadvantaged neighborhoods. This is apparent in the lower COVID-19 death rates and higher vaccination rates, relative to disadvantaged residents in Los Angeles. In other words, STM matters, but can vary across regions and policy arenas. The finding points to a reality that a "one-size-fits-all" approach is not sufficient to address the transportation needs and investment opportunities of disadvantaged communities.

Conclusion: Despite the diversity in measured outcomes, the findings also point to a singular unescapable commonality, our society is spatially stratified. Neighborhood inequality is both a reflection and a contributor to aspatial forms of disparities along economic and race lines. Disadvantaged places are disproportionately inhabited by low-income households and people of color, a consequence of market forces and discriminatory practices. The problem is not merely one of housing segregation but also of economic underinvestment, place stigma, and political disenfranchisement. The unequal spatial structure is compounded by systematic inequalities in household transportation resources, which is only partially offset by public transit. Residents in marginalized neighborhoods have relatively fewer vehicles, which limits their ability to access regional opportunities. The multiple arena of societal marginalization forms a web of interacting forces that creates and reinforces neighborhood stratification. STM is an integral part of this larger structure, which some call systemic inequality and systemic racism. While it is too daunting to tackle and dismantle the whole structure, it is possible to chip away through little steps within the field of transportation.

Recommendations: The project has three major recommendations. The first is that public-sector agencies should incorporate the project's approach to analyzing disadvantaged neighborhoods through detailed and geographic-specific data, indicators, and metrics. This would enable them to better identify, prioritize, and customize policies, programs, and investments. The second recommendation is to replicate the information for the entire state, and make the data readily accessible to other analysts, community stakeholders, and interested parties. The latter can be done through a user-friendly data/mapping portal. The final recommendation is to expand beyond the traditional boundaries of transportation planning because the "accessibility problem" is complex, the product of multiple factors. Acknowledging this reality into professional practice will expand the arena for transportation planning and build bridges to other public policy arenas that can collectively eliminate the barriers.

Chapter 1: Introduction

This chapter (Introduction) provides an overview of the entire project, and much more details are discussed in subsequent chapters. This project examines the nature, pattern, and magnitude of commonalities and differences among disadvantaged neighborhoods in mobility and access to opportunities. The project constructs and analyzes small areas (census tracts) transportation-mode-specific accessibility indicators to employment, quality elementary schools, and health care. Because of the pandemic, the health-care analysis focuses on the current COVID-19 crisis. It is too early to analyze the pandemic impacts on employment and education, so the report focuses on patterns prior to the public-health disruptions. The project focuses on one urban county (Los Angeles, or LA) and one agriculture-dominated county (San Joaquin, or SJ); more information is included in Chapter 2. The project mainly uses bivariate tabulations to describe the variation in accessibility among policy-based definitions of disadvantaged neighborhoods.

The project is designed to produce insights that can enable California to meet its climate-change goals, as articulated in Senate Bill 535 and other legislation. For example, David S. Kim, California Secretary of Transportation (CalSTA), has stated that "CalSTA firmly embraces racial equity, inclusion and diversity." CARB's Resolution 20-33 commits the agency "to establish and enhance proactive measures to ensure racial equity permeates all of CARB's activities." This includes policies, programs, and investments that promote social equity, including prioritizing efforts to assist the most disadvantaged neighborhoods. This project contributes to those efforts by providing information on the commonality and uniqueness of these communities with respect to mobility, accessibility to opportunities, and needs to close transportation disparities. State agencies such as the Department of Transportation (Caltrans) and the Air Resource Board (CARB) can benefit because they were slow to implement policies and programs to improve the quality of life, public health, and economic opportunity in marginalized communities (California Environmental Justice Alliance, 2017). The project's findings contribute to fulfilling these promises by developing analytical methods that empirically examine and document the diversity among disadvantaged neighborhoods in terms of transportation, land-use patterns, and accessibility.

The project is organized around five tasks, three of which are discussed in this draft report. Task 1 includes accessing, assessing, geocoding and cleaning data, and assembling the components into a research dataset. Task 2 utilizes and tests alternative formulas and specifications to construct accessibility indicators. Task 3 quantitatively examines and measures the heterogeneity in the accessibility indicators among all neighborhoods and disadvantaged neighborhoods. The other two tasks will be completed by the end of the project. Task 4 will cover the posting of the dataset on a website. The final task will produce a PSR-approved final report, a policy brief for UCLA Institute of Transportation Studies, and a paper to submit to academic and professional journals for publication. Some tasks have been modified because of the unexpected and significant disruptions caused by the COVID-19 pandemic, which created numerous obstacles that made it challenging to work collectively as a research team and to access resources housed physically on campus. Moreover, our efforts to use multivariate clustering techniques did not produce useful results, thus are not reported here. At the same time, the pandemic also provides new opportunities to modify a part of the research project (the health section) to produce much-needed and timely insights.

The project's conceptual framework is based on both academic and professional knowledge and practices, the nexus between societal opportunities and transportation-spatial access. We draw heavily from the spatial-transportation mismatch literature, which argues that both space and the ability (or lack of ability) to overcome space are critical in understanding economic, educational, and health outcomes. The literature points to the critical importance of vehicle ownership in our car-dominated society. Car ownership is influenced by both income and cost, and the latter is associated with factors such as interest rates on loans and insurance premiums. Residents in disadvantaged neighborhoods face disproportionately higher poverty rates, thus are less likely to have a private vehicle, which in turn lowers access to opportunities and produces systemic inequality of outcomes. This can be partially offset by two other factors that also influence accessibility: whether transit stops are within a reasonable walking distance and level of service, and the availability of nearby services and opportunities. We use this conceptual framework, which is discussed in more details in later chapters, in selecting key indicators for analysis.

A crucial element for this study is defining the criteria used to designate whether a neighborhood is disadvantaged, not a simple task given that there are multiple forms of spatial inequality (social, economic, political, environmentally, etc.). There is no definitive approach, but rather alternatives that prioritize some dimensions over others. Using one ultimately involves trade-offs. This project uses policy-based definitions because they are consistent with a larger goal to inform decision makers, community stakeholders, and public-sector agencies. Operationalizing categories this way produces empirical results that are useful to the development and implementation of social-justice policies, programs, and investments. Chapter 3 describes our method of designating disadvantaged places.

The rest of the report is organized into six additional chapters: Chapter 2 provides a background of the two case-study counties; Chapter 3 defines disadvantaged neighborhoods and their characteristics; Chapter 4 contains the analysis of access to employment opportunity; Chapter 5 reports the analysis of access to educational opportunity for young students; Chapter 6 focuses access to health, including pandemic-related topics; and Chapter 7 finishes with conclusions and recommendations. Each of the empirical chapters (3, 4, and 5) has the same structure as the whole report but focusing on its specific topic: (1) an introduction, (2) literature-based background, (3) data and method, (4) findings, and (5) conclusion. The empirical results focus on three comparisons: (1) how disadvantaged neighborhoods differ from advantaged neighborhoods in Los Angeles; (2) how disadvantaged neighborhoods differ from advantaged neighborhoods in San Joaquin; and (3) how disadvantaged neighborhoods in Los Angeles differ from disadvantaged neighborhoods in San Joaquin. There are other possible comparisons (e.g., the partially disadvantaged against others, LA and SJ advantaged neighborhoods), but the report's primary focus is on disadvantaged communities. The report also includes three appendices, which include details on data, technical methods, and statistical tests. The latter appendix includes results on bivariate and multivariate analyses of differences between disadvantaged and nondisadvantaged neighborhoods within each region, and between disadvantaged neighborhoods across regions.

The findings from this project provide additional insights into the nature, pattern, and magnitude of commonalities and differences among disadvantaged neighborhoods in mobility and access to opportunities. Our approach is based on the concept of spatial-transportation mismatch (STM), which asserts that spatial distance and poor transportation are simultaneous barriers to opportunities beyond one's immediate location. To maximize real-world application, we adopted two policy-based indicators to create three classes of neighborhoods: disadvantaged, partially disadvantaged, and not disadvantaged (please refer to Appendix A for definitions of each indicator). Analytically, we focus on accessibility indicators to employment, quality elementary schools, and health care. The study uses a comparative approach utilizing two different regions in California, one highly urbanized (Los Angeles County) and one relatively more agriculture based (San Joaquin County). This allows us to compare disadvantaged neighborhoods with nondisadvantaged neighborhoods within each region, and to compare disadvantaged neighborhoods in one county versus another.

The project's empirical findings are unsurprisingly consistent with the existing literature: residents of disadvantaged neighborhoods suffer from STM in multiple arenas, especially those in rural areas. The analysis finds considerable heterogeneity in the magnitude of inaccessibility in the two regions. In most cases, residents in disadvantaged San Joaquin fare worse in terms of mobility and access to opportunities but there are exceptions. The diversity of outcomes at the neighborhood level points to the limitations of a "one-size-fits-all" policy approach. There needs to be flexibility so the programs and investments can address the specific transportation needs and investment opportunities of disadvantaged communities. Despite the diversity in precise outcomes, there is an overarching and unescapable commonality. Society is replete with spatial stratification that reflects and reinforces economic and racial disparities. Transforming transportation planning practices can contribute to dismantling explicit and implicit institutional biases.

The project has three major recommendations. The first is that public-sector agencies should incorporate the project's approach to analyzing disadvantaged neighborhoods through detailed and geographic-specific data, indicators, and metrics. This would enable them to better identify, prioritize, and customize policies, programs, and investments. The second recommendation is to replicate the information for the entire state, and make the data readily accessible to other analysts, community stakeholders, and interested parties. The latter can be done through a user-friendly data/mapping portal. The final recommendation is to expand beyond the traditional boundaries of transportation planning because the "accessibility problem" is complex, the product of multiple factors. Acknowledging this reality into professional practice will expand the arena for transportation planning and build bridges to other public policy arenas that can collectively eliminate the barriers.

Chapter 2: Case Study Regions: Los Angeles and San Joaquin Counties

Introduction

This chapter provides background information on the two case-study regions, Los Angeles County and San Joaquin County. The two regions are examples of places at different points in the urban–rural spectrum. They are distinct along a number of dimensions, and the fundamental regional variation enables us to make meaningful comparisons of disadvantaged neighborhoods situated in contrasting settings. The chapter has four sections: (1) one an overview on the spatial location and configuration; (2) the two economic bases; (3) the two populations; and (4) transportation and travel patterns. The two counties are located in different parts of California, which influence and shape their economies. Despite the economic differences, the two populations are similar qualitatively in racial composition and socioeconomic status. There are two noticeable socioeconomic discrepancies: income distribution and educational attainment. The differences are due to the labor needs of the two economies. The other noticeable dissimilarity is in transportation and travel patterns.

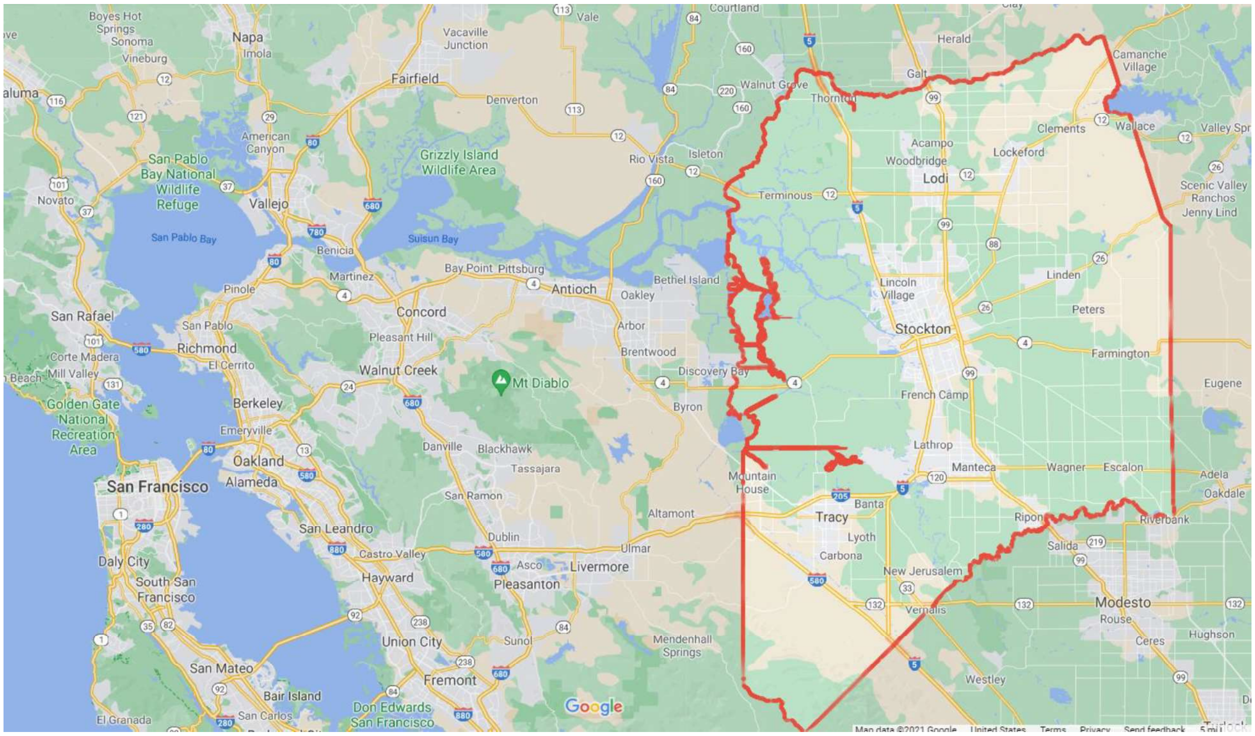
Overview

The two case-study counties are located more than three hundred miles apart. (See Figure 2.1.) These two regions are also worlds apart, the former toward the urban end of the human settlement, and the latter toward the rural end. The difference in population density is significant, about 2,099 persons per square miles for Los Angeles County compared with only 491 for San Joaquin County. One should, however, be careful not to essentialize the two because Los Angeles has large sections that are very low density, and San Joaquin has urbanized sections. The two are also different in their national and global identity. Los Angeles is in Southern California and is best known as the film capital of the world, but also as America's major international port and concentration of higher-education institutions. San Joaquin is located in the state's Central Valley and is best known as the shipping gateway to world's richest agricultural region, also called the breadbasket of the world stretching approximately 450 miles north-south and 40 to 60 miles wide. These fundamental regional differences enable us to make meaningful comparisons of disadvantaged neighborhoods situated in contrasting settings.

Figure 2.1. Two Case-Study Counties

Figure 2.2 shows a map of San Joaquin County. According to the most recent estimate, San Joaquin County is the fifteenth largest county in California by population. The low-density east side runs up against the foothills of the Sierra Nevada mountain range, home to Yosemite National Park. There are more urbanized places running along Interstate 5 and U.S. 99, with Stockton being the largest city, with about 309,000 residents. Just west of the city is Sacramento–San Joaquin River Delta, formed by the confluence of the Sacramento and San Joaquin rivers. In recent years, the southwestern part of the county centering around Tracy has become an exurb to the San Francisco Bay Area, providing more affordable homes but at the expense of long commutes.

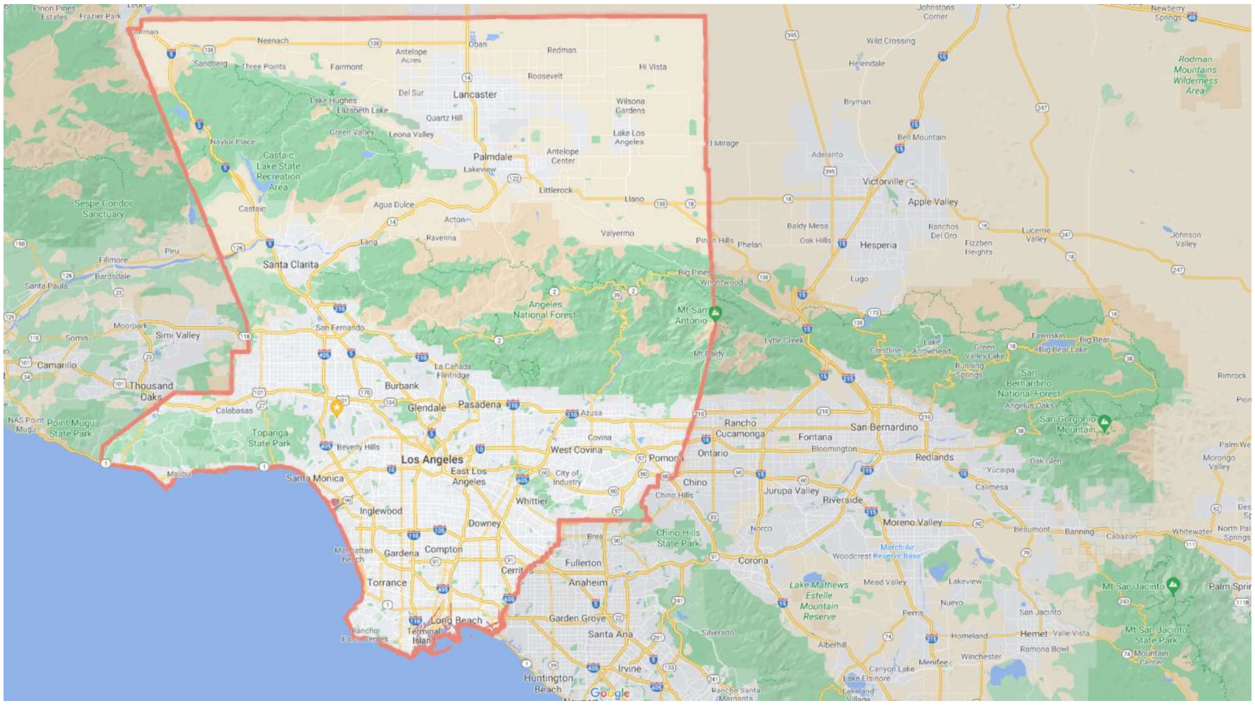
Figure 2.2. San Joaquin County



Source: Google Maps

Figure 2.3 shows a map of Los Angeles County. Los Angeles County is an order of magnitude larger than its northern counterpart, home to more than ten million people, making it the largest county in the United States, four times the size of the next largest (Cook County, Illinois). Los Angeles is a part of and hub for the Greater Southern California region, a mega region running from Ventura (northwest of LA) down south to Orange County and San Diego. To the east are the exurbs of the Inland Empire. The most urbanized areas in Los Angeles are south of the San Gabriel and Angeles mountains, centering downtown. The County has 88 cities, and Los Angeles City is the largest with nearly four million residents. Although the region is known for its freeway-induced sprawl, it also has some of the densest neighborhoods in the nation (Malouff, 2013). There are also major sections in the northern and western parts of the county that are very low density, due in large part to huge national and state parks. As the birthplace of freeways (Loukaitou-Sideris and Gottlieb, 2005), the county now has more than 500 miles (Los Angeles Almanac, 2021) in a vast network that is often among the most congested (Wachs, Chesney, and Hwang, 2020).

Figure 2.3. Los Angeles County



Source: Google Maps

Comparing Economies

Absolute size is not the only difference because the two regions have distinct economies. One method of characterizing an economy is by identifying prominent industries using the location quotient (LQ), where the proportion of each industry's employment to total employment in the region is divided by the state's industry employment to total employment. A LQ value greater than 1 indicates greater importance as a potential export base (Isserman, 1977). Table 2.1 provides the results for major industrial clusters (NAICS Association, n.d.). In Los Angeles, the information sector stands out, and this includes film and television production, as well as internet-based production. The LA-LB harbor complex (Los Angeles, Long Beach) port is the nation's largest, driven by trade with Asia, and this is evident in the LQ for the second and third most important industrial sectors. The LQ for education and health is driven by the presence of major and elite universities (UCLA, USC, Caltech, etc.) and associated medical schools and hospitals. Agriculture and associated activities dominate San Joaquin County. The most obvious is farming, but also in nondurable goods production centered around the processing of crops. As the distribution center for the entire Central Valley, San Joaquin also has a disproportionate number of jobs concentrated in the transport sector.

Table 2.1. Industry Concentration Data

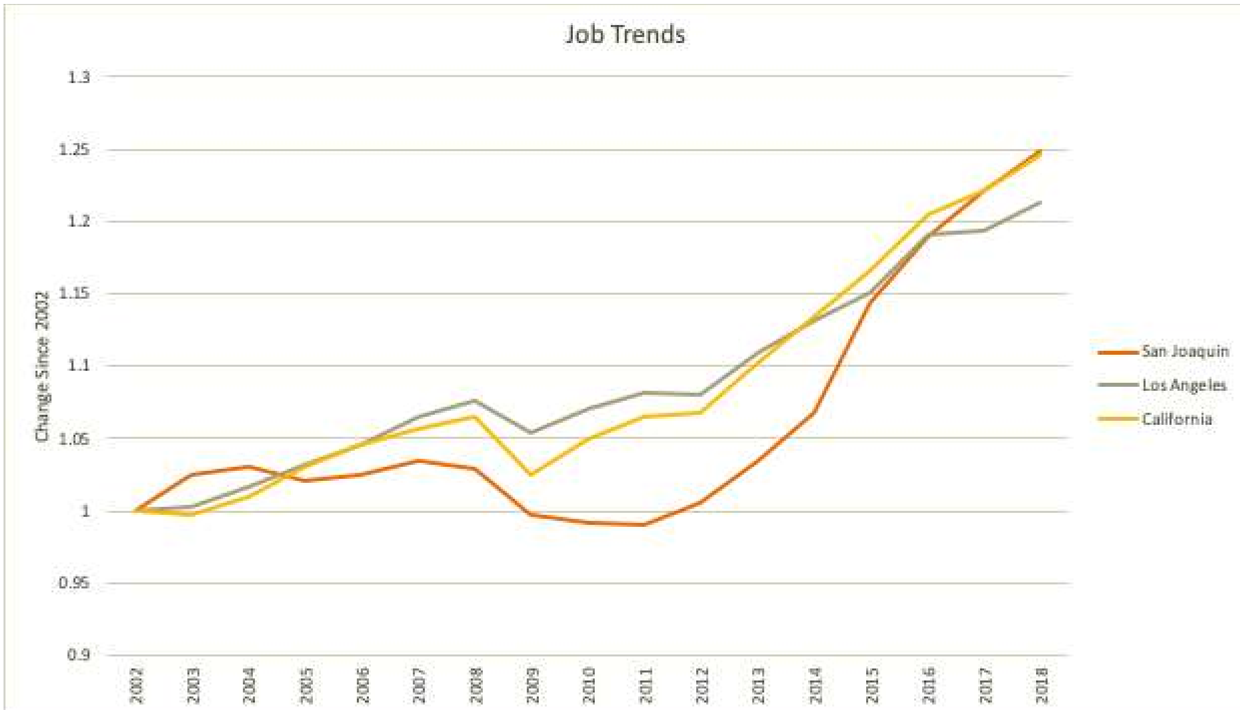
Top LA County Industries by NAICS Code	Total Employment	Location Quotient
Information—50	217,900	1.48
Wholesale Trade—41	220,500	1.22
Transportation, Warehousing, and Utilities—43	213,000	1.16
Educational and Health Services—65	839,900	1.14
Nondurable Goods—32	139,200	1.12

Top SJ County Industries by NAICS Code	Total Employment	Location Quotient
Total Farm—11	15,400	2.57
Nondurable Goods—32	11,200	1.66
Trade, Transportation, and Utilities—40	69,100	1.60
Government—90	44,900	1.22
Wholesale Trade—41	11,600	1.18
Retail Trade—42	26,200	1.12

Source: Current Employment Statistics

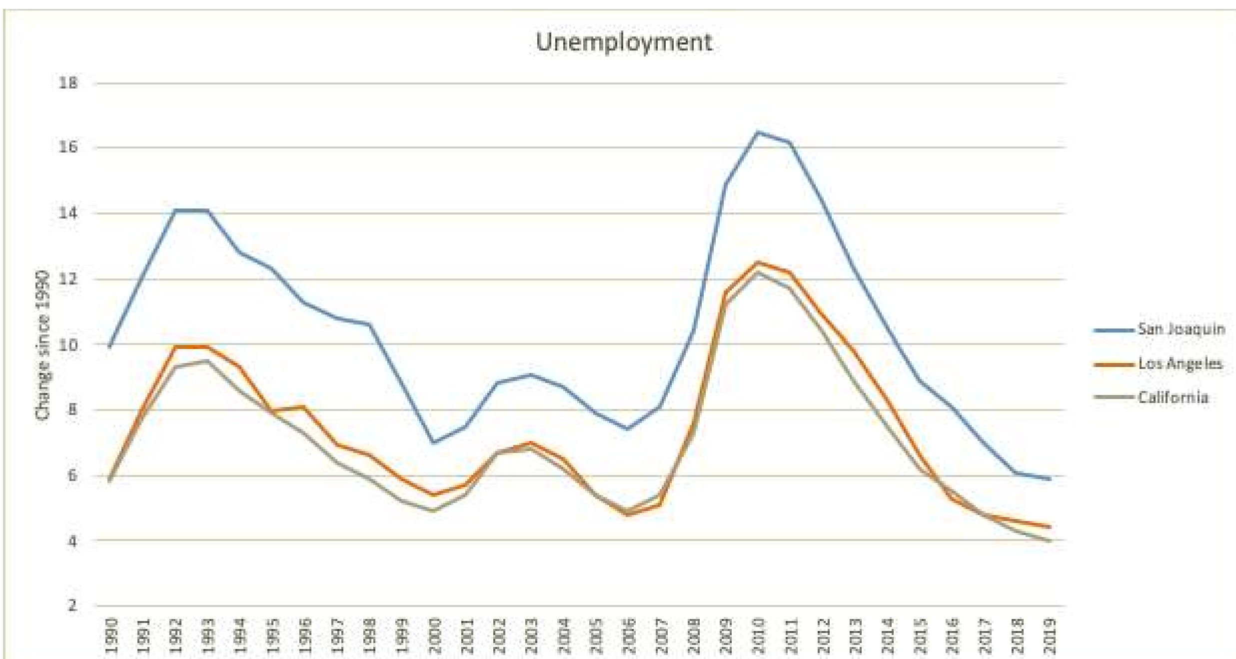
The longitudinal performance of the two economies can be traced by looking at the labor market. Figure 2.4 reports the jobs counts for the two counties and for California (California Employment Development Department, n.d.). Because of the enormous differences in the size of the three economies, each year's job counts are indexed to 2002, the base year. A value greater than 1 indicates more jobs compared to 2002 and a value less than 1 indicates fewer jobs than 2002. All three geographies have experienced a long-term secular growth, disrupted around the turn of the last decade by the Great Recession. The impact of the last cyclical downturn was particularly hard on San Joaquin, which drove the city of Stockton into bankruptcy (Christie, 2012). The business cycle can also be seen in the unemployment rates in Figure 2.5. Overall, San Joaquin has a higher unemployment rate, indicating more underlying structural problems that make employment less stable and harder to find.

Figure 2.4. Job Trends



Source: California Employment Development Department

Figure 2.5. Unemployment Rates



Source: California Employment Development Department

Population Comparison

As with the economies, the most obvious difference between the two populations is their size. This can be seen in data from the U.S. Census Bureau's American Community Survey in Table 2.2. Whereas Los Angeles can be measured in the millions, San Joaquin has fewer than a million people. Angelenos outnumber their counterparts by 75 to 1. San Joaquin County has a higher growth rate. According to state estimates and projections, San Joaquin grew by more than 12% between 2010 and 2020 and is projected to grow nearly 10% from 2020 to 2030 (California Department of Finance, 2021). Los Angeles is relatively anemic, with only about a quarter of the growth rate (approximately 3% and 1–2%, respectively).

Table 2.2. Demographic and Socioeconomic Characteristics

	San Joaquin County	Los Angeles County	California
Demographics			
Total Population	762,148	10,039,107	39,512,223
Non-Hispanic White	30.40%	25.90%	36.30%
African American	6.70%	7.70%	5.50%
Hispanic or Latino	42.00%	48.60%	39.40%
Asian	15.80%	14.50%	14.70%
Socioeconomic			
Mean Household Income	$68,997	$72,797	$80,440
Pop in Poverty %	12.00%	11.70%	10.70%
Gini Index	0.45	0.494	0.487
Education Attainment (25 and older)			
Less Than High School %	20.40%	20.20%	16.00%
High School Graduate %	29.10%	20.70%	20.60%
Some College %	30.50%	25.40%	28.40%
Bachelor's and Above %	20.00%	33.70%	35.00%

Source: 2019 ACS 1-year estimates

Qualitatively, the two counties have similar racial/ethnic composition, although there are quantitative differences. Compared to the rest of California, San Joaquin and Los Angeles have a large relative number of people of color. In both regions, Hispanics or Latinos are a plurality, and African Americans are numerically the smallest. Forty-two percent of San Joaquin residents are Hispanic or Latino, while more than 48% of Angelenos are. The comparable figures for Blacks are less than 7% and 8%, respectively. Asian Americans comprise roughly the same percent of the population in the two counties, approximately between one-in-six and one-in-seven of the populations.

Compared to the rest of the state, mean household income is lower in the two study sites, with San Joaquin's average being about $3,000 lower than that for Los Angeles. Despite this income difference the poverty rates are very close, approximately 12%. The difference in average income but similarity in poverty is due to greater income inequality in Los Angeles than in San Joaquin. The level of inequality is measured by the Gini index, where a higher value usually means more income is concentrated at the top. Taken together, the statistics indicate those at the bottom of Los Angeles' economic ladder are receiving less of the region's income, thus pushing many into poverty. The income patterns may be partly due to regional differences in the stock of human capital. Relative to Los Angeles County, San Joaquin County has far fewer adults with a bachelor's degree (20% vs. 34%), the same relative proportion without a high-school education (20% each).

Comparing Travel Patterns

Despite the popular stereotype of Los Angeles being the prototypical car-centric capital of the world (Lutz, 2000), San Joaquin is more car dominant. Perhaps a better representation of the car culture in the Central Valley is the movie *American Graffiti*, which hypothetically takes place in the town of Modesto just south of San Joaquin County. The automobile is much more of a necessity for the more rural area, not just for Saturday night cruising, but also for many more necessary activities. This reversal of roles can be seen in the statistics from the American Community Survey reported in Table 2.3. The southern county has relatively more car-less households, 9% versus 6%, or one and a half times as likely. At the other end of the distribution, households in Central-Valley County are one and half times as likely to own four or more vehicles. Overall, the average number of vehicles per household is 2.15 in San Joaquin compared to 1.85 in Los Angeles.

Table 2.3. Vehicle Ownership and Usage

	Los Angeles County	San Joaquin County
Vehicles in Households		
No vehicle available	9%	6%
1 vehicle available	33%	25%
2 vehicles available	35%	36%
3 vehicles available	14%	20%
4 vehicles available	6%	10%
5 or more vehicles available	3%	4%
Average per HH	1.85	2.15
Job Commute Mode		
Drove alone	74%	79%
Carpooled	9%	12%
Public transportation	6%	2%
Other means	5%	2%
Worked from home	6%	4%

Source: 2019 ACS 1-year estimates

The greater dependency on a private vehicle is also apparent in the mode split for job commutes shown in Table 2.4. There is about an 8-percentage point difference in the proportion of workers driving alone or carpooling. Public transit and active transportation have only a miniscule share of commute trips in San Joaquin, less than half of the rate in Los Angeles. San Joaquin workers also travel further, although at faster speeds than Angelenos due to traffic congestion in the southland. While the average distance for San Joaquin workers is more than one and half times as great as for Los Angeles workers, average commute time is only one and an eight longer. The differences in commute patterns are also apparent in the distribution by time (from American Community Survey) and distance (from OnTheMap data). Compared with Los Angeles, a disproportionate larger number of San Joaquin workers spend an hour or more commuting and travel more than 50 miles each way. The discrepancy is due to both a greater geographic dispersal of jobs in the agricultural-oriented county and the dependency on jobs in the Silicon Valley.

Table 2.4. Job Commute Characteristics

	Los Angeles County	San Joaquin County
Job Commute Travel Time		
Less than 15 minutes	16%	24%
15–29 minutes	32%	31%
30 to 59 minutes	36%	22%
60 minutes or more	16%	23%
Average Commute Minutes	32.8	36.8
Job Commute Distance		
Less than 10 miles	50%	35%
10 to 24 miles	30%	18%
25 to 50 miles	11%	22%
Greater than 50 miles	9%	25%
Average Commute miles	13	22

Source: 2019 ACS 1-year estimates; OnTheMap

Conclusion

Although Los Angeles and San Joaquin are not diametrically opposites, they nonetheless capture many of the state's regional diversity. There are other differences that we have not had the resources to examine in detail, but they are worth noting briefly. For example, the Central Valley County is politically more conservative with Republicans making up 28.5% of registered voters, compared with 17.2% in Los Angeles, and 24.1% in the state (California Secretary of State, 2021). There is also a difference in the cost of living. For example, median gross rent in San Joaquin is $1,907 compared to $2,498 in Los Angeles and $2,357 in California (2015–19 American Community Survey). These facts, and some of the information presented in this chapter, show that the two counties are on the opposite side of state averages. The question is how these economic, social, and geographic differences affect accessibility and mobility for residents in disadvantaged neighborhoods in the two regions.

Chapter 3: Defining Disadvantaged Neighborhoods

Introduction

Identifying disadvantaged neighborhoods is not simple given the multiple forms of inequality (social, economic, political, environmental, etc.). Any selection is an exercise in trade-offs because each definition produces its own set of neighborhoods. While there are overlaps among alternative sets, there are also places that are included by one definition but not by another. For this project, policy-based definitions are most relevant because the larger goal is to inform decision makers, community stakeholders, and public-sector agencies that are engaged in efforts to develop and implement social-justice policies, programs, and investments. The project initially examined three options: (1) Low Response Score (LRS), (2) CalEnviroScreen 3.0 (CES 3.0), and (3) Hass Institute's Opportunity Mapping Project. That, however, has changed. Given the pandemic-imposed delays and disruptions, the LRS became less relevant. We settled on the latter two (CES 3.0 and OMP), and this section describes how they are used to designate disadvantaged places.

The rest of this chapter is organized into three sections. The first discusses the method used to categorize neighborhoods, and includes information on the two input indicators, the algorithm used to assign neighborhoods, and the consistency of the designation with other vulnerability indicators. Slightly more than a quarter of census tracts are designated as being disadvantaged. The second section profiles the clusters of neighborhoods (disadvantaged, partially disadvantaged, and nondisadvantaged). We focus on demographic composition, socioeconomic status, transportation resources, and housing. The last section provides a summary of the findings.

Data and Methods

This project uses two statewide policy-based tools to develop a working definition of "Disadvantaged" neighborhoods: CalEnviroScreen 3.0 and Opportunity Map Project.

CalEnviroScreen 3.0 is a mapping tool developed by the California Environmental Protection Agency's (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify the state's most pollution-burdened and vulnerable communities. The final score represents a composite of 20 different indicators relating to the environmental, health, and socioeconomic status of a neighborhood and its residents. In accordance with SB 535 (de Leon), CalEPA is responsible for identifying disadvantaged communities to prioritize public investments using cap-and-trade (Greenhouse Gas Reduction) funds to improve health and economic opportunities. As of February 2017, CalEPA designated disadvantaged communities as the 25% highest scoring census tracts in CalEnviroScreen 3.0, along with other areas with high amounts of pollution and low populations (CalEPA, 2017).

The second definition comes from the Opportunity Mapping Project, which uses spatial data to identify investment opportunities (Haas, 2017). The Opportunity Mapping Project (OMP) uses a series of indicators related to education, earnings from employment, environmental variables, and economic mobility to measure and visualize place-based characteristics related to critical life outcomes (California Fair Housing Task Force, 2020). The unit of measure is at the census tract level for metropolitan areas and the block level for rural areas. Tracts are first filtered by "High Segregation and Poverty," which included any tracts with 30% of the population living below the poverty line and those with an overrepresentation of people of color compared to the county (California Fair Housing Task Force, 2020). The rest of the tracts or rural blocks fall into one of four categories based on 21 indicators. The categories are Highest Resource, High Resource, Moderate Resource, and Low Resource (California Fair Housing Task Force, 2020). The Opportunity Map is used by California's Tax Credit Allocation Committee and California's Housing and Community Development (HCD) to help target low-income tax credit locations. HCD will use the information to evaluate whether California meets federal goals of "Affirmatively Furthering Fair Housing," designed to locate subsidized and affordable housing in high-opportunity places.

Using the two policy tools, the project created three neighborhood types:

- Disadvantaged: Census tracts designated as "Disadvantaged" by CES 3.0 AND census tracts designed as "High Segregation & Poverty" and "Low Resource" by OMP;
- Partially Disadvantaged: Census tracts designated as either "Disadvantaged" by SB 535 or as "High Segregation & Poverty" and "Low Resource" by OMP but not both; and
- Nondisadvantaged: census tracts that are neither designated as "Disadvantaged" or "Partially Disadvantaged."

Table 3.1 provides a breakdown of the three neighborhood types for the two counties. A little over a quarter of the neighborhoods in both counties are designated as "Disadvantaged" neighborhoods using the definition for this project. Table 3.1 also report tracts that are not designated as "disadvantaged" using the combined method but are considered "disadvantaged" by either CES 3.0 or OMP. These tracts fall under the "Partially Disadvantaged" category.

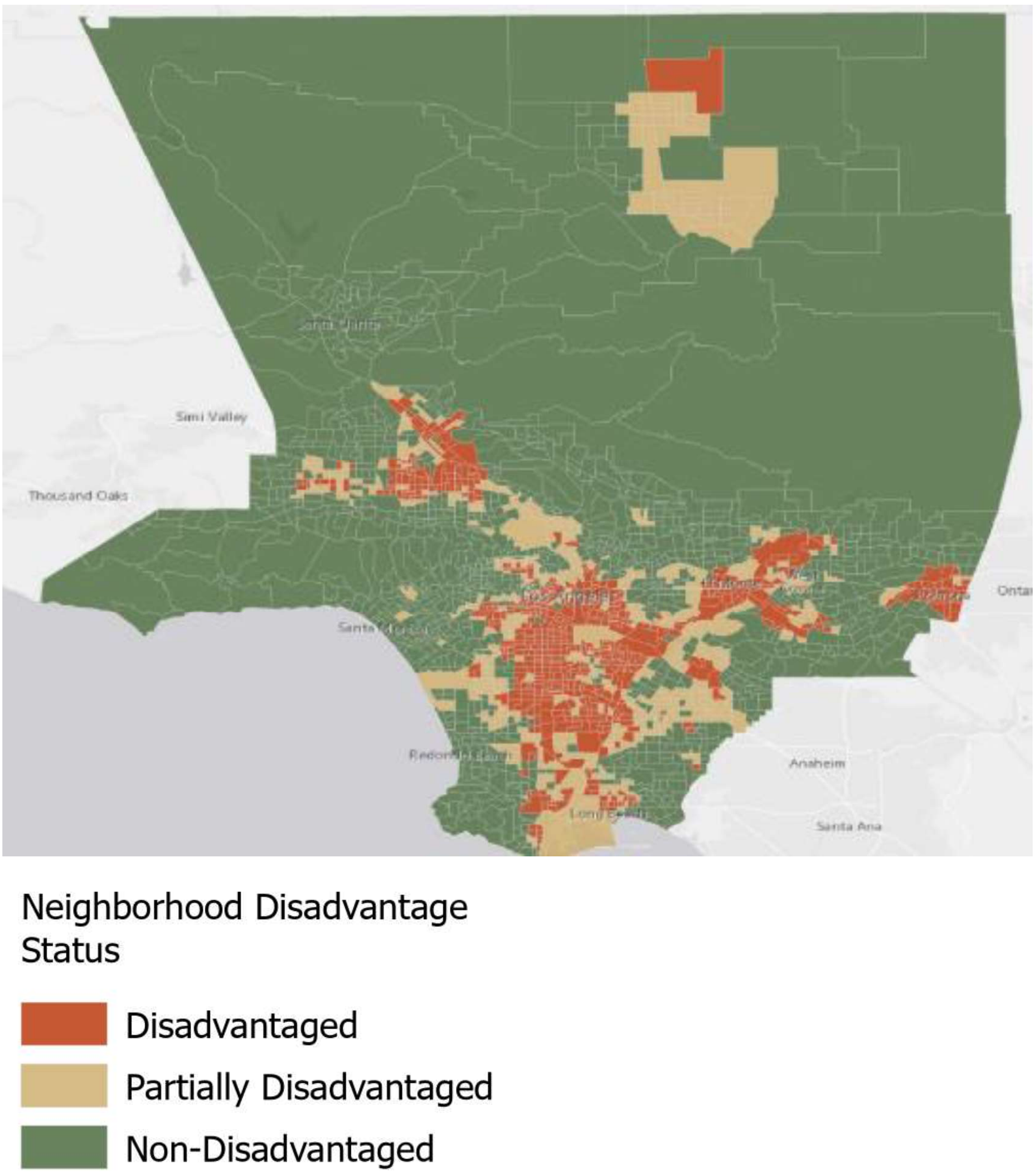
Table 3.1. Disadvantaged Neighborhood Types, Los Angeles County and San Joaquin County

	Los Angeles		San Joaquin	
	Total	%	Total	%
Disadvantaged	656	28%	38	27%
Partially Disadvantaged	514	22%	38	27%
Disadvantaged by CES 3.0 Only	382	16%	33	24%
Disadvantaged by OMP Only	132	6%	5	4%
Nondisadvantaged	1,176	50%	63	45%
Total Tracts	2,346		139	

Figures 3.1 (Los Angeles) and 3.2 (San Joaquin) visually display the three neighborhood types. In Los Angeles, much of the urban core and South LA in particular, are among the most disadvantaged. Parts of the San Fernando Valley and Pomona also have high incidences of disadvantaged neighborhoods. The more nondisadvantaged neighborhoods are located on the

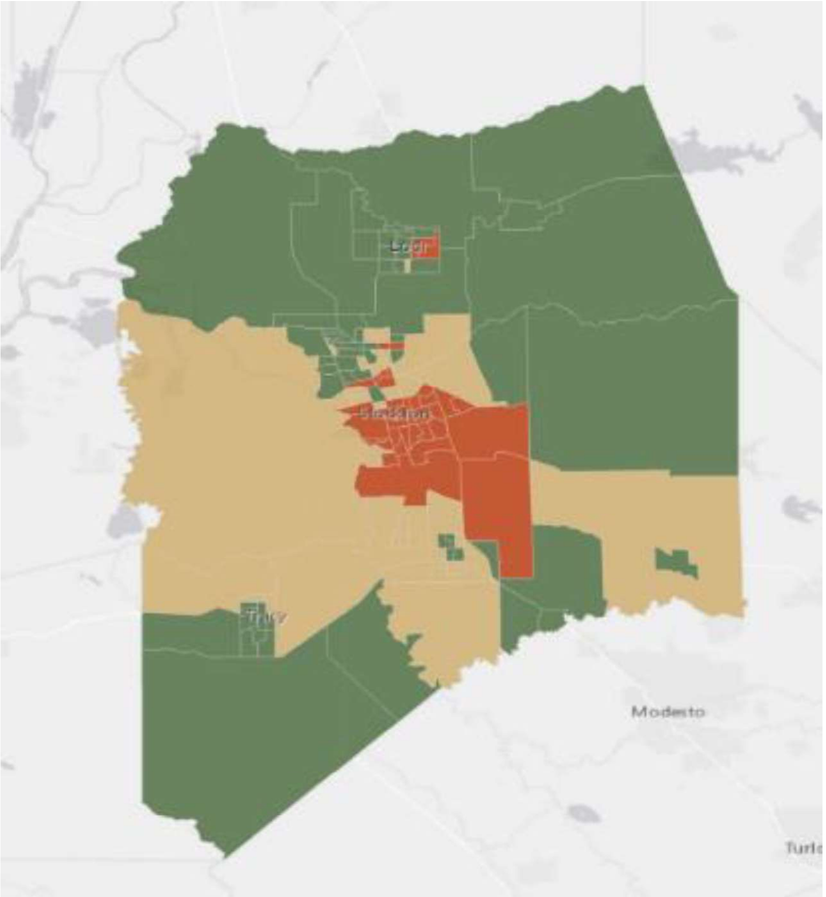
Westside and along the coastal cities like Santa Monica, El Segundo, and Redondo Beach. The disadvantaged places in San Joaquin are concentrated in the city of Stockton, particularly in neighborhoods in and around the area known as "South of Charter." There are also disadvantaged neighborhoods in Lodi.[1] It is unknown whether the policy indicators that designate disadvantaged neighborhoods have a bias toward more urban and populated areas. This is an important question and requires additional research that is beyond the scope of this project.

Figure 3.1. Disadvantaged Neighborhood Types, Los Angeles County



[1] Lodi is a small city made famous by the rock band Creedence Clearwater Revival.

Figure 3.2. Disadvantaged Neighborhood Types, San Joaquin County



We assessed the policy-based neighborhood types against other vulnerability indices. Table 3.2 reports how our designated disadvantaged neighborhoods compare with other neighborhoods using three widely used indicators denoting vulnerability, risks, and other forms of marginalization. The table also includes the CES 3.0 score for comparison. The LRS (low response score) is based on a multivariate predictive model developed for the U.S. Census Bureau as a planning tool for targeted outreach during the 2020 decennial enumeration (Erdman and Bates, 2017). The social vulnerability index (SVI) was created by the Centers for Disease Control to identify vulnerable areas for disaster planning and response (Flanagan et al., 2011. The Public Health Alliance of Southern California developed the Healthy Places Index (HPI) to help policy makers target the most disadvantaged communities for interventions and resources (Delaney et al., 2018. The HPI is inverted to denote the least healthy location. For all four indicators, higher values indicate greater disadvantage. The results show that our designated disadvantaged neighborhoods consistently score worse than nondisadvantaged neighborhoods in both counties. Disadvantaged neighborhoods in San Joaquin fared worse than their counterparts in Los Angeles for SVI and HPI, but not for LRS. Overall, the policy-based designations are associated with other methods of identifying marginalized places.

Table 3.2. Neighborhood Types by Vulnerability Indicators

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
Included Indicator						
CES 3.0	908.4	784.8	444.6	920.5	818.8	561.8
Other Indicators						
LRS	31.3	27.9	22	29.6	24.7	21.9
SVI	834.8	681.6	356.4	907.5	653.4	531.9
HPI	838.1	708.5	360.5	912.2	648	500.3

Results

Demographic, Socioeconomic, and Housing Profiles

To better understand the differences and commonalities across neighborhoods and among disadvantaged neighborhoods, Tables 3.3 through 3.6 provide the demographic, socioeconomic, housing, and transportation profiles of the three different neighborhood types in both study sites.

Table 3.3 describes the demographic characteristics of the population in Los Angeles and San Joaquin across disadvantaged, partially disadvantaged, and nondisadvantaged neighborhoods. Characteristics described included race, nativity and languages, and age. In Los Angeles, disadvantaged neighborhoods have a greater share of the Hispanic and Black population (74% and 11%), while having the smallest share of the non-Hispanic white (NH White) population (7%). In contrast, nondisadvantaged neighborhoods have the lowest share of the Latinos and Black population (29% and 5%, respectively), while having the highest share of the NH white population (43%). Additionally, disadvantaged neighborhoods have the highest share of immigrants and noncitizens, as well as the greatest share of Limited English Proficient (LEP) households, while nondisadvantaged neighborhoods have the lowest share of these populations (29%, 10%, and 9%, respectively). Furthermore, disadvantaged neighborhoods tend to have a greater share of young people, including children (0–17) and young adults (18–34). In contrast, nondisadvantaged neighborhoods tend to have a greater share of older adults (35–64) and the elderly (65 and over).

Similarly, in San Joaquin, disadvantaged neighborhoods tend to have a greater share of the Hispanic and Black populations (61% and 10%, respectively), while having the smallest share of the NH White population (13%). In contrast, nondisadvantaged neighborhoods tend to have the smallest share of the Hispanic and Black populations (35% and 5%, respectively), while having the greatest share of the NH white population (44%). Additionally, disadvantaged neighborhoods, again, have the highest share of the immigrants, noncitizens, and LEP households (30%, 20%, and 17%, respectively); while nondisadvantaged neighborhoods have the lowest shares of these same populations (18%, 9%, and 6%). Finally, the age distribution in both disadvantaged and nondisadvantaged neighborhoods is comparable, however, disadvantaged neighborhoods still have a higher share of the young population (including youth and young adults), while nondisadvantaged neighborhoods have a higher share of the older adult and elderly population.

Table 3.3. Demographic Characteristics by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
Race and Ethnicity						
NH White	7%	17%	43%	13%	31%	44%
Black	11%	10%	5%	10%	7%	5%
Hispanic	74%	58%	29%	61%	43%	35%
Asian	7%	13%	19%	12%	15%	12%
Nativity/Language						
Immigrant	41%	37%	29%	30%	22%	18%
Noncitizen	25%	18%	10%	20%	11%	9%
LEP Households	20%	16%	9%	17%	8%	6%
Age						
Youths (0–17)	26%	22%	19%	29%	27%	25%
Younger Adults (18–34)	28%	27%	24%	26%	25%	22%
Older Adults (35–64)	36%	38%	41%	34%	36%	37%
Elderly (65 plus)	10%	12%	16%	10%	12%	16%

Source: 2015–19 5-year ACS

Additionally, we compared socioeconomic characteristics across Los Angeles and San Joaquin (Table 3.4). Overall, in Los Angeles, disadvantaged neighborhoods have the lowest average HH income ($60.3k), the highest poverty rate (24%), the highest share of people with less than a high school education (39%), and the lowest share of people with a college education (13%). In contrast, nondisadvantaged neighborhoods have the highest average HH income ($125.6k), the lowest poverty rates (9%), the lowest share of people with less than a high school education (10%), and the highest share of people with a college degree (46%). Interestingly, the Gini coefficient is similar across all three types of neighborhoods; however, nondisadvantaged neighborhoods have the highest value, indicating a higher level of income inequality within the population living in those neighborhoods.

In San Joaquin, again, disadvantaged neighborhoods have the lowest average HH income ($50.9k), the highest poverty rate (29%), the highest rate of people with less than a high school education, and the lowest share of people with a college education (7%). In contrast, nondisadvantaged neighborhoods have the highest average HH income ($93.6), the lowest poverty rate (11%), and the highest share of population with less than a high school education (39%), but the lowest share of people with a college education (7%). The Gini coefficient is again within a close range across all three neighborhoods; however, in this case the disadvantaged neighborhoods have the highest coefficient, indicating higher levels of income inequality.

Table 3.4. Socioeconomic Characteristics by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
Economic						
Average HH Income (in $1,000)	60.3	73.6	125.6	50.9	81.6	93.6
Poverty Rate	24%	17%	9%	29%	15%	11%
Education (Human Capital)						
Less Than High School	39%	26%	10%	39%	20%	15%
College (Bachelor's or Higher)	13%	22%	46%	7%	16%	22%
Gini Index (Income Inequality)	0.428	0.423	0.437	0.43	0.411	0.415

Source: 2015–19 5-year ACS

In Table 3.5, we report the housing profiles for both disadvantaged, partially disadvantaged, and nondisadvantaged neighborhoods across Los Angeles and San Joaquin County. In Los

Angeles, disadvantaged neighborhoods tend to have higher overall density (5,645 housing units per sq. mile, 5,328 occupied housing per sq. mile) and higher share of renter occupied housing (67%). Additionally, home values and monthly gross rent are lowest in disadvantaged neighborhoods ($455.2k and $1,257, respectively), yet they have the highest rates of homeowners and renters who are severely cost-burdened (defined as paying more than 50% of their income toward housing costs) (21% and 33%, respectively). In contrast, nondisadvantaged neighborhoods have the lowest density (4,251 HU per sq. mile, 3,917 OHU per sq. mile), more owner-occupied households (58%) as opposed to renter households (42%), and higher average home values and rent. Nondisadvantaged neighborhoods also disproportionately have fewer homeowners (16%) and renter households (26%) that are severely cost-burdened.

In San Joaquin, disadvantaged neighborhoods tend to have higher density (2,035 HU per sq. mile, 1,841 OHU per sq. mile, 71% medium density, and 13% high density) and be primarily renter occupied (63%). Additionally, home and rent values are lowest in disadvantage tracts ($219k and $1,000, respectively), while having the highest share of owner and renter housing burner (14% and 31%, respectively). In contrast, nondisadvantaged neighborhoods have a lower housing density (29% of the low-density housing) and a higher share of owner occupied housing (61%). Nondisadvantaged neighborhoods again have the highest home values and monthly rents ($373.8k and $1,364, respectively), yet the lowest rates of homeowner and renter housing burden (11% and 21%, respectively).

Table 3.5. Housing Characteristics by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
Housing Density						
Housing unit (HU) per sq. mile	5,645	5,319	4,251	2,035	1,836	1,748
Occupied HU per sq. mile	5,328	4,965	3,917	1,841	1,724	1,664
% low density (bottom quartile)	4%	7%	15%	16%	26%	29%
% medium density	33%	41%	49%	71%	68%	68%
% high density (top quartile)	64%	52%	35%	13%	5%	3%
Tenure						
% owner	33%	40%	58%	37%	58%	61%
% renter	67%	60%	42%	63%	42%	39%

Housing Economics						
Average home value (mean)	$455k	$485k	$884k	$219k	$337k	$374k
Very High Owner Burden	21%	18%	16%	14%	12%	11%
Average Gross Rent (mean)	1,257	1,400	1,848	1,000	1,283	1,364
Very High Renter Burden	33%	30%	26%	31%	24%	21%

Source: 2015–19 5-year ACS

The transportation resources for neighborhoods in Los Angeles and San Joaquin are described in Table 3.6. In Los Angeles, disadvantaged neighborhoods have the greatest share of households with no vehicles (14%), the lowest ratio of vehicles per person and vehicles per adults (0.48 and 0.65, respectively). Moreover, even when they do have vehicles, these vehicles tend to be older as indicated by the proportion of "Clunker Vehicles"[2] and fewer share of clean vehicles[3] (4%). In contrast, nondisadvantaged neighborhoods disproportionately have fewer households with no vehicles (6%), more private vehicles available to the population within the household, less clunker vehicles (8%), and more clean vehicles (12%). The lack of private vehicle ownership can limit one's ability to travel far, which can be translated and measured by the average household vehicle miles traveled (HVMT). Households in disadvantaged neighborhoods in Los Angeles generate lower levels of overall VMT compared to households in nondisadvantaged neighborhoods (17,000 vs. 18,000).

In terms of access to transit, disadvantaged neighborhoods have the highest share of access to high-quality transit locations (77%) and the highest walkability scores (13.88); however, they have a significantly lower level of available bikeways (6.23).[4] In contrast, nondisadvantaged neighborhoods have far fewer availability of high-quality transit locations and lower scores for neighborhood walkability but have more bikeway availability.

Similarly, in San Joaquin, disadvantaged neighborhoods have the highest share of households with no vehicle (13%), but the lowest rate of vehicles per person and per adult (0.51 and 0.73, respectively). Additionally, disadvantaged neighborhoods have the highest rate of clunker vehicles (15%) but the lowest rates of clean vehicles (2%). Again, households in disadvantaged neighborhoods have the lowest VMT (18,000), but the highest access to high-quality transit and highest walkability scores. Interestingly, in San Joaquin, disadvantaged neighborhoods have the highest availability of bikeways (5.23); however, this access is small when compared to any neighborhoods in Los Angeles. By contrast, not disadvantage neighborhoods have low level of

[2] "Clunker" vehicles include all vehicles that are more than 20 years old based on the model year.

[3] Clean vehicles include the following fuel types: battery electric vehicle, plug-in hybrid-electric vehicle, and hybrid electric vehicles.

[4] High-Quality Transit locations were constructed by the Center for Neighborhood Knowledge for CARB/Caltrans project using the General Transit Feed Specification. They are locations within a quarter-mile of transit stops that receive a high level of service during the morning commute.

households with no vehicle access (5%), a high rate of vehicles per person and per adult (0.70 and 0.94, respectively), a lower level of clunker vehicles (11%), and a slightly higher share of clean vehicles (4%) when compared to disadvantaged neighborhoods. However, overall rates of clean vehicles are much lower in San Joaquin compared to Los Angeles. Furthermore, nondisadvantaged neighborhoods in San Joaquin have the lowest access to high-quality transportation, bikeways, and walkability (4%, 4.01, and 10.44, respectively).

Table 3.6. Transportation Resources by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Non-Disadv	Disadv	Partially Disadv	Non-Disadv
Private Vehicles						
No vehicle HHs	14%	10%	6%	13%	5%	5%
Vehicles per persons	0.48	0.56	0.7	0.51	0.64	0.7
Vehicles per adult	0.65	0.73	0.87	0.73	0.88	0.94
Clunker vehicles (Age 20+)	12%	10%	8%	15%	11%	11%
Clean vehicles	4%	7%	12%	2%	4%	4%
Household VMT	17,000	18,000	18,000	18,000	23,000	22,000
High-Quality Transit Locations	77%	59%	46%	18%	7%	4%
Active Transportation						
Availability of bikeways	6.23	211.8	92.75	5.23	4.76	4.01
EPA's Walkability Index	13.88	13.4	12.17	13.61	11.54	10.44

Source: 2015–19 5-year ACS, UCLA CNK-CARB Transportation Disparity Dataset

Conclusion

The analysis shows commonalities and differences between neighborhood types and across the two regions. In both counties, people of color, immigrants, and younger populations tend to be more concentrated in disadvantaged areas, while NH whites and older adults tend to be located in nondisadvantaged areas. Disadvantaged neighborhoods in Los Angeles tend to have a higher percentage of these subgroups than in San Joaquin, suggesting greater income and class segregation. In terms of socioeconomic status, disadvantaged neighborhoods in both regions have lower income, higher levels of poverty, and lower levels of educational attainment. This is not a surprising result because the two underlying policy-instruments were designed to identify marginalized communities. What the numbers quantify is the enormous gap in economic well-being across neighborhood types. For example, in both counties, the average poverty rate in disadvantaged neighborhoods is more than 2.5 times higher than nondisadvantaged neighborhoods. Disadvantaged neighborhoods in San Joaquin appear to be the worst off, having the lowest average household income, the highest poverty rate, the lowest college education levels, and the highest Gini coefficient. There are concomitant disparities in housing. Overall, across both counties, disadvantaged neighborhoods have a higher share of housing density, higher share of renter-occupied housing, and lower home and rent values, but higher owner and renter vulnerability. However, regardless of the type of neighborhood, density, home and rent values, as well as owner and renter housing burden are much higher in Los Angeles. This reflects a more competitive housing market across all neighborhoods in Los Angeles compared to San Joaquin. In the transportation arena, Los Angeles has more access to clean vehicles, produces less household VMT, and has higher access to transit. However, in San Joaquin, neighborhoods have lower rates of nonvehicle households, higher rates of vehicles per adult, and less availability of bikeways. In disadvantaged neighborhoods in both Los Angeles and San Joaquin, there are higher levels of walkability compared to all other neighborhoods.

Chapter 4: Job Access

Introduction

This chapter details the process and findings in accessibility to employment across the categories of disadvantaged neighborhoods in Los Angeles and San Joaquin counties in California. Here, the report examines the role of the urban or rural spatial structure in determining labor-market outcomes for disadvantaged and nondisadvantaged neighborhoods. Literature indicates that workers face aspatial barriers that result in lower rates of employment and lower earnings, such as lower education attainment, lack of appropriate skills, and low levels of acculturation among immigrants. Human capital, however, is not the only factor that contributes to labor market outcomes. This portion of the project constructs and analyzes tract-level and transportation-mode-specific indicators to speak to spatial and mobility barriers workers face.

The findings in this chapter contribute to the academic literature on spatial disparities in transportation resources, land-use activities, and accessibility. There are three frameworks in the employment and accessibility literature: spatial mismatch hypothesis (SMH), spatial transportation mismatch (STM), and car-employment simultaneity. SMH is based on John Kain's seminal study of how the suburbanization of jobs and persistent housing segregation create spatial barriers to employment opportunities (Kain, 1968).

The core argument of SMH is that minorities became increasingly separated from economic opportunities because jobs suburbanized while minorities remained trapped in the inner city due to housing discrimination. In other words, the growing spatial disconnection is inherently a form of inequality in relative location. Implicit in this physical reconfiguration of the cityscape was the lack of jobs within and close to minority neighborhoods due to disinvestment and underinvestment (Soja et al., 1983). Since Kain's seminal publication, SMH has been empirically tested numerous times. Most of the findings are consistent with the central tenet of SMH: restrictions to residential mobility produce adverse labor market outcomes for low-skilled inner-city Blacks (Gobillon et al., 2007; Holzer, 1991; Ihlanfeldt and Sjoquist, 1998; Kain, 2004).

SMH and poor labor market outcomes are also documented among welfare recipients (Ong and Blumenberg, 1998). However, in Los Angeles, the magnitude and constancy of effects for poor populations are blurry (Hu 2014, 2015a, 2015b). These studies use job accessibility to measure variations in the level of geographic isolation from employment opportunities.

Transportation mismatch, the lack of access to a private automobile, refines SMH by incorporating the role of an individual's transportation resources in confounding the effects of spatial mismatch. Spatial-transportation mismatch (STM) examines distance and transportation/modal access as a contributor to employment outcomes. Job accessibility is often not simply related to the socioeconomic status of neighborhoods. Spatial barriers are less daunting if an individual can travel by car and is not limited to public transit only (Ong, 1996; Ong and Blumenberg, 1998; Ong and Miller, 2005; Raphael et al., 2001; Taylor and Ong 1995). The empirical research on STM finds that disadvantaged neighborhoods are disproportionately affected by transportation deficits.

The final framework addresses one of the analytical challenges to testing spatial-transportation mismatch: the endogeneity of vehicle ownership and employment status. This can be seen by a simple illustration. Owning an automobile facilitates job search (e.g., going to places to pick up an application, to conduct an interview, to get to work on time), and having a job makes it possible to own and maintain a car. In other words, the causality flows in both directions. Unfortunately, causality flows are difficult to disentangle due in large part to a lack of micro-level and geographic detailed data on underlying and exogenous factors that may influence the availability of cars but are not related to labor market outcomes. To address this, the principal investigator conducted a study that used spatial variations in insurance rates across neighborhoods within a metropolitan area

It found that premiums varied by a factor of two for identical vehicles and drivers with the same driving record for the population of welfare recipients transitioning to work (Ong, 2002). This difference is for drivers with the same driving history, coverage, and personal characteristics. On average, higher insurance costs have large and negative direct impacts on car ownership rates and negative indirect impacts on employment outcomes. These findings further indicate how systematic spatial inequality in one market (insurance) can affect another market (vehicle ownership) thus indirectly contributing to inequality in access to jobs and, ultimately, employment outcomes.

This chapter identifies patterns and the magnitude of commonalities and differences among neighborhoods in mobility and access to job opportunities. Utilizing the same distinctions of disadvantaged, partially disadvantaged, and nondisadvantaged neighborhoods described previously in the report, we are able to see how residents in rural areas access transportation is distinguished from urban access to transportation. The findings mentioned in the text that follows indicate that these differences in accessibility have profound implications on employment. As such, transportation allocation and investments should be tailored to neighborhood-specific needs. For example, transit improvement projects should target neighborhoods with low-level access to quality mass transportation but within reasonable proximity to jobs. The project's findings can be a practical tool to help key decision makers and community stakeholders better understand a neighborhood's transportation problems and identify effective strategies.

Data and Methods

This chapter uses several data sources to construct information related to access to employment. This chapter utilizes two types of indicators. The first are preexisting sources and the second are those previously developed by UCLA Center for Neighborhood Knowledge as part of their CARB-funded transportation disparity project. Table 4.1. outlines each of the indicators used in this chapter and its corresponding data source, followed by descriptions of each indicator.

Table 4.1. Job-Access-Related Indicators and Data Sources

Indicator	Data Source	Geography
Employment Status	2015–2019 5-Year ACS	Census Tract
Earnings	2018 LEHD LODES	Census Tract
Job Density	2018 LEHD LODES	Census Tract
Jobs-to-Worker Ratio	2018 LEHD LODES	Census Tract
Commute Mode	2015–2019 5-Year ACS	Census Tract
Commute Travel Times	2015–2019 5-Year ACS	Census Tract
Commute VMT per Worker	CNK-CARB Transportation Disparity	Census Tract
Jobs-Housing Fit	CNK-CARB Transportation Disparity	Census Tract
Job Accessibility	CNK-CARB Transportation Disparity	Census Tract

This chapter uses several data sources. The first American Community Survey (ACS) data from the 2015–19 5-year summary for employment patterns, commute modes, and commute travel times is detailed in the following text. Longitudinal Employer-Household Dynamics (LEHD) informs this chapter's indicators for job earnings, density, and jobs-to-worker ratio. The final source is from the UCLA Center for Neighborhood Knowledge, which developed a series of metrics as part of their CARB-funded transportation disparity project previously developed indicators, which are used in this chapter. These indicators are the Commute Vehicle Miles Traveled (VMT) per Worker, Jobs-Housing Fit, and Job Accessibility. Appendix A provides details of these data sources and the methods used to construct several of the indicators.

Results

Employment Status

To fully understand accessibility to jobs, the report analyzes employment patterns in both Los Angeles and San Joaquin within the different disadvantaged categories. The broadest measure of engagement in the economy is the labor force participation rate, which is the share of the working age population either employed or seeking work. (See top portion of Table 4.2.[5]) The

[5] There are also gender differences in labor force participation rates, which are consistent with *a priori* expectation of lower rates for women. In Los Angeles, the share of the male population participating in the labor force rests at 71% for nondisadvantaged and slightly higher at 72% in disadvantaged neighborhoods. The share of the female population participating in the labor force is lowest in the disadvantaged neighborhoods (56%) but rises to 60% in nondisadvantaged neighborhoods. San Joaquin also show less labor participation among women in disadvantaged

rate in Los Angeles sits consistently around 65% in all three neighborhood types, with 64% participation in the disadvantaged and 65% in the nondisadvantaged neighborhood. This indicates that STM does not have a noticeable impact on willingness or ability to be economically active. This pattern does not hold for San Joaquin, where the rate for nondisadvantaged neighborhoods is 61% while the rate in disadvantaged neighborhoods is only 56%. This indicates that STM does have a noticeable negative impact on the willingness or ability to be economically active.

Differences in the unemployment rate (number of unemployed divided by those in the labor market) are consistent with the STM thesis. The share of unemployed labor is higher in disadvantaged neighborhoods in both counties. The share of the unemployed population in San Joaquin is 11% in disadvantaged neighborhoods and 7% in nondisadvantaged. Los Angeles' unemployment percentage in the disadvantaged neighborhoods is 8% and 5% in nondisadvantaged. These systematic difference is consistent with the *a priori* expectation that the relative lack of access to jobs coupled with poorer transportation resources create barriers to finding employment for residents in disadvantaged neighborhoods.

The impact of STM can also be seen in the proportion working full-time, year round (FTFY). Disadvantaged neighborhoods in both counties have the lowest percentage: San Joaquin maintains 34% full-time, year-round employment in disadvantaged neighborhoods compared to nondisadvantaged neighborhoods' 39%. The nondisadvantaged neighborhoods in Los Angeles County have 44% full-time, year-round employment while disadvantaged neighborhoods rest at 40%. These patterns imply that among those working, STM makes it more difficult to be fully employed.

In summary, the statistics on labor force participation, unemployment, and FTFY employment are consistent with the STM thesis. Residents in disadvantaged neighborhoods fare worse than in nondisadvantaged neighborhoods. Moreover, the impacts in San Joaquin appears to be more severe.

Earnings

Along with the systematic disparities in employment status, the data shows parallel inequalities in earnings across neighborhood types (Table 4.2). In fact, the variations in earnings are considerably more unequal in both Los Angeles and San Joaquin. In Los Angeles County, average earnings for jobs in nondisadvantaged neighborhoods are $70.4k while earnings for jobs in disadvantaged neighborhoods average $32.4k. Jobs in nondisadvantaged neighborhoods in San Joaquin average $51.2k while disadvantaged neighborhoods in San Joaquin average $30.5k. Much of the disparities in earnings is due to differences in human capital (education and on-the-job skill acquisition), but there is at least an indirect STM effect because workers from disadvantaged neighborhoods a less able to work FTFY, thus lowering their take-home pay.

neighborhoods, with 64% male and 48% female populations participating in the labor force. In nondisadvantaged neighborhoods, female participation rests at 54% and male participation is 68%.

The disparities across neighborhood types are also evident when examining the distribution by earnings category. The available information reports three categories: $1,250 per month or less—the low earning category, the percentage of workers who earn between $1,251 to $3,333 per month—the medium earning category, and the percentage of workers who earn more than $3,333 per month—the high earning category. In Los Angeles County, 31% of jobs in disadvantaged neighborhoods fall into the low earnings designation by LEHDs, 40% into medium earnings, and 30% into high earnings. Jobs in nondisadvantaged neighborhoods have a greater percentage in the high earnings category (34%), with 37% falling to the medium earnings section, and 28% with low earnings. In San Joaquin County, around 24% of jobs in disadvantaged neighborhoods have low earnings, 35% medium earnings, and 41% high earnings. Jobs in San Joaquin County's nondisadvantaged neighborhoods have 27% in the low earnings category, 38% medium earnings, and 35% with high earnings.

Generally, in both counties, the medium income category represents a higher percentage of earners. One exception lies in San Joaquin's disadvantaged group of neighborhoods, in which 41% of neighborhoods earn more than $3,333 per month or at least $39,996 per year. This is indicative of spatial mismatch, where those who earn in disadvantaged neighborhoods are unlikely to be residents.

Table 4.2. Employment Characteristics by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not DA	Disadv	Partially Disadv	Not Disadv
Employment Status						
% Labor Force Participation	64%	64%	65%	56%	60%	61%
% Male Labor Force Participation	72%	71%	71%	64%	68%	68%
% Female Labor Force Participation	56%	58%	60%	48%	53%	54%
% Unemployed	8%	6%	5%	11%	9%	7%
% Full-time, Year-round	40%	42%	44%	34%	38%	39%
Earnings						
Average Earnings	$32,407	$40,899	$70,387	$30,465	$44,559	$51,182
Job Earnings Categories						
% Low ($1,250/month or less)	31%	31%	28%	24%	28%	27%
% Medium ($1,251 to $3,333/month)	40%	38%	37%	35%	37%	38%
% High (more than $3,333/month)	30%	31%	34%	41%	34%	35%

Source: 2015–19 5-year ACS; 2018 LEHD LODES

Spatial Structure

Spatial access to jobs can be measured in several ways. The first is the availability of jobs within one's own neighborhood, and the second is the accessibility to all jobs, both those within one's own neighborhood and those in the region. The third measure examines the inequality or misalignment in the relative location of affordable housing and low-wage jobs, which can force less skilled workers to live far from where they can find employment.

Job Density

Job density is measured by the number of jobs per square mile and is shown in Table 4.3. Of course, because of the difference in population density, Los Angeles County will have greater job density than San Joaquin County. However, knowing how density changes within the disadvantaged categories provides some indication to the mobility required to search for and sustain employment.

Overall, in Los Angeles County, disadvantaged neighborhoods have minimal low-density areas, measuring at only 1%, with high density in 42% of neighborhoods and the remaining 57% of disadvantaged neighborhoods maintaining medium density. In contrast, nondisadvantaged neighborhoods are 17% low density with twice as many high-density neighborhoods (34%). Approximately half of nondisadvantaged neighborhoods have medium job density. These results are expected, as nondisadvantaged neighborhoods are farther from urban metro cores with higher concentrations of job centers. Job density in San Joaquin County increases as tracts are more disadvantaged. Nondisadvantaged neighborhoods in San Joaquin County have 1,222 jobs per square mile, while disadvantaged neighborhoods in San Joaquin County have the greatest number of jobs per square mile, with 1,984.

In San Joaquin County, disadvantaged neighborhoods have fairly proportionate areas of low density (11%) and high density (16%), with medium-density areas comprising the majority of disadvantaged neighborhoods (74%). Density in San Joaquin County is similarly dispersed, with slightly lower density in nondisadvantaged neighborhoods. Density in nondisadvantaged neighborhoods is 37% low, 52% medium, and 11% high density.

Employment Opportunities

With these measures of job density in mind, consider Table 4.3, which includes ratios for all workers to all jobs and for low earning jobs to low earning workers in each disadvantaged category. Jobs-to-workers ratio is an indicator of a worker's access to employment opportunities. Neighborhoods with ratios above 1 are considered job rich while those below 1 are considered job poor.

In Los Angeles County, nondisadvantaged neighborhoods are job rich while disadvantaged neighborhoods are considered job poor. Nondisadvantaged neighborhoods are only slightly job rich, with a ratio of 1.01, meaning there are an almost equal number of jobs to workers. The ratio of low earnings jobs is about 15% higher (1.17). Disadvantaged neighborhoods are slightly job poor, with 9 jobs for every 10 workers in aggregate jobs and a low earnings jobs ratio of 0.78.

In San Joaquin County, disadvantaged neighborhoods are job rich, with a jobs-to-worker ratio of 1.20 while nondisadvantaged neighborhoods are not, with a ratio of 0.68. disadvantaged and nondisadvantaged neighborhoods' low earnings jobs ratio are job poor, with ratios of 0.83 and 0.87, respectively.

These low earnings job density figures indicate that in many of the neighborhoods of San Joaquin County and in Los Angeles disadvantaged neighborhoods, there are more workers than available jobs. While there are always workers commuting to other neighborhoods for work, these job-poor neighborhoods are more likely to require workers to commute to jobs.

Table 4.3. Spatial Structure by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
Job Density						
Jobs per sq mile	4,306.3	6,241.7	4,150.1	1,984.2	1,331.9	1,222.7
% low density (bottom quartile)	1%	4%	17%	11%	32%	37%
% medium density	57%	51%	49%	74%	58%	52%
% high density (top quartile)	42%	45%	34%	16%	11%	11%
Jobs to Worker Ratio						
All jobs	0.91	1.32	1.01	1.20	0.86	0.68
Low earnings jobs	0.78	1.05	1.17	0.83	1.00	0.87
Jobs-Housing Fit	3.303	4.610	27.824	1.958	2.921	2.770

Source: 2018 LEHD LODES; UCLA CNK-CARB Transportation Disparity Dataset

Figures 4.1 and 4.2 show the spatial distribution of the jobs-to-workers ratio within each category of disadvantaged neighborhoods in Los Angeles and San Joaquin counties. In Los Angeles, much of the urban core and South LA in particular, are among the most disadvantaged and are job poor. Parts of the San Fernando Valley and Pomona also have high incidences of disadvantaged neighborhoods, most of which are slightly job poor. The nondisadvantaged neighborhoods on the Westside and along the coastal cities like Santa Monica, El Segundo, and Redondo Beach are job rich. The large counties above Santa Clarity but below Palmdale register as job poor because they are mountainous and sparsely populated. Many job poor neighborhoods in San Joaquin are in the city of Stockton, particularly in neighborhoods in and around the area known as "South of Charter." However, because San Joaquin County is such an agricultural industry region, jobs are less clustered and the jobs-to-workers ratio is more dispersed across the county.

Figure 4.1. Ratio of Jobs-to-Workers in Los Angeles County, CA

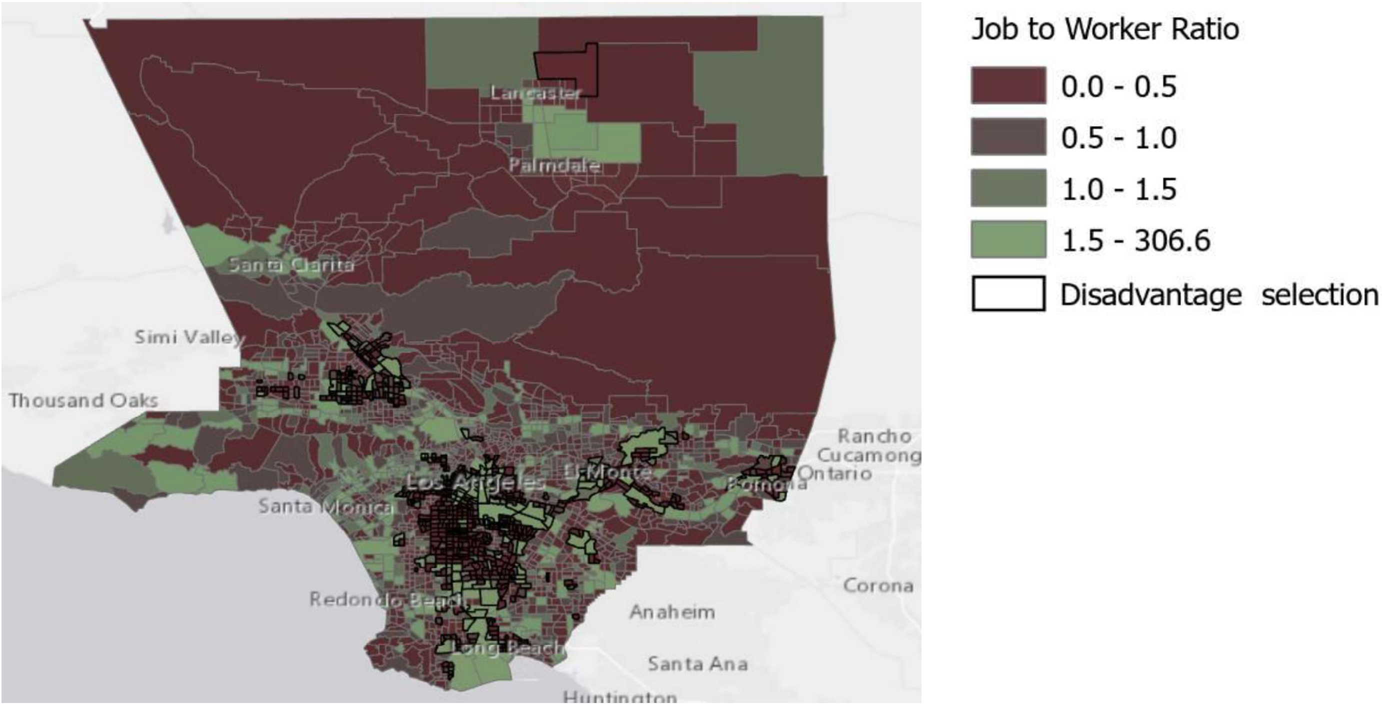
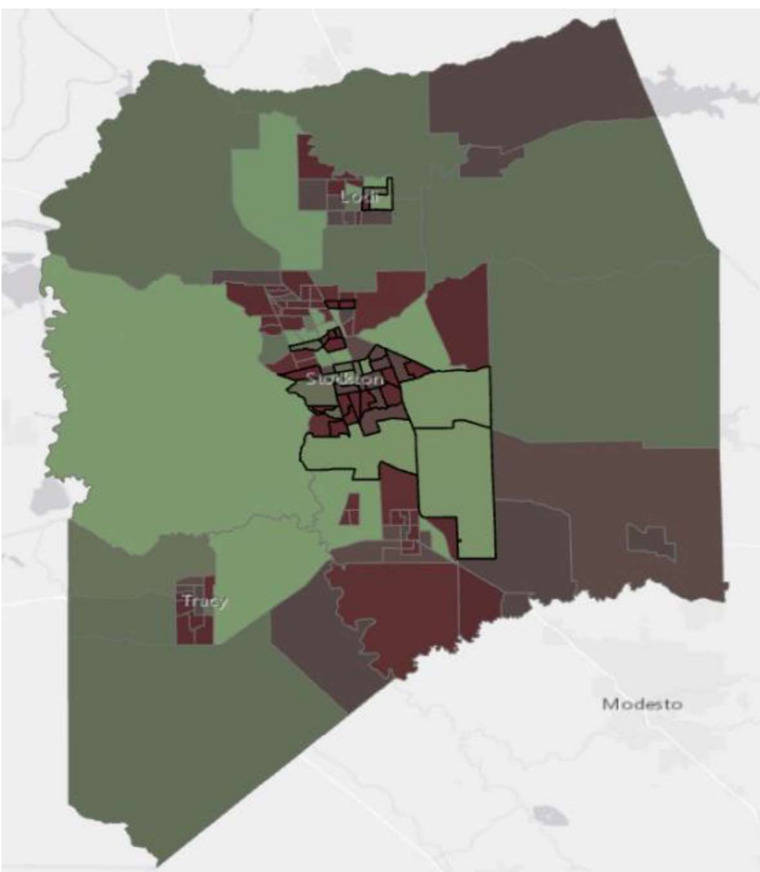


Figure 4.2. Ratio of Jobs-to-Workers in San Joaquin County, CA



Jobs-Housing Fit

A critical aspect of spatial-transportation mismatch is a discrepancy between where many low-wage workers work and the availability of affordable housing close to their job site. For example, many high-income and affluent neighborhoods require a low-wage labor force to staff retailing outlets, personal services, and food establishments, and many of the employees have to commute long distances from where they can find affordable housing. This problem is compounded by the fact that many of the neighborhoods with affordable housing do not have many jobs for the low-wage earners due to systematic underinvestment. This form of STM is known as Jobs-Housing Fit (for low-wage workers and affordable housing). The phenomenon is measured by comparing the number of low-wage jobs in a neighborhood to the number of nearby affordable housing units. A good balance, a good fit, lowers the amount of commuting, thus saving travel cost to individuals while generating a social good in terms of reduced VMT and associated greenhouse gases. A high ratio (relative to the region's overall average) represents neighborhoods with a relative deficit of affordable housing compared to the number of low-wage jobs, and a low ratio (relative to the region's overall average) represents a deficit of low-wage jobs relative to the amount of affordable housing. In Table 4.3., nondisadvantaged neighborhoods in Los Angeles have an affordable housing deficit, where disadvantaged neighborhoods have a low-wage job deficit. San Joaquin has a similar disparity or poor Jog-Housing Fit (after normalizing by the county average), but the difference between disadvantaged and nondisadvantaged neighborhoods is not as great.

Commute Patterns

There are minor differences in the disadvantaged categories when it comes to mode of transit to work, indicate in Table 4.4. In Los Angeles County, the prominent mode is driving alone to work, though those in nondisadvantaged neighborhoods drive less. More than three-quarters (76%) of those who live in nondisadvantaged neighborhoods drive to work alone, while 69% in disadvantaged neighborhoods drive to work. Disadvantaged neighborhood residents rely on carpooling (12%) and transit (11%) more than residents in nondisadvantaged neighborhoods (8% and 4%, respectively). Those who bike and walk are fewer in both neighborhoods, with only 4% cyclists and walkers in disadvantaged neighborhoods and 3% in nondisadvantaged neighborhoods. Notably, the portion of workers who avoid a commute entirely by working from home is higher in nondisadvantaged neighborhoods (7%) than in disadvantaged neighborhoods (3%).

All three neighborhoods average around a half hour to travel to work, with fairly consistent proportions of travel time breakdowns for workers. For instance, 15% of workers in disadvantaged neighborhoods can get to work in 15 minutes or less. Eighteen percent of nondisadvantaged workers have the same travel times. Those that can get to work in 15 to 29 minutes constitute 31% of disadvantaged neighborhoods and 32% of nondisadvantaged neighborhoods. Workers traveling 30 to 59 minutes are 39% of disadvantaged neighborhoods and 36% of nondisadvantaged neighborhoods. Workers traveling an hour or above are 15% of all categories. Therefore, in all disadvantaged categories, there are similar commute times, with slightly more workers traveling less than 15 minutes and slightly fewer workers traveling between 30 minutes to an hour in nondisadvantaged neighborhoods. This is consistent with the spatial mismatch indicated by the jobs to workers ratio mentioned in the preceding text.

San Joaquin County's commute patterns follow similar trends as Los Angeles County, with a key difference: More workers in all of San Joaquin County drive alone to work. More than three-quarters of all workers in all categories drive to work; those who live in nondisadvantaged neighborhoods who drive to work alone constitute 80% of the population, while 76% in disadvantaged neighborhoods drive to work. Fifteen percent of disadvantaged neighborhood workers rely on carpooling and only 2% utilize transit. Nondisadvantaged neighborhoods' workers also have higher percentages of carpoolers than in Los Angeles, with 11% carpooling. Only 1% of workers in nondisadvantaged neighborhoods transit to work; only 2% bike or walk. Workers in disadvantaged neighborhoods who bike or walk are also only 2%. The portion of work-from-home residents are 3% in disadvantaged neighborhoods and 4% in nondisadvantaged neighborhoods.

All three neighborhood types in San Joaquin County also average around a half hour to travel to work, but with a greater proportion of workers' travel taking less time. For instance, 25% of workers in disadvantaged neighborhoods and 28% of workers in nondisadvantaged neighborhoods can get to work in 15 minutes or less, compared to the 15% and 18% in Los Angeles County. Those that can get to work in 15 to 29 minutes in San Joaquin County constitute 35% of disadvantaged neighborhoods and 33% of nondisadvantaged neighborhoods. Workers traveling an hour or more are 17% of the disadvantaged category and 18% of nondisadvantaged neighborhoods. Therefore, commuters in San Joaquin County rely more on private vehicles than walking, biking, or taking transit. Their commute times are fairly consistent between the disadvantaged categories and fairly evenly distributed in time breakdowns. Roughly 60% of workers in all disadvantaged categories travel less than a half hour to work, where nondisadvantaged neighborhoods' workers tend to have shorter commutes.

Average Commute VMT per Worker shows the mean distance a worker drives to work by vehicle. Higher Commute VMT per Worker is expected in less dense areas. In Los Angeles, nondisadvantaged neighborhoods have the highest average Commute VMT per Worker, measuring at 14.42 miles. This is expected, as nondisadvantaged neighborhoods are concentrated in less dense or more residential areas, which would require residents to travel longer distances to work. Disadvantaged neighborhoods in Los Angeles have an average Commute VMT per Worker roughly 3 miles less than nondisadvantaged neighborhoods, which average 11.46 miles. Even though disadvantaged neighborhoods have higher medium and high job density, the average commute VMT is still more than 10 miles. This suggests that workers in disadvantaged neighborhoods must travel outside their neighborhoods to work.

In all, the Average Commute VMT per Worker in San Joaquin County is higher. These higher numbers follow expectations based on job density and the rural characteristics of the county. Similarly, to Los Angeles County, disadvantaged neighborhoods have slightly lower VMT for commutes, measuring at 20.24 miles compared to 22.37 miles in nondisadvantaged neighborhoods. Nondisadvantaged neighborhoods with the highest average Commute VMT are located in areas farther away from job centers.

Table 4.4. Commute Patterns by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
By mode (%)						
Drive Alone	69%	74%	76%	76%	78%	80%
Carpool	12%	10%	8%	15%	13%	11%
Transit	11%	6%	4%	2%	2%	1%
Bike or Walk	4%	3%	3%	2%	2%	2%
Other Means	2%	2%	1%	1%	1%	1%
Work at Home	3%	4%	7%	3%	4%	4%
Travel times						
Average (min)	32.3	31.7	31.7	31.7	34.5	31.6
Less than 15 min	15%	17%	18%	25%	26%	28%
15–29 min	31%	33%	32%	35%	33%	33%
30–59 min	39%	35%	36%	23%	19%	21%
Long (60+)	15%	15%	15%	17%	22%	18%
Travel distances						
Commute VMT per Worker	11.46	13.85	14.42	20.24	22.95	22.37

Source: 2015–19 5-year ACS, UCLA CNK-CARB Transportation Disparity Dataset

Job Accessibility

Job accessibility measures the relative number of jobs that are accessible by residential location. The job access indicator e is compared and normalized by the average accessibility in its corresponding county and then to the state of California. This index is reported in Table 4.5. Disadvantaged neighborhoods in Los Angeles County have greater job accessibility than nondisadvantaged neighborhoods. In fact, their access to jobs is twice the rate of the entire state (2.01), whereas nondisadvantaged neighborhoods are slightly less compact than the state (0.9). Looking at each designation of neighborhood compared to the county mean, disadvantaged neighborhoods still have more job accessibility, but the disparity to nondisadvantaged neighborhoods is less drastic (from 1.13 to 0.92).

These accessibility figures accentuate the spatial differences between Los Angeles County compared to San Joaquin County. San Joaquin is more rural; thus, jobs are more spatially spread out. Disadvantaged and nondisadvantaged neighborhoods both rest around 40% as accessible as the rest of the state. Compared to the county average, disadvantaged neighborhoods are slightly more accessible and nondisadvantaged neighborhoods are slightly less accessible.

Table 4.5. Job Accessibility by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
Normalized by state mean	2.01	1.00	0.90	0.39	0.38	0.36
Normalized by county mean	1.13	1.01	0.92	1.05	1.00	0.97

Source: UCLA CNK-CARB Transportation Disparity Dataset

Conclusion

The purpose of this chapter is to assist stakeholders identify the patterns and the magnitude of commonalities and differences among neighborhoods in employment outcomes, mobility, and access to job opportunities. The major finding is that outcomes in both regions are consistent with the STM thesis, but there are some differences. Access to jobs in rural areas is distinguished from access in urban areas, as well as between neighborhoods that are disadvantaged or not disadvantaged. These differences have implications on employment and earnings. As such, transportation allocation and investments should be tailored to neighborhood-specific needs.

The following are key findings. Job density in Los Angeles is similar in both disadvantaged and nondisadvantaged neighborhoods, but when compared with workers to fill those jobs and housing for low-wage workers, we see a mismatch. Disadvantaged neighborhoods are job poor and have an affordable housing deficit, while nondisadvantaged neighborhoods are job rich but have a low-wage deficit. This indicates that residents in many neighborhoods do not live and work in the same neighborhood, but workers in disadvantaged neighborhoods have limited ability to travel (indicated by lower Commute VMT). Remember that labor force participation is fairly consistent between disadvantaged and nondisadvantaged neighborhoods, but with vastly different earnings, where nondisadvantaged neighborhoods earn over twice as much.

In San Joaquin County, labor participation is consistent between disadvantaged and nondisadvantaged, while earnings in nondisadvantaged are 1.7 times as high as disadvantaged neighborhoods. Because jobs in San Joaquin County are more spatially dispersed in all neighborhoods, both disadvantaged and nondisadvantaged neighborhood workers commute more. Yet, the ability to travel is lower in disadvantaged neighborhoods.

These findings indicate that transportation allocation and investments should be tailored to neighborhood-specific needs. Transit improvement projects should target neighborhoods with low-level access to quality mass transportation but within reasonable proximity to jobs. The project's findings can be a practical tool to help key decision makers and community stakeholders better understand a neighborhood's transportation problems and identify effective strategies.

Chapter 5: Education Access

Introduction

This chapter examines the impact of spatial and transportation mismatch (STM) on enrollment to quality schools. The main focus of this chapter centers on how urban spatial structural elements such as unequal places, location of opportunities, and mobility networks contribute to the production of inequality (Ong and Gonzalez, 2019). Cities and towns are economically, socially, and politically constructed, and one unfortunate consequence is the production of disparities. STM occurs because disadvantaged people live far from opportunities and lack the means to overcome distances. This framework has been successfully applied to demonstrate how STM limits access to high-performing schools, extended learning opportunities, and educational internships. BIPOC and low-income households and neighborhoods often lack geographical proximity and transportation to overcome the distance to access quality education.

As mentioned in previous chapters, STM builds on John Kain's seminal work on the spatial mismatch hypothesis (SMH), which focuses on examining the suburbanization of jobs and racial housing segregation as constructing spatial barriers to employment opportunities (Kain, 1992). By including transportation as a medicating factor, STM builds on SMH, arguing that the limited access to private vehicles hurts disadvantaged neighborhoods (Taylor and Ong, 1995). This approach has been adopted to examine elementary school students, high school students, and access to enrichment opportunities (Ong and Terriquez, 2008; Houston and Ong, 2013; Ong and Ong, 2017). Additionally, despite the historical ruling in 1954 Brown versus the Board of Education, racial segregation has had a resurgence within the school system (Ong and Rickles, 2004; Rickles, Ong, and Houston, 2005; Fiel and Zhang, 2019). Segregation remains a problem even when parents have a choice on school options for their children (Goldstein, 2019; Knight, 2019; Coughlan, 2018). This problem is further compounded by unequal transportation resources, creating additional barriers to accessing high-performance schools frequently located far from disadvantaged neighborhoods.

This chapter aims to understand access to High-Quality Elementary Schools (HQS; defined in the "Data and Methods" section) for young students in Los Angeles and San Joaquin counties. Early education sets the trajectory for later educational achievement. Primarily, the study focuses on understanding neighborhood-level access to third-grade quality education based on the neighborhood's disadvantaged status. We also focus on illustrating access to high-quality education for disadvantaged neighborhoods via multiple forms of transportation.

Data and Methods

The data for this chapter comes from several sources to develop information related to access to high quality education. All indicators were developed specifically for this project. Table 5.1. describes each of the key indicators in detail. We focus on high quality education access for third grade students as an indicator for later educational success.

Table 5.1. Summary of Variables

Indicator	Data Source	Geography
Education Quality	California Department of Education—2019 California School Dashboard (California Department of Education, 2020b)	Point location (x/y coordinates)
Walking Access to High Quality Schools Index	Index constructed using school education quality data from California Department of Education	Census Tract
Transit Access to High Elementary Schools	General Transit Feed Specification (GTFS) from Google API	Within 30-min of a walking-transit trip through the Google transit network
Disadvantaged Neighborhood	CalEnviroScreen 3.0 and Opportunity Maps	Census Tract

The construction of disadvantaged neighborhoods is described in Chapter 3. The remaining indicators are described in more detail in the text that follows. The main area of analysis for this chapter is at census tract level. Census tracts and neighborhoods are used interchangeably throughout.

To note, given that our primary interest is understanding access to quality education in disadvantaged neighborhoods, and the limited access to private vehicles by transportation deficient households, we did not include car access to high-quality schools in this chapter. Instead, we focused on geographic proximity, as well as walking and transit accessibility to high-quality schools.

Education Quality

This project focuses on measuring high-quality education at the third-grade level.[6] Kindergarten to fifth grade enrollment is critical to subsequent education performance (see Ong and Ong, 2017; Ong and Gonzalez, 2019 for details). The "quality" of an elementary school was determined based on the school's overall performance on the California Assessment of Student

[6] While all early education is fundamental to further educational success, we focused on students attending the third grade to maintain consistency across schools that might not host the same grade levels.

Performance and Progress (CAASPP) System, a system of assessments meant to measure a student's capacity to integrate knowledge and skills across a variety of educational subjects, which is a key indicator of college and career readiness. CAAPS replaced the STAR Program in 2014. The CAASPP system included the Smarter Balanced Interim and Summative Assessment for both English language arts/literacy (ELA) and mathematics for students in third through eighth grade, as well as eleventh grade. The Smarter Balanced Assessment Consortium membership was paid for by the state of California to develop the CAASPP assessment so only public schools have access to the California assessments (CAASPP, 2021).

To determine the quality of schools, we took the average of each school's math and ELA scores, with final scores ranging from 1–5. An average score of 4 or higher indicates a high-quality school (HQS), while a score of 2 or 3 indicates a medium-quality school, and a score of 1 indicates a low-quality school.

Walking Access to High-Quality Schools Index

To create walking access to high-quality schools, we first identified the location of high-quality elementary schools. Then we applied a 1-mile buffer using great circle distance around high-quality elementary schools (HQS). A 1-mile buffer is meant to capture a reasonable distance for children to walk to school in the morning (Falb et al., 2007; Su et al., 2013). Then we determined how much of each census tract was covered by the 1-mile buffer. Finally, we multiply the tract coverage to the number of children ages 5 to 9 years old (ACS 2015–2019) and determine the share of children with access to HQS within each census tract.

While we account for walking proximity to high-quality schools, we did not account for walking connectivity or traffic safety when measuring walking accessibility. Thus, while some neighborhoods might appear to be "walking accessible," if they lack quality walking infrastructure or experience high levels of pedestrian collisions, young children may not be able to walk to school under these conditions (Giles-Corti et al., 2011). Additionally, while a 1-mile walking distance is often considered a reasonable distance to walk to school, it might not be appropriate to expect a third-grade student to walk this distance (Chillón et al., 2015).

Transit Access

To measure transit accessibility, we utilized Google Directions API to measure what census tracts were accessible using public transit within 30 min at 7 am. To do this, we estimated the total transit time between the weighted population centroid of a census tract and each high-quality elementary school within a 4-mile radius using Google Directions' transit mode. These directions include time spent walking from the census centroid to the bus stations, waiting at the station, and traveling from the bus to the school. The weighted population centroid gives a better estimate for resident travel time than the center of the geometric center.

We used Tuesday, April 13th at 7:00 am PT as the departure time to allow ample time for potential bus delays and for students to enter and settle into class before a 7:50 am first bell. Tracts with total travel times within 30 minutes are considered accessible, as we anticipate anything beyond 30 minutes would be onerous for an elementary student's travel and thus unrealistic.

There are several limitations to utilizing the Google API to measure transit accessibility. First, children walk slower than adults, which is not accounted for in Google's estimates (Toor et al., 2001). Additionally, we calculated these transit times during the COVID-19 pandemic, which means that traffic is lighter as residents could work from home and LA Metro has reduced their services by roughly 20% (Frazier, 2020). Additionally, Google API restricts the number of calls for walking-and-transit trips by time, while charging for each call. Given budget and time limitations, we restricted our analysis to Transit Access to HQS only for disadvantaged census tracts.

Results

Elementary School Quality by Neighborhood Type

In Los Angeles, there are a total of 1,298 schools serving third-grade students (Table 5.2). Of those 1,298 schools, 619 (48%) are located in nondisadvantaged neighborhoods, 289 (22%) in partially disadvantaged neighborhoods, and 390 (30%) in disadvantaged neighborhoods. Within the types of neighborhoods, there are differences in the quality of schools present. Out of the 390 schools within disadvantaged neighborhoods, only 4% are high-quality schools (HQS), while 77% are low-quality schools. In contrast, out of the 619 schools within nondisadvantaged neighborhoods, 52% are HQS, with 23% of schools considered low-quality schools.

In San Joaquin, there are a total of 160 schools serving the third grade. There are a total of 70 (44%) schools in nondisadvantaged neighborhoods, 46 (29%) in partially disadvantaged neighborhoods, and 44 (28%) in disadvantaged neighborhoods. Within the disadvantaged neighborhoods, 5% of the schools are HQS, while 89% are low-quality schools. In contrast, in nondisadvantaged neighborhoods, 14% of the schools are HQS, while 53% are low-quality schools.

Table 5.2. Location of Schools by Level of Quality

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disadv	Disadv	Partially Disadv	Not Disadv
Total number of schools	390	289	619	44	46	70
Low-Quality Schools (bottom level)	77%	54%	23%	89%	61%	53%
Middle Quality Schools (middle half)	20%	29%	26%	7%	26%	33%
High-Quality Schools (top level)	4%	17%	52%	5%	13%	14%

While across both counties, the percentage of HQS is much lower in disadvantaged neighborhoods as compared to nondisadvantaged neighborhoods, San Joaquin had overall a higher rate of low-quality schools. More than half of the schools in San Joaquin across all three types of neighborhoods are low-quality schools. Additionally, the highest percentage of HQS in

San Joaquin is 14%, while the highest number of HQS in Los Angeles is 52%. Thus, San Joaquin has much less access to quality third-grade education compared to Los Angeles, regardless of disadvantaged neighborhood status.

Walking Access to High-Quality Schools by Geographical Location

Figure 5.1 and Figure 5.2. both display the spatial distribution of Walking Access to High Quality Schools Index (Walking Access to HQS Index). In the maps, the purple tones indicate lower rates of children with access to HQS in each neighborhood, while the green tones indicate higher access to HQS. Additionally, a black outline in both maps highlights disadvantaged census tracts.

The spatial distribution of walking access for children 5–9 to high-quality schools in Los Angeles County is illustrated on Figure 5.1. Neighborhoods with high walking access to HQS are located primarily in Santa Monica, Redondo Beach, Santa Clarita, Pasadena, and Downey. Neighborhoods with low walking access to HQS are primarily located in Downtown and South LA, portions of San Fernando Valley, Malibu, and north of Los Angeles Forest. In downtown, south LA, and the San Fernando Valley, areas with low access to HQS are also primarily disadvantaged census tracts. In contrast, in Malibu and most neighborhoods north of the Los Angeles forest, there are not as many, if any, disadvantaged neighborhoods. This spatial pattern could indicate the low-density levels in both of these areas, leading to lower levels of walking accessibility to HQS for children 5–9.

Similarly, Figure 5.2 illustrates walking access for children ages 5–9 to high-quality schools in San Joaquin County. Neighborhoods with high levels of walking access to HQS are located primarily in Tracy, Lodi, and Lincoln Village. However, most neighborhoods, regardless of disadvantage status, have very low levels of walking access to HQS (0–20%). Additionally, all disadvantaged neighborhoods appear to also have low levels of walking access to HQS.

Overall, across Los Angeles and San Joaquin, disadvantaged neighborhoods tend to have low walking access to HQS. Additionally, San Joaquin appears to have a higher share of neighborhoods with very low walking access to HQS. In Los Angeles, neighborhoods that are not marked as disadvantaged but have low levels of walking access to HQS also tend to be neighborhoods with low levels of density. Thus, results point to a lack of walking access for both disadvantaged and low-density neighborhoods.

Figure 5.1. Los Angeles Neighborhood Level Access to High-Quality Education

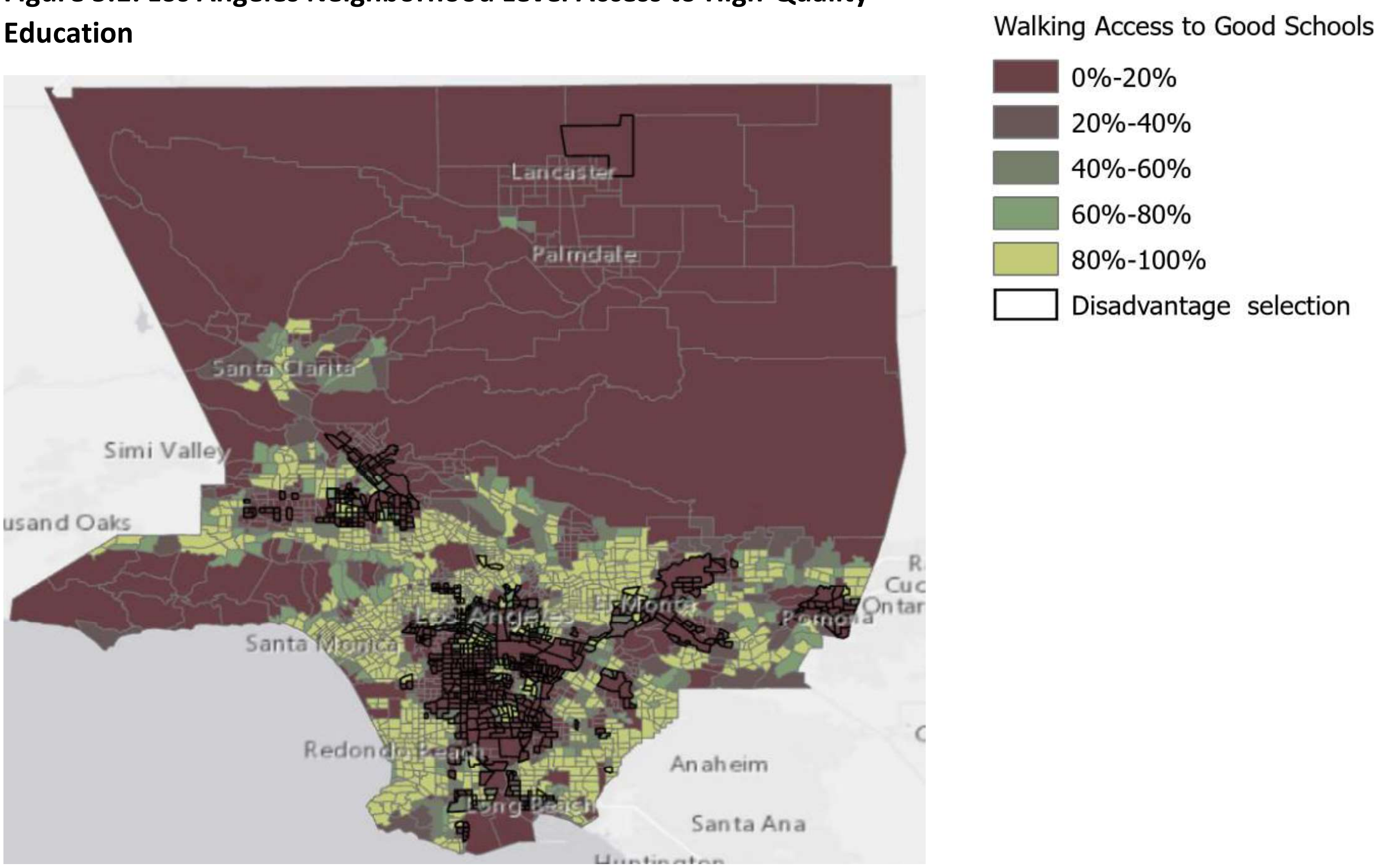
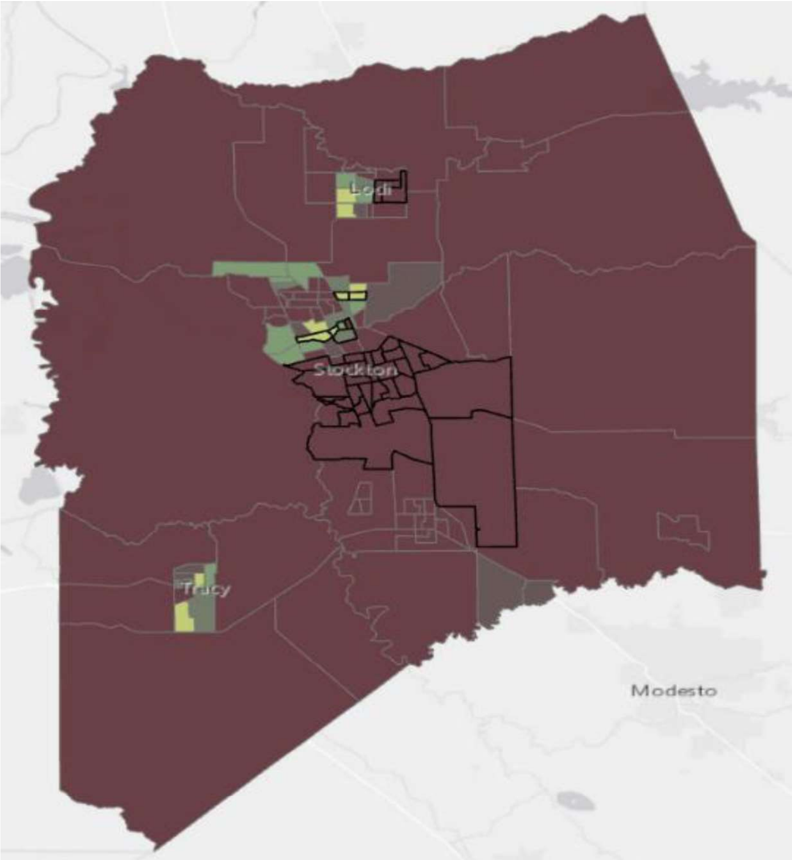


Figure 5.2. San Joaquin Neighborhood Level Access to High-Quality Education



Share of Children with Walking Access to HQS by Neighborhood Type

We further wanted to understand the level of access 5–9 children have to HQS. In Table 5.3, we examined the distribution of children based on walking access to HQS by neighborhood types.

Table 5.3. Share of Children with Walking Access to High-Quality Elementary Schools

	Los Angeles			San Joaquin		
	Disadv	Partially Disadv	Not Disad	Disadv	Partially Disadv	Not Disadv
Number 5–9 years old	200,000	139,000	257,000	14,000	21,000	23,000
Share with no accessibility	53%	42%	13%	86%	55%	30%
Some but less than majority	20%	14%	17%	0%	38%	30%
Share with a majority accessible	14%	20%	29%	9%	7%	33%
Share 100% accessible	13%	24%	41%	5%	0%	7%

In Los Angeles County, 200,000 children between the ages of 5–9 live in disadvantaged neighborhoods, while 257,000 live in nondisadvantaged neighborhoods. Out of the 200,000 children who live in disadvantaged neighborhoods, 53% reside in neighborhoods with no walking access to HQS, while only 13% live in neighborhoods with full access to HQS. In contrast, out of the 257,000 children living in nondisadvantaged neighborhoods, 13% live in neighborhoods with no walking access to HQS, while 41% live in neighborhoods with full access to HQS.

In San Joaquin County, there are 14,000 children ages 5 to 9 living in disadvantaged neighborhoods and 23,000 children living in not disadvantaged neighborhoods. Out of the 14,000 children living in disadvantaged neighborhoods, 86% live in neighborhoods with no walking access to HQS, while only 5% live in neighborhoods with full walking access to HQS. Out of the 23,000 children living in nondisadvantaged neighborhoods, 30% reside in neighborhoods with no walking access to HQS, while 7% reside in neighborhoods with full walking accessibility.

Across both Los Angeles and San Joaquin, children living in disadvantaged neighborhoods have the least walkable access to HQS. However, overall, children in San Joaquin have the lowest walkable access to HQS regardless of the type of neighborhood they live in, with the lowest rate of children living in neighborhoods with full access to HQS regardless of neighborhood disadvantage status.

Access to High-Quality Schools for Disadvantaged Neighborhoods

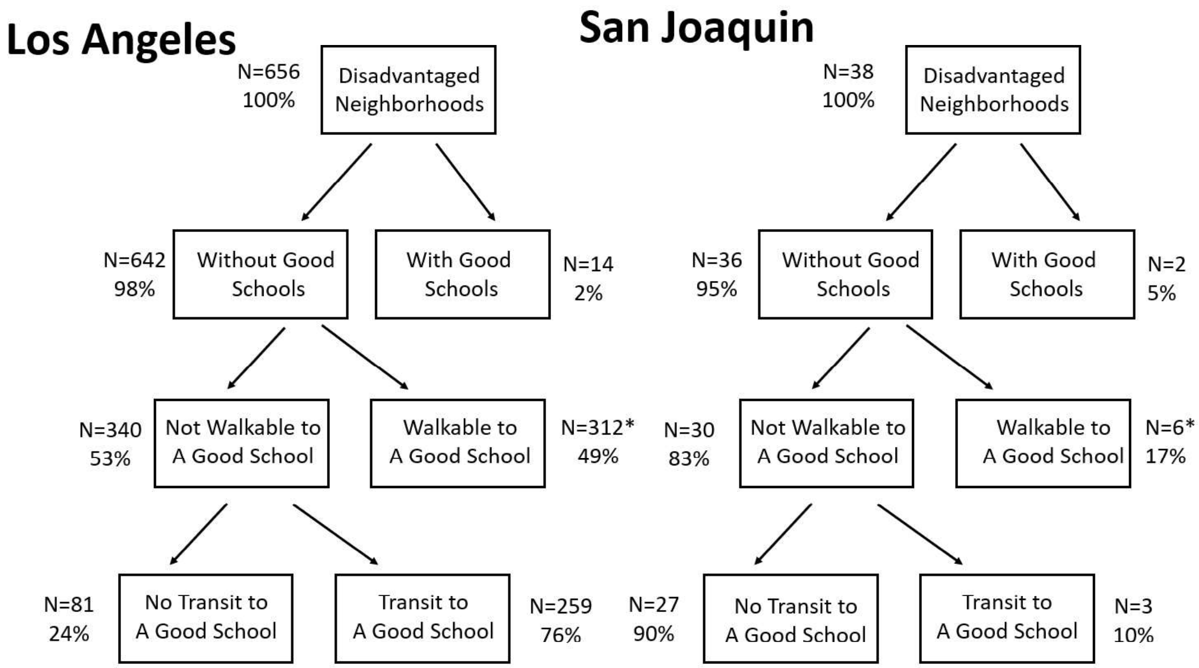
We further examined access to HQS for disadvantaged neighborhoods. This analysis included both walking access to HQS and transit access to HQS. A full description of access by walking or transit for all neighborhood types can be found in Appendix B.

Figure 5.3. illustrates the distribution of disadvantaged neighborhoods via their access levels to HQS. In Los Angeles, there are a total of 656 disadvantaged neighborhoods. However, only 14 (2%) neighborhoods have a HQS within their boundaries. Out of the 642 neighborhoods without a HQS, 340 (53%) are not walkable to HQS. Among the neighborhoods with no walkable access to HQS, 76% have access to HQS within a 30 min transit ride. Overall, 81 disadvantaged neighborhoods do not have access to HQS using walking or transit.

In San Joaquin, there are a total of 38 disadvantaged neighborhoods. Out of the 38 disadvantaged neighborhoods, only 2 (5%) have a HQS within their borders. Of the 36 schools without a HQS, only 6 (17%) have walkable access to HQS, while 30 (83%) do not. Out of the 30 neighborhoods with no walkable access to HQS, only 3 (10%) have access to HQS using transit, while 27 do not.

Overall, disadvantaged neighborhoods in Los Angeles have a higher level of access to high-quality schools either by walking or public transit. Disadvantaged neighborhoods in San Joaquin have deficient access to walking or transit, a total of 27 (76% of the total number of disadvantaged tracts in SJ) neighborhoods do not have access to HQS either by walking or public transit. Therefore, there is a lower level of access in San Joaquin than in Los Angeles. The relatively high levels of transit accessibility in Los Angeles highlights challenges beyond transportation that might be keeping students living in disadvantaged neighborhoods from accessing HQS. However, in both counties, the actual low presence of HQS within disadvantaged tracts highlights persistent spatial mishmash in access to high-quality schooling in places where people of color and low-income individuals reside.

Figure 5.3. Classification of Disadvantaged Neighborhoods and HQS Access



*Includes completely walkable (fully within 1 mile) or partially walkable to a High-Quality School

Conclusion

This chapter focused on examining access to quality education for children living in Los Angeles and San Joaquin. We further explored how access to quality education is different depending on the disadvantaged status of a neighborhood. To examine spatial access to HQS, we stratified neighborhoods into those with nearby HQS (thus have spatial access), those with high automobile ownership (thus have the transportation resources to attend HQS outside the immediate area), and those that lack both of these qualities. For the last group, we examine whether public transit is a viable alternative (within a reasonable commute time).

Overall, we find a greater share of HQS in Los Angeles compared to San Joaquin regardless of neighborhood type. However, across both counties, disadvantaged neighborhoods have less access to HQS when compared to other neighborhood types within the same county. Additionally, through visual spatial examination, we found that both disadvantaged tracts and tracts with low density tend to have low levels of walking accessibility across both counties. However, San Joaquin appears to have a lower share of neighborhoods with walkable access to HQS.

Among disadvantaged neighborhoods in both counties, there are very low rates of neighborhoods with HQS within its boundaries. The low levels of HQS within disadvantaged neighborhoods highlight a high-level spatial mismatch in nearby access to quality education for low-income and people of color in Los Angeles. When incorporating transportation, disadvantaged neighborhoods in Los Angeles are more likely to have access to HQS, either using walking or public transit when compared to disadvantaged neighborhoods in San Joaquin. This lack of walking and transit access to HQS in San Joaquin could be indicative of the low levels of density across San Joaquin County. One of the limitations of our analysis is that it just examines travel distance. Future studies should also factor into the quality of the walking infrastructure available to disadvantaged neighborhoods. Often, disadvantaged neighborhoods have higher levels of collision and less walking-friendly streets, which might be preventing students from accessing HQS, even if they live close enough to a good school.

While STM can affect the ability of some students from accessing HQS, another constraint appears to be more dominant or deterministic. Surprisingly, we found only 81 LA census tracts (about 10% of all disadvantaged tracts) with no walking or transit access. In other words, in Los Angeles STM is not a binding constraint in accessing HSQ for many children in disadvantaged neighborhoods. Those better performing schools are not the nearest one but are reachable by walking or transit (and certainly by private vehicles for families with a car). Yet, children in these neighborhoods are barred by another factor, the administrative requirement to attend one's neighborhood school, a system that prevents too many disadvantaged youths from receiving a better education (Ong and Gonzalez, 2019). This is not to dismiss the contribution of STM because walking and taking transit can still be a burden, an additional hurdle to reinforce a system of unequal educational opportunities. The two forces, STM and territorial restrictions, work together as elements in a larger web of systemic inequality.

Chapter 6: Health Access

Introduction

This chapter examines the health challenges facing residents of disadvantaged neighborhoods through the lens of the COVID-19 pandemic. Los Angeles County and San Joaquin County, like the rest of the nation, have experienced an unprecedented disruption to its people and economy caused by the spread of COVID-19. The human and health impacts are traumatic. As of May 23, 2021, San Joaquin reported more than 73,000 confirmed cases and 1,402 deaths (San Joaquin County, 2021). The numbers in Los Angeles County with its larger population are staggering with more than 1.2 million cases and 24,166 deaths (Los Angeles County, 2021). The pandemic has upended how people work, pursue education, exercise, and socialize. Government has taken extraordinary steps to contain the novel coronavirus and prevent the disease from overwhelming the health care system. Guided by health experts, the state, counties, and cities have limited person-to-person interactions by restricting group gatherings, encouraging "social distancing," and ordering people to "shelter in place." Fortunately, conditions have been improving with the approval of COVID-19 vaccinations. By mid-May of 2021, about half of the eligible population in the two counties have received at least one inoculation shot. This has contributed to a dramatic drop in new infections. In Los Angeles, the latest 7-day average daily count (as of May 21) was only 114 cases and 7 deaths. The comparable figures were 12 and 0.5 for San Joaquin.

Although everyone is at risk from the novel coronavirus, there are systematic differences along racial lines. Additionally, while the state has prioritized risky neighborhoods for vaccination (after other high-risk populations such as frontline health care providers and the elderly), it has not produced racial equity in inoculation rates. (Unfortunately, there is no readily available information on outcomes by income class, but there is evidence that rates are higher in poor neighborhoods.) The inequities can be seen in Table 6.1. In Los Angeles, Blacks and Hispanics are much more likely to suffer COVID-19 deaths and are significantly less likely to be inoculated. There are also racial disparities in San Joaquin, with Blacks having higher mortality and low immunization. Hispanics appear to have lower death rates, but this may be an artifact of the county including Hispanic Whites in their count of the White population. Hispanics in the Center Valley region are significantly less likely to be vaccinated.

Table 6.1. COVID-19 Death and Vaccination Rates by Race

	Los Angeles		San Joaquin	
	Death Rates	Vaccination Rates	Death Rates	Vaccination Rates
All	229	47%	184	50%
Relative to NH White (= 1)				
Asian	1.14	1.12	0.90	1.00
Black	1.20	0.63	1.28	0.58
Hispanic	1.31	0.72	0.88	0.52
NH White	1.00	1.00	1.00	1.00

As of reports for May 23, 2020; compiled and estimated by authors.
Sources: California Department of Public Health; American Community Survey

Given the reality that different racial groups are not evenly distributed across space, the county level disparities are likely to translate into neighborhood level disparities in COVID-19 outcomes. A major challenge of studying pandemic outcomes at the neighborhood level is a lack of timely and consistent information on COVID-19. For example, LADPH reports by cities or communities, which can vary enormously in size. These do not correspond to geographies that are most relevant to neighborhoods. San Joaquin does report information by zip code, but the information is not readily downloadable. We rely on the available data from the California Department of Public Health. We spatially allocate that information to census tracts.

To understand how the pandemic has affected disadvantaged neighborhoods, we examine three aspects. The first examines preexisting conditions in terms of health status and health resources prior to the pandemic. The second part focuses on two factors that are important to health and travel (active transportation) during the pandemic, access to parks and bikeways. The final section examines the rate of COVID-19 deaths and vaccination, and how the latter is impacted by spatial-transportation mismatch.

Data and Methods

This chapter uses multiple data sources to construct information related to access to health care services. Similar to the previous chapters, this chapter includes two types of indicators. The first are those previously developed by UCLA Center for Neighborhood Knowledge as part of their CARB-funded transportation disparity project and preexisting one from other sources (e.g., American Community Survey), which were evaluated to determine which are relevant for inclusion (see Appendix A for further details on these datasets). The second type of indicators includes new ones constructed for the project. Table 6.2 summarizes the key indicators discussed in this chapter and their source. Additional details can be found in the appendix.

Table 6.2. Health-Related Indicators and Data Sources

Indicator	Data Source	Geography
Health Insurance	2015–19 ACS	Census Tract
Disability	2015–19 ACS	Census Tract
Primary Care Shortage Area	CNK-CARB Transportation Disparity	Census Tract
Access to Publicly Open Space	CNK-CARB Transportation Disparity	Census Tract
Availability of Bikeways	CNK-CARB Transportation Disparity	Census Tract
COVID-19 Deaths and Vaccination	California Department of Public Health	Zip Code, allocated to Census Tracts by authors
COVID-19 Vaccination Provider	URISA's GISCorps	Point location (x/y coordinates)

Data on COVID-19 deaths come from the "California Vital Data (Cal-ViDa) Query Tool," which allows researchers to download aggregated counts of deaths by cause by zip code (California Department of Public Health, 2021a). The information is based on death certificates, and we use the cumulative deaths in 2020 and 2021. Data on COVID-19 vaccination come from the "COVID-19 Vaccine Progress Dashboard Data by ZIP Code," which provides aggregated information on the number of individuals who are fully and partially vaccinated. Both sets of zip-code-level data are spatially allocated to census tracts, weighted by population.

Data on the location of COVID-19 provider comes from URISA's GISCorps. The dataset includes "information about locations where government agencies and healthcare providers are directing members of the public to access COVID-19 vaccination." This dataset is updated daily and the data used for this project was extracted on April 3, 2021.[7]

[7] For more information see https://giscorps.maps.arcgis.com/home/item.html?id=c50a1a352e944a66aed98e61952051ef (accessed May 21, 2021).

Results

Preexisting Health Conditions and Resources

We first analyze prepandemic metrics, including preexisting health conditions, availability of health resources, and insurance coverage. Table 6.3 summarizes key information relating to these areas for the two counties and by three different neighborhood types. Preexisting health conditions can exacerbate the impact of COVID-19 by generating more severe morbidity and higher mortality rates. These conditions can also make it more difficult for individuals to adjust to “shelter in place” and seek assistance. We use two American Community Survey indicators, percent with any reported disability and percent with an ambulatory difficulty. There is no clear pattern in Los Angeles, with the disability rates being roughly equivalent in all three neighborhood types. Residents of disadvantaged L.A. neighborhoods are marginally more likely to have ambulatory difficulty than those in nondisadvantaged places. Neighborhood disparities are more apparent in San Joaquin, where the rates for both metrics are noticeably higher in disadvantaged neighborhoods, by about three percentage points.

Table 6.3. Health-Related Metrics by Neighborhood Types

	Los Angeles			San Joaquin		
	Disadvantaged	Partially Disadvantaged	Not Disadvantaged	Disadvantaged	Partially Disadvantaged	Not Disadvantaged
Preexisting Disability						
% with disability	10%	11%	10%	16%	13%	13%
% with an ambulatory difficulty	6%	6%	5%	10%	8%	7%
Health Insurance						
% not covered	15%	11%	6%	11%	6%	5%
% on Medicaid	38%	27%	12%	46%	28%	21%
Access to Medical Care						
Primary care shortage area	88%	68%	23%	92%	39%	37%

Sources: 2015–19 5-year ACS; UCLA CNK-CARB Transportation Disparity Dataset

While residents in disadvantaged neighborhoods are not only at greater COVID-19 risk (albeit not hugely so) they also have fewer medical resources when infected. (Although the government is covering much of the medical cost related to COVID-19, those with fewer resources may not have the connections and knowledge to get help when infected.) For example, they are less likely to be medically insured than those residing in nondisadvantaged neighborhoods, with the uninsured rate being much higher in Los Angeles than San Joaquin County across all neighborhood types. Table 6.3 also includes information on Medicaid coverage (MediCal in the state), the governments' health insurance program for low-income as well as disabled individuals. Given its purpose, it is not surprising to see higher rates of Medicaid coverage in disadvantaged neighborhoods; however, the rates are higher in San Joaquin's disadvantaged neighborhoods. On average, nearly half of the population in San Joaquin disadvantaged neighborhoods are dependent on Medicaid compared to a little more than a third in Los Angeles disadvantaged neighborhoods.

We also examine the distribution of neighborhoods designated as primary care shortage areas (PCSAs). Primary care shortage areas are a designation defined by the state of California for the purposes of identifying medically underserved areas to inform funding decisions for programs within the Office of Statewide Health Planning and Development. An overwhelming majority of the disadvantaged neighborhoods in both Los Angeles and San Joaquin counties are designated as PCSAs. In both counties, disadvantaged neighborhoods were more than three times as likely to be designated a PCSA compared to nondisadvantaged neighborhoods. Moreover, disproportionately more of San Joaquin disadvantaged neighborhoods are designated as PCSAs compared to Los Angeles.

Active Transportation

Access to active transportation (specifically walking and cycling) was important to health prior to COVID-19 and continues to be during the pandemic. There are clear health benefits from cycling, although the net outcome is dependent on context (Götschi, Garrard, and Giles-Corti, 2015). Increasing cycling has broad and positive societal impacts by reducing air quality pollution from fewer automobile trips. At the individual level, cycling improves health by increasing physical activity (Rutter et al., 2013;) and reducing mortality (Oja, Vuori, & Paronen, 1998; Hamer & Chida, 2008). This form of active transportation also improves weight control, mental health, emotional well-being, and happiness (De Hartog, Boogaard, Nijland, & Hoek, 2010; Mueller et al., 2015). These positive outcomes from cycling are also apparent in walking (Hanson and Jones, 2015; Kelly et al., 2014; Murphy et al., 2007). Active transportation has become more important during the pandemic because it can enable people to simultaneously travel and socially distance (De Vos, 2020; Brooks, Tingay, and Varney, 2021; Buehler and Pucher, 2021).

The level of active transportation is influenced by availability of infrastructure. Research finds that bikeways are positively associated with cycling levels, particularly the presence of exclusive bike lanes (Buehler and Dill, 2016; Chen et al., 2019). Moreover, parks can increase both forms of active transportation, and improve physical and mental health (Orsega-Smith et al., 2004; Bedimo-Rung, Mowen, & Cohen, 2005). Unfortunately, parks are less available to minorities (Garrison, 2019; Wang and Lan, 2019;), and the same is true for bikeways (Parker, Hinson, and Porter, 2021).

Table 6.4 summarizes the differences in access to public parks and bikeways. There is a stark difference in park availability between disadvantaged and nondisadvantaged neighborhoods. Disadvantaged neighborhoods in both counties have fewer availability of parks compared to nondisadvantaged neighborhoods. In San Joaquin, the difference in the park area to population ratio for not disadvantaged neighborhoods is at least nine times that for disadvantaged neighborhoods. In Los Angeles, the difference is even greater, more than 100 times higher than for disadvantaged neighborhoods. This disparity, however, is driven by affluent neighborhoods located adjacent to the state and national parks and forest. This bikeway availability follows a similar pattern as public park availability previously discussed in which disadvantaged neighborhoods have the least availability and nondisadvantaged neighborhoods have the most availability, though this is primarily the case for Los Angeles and not San Joaquin County. San Joaquin County, overall, has fewer bikeway availability compared to Los Angeles, which could be a result of the county's rural landscape.

Table 6.4. Active Transportation Infrastructure by Neighborhood Types

Neighborhood Type	Access to Public Parks and Open Space	Availability of Bikeways
Los Angeles		
Disadvantaged	11	6
Partially Disadvantaged	15	212
Not Disadvantaged	1,211	93
San Joaquin		
Disadvantaged	12	5
Partially Disadvantaged	51	5
Not Disadvantaged	111	4

Source: UCLA CNK-CARB Transportation Disparity Dataset

COVID-19 Deaths and Vaccination

To further understand disparities and commonalities across neighborhoods as it relates to health, we analyze COVID-19 death and vaccination metrics for the two counties. Table 6.5 displays these metrics by the three neighborhood types. In Los Angeles, the death rates in disadvantaged neighborhoods are 1.7 times as high as those in the nondisadvantaged neighborhoods, but the comparable ratio for vaccination rates is less than 0.6 times. In other words, disadvantaged neighborhoods have suffered disproportionately more deaths and are being inoculated at a much lower rate. This means that the residents are more likely to be in harm's way because they are much further from reaching localized herd immunity while much more likely to encounter infections. (Past COVID-19 cases and deaths are predictive of subsequent infections and mortalities.) These disparities are also present among the categories of neighborhoods in San Joaquin, although the disparities are not as extreme. In that county, the death rates in disadvantaged neighborhoods are a little more than 1.5 times as high as those in the nondisadvantaged neighborhoods, and the ratio for vaccination rates is less than 0.9 times. Moreover, disadvantaged neighborhoods in San Joaquin fare better than disadvantaged neighborhoods in Los Angeles, with lower death rates and higher vaccination rates. These results mirror similar disparities in other parts of the country (Jean-Jacques and Bauchner, 2021; Ong et al. 2021).

Table 6.5. COVID-19 Impacts by Neighborhood Types

	COVID-19 Death Rates	Percent Fully Vaccinated
Los Angeles		
Disadvantaged	273	32%
Partially Disadvantaged	243	36%
Not Disadvantaged	160	56%
San Joaquin		
Disadvantaged	242	37%
Partially Disadvantaged	156	43%
Not Disadvantaged	157	42%

As of reports for May 23, 2020; compiled and estimated by authors.
Sources: California Department of Public Health; 2015–19 5-year ACS

To assess whether vaccines are adequately reaching disadvantaged neighborhoods, we analyze available data on the location of vaccination sites. Table 6.6. shows the distribution of vaccination sites by the three neighborhood types. For all sites, vaccination sites are disproportionately underrepresented in disadvantaged neighborhoods in both counties. In Los Angeles County, after adjusting for population size, vaccination sites are about half as likely to be located in a disadvantaged neighborhood compared to a not disadvantaged neighborhood. Similar patterns are found in San Joaquin County, whereby vaccination sites are also about half as likely to be located in a disadvantaged neighborhood as a nondisadvantaged neighborhood.

Table 6.6. Distribution of Vaccination Sites

	Disadvantaged	Partially Disadvantaged	Not Disadvantaged
Share of Population			
Los Angeles	28%	22%	50%
San Joaquin	22%	34%	45%
Share of All Vaccination Sites			
Los Angeles	17%	24%	58%
San Joaquin	12%	39%	48%
Vaccination Sites Not Requiring Vehicle			
Los Angeles	18%	24%	59%
San Joaquin	5%	48%	48%

Source: URISA's GISCorps

One of the factors that may contribute to the disparity in COVID-19 vaccination rates is access to transportation. This matters because some of the vaccination sites, particularly the "mega sites," require vehicles and these sites ("drive thru sites") are not necessarily located in disadvantaged neighborhoods (Asgary et al., 2020). Both San Joaquin and Los Angeles have such facilities; therefore, people in car-poor households are disproportionately hindered from accessing shots. As documented earlier, these individuals are disproportionately concentrated in disadvantaged neighborhoods. Even among sites that accept "walk-in" patients (sites designated as not requiring a vehicle), residents in disadvantaged neighborhoods are handicapped. The second half of Table 6.6 presents the results and shows that "walk-in" sites are disproportionately underrepresented in disadvantaged neighborhoods. In Los Angeles, disadvantaged neighborhoods are about half as likely to have a "walk-in" vaccination site than nondisadvantaged neighborhoods. The disparity in San Joaquin County is even greater, less than a quarter as likely (5% for disadvantaged).

Conclusion

Although there are regional differences in the COVID-19 impacts on disadvantaged places, their commonalities point to an underlying pattern. The pandemic is reproducing neighborhood inequality, taking on new forms created by the novel coronavirus public-health crisis. Some of the inequalities are built on the foundation of preexisting disparities, such as the lower access to health resources. Others are due to differentiated risks baked into the stratified and unequal urban landscape. Residents of disadvantaged neighborhoods are more likely to live in denser places and overcrowded housing, which makes social distancing and staying at home more difficult. They also lack the infrastructure to travel and stay healthy, as revealed by the lack of open space and cycling lanes. Other neighborhood disparities are newly manufactured, such as the barriers to vaccination sites. Spatial-transportation mismatch is a contributor to the pandemic outcomes. This cycle of disparities is, at a fundamental level, the deeper tragedy of systemic inequality.

Chapter 7: Conclusion

The findings from this project provide additional insights into the nature, pattern, and magnitude of commonalities and differences among disadvantaged neighborhoods in mobility and access to opportunities. Our approach is based on the concept of spatial-transportation mismatch (STM), which asserts that spatial distance and poor transportation are simultaneous barriers to opportunities beyond one's immediate location. To maximize real-world application, we adopted two policy-based indicators to create three classes of neighborhoods: disadvantaged, partially disadvantaged, and not disadvantaged. Analytically, we focus on accessibility indicators to employment, quality elementary schools, and health care. The study uses a comparative approach utilizing two different regions in California, one highly urbanized (Los Angeles County) and one relatively more agriculture based (San Joaquin County). This allows us to compare disadvantaged neighborhoods with nondisadvantaged neighborhoods within each region, and to compare disadvantaged neighborhoods in one county versus another.

The broad results are not surprising and confirm what is obvious to experts: residents of disadvantaged neighborhoods suffer from STM in multiple arenas, especially those in more rural areas. What the project contributes is an empirical quantification of the magnitude and patterns of disparities in mobility and accessibility. The details are critical to formulating socially just transportation policies, programs, and investments. Moreover, fine-grain analysis is essential to customizing interventions and actions that are specific needs, priorities, and opportunities for a neighborhood. Of course, this study does not provide the necessary information for every single disadvantaged neighborhood in Los Angeles and San Joaquin, but it highlights the range of indicators and metrics that can be used by transportation planners and analysts and other stakeholders.

There is, as documented in the empirical chapters, noticeable heterogeneity in the magnitude of inaccessibility in the two regions. (Appendix C reports the statistical results to support the following interpretations.) For example, residents in disadvantaged San Joaquin fare worse in employment outcomes, and young students fare worse in reaching quality education. Both of these outcomes are partially the product of larger structural factors: a relative lack of geographic compactness and density, as well as a lower wage and less stable labor market and lower-performing school system. One interesting observation is that one response to the more dispersed spatial configuration is a greater reliance on automobiles, both in terms of higher ownership and more VMT. San Joaquin's geographic structure, however, is not always a negative for disadvantaged neighborhoods. This is apparent in the lower COVID-19 death rates and higher vaccination rates, relative to disadvantaged residents in Los Angeles. In other words, STM matters, but can vary across regions and policy arenas. The finding points to a reality that a "one-size-fits-all" approach is not sufficient to address the transportation needs and investment opportunities of disadvantaged communities.

Despite the diversity in precise outcomes, the findings also point to a singular unescapable commonality, which is that our society is spatially stratified. Neighborhood inequality is both a reflection and a contributor to aspatial forms of disparities along economic and race lines.

Disadvantaged places are disproportionately inhabited by low-income households and people of color, a consequence of market forces and discriminatory practices. The problem is not merely one of housing segregation but also of economic underinvestment, place stigma, and political disenfranchisement. The multiple arena of societal marginalization forms a web of interacting forces that creates and reinforces neighborhood stratification. STM is an integral part of this larger structure, which some call systemic inequality and systemic racism. While it is too daunting to tackle and dismantle the whole structure, it is possible to chip away through little steps within the field of transportation.

Public-sector agencies should undertake future efforts to incorporate the project's approach to analyzing disadvantaged neighborhoods through detailed and geographic-specific data, indicators, and metrics. Doing this will enable CARB and Caltrans to better identify, prioritize, and customize policies, programs, and investments. The information will enable the two agencies to know how urban neighborhoods are different from rural ones, as well as those in suburbs and exurbs. This will enhance the state's ability to fulfill its commitment to equity as a part of its ambitious climate-change initiative (e.g., SB 535 and AB 617). To be effective, it is equally important to have Metropolitan Planning Organizations adopt this approach.

An expanded version of the project's dataset should be made accessible to other analysts, community stakeholders, and interested parties. The project will make the research dataset available to faculty and graduate student affiliates of CNK and will make a subset of the tract-level variables available to appropriate stakeholders through a website. These steps, however, are not sufficient. Ideally, the same type of information should be replicated for the entire state. The technical report will include sufficient information for others to reproduce the metrics and indicators. An effective way to distribute the information is through an interactive data/mapping portal. Examples of how this can be done is UrbanDisplacement.Org, which is a website that focuses on gentrification and displacement, maintained by UC Berkeley with CNK as a collaborator. The other website is California Energy Commission's energy equity project, which maps state funding relative to disadvantaged neighborhoods. This coming summer, CARB will launch a new data/mapping portal based on a collaborative study on transportation disparities.

While it is important to focus on improving transportation, it is equally critical to not see this as the only solution. The literature clearly shows that the "accessibility problem" is complex, the product of multiple factors. At its core, the problem is a lack of meaningful private transportation resources. A racial gap in car ownership unjustly denies people of color access to regional economic opportunities and amenities. This is not due just to having less income. Car-poor households face unfair cost barriers to vehicle ownership, very similar to those encountered in the housing market. Transportation planning has not given sufficient attention to the racial gap in car ownership, focusing instead on public transit, a distant second best alternative in an automobile dominated society. While many of the discriminatory factors are outside of the traditional purview of transportation planning, it is important to acknowledge this uncomfortable reality to dismantle institutionalized racism. Incorporating this reality into professional practice will expand the boundaries of transportation planning and build bridges to other public policy arenas that can address the barriers.

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Data Management Plan

Products of Research

This project does not collect primary data but devotes significant resources to assembling a research dataset and constructing new measures to better understand the commonalities and differences in neighborhoods in mobility and access to opportunities. Appendix A outlines the common data sources used across the various chapters in the report. Specific data sources and methodology used to develop new indicators for this project are discussed in detail in each individual chapter.

This project uses several data sources to construct information and indicators related to access to employment, education, and health. There are two types of indicators. The first are preexisting publicly available sources and the second are those previously developed by UCLA Center for Neighborhood Knowledge as part of their California Air Resources Board (CARB)–funded transportation disparity project. The CARB project constructed neighborhood-level (tracts) indicators and metrics related to the systematic variation in transportation resources and accessibility.

The project uses the American Community Survey (ACS) census tract-level statistics for neighborhood characteristics including demographic (racial and ethnic composition of the neighborhood), economic status (median household income or poverty), housing (tenure and housing costs), and transportation (means of transportation to work, vehicle ownership). The data from the Longitudinal Employer-Household Dynamics (LEHD) program is used to construct information on job earnings, job density, and jobs-to-worker ratio. Information on elementary schools and academic performance comes from California's Department of Education. The indicators derived from the CNK-CARB project and incorporated for this project include clean vehicles, vehicle miles traveled, jobs-housing fit, job accessibility, and availability of bikeways.

Data Format and Content

All indicators are reported at the census tract level (2010 vintage boundary) for both counties (Los Angeles and San Joaquin) and available in an Excel data spreadsheet. Indicators derived from the ACS and LEHD are reported as numerical values. The values of CARB-CNK variables are reported in units that are available to the public, per agreement between the two organizations. The CNK-CARB derived indicators are reported as deciles with each tract ranked relative to all tracts in the state.

The following indicators are included in the research dataset. The available dataset does not include information on transit travel to school because the analysis only focused on a few select tracts in each region.

Indicators	Source
Disadvantaged Neighborhoods	Constructed by UCLA CNK
Race and Ethnicity	American Community Survey, 2015–19
Nativity/Language	American Community Survey, 2015–19
Age	American Community Survey, 2015–19
Economic	American Community Survey, 2015–19
Educational Attainment	American Community Survey, 2015–19
Gini Index	American Community Survey, 2015–19
Housing Density	American Community Survey, 2015–19
Tenure	American Community Survey, 2015–19
Average Home Value	American Community Survey, 2015–19
Very High Owner Burden	American Community Survey, 2015–19
Average Gross Rent	American Community Survey, 2015–19
Very High Rent Burden	American Community Survey, 2015–19
Private Vehicles	CNK-CARB, 2021
Clunker Vehicles	CNK-CARB, 2021
Clean Vehicles	CNK-CARB, 2021
Household VMT	CNK-CARB, 2021
Employment Status	American Community Survey, 2015–19
Earnings	LEHD, 2018
Job Density	LEHD, 2018
Jobs-to-Worker Ratio	LEHD, 2018
Commute Mode	American Community Survey, 2015–19
Commute Travel Times	American Community Survey, 2015–19
Commute VMT per Worker	CNK-CARB, 2021
Jobs-Housing Fit	CNK-CARB, 2021
Job Accessibility	CNK-CARB, 2021
Availability of Bikeways	CNK-CARB, 2021
Walkability Index	EPA, 2014
Walking Access to High-Quality Schools	Constructed by UCLA CNK

Data Access and Sharing

The tract-level dataset for the two counties can be requested by emailing the UCLA Center for Neighborhood Knowledge at knowledge@luskin.ucla.edu.

Reuse and Redistribution

Users should cite UCLA Center for Neighborhood Knowledge (2021) as the source of the data.

Appendix A: Common Data Sources and Methods

This report does not collect primary data but devotes significant resources to assembling a research dataset and constructing new measures to better understand the commonalities and differences in neighborhoods in mobility and access to opportunities. This appendix outlines the common data sources used across the various chapters in the report. Specific data sources and methodology used to develop new indicators for this project is discussed in detail in each individual chapter.

American Community Survey

The project uses the American Community Survey (ACS) census tract-level statistics for neighborhood characteristics including demographic (racial and ethnic composition of the neighborhood), economic status (median household income or poverty), housing (tenure and housing costs), and transportation (means of transportation to work, vehicle ownership). The ACS is a continuous survey that collects social, economic, demographic, and housing characteristics information about the population. The ACS pools a series of monthly samples to provide an ongoing stream of detailed and updated information. The ACS provides two period estimates, 1-year and 5-year. Period estimates are determined by the population size of an area: 1-year estimates for geographies with a population of more than 65,000 and 5-year estimates for all areas. The ACS surveys about 2.5% of the population annually or 12.5% over 5 years. The 5-year survey is used for this project because it provides the largest sample size of all the ACS data products, making data available for small geographies such as a census tract. This project specifically uses the 2015–19 5-year ACS.

Employment Status: ACS identifies participation in the labor force by those who worked at any time during a specific week, those who were temporarily laid off but available for work, those who did not work during the week surveyed but had work from which they were temporarily absent, those who did not work but were available to work and searching for work during the last month and those who were not in the labor force.

Commute Mode: This ACS data covers workers 16 years of age and older who were employed during the week prior to the ACS reference week and did not work at home. Respondents answered questions about the means of transportation used to get to work. The percentage of workers using a specific travel mode was obtained by dividing the number of workers in that category by the total population of workers.

Commute Travel Time: Average travel time that workers usually took to get from home to work (one-way) in minutes. This was calculated by dividing the total number of minutes of their one-way travel by the number of workers 16 years old and over who did not work at home. This measure is obtained by dividing the total number of minutes taken to get from home to work (the aggregate travel time) by the number of workers 16 years old and over who did not work at home.

UCLA CNK Transportation Disparity Dataset

The project includes indicators developed by the UCLA Center for Neighborhood Knowledge from a project funded by the California's Air Resource Board related to transportation disparities and health. The CARB project constructed neighborhood-level (tracts) indicators and metrics related to the systematic variation in transportation resources and accessibility. The CNK-CARB transportation disparity dataset includes but not limited to the following: barriers and substitutes for private vehicles (e.g., interest rates, automobile insurance premium, proximity to transit); vehicle stock (e.g., the relative number of clean cars and "clunkers"); travel patterns (e.g., total VMT based on real observed data for small geographies, commute VMT based on observed origin-destination data, mode split); and access to opportunities (e.g., housing-job fit for low-income, spatial access to jobs).

In Chapter 4 (Job Access), the following CNK-CARB indicators were included for analysis: Commute Vehicle Miles Traveled per Worker (CVMT), Jobs-Housing Fit, and Job Accessibility.

A brief description of each is provided in the following paragraphs.

Commute Vehicle Miles Traveled per Worker:

This indicator measures the average commute vehicle miles traveled (CVMT) per worker across census tracts in Los Angeles and San Joaquin counties. CVMT per worker measures the average (mean) distance a worker drives to work by vehicle in a given period, providing insight on a commuters' general travel patterns. VMT data are based on odometer readings from 2016 to 2017 collected by the California Bureau of Automotive Repairs (BAR) and provided by the California Air Resources Board. For a full description of CVMT construction see the PI's Caltrans and CARB report on evaluating transportation and built environment disparities (forthcoming, Ong et al.).

CVMT is constructed using a combination of two datasets. The first is constructing person miles traveled (PMT) for commute and converting this measure to commute by vehicle. The second is obtaining Means of Transportation to Work data from 2015–19 5-year ACS.

Step 1 - Estimate Person Miles Traveled

Average (mean) person miles traveled (PMT) to a work site is a measure of the typical commute of a worker at that place of residence to their work site. It is constructed using the 2015 LEHD data on commute flows (where one lives and works) combined with distances generated through the HERE street network. The average (mean) commute for these workers is calculated by multiplying the network distance between residential tract and job-site tract and dividing it by the number of workers in the residential tract. For a full description of these two datasets and their construction see the PI's Caltrans and CARB report on developing indicators related to measure sustainable communities strategies (Ong et al., 2018).

The data on commute flows from LEHD does not directly translate into VMT because it depends on the worker's mode of transportation. For example, PMT would equal CVMT if the worker drove alone; however, some workers carpool and therefore each worker generates less VMT because they share the vehicle. One would have to adjust for the composition by mode of transportation. This is done in the next step using data on Means of Transportation to Work from the American Community Survey.

Step 2 - Calculate the Means of Transportation to Work for Select Modes

The ACS Means of Transportation to Work reports commutes by car, truck, or van ("drive alone" or "carpool"), public transportation, motorcycle, bicycle, and walking. We specifically focused on commute estimates for personal vehicles (e.g., drove alone, carpooled with two persons, carpooled with three persons). To do so, we modified the carpool measure to account for the number of passengers in a carpool. In this case, we are assuming that all passengers are workers.

The final CVMT measure is calculated as follows:

$$CVMT_{Worker} = PMT * \frac{(Alone + \frac{Pool_2}{2} + \frac{Pool_3}{3} + \frac{Pool_4}{4} + \frac{Pool_5}{5.5} + \frac{Pool_7}{8})}{Commuters}$$

CVMT_Worker=PMT(Alone+(pool2/2)+(pool3/3)+(pool4/4)+(pool5/5.5)+(pool7/8))/commuters*

CVMT_Worker is commute VMT per worker
PMT is person miles traveled
Alone is number of workers driving alone to work
$Pool_2$ is number of workers in a 2-person carpool
$Pool_3$ is number of workers in a 3-person carpool
$Pool_4$ is number of workers in a 4-person carpool
$Pool_5$ is number of workers in a 5- or 6-person carpool
$Pool_7$ is number of workers in a 7- or more person carpool
Commuters is number of workers that commute by personal vehicle
Carpool estimates are adjusted to account for differences in number of commuters per vehicle.

Jobs-Housing Fit: This indicator analyzes the nexus between affordable housing and job commutes for workers at the lower end of the labor market (e.g., low-wage earners) and adjusts for regional differences. The construction of this indicator utilized data on jobs by earnings level from the 2006–10 5-year Census Transportation Planning Products (CTPP), which is based on the 2006–10 5-year ACS and housing units by rent levels from the 2008–12 5-year ACS.

Job Accessibility: This indicator measures the relative number of jobs that are accessible by residential location. It is calculated using an exponential decay method with a state-calibrated parameter. Calculations used employment flow data from the 2017 LEHD LODES database. Time and distance data were obtained from the HERE road network.

In Chapter 6 (Health Access), the following CNK-CARB indicators were incorporated into the analysis.

Availability of Weighted Bikeways per Population

This indicator represents the distribution of bikeways per population across census tracts in Los Angeles and San Joaquin counties. Access to bikeways has profound impacts on health and well-being. Further, cycling has indirect links to health by reducing air-quality pollution as it could replace trips by car. Given that there is no single source for bikeway data in California, data were obtained from various Metropolitan Planning Organizations (MPOs) and counties in California.

Availability of Parks and Public Open Space per Population

This indicator represents the availability of public park space per population across census tracts in Los Angeles and San Joaquin counties. With some modifications to address limitations in the data, the original data comes from the California Department of Parks and Recreation's park access tool. This tool uses neighborhood-level park access and demographic information from 2015. It specifically looks into (1) areas within a half mile of a public park and (2) ratio of park acres per population.

Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics

The Longitudinal Employer-Household Dynamics (LEHD) program brings together "federal, state, and Census Bureau data on employers and employees" (U.S. Census Bureau Center for Economic Studies). LEHD LODES (Origin-Destination Employment Statistics) reports data on the distribution of jobs by employment location, residential location, and the journeys from home to work. Collected by the U.S. Census Bureau, LEHD LODES combines administrative data (e.g., unemployment insurance earnings data, the Quarterly Census of Employment and Wages [QCEW] data, and others) with census and survey data. These data are combined to "create statistics on employment, earnings, and job flows at detailed levels of geography and industry for different demographic groups" (U.S. Census Bureau, "About Us"). The following indicators were constructed using the 2018 LEHD data.

Job Density (Jobs per Square Mile): The measure of job density at the tract level is constructed combining census tract-level information on total number of jobs ("All Jobs") in 2018 from the Workplace Area Characteristics (WAC) data files in the LEHD LODES provided by the Census Bureau and tract-level information on land area in square miles from the 2017 Census Cartographic Boundary Shapefiles. We compute job density as the number of jobs per square mile in each tract.

Job Earnings: Earnings are derived from the LEHD LODES Workplace Area Characteristics (WAC). WAC provides census tract level information for the total number of jobs within each tract, as well as the number of jobs with earnings at different levels of the monthly pay. Monthly earnings are broken down into three categories: jobs with earnings at or below $1,250 per month, jobs with earnings between $1,250 and $3,333 per month, and jobs with earnings over $3,333 per month. Data is from 2018.

Jobs-to-Worker Ratio: The ratio of jobs to workers in a neighborhood is also informed by the Workplace Area Characteristics (WAC) files in the 2018 LEHD LODES from the U.S. Census Bureau. Included in this chapter are two measures of jobs to worker ratios: one for "all jobs" and one for "low-earning jobs." Each ratio includes the total count of jobs for each category per the total number of workers within each category (e.g., All Jobs/All Workers, Low-Earning Jobs/Workers with Low-Earnings).

CalEnviroScreen 3.0

This project utilizes the CalEnviroScreen 3.0. This mapping tool was developed by the California Environmental Protection Agency's (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify communities in the state with the most pollution burden and vulnerability. The tool provides a final score developed from 20 different environmental, health, and socioeconomic indicators. The 25% highest scoring census tracts in the CalEnviroScreen were designated as disadvantaged communities by the CalEPA in 2017. The list of the disadvantaged communities is in accordance with SB 535 (de Leon), which requires CalEPA to identify disadvantaged communities to prioritize public investments (California Environmental Protection Agency, 2017).

Opportunity Mapping Project

This project includes data from the Opportunity Mapping Project. The opportunity-mapping project utilizes spatial data to identify investment and policy opportunities. The Opportunity Mapping Project contains a list of indicators related to education, earnings from employment, environmental variables, and economic mobility to measure and visualize place-based characteristics related to critical life outcomes (California Fair Housing Task Force, 2020).

Geographic Unit of Analysis

The basic geographic unit of analysis in this report is the census tract, which serves as a reasonable proxy for neighborhoods. We use these terms (*census tracts* and *neighborhoods*) interchangeably in this report. The Bureau of Census defines *census tracts* as “a relatively homogenous area with respect to population characteristics, economic status and living conditions.” The average population of a census tract is 4,000 people (ranging from 2,500 to 8,000) and approximately 1,500 housing units. In some cases, some of the underlying data used to construct an indicator is reported in a different geography other than census tracts (e.g., zip code tabulation instead of census tracts). When there are incidents of these, we use a geographic crosswalk to allocate the information into the tracts.

Appendix B: Education Access

In addition to looking at the distribution of schools across neighborhoods, we looked at the total number of tracts across the three different types of neighborhoods (Table B.1.). Only tracts with information on both access to high-quality education and disadvantaged designations are included, with a total of 2,294 for Los Angeles County and 139 for San Joaquin County. In Los Angeles, 28% of the tracts are disadvantaged, 22% of tracts are partially disadvantaged, and 50% of tracts are not disadvantaged. Of the disadvantaged tracts, 13% have full access to high-quality schools while 52% have no accessibility. In contrast, of the not disadvantaged tracts, 43% have full access to high-quality schools, while 13% have no access. In San Joaquin County, 27% of the tracts are not disadvantaged, 27% of tracts are partially disadvantaged, and 45% of tracts are not disadvantaged. Of the disadvantaged tracts, 16% have a majority or complete access to high-quality schools, while 84% have no access to high-quality schools. By contrast, out of the not disadvantaged tracts, 28% have a majority or complete access to high-quality schools, while 40% have no accessibility to high-quality schools. Overall, we see that disadvantaged tracts across counties have less transportation accessibility compared to nondisadvantage tracts, however, San Joaquin tracts have even less access to quality education, regardless of the type of neighborhood.

Table B.1. Distribution of Census by Level of Walkable Access to High-Quality Elementary Schools

	Los Angeles			San Joaquin		
	Disadvantaged	Partially Disadvantaged	Not Disadvantaged	Disadvantaged	Partially Disadvantaged	Not Disadvantaged
Number of Tracts						
Total Tracts*	652	498	1144	38	38	63
Share with no accessibility	52%	36%	13%	84%	61%	40%
Some but less than majority	19%	15%	17%	0%	29%	32%
Share with a majority accessible	15%	21%	27%	8%	11%	22%

Share 100% accessible	13%	28%	43%	8%	0%	6%

*Only tracts with information on both access to high-quality education and disadvantaged designations are included.

We further examined disadvantaged and partial neighborhoods in terms of access to high-quality schools using a 30-minute public transportation. This is shown in Table B.2. Overall, we found that out of 652 tracts with a disadvantaged status, 259 had no access to high-quality elementary schools using public transportation, and 217 had only partial access to high-quality schools. Out of the 498 partially disadvantaged tracts, 113 had no access to high quality schools, and 173 had only partial access to high-quality schools. In San Joaquin, out of the 39 disadvantage tracts, three have no access to high-quality schools, and three only have access to partial high-quality schools.

Table B.2. Transit Accessibility for Neighborhood with No or Limited High-Quality Schools

	Los Angeles			San Joaquin		
	Disadvantaged	Partially Disadvantaged	Not Disadvantaged	Disadvantaged	Partially Disadvantaged	Not Disadvantaged
No high-quality schools	259	113	NA	3	1	NA
Partial high-quality schools	217	173	NA	3	9	NA

Appendix C: Statistical Testing of Differences in STM

The following reports a series of statistical tests to examine three pairwise differences: (1) disadvantaged versus not disadvantaged neighborhoods in San Joaquin County; (2) disadvantaged versus not disadvantaged neighborhoods in Los Angeles County; and (3) disadvantaged neighborhoods in San Joaquin County versus disadvantaged neighborhoods in Los Angeles.

Table C.1 summarizes ANOVA tests of differences for three transportation variables and three opportunity variables. Relative to not disadvantaged neighborhoods in San Joaquin, disadvantaged neighborhoods have fewer vehicles per person and fewer high-quality schools, but have more access to regional and local jobs, have more access to high-quality transit, and are more walkable. The patterns are similar in Los Angeles, except that the difference in local jobs is statistically insignificant. The size of the gaps between disadvantaged and not disadvantaged neighborhoods vary across the two regions. The last column compares disadvantaged neighborhoods in San Joaquin and Los Angeles. Three outcomes are statistically significant: San Joaquin has less access to high-quality transit, regional jobs, and high-quality schools.

Table C.1. Bivariate ANOVA

	Disadvantaged & Not Disadvantaged				San Joaquin & Los Angeles	
	San Joaquin		Los Angeles		Disadvantaged	
Transportation						
Vehicles per person	-0.195	***	-0.220	***	0.030	N.S.
Walkability	2.870	***	1.516	***	-0.540	N.S.
High Quality Transit	0.122	***	0.298	***	-0.598	***
Opportunities						
Regional Job Access	0.039	***	0.423	***	-1.94	***
Local Job Access	0.644	*	-0.086	N.S.	0.462	N.S.
High Quality Schools	-0.193	***	-0.417	***	-0.143	*
* p<.05; ** p<.01; *** p<.001						

N.S. = Not significant

Table C.2 summarizes multivariate results for four models. The purpose is to identify which STM factors are the most associated with the dependent variables, *ceteris paribus*. The dependent variable for the first model is being a disadvantaged neighborhood in San Joaquin (not disadvantaged in that county is the excluded category). The dependent variable for the second model is being a disadvantaged neighborhood in Los Angeles (not disadvantaged in that county is the excluded category). The dependent variable for the third model is being a disadvantaged neighborhood in San Joaquin (disadvantaged in Los Angeles is the excluded category). These first three models have six independent variables—three transportation factors and three opportunity variables. Model four is similar to the other models but excludes one independent variable.

Table C.2. Multivariate Logit

	Disadvantaged & Not Disadvantaged				San Joaquin & Los Angeles			
	San Joaquin		Los Angeles		Disadvantaged			
Intercept	-16.0	N.S.	7.57	***	1.76	N.S.	-3.35	N.S.
Transportation								
Vehicles per person	-22.0	***	-15.3	***	-2.38	N.S.	-3.54	N.S.
Walkability	0.156	N.S.	0.000	N.S.	0.630	N.S.	0.396	***
High Quality Transit	2.78	N.S.	0.554	N.S.	-4.59	N.S.	-7.06	***
Opportunities								
Regional Job Access	57.8	***	0.840	***	-8.84	***	N.A.	
Local Job Access	-0.053	N.S.	0.066	N.S.	0.372	N.S.	0.105	N.S.
High Quality Schools	-1.97	N.S.	-3.14	***	0.915	N.S.	-0.839	N.S.
* p<.05; ** p<.01; *** p<.001								
Sample Size	101		1796		690		690	
-2 Log L, Intercept Only	142.9		2334.1		287.7		287.7	
-2 Log L, Intercept and Covariates	50.0		963.6		11.4		166.6	
Psuedo R-Squared	0.65		0.59		0.96		0.42	

N.S. = Not significant

In San Joaquin, fewer vehicles per person and greater spatial access to regional jobs differentiate disadvantaged neighborhoods from not disadvantaged neighborhoods. In Los Angeles, fewer vehicles per person, greater spatial access to regional jobs and fewer high-quality schools differentiate disadvantaged neighborhoods from not disadvantaged neighborhoods. These results should not be interpreted as finding that there are no systematic differences for the other independent variables. Instead, the results indicate which of the independent variables are most strongly associated with being a disadvantaged neighborhood. The last two columns report the results from the models comparing disadvantaged neighborhoods in San Joaquin and disadvantaged neighborhoods in Los Angeles. The regional-job-access variable dominates model three. This is due largely to the fact that San Joaquin has far fewer jobs, and those jobs are widely dispersed. Model four drops that dominant variable and finds that San Joaquin is more walkable but has less access to high-quality transit.