Accessing Opportunity:

Employment and Commuting Patterns among Low-, Medium- and High-Wage Workers in Houston

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Executive Summary

Proximity to jobs is important for all residents as it can affect employment outcomes, but it is especially crucial for low-income households whose budgets can be disproportionately impacted by transportation costs and long commutes. This report uses data from the Longitudinal Employer-Household Dynamics (LEHD) program, the American Community Surveys and other survey data to explore the geographical movement of workers in an urban setting. The purpose of the work presented here is to document differences in commuting patterns among different income groups and to inform the development of programs designed to enhance the physical and economic mobility of Houston's labor force.

Specifically, the report investigates commuting patterns between home and job tracts among low-, medium- and high-wage earners in Harris County. Area resident workers' commuting patterns are visualized to understand the differences in commuting experienced by the three wage groups. To illustrate the dynamics between residence and employment center, we created a web-based data tool at http://www.datahouston.org/story/Commuting.html.

To explore trends in depth, we report on three job centers in Houston—Downtown, the Texas Medical Center (TMC) and Uptown (including the Galleria). Selected residence areas are highlighted and compared to draw a picture of the characteristics of the workers and neighborhoods tied to each community. The results demonstrate the complexity of addressing the transportation and housing challenges to enhance access to job opportunities, particularly for low-wage workers and disadvantaged neighborhoods.

Key Findings:

- In 2014, there were almost 3 million nonfarm jobs in the Houston metropolitan area, 79 percent of which were concentrated in Harris County.

- Almost 2 million workers commute from somewhere within the region to Harris County every day. More than half are high-wage workers, 30 percent medium-wage and 19 percent low-wage workers.

- Workers who live outside of Harris County and travel to Harris County to work are more likely to be high-wage earners, compared to commuters living within the county boundary.

- High-poverty areas tend to have lower levels of opportunity. Low- and medium-wage jobs are concentrated in major job centers such as Downtown, the Texas Medical Center, Upper Kirby/Greenway Plaza and Uptown/the Galleria area.

- In Harris County, about 47 percent of the household budget is spent on combined housing and transportation costs. When housing and transportation burdens are both considered, Houston is not very affordable compared to other cities. In general, living close to job centers is expensive. Few affordable units are found in major job centers, making it difficult for low-wage workers to live close to where they work. Compared to higher-wage workers, low-wage workers are more likely to live all over Harris County in neighborhoods that are poorly connected to job centers by transit.

- The case studies reveal that the commuting pattern for each wage group differs. Among the three job centers, relatively few people live in Downtown and the Texas Medical Center, compared to Uptown. Renters have affordability challenges in the Medical Center area, compared to the county average.

- The typical commute distance for residents in the Greater Houston area is 12.2 miles. On average, low-wage workers in Harris County travel 12.3 miles to Downtown to work and 13.4 miles to the Texas Medical Center or Uptown. The average commute distance for medium-wage earners in Downtown, Texas Medical Center and Uptown was 13.0 miles, 12.1 miles and 13.0 miles respectively. For high-wage earners, the average commute distance was 14.4 miles to Downtown, 12.5 miles to Texas Medical Center and 12.4 miles to Uptown.

- Generally speaking, wealthy neighborhoods located in the central city have more job opportunities. Affluent suburban neighborhoods are well served by park and ride and express bus to connect with major job centers while economically disadvantaged neighborhoods have limited or no public transit options as an alternative to driving to work.

- The study suggests that job centers should be better connected to the regional transportation network. Policymakers should develop strategies to help low-income communities as well as urban and suburban communities of color to get investments needed to improve job accessibility and achieve equity in transportation. At the same time, housing options should be expanded within or near job centers, especially around existing or planned public transit.

Introduction

Houston is among the fastest growing metropolitan areas in the United States. The metropolitan area had year-over-year employment increases in each month from July 2010 through May 2015. That dropped during the oil bust of 2015–16 and rebounded in 2017 despite Hurricane Harvey. While the employment growth looks promising and the local economy seems pretty robust in recent years, gentrification processes tend to push low-income households farther away from jobs.

Where are the jobs in the Greater Houston area? How is the relationship between jobs and housing playing out in Houston? Given the large geographical area Houston covers, it is worth studying geographical labor mobility, especially the level of freedom that low-wage earners have to move in order to find new or better employment within an acceptable commute distance or time that reflects their training and experience.

In general, the ability to move within an economy is determined by the level of education, housing options and family situations. Low-wage workers often have limited housing and commuting options. They also have to cope with difficulties resulting from the long commute to work, such as connecting to available public transit, time scarcity, and the high cost of gasoline. They are more likely to experience spatial barriers to employment and tend to search for jobs closer to where they live. However, the need for affordable housing and transportation for lower-wage workers is often neglected. As our region works on creating new job opportunities, it is critical to discuss the importance of providing reliable and affordable transportation services in order to get people to jobs. It is also important to ensure that affordable housing is available in areas where commutes are not too long and costly.

Using 2014 data from the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program, this report examines the overall employment patterns in the Greater Houston area, and tracks the inflows and outflows of workers between Harris County and the surrounding counties. Further, the report explores the spatial distribution of residence and worksite for low- and medium-wage workers in Harris County, and their commuting patterns by applying dot- and flow-mapping techniques. In addition, it discusses job accessibility and affordability issues. To explore trends in depth, we report on three job centers in Houston—Downtown, the Texas Medical Center and Uptown (including the Galleria); and examine the characteristics of selected neighborhoods, as well as the commuting options their residents have. This study sheds light on patterns and concentrations that can help us address both housing affordability and transportation costs of the working poor in Houston. For policymakers, the findings point to the need for more integrated strategies around economic and workforce development, housing and transportation programs to improve upward mobility for all residents.

Spatial Distribution of Jobs and Workers in Greater Houston Area

Released by the U.S. Census Bureau, the Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES) database provides data on three elements at the census block level—Residence Area Characteristics (RAC) that contain the total number of workers in each block, Workplace Area Characteristics (WAC) that report the total number of jobs in each block, and Origin-Destination (OD) that includes the number of commuters between blocks. It allows us to examine the overall employment and commuting patterns of workers in the Houston metropolitan area. It's also worth noting that LEHD data has some limitations, including a limited number of earning categories and a lack of information on transit mode of the workers.[1]

The LEHD program reports earnings on a job basis and all workers are grouped into three wage groups:

1. Low-wage workers: those earning $1,250 or less per month, suggesting annual earnings of $15,000 for a full-time worker;

2. Medium-wage workers: those earning $1,251 to $3,333 per month, suggesting annual earnings between $15,000 and $40,000; and

3. High-wage workers: those earning more than $3,333 per month, suggesting annual earnings of more than $40,000.[2]

In this report, we adopt the terminology of **"low-, medium- and high-wage"** used by LEHD program. However, it is important to recognize that the "low-wage workers" in the LEHD data are actually earning *very low* wages that are below or near the poverty wage level for any household with more than one member. The working poor are defined as those whose earnings fall in the low- and medium-wage categories, i.e. earning less than $40,000 annually.[3] Note that in 2014 the median earnings for full-time, year-round workers in the Houston metropolitan area was $50,501 for males and $40,100 in 2014 for females.[4]
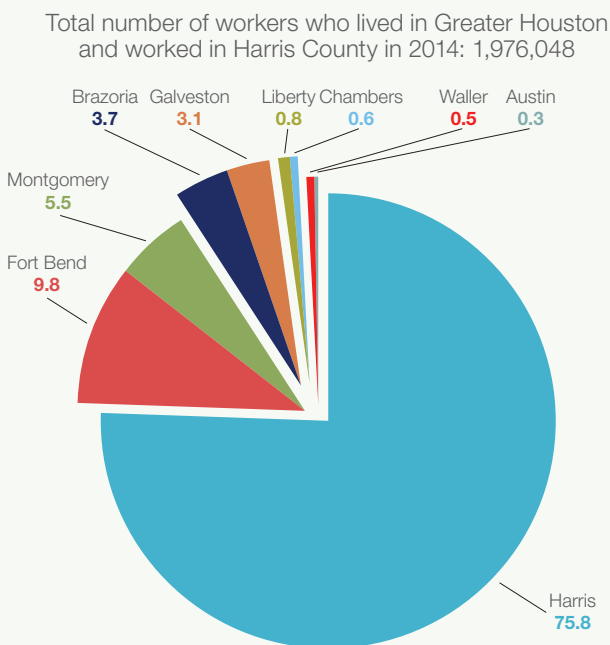
| TABLE 1 | LEHD Wage Classification |

	Monthly	Annual	Hourly (for a full-time worker)
Low-wage	$1,250 or less	$15,000 or less	$7.81 or less
Medium-wage	$1,251–$3,333	$15,000–$40,000	$7.81–$20.83
High-wage	More than $3,333	More than $40,000	More than $20.83

FIGURE 1a **Harris County Workers by Residence Area**

Total number of workers who lived in Greater Houston and worked in Harris County in 2014: 1,976,048

Brazoria **3.7** Galveston **3.1** Liberty **0.8** Chambers **0.6** Waller **0.5** Austin **0.3**

Montgomery **5.5**

Fort Bend **9.8**

Harris **75.8**

FIGURE 1b **Harris County Workers by Earnings**

■ Low-wage ■ Medium-wage ■ High-wage

18.8%

51.3%

29.8%

Mapping Jobs in Greater Houston and Harris County

In 2014, there were 2,887,772 nonfarm jobs in the Houston-The Woodlands-Sugar Land metropolitan statistical area, 79 percent of which were concentrated in Harris County. Among the 2.3 million Harris County employees in 2014, 87 percent (1,976,048 workers) commuted from somewhere within the metropolitan area. The rest came from other parts of the state outside of the Houston region. Most of those were telecommuting or contract jobs, rather than full-time primary jobs. Figure 1a shows that almost all of Harris County workers (98 percent) lived in the top five most populous counties in Houston region.
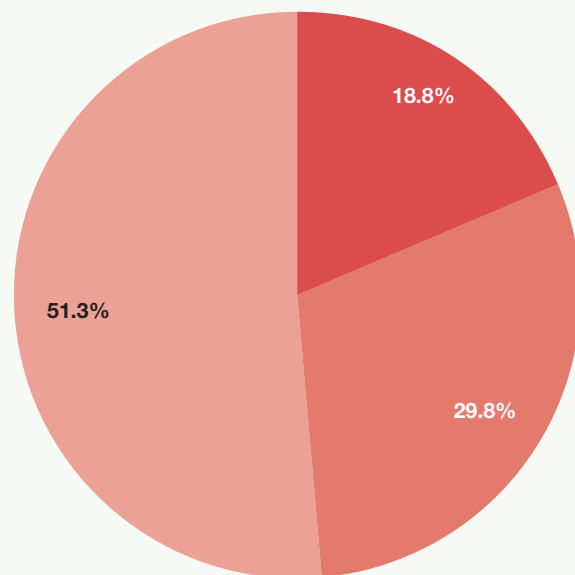
As illustrated by Figure 1b, more than half of those 2 million Harris County employees are high-wage workers, suggesting that $20 per hour is a more or less median wage; while almost one-fifth are earning $7.81 or less per hour.

To better understand the spatial distribution of low-, medium- and high-wage jobs in the Houston metropolitan area, we apply dot-mapping techniques to help identify the pattern. In Figure 2 a-c, one dot represents 100 jobs. The three maps indicate that the spatial distribution patterns of jobs within the region are similar for all three wage categories. Most of the jobs are concentrated in Harris County, with a few available in Sugar Land and Rosenberg along U.S. Route 59, in The Woodlands and Conroe area along Interstate 45 and in League City and Dickinson in Galveston County.

However, in terms of commuting patterns, low-wage and high-wage workers are quite different. About 20 percent of all low- and medium-wage workers commute from somewhere outside Harris County to a worksite inside the county on a daily basis. In contrast, 28 percent of all high-wage earners commute from suburban counties to Harris County. In other words, workers who live outside of Harris County and commute to Harris County are more likely to be high-wage earners, compared to commuters living within the county boundary.

The top five job centers within Harris County are **Downtown, Uptown/the Galleria area, Upper Kirby/Greenway Plaza, the Texas Medical Center** and **George Bush Intercontinental Airport**. Dot-maps help to identify where low-, medium- and high-wage jobs are concentrated. Figure 3a illustrates the four job centers where most of the low-wage jobs are, based on total job counts. These are Downtown, the Sharpstown and Chinatown area, Upper Kirby/Greenway and Uptown. The employment clusters for medium-wage jobs are shown in Figure 3b. They are Downtown, TMC, Upper Kirby/Greenway and Uptown. More than half of the jobs in Harris County are classified as high-wage jobs and six clusters are identified in Figure 3c. These areas are Downtown, TMC, Upper Kirby/Greenway Plaza, Uptown, the Energy Corridor and George Bush Intercontinental Airport.
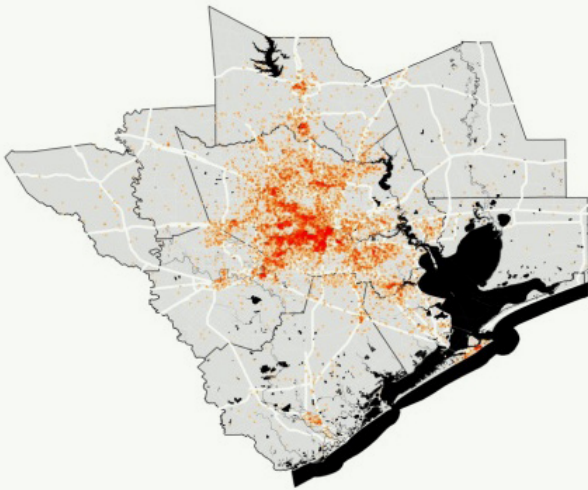
FIGURE 2 a-c

Spatial Distribution Pattern of Low-, Medium- and High-wage Jobs in Houston-The Woodlands-Sugar Land MSA (one dot = 100 jobs)

a. Low-wage jobs
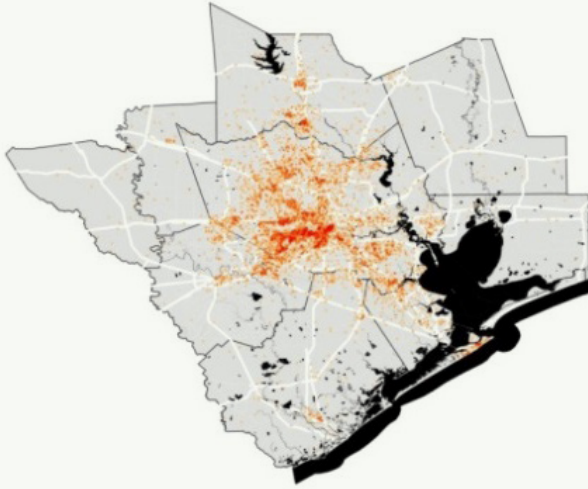
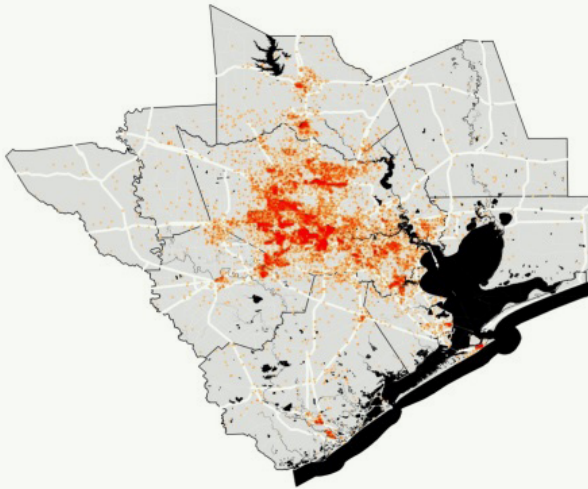
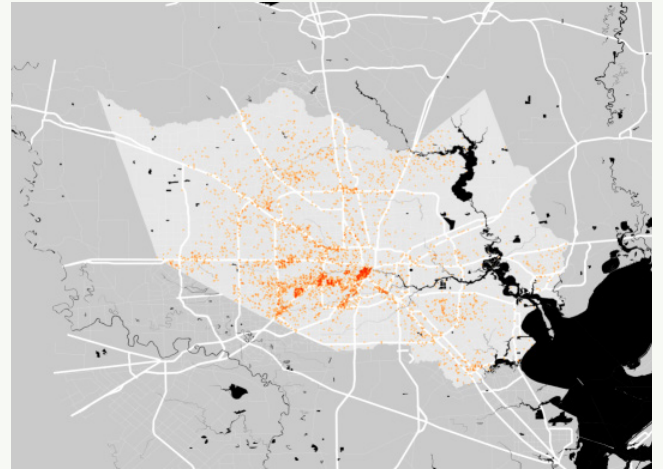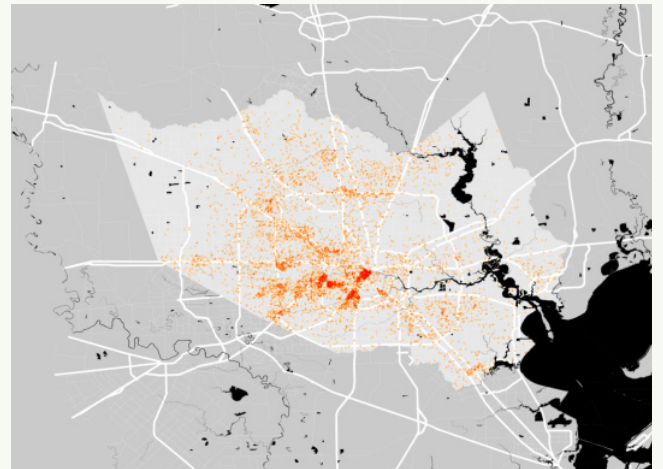**b. Medium-wage jobs**

c. High-wage jobs

FIGURE 3 a-c

Spatial Distribution Pattern of Low-, Medium- and High-wage Jobs in Harris County (one dot = 100 jobs)
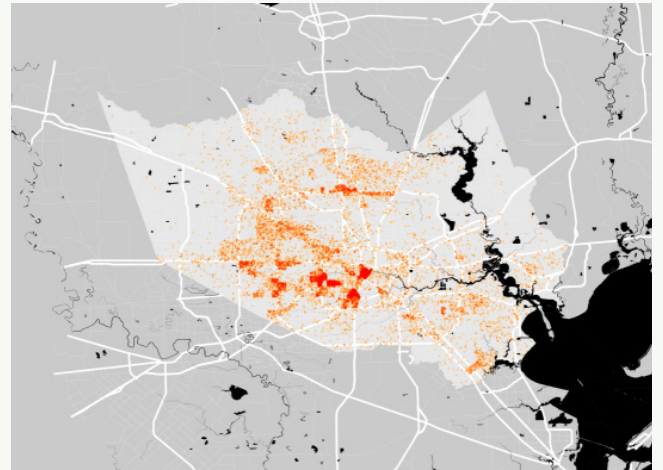
a. Low-wage jobs

b. Medium-wage jobs

c. High-wage jobs

Where Do the Working Poor Live in Harris County?

In this report, **the working poor** are defined as individuals whose earnings fall in the low- and medium-wage categories, i.e. earning less than $40,000 annually.[5] According to the U.S. Bureau of Labor Statistics, Houston's labor force in the following occupational groups has the lowest mean hourly wage: food preparation and services, building and grounds cleaning and maintenance, personal care and service and farming, fishing and forestry.[6]

The working poor face various obstacles that make it difficult for them to find and keep a job.[7] Many of them have lower skill levels and less formal education.[8, 9] These workers overcome basic barriers such as arranging for housing, commuting and childcare, and enter into the labor market, yet they struggle with finding a path to financial security in the midst of a knowledge-based economy.[10]

Do the working poor have a distinct geography in Houston? We analyzed the spatial distribution patterns of residence area for each wage group, and found that low-wage workers don't tend to reside in inner-city neighborhoods. In fact, they live all over the study area, and one cluster could be observed in the southwest part of Harris County. On the contrary, a large cluster of high-wage workers is found in the western part of central Houston, in West University, Bellaire, Uptown and in neighborhoods of Meyerland and the Heights. The areas with high concentration of the working poor in Harris County have a very similar geographical distribution pattern with those of concentrated poverty.[11] Additionally, those areas where the working poor are concentrated are majority black or majority Hispanic tracts or tracts with no majority.[12]

The analysis below uses Kinder Community Tabulation Areas (CTAs) as neighborhood boundaries that are designed to serve as approximations of neighborhoods, based specifically on census geographic boundaries, to facilitate the aggregation of data to geographies larger than census tracts, but smaller than counties. By taking social community boundaries, such as super neighborhoods,

<table>
<tr><td>FIGURE</td><td>4</td></tr>
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Residence Areas with High Concentration of the Working Poor in Harris County
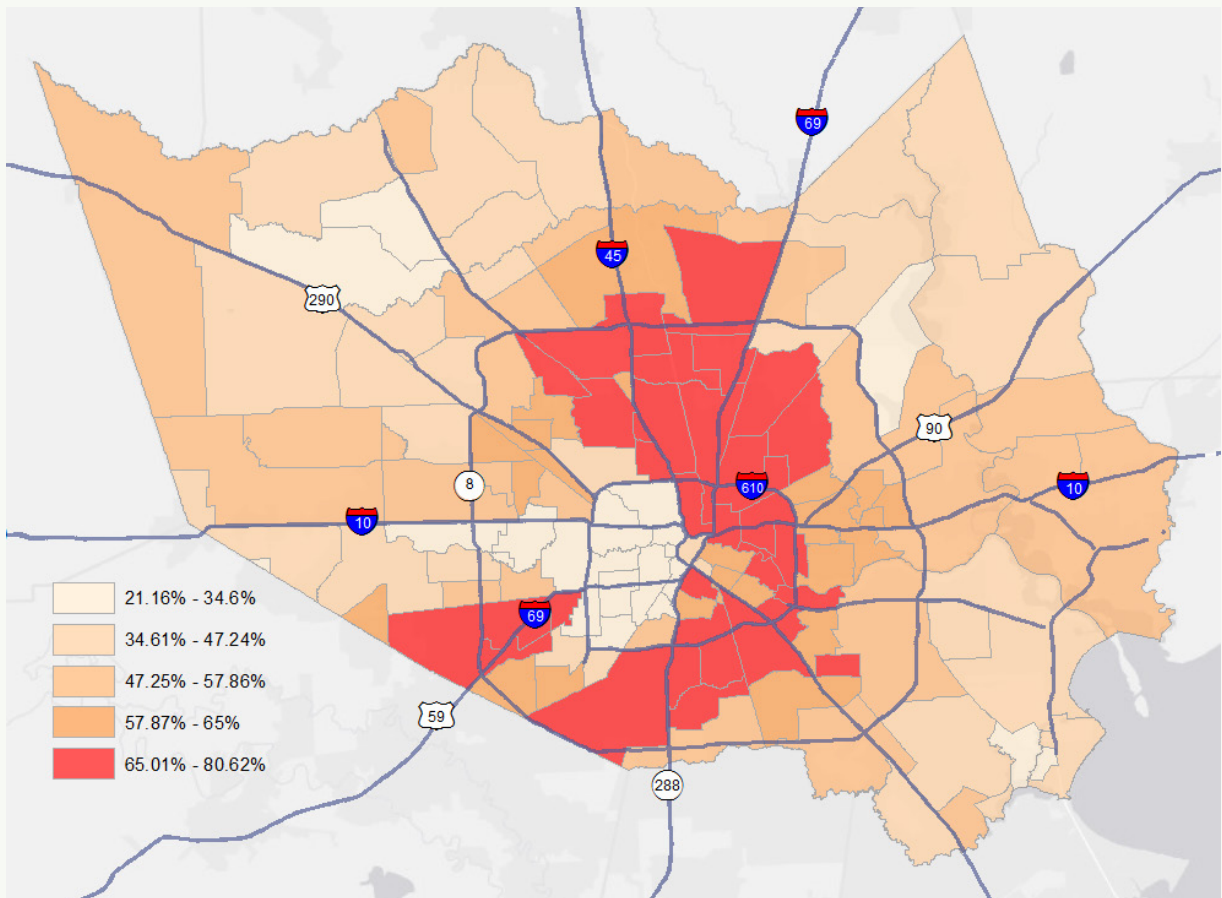
Legend:
- 21.16% - 34.6%
- 34.61% - 47.24%
- 47.25% - 57.86%
- 57.87% - 65%
- 65.01% - 80.62%

market areas and school districts into account, it is hoped that Kinder CTAs will serve as a more suitable approximation of neighborhoods than zip code tabulation areas.[13]

The map in Figure 4 shows the percentage of low- and medium-wage workers within each neighborhood area. The areas highlighted in red are the neighborhoods where more than 65 percent of the residents are the working poor. Significant pockets of high concentration are located in southwest Houston neighborhoods outside the 610 Loop such as Sharpstown and Braeburn, areas south of the 610 Loop such as Five Corners and Sunnyside, areas east and northeast of downtown such as Fifth Ward, Kashmere Gardens and Magnolia Park, and areas north of the 610 Loop such as Acres Homes and Northside/Northline. None of the top four job centers are located in the red areas.

Proximity to Employment and Job Accessibility

Previous studies indicate that proximity to employment has a range of positive economic and social outcomes for residents, particularly low-income and minority workers.[14] For example, Immergluck found that besides race and educational attainment, neighborhood job proximity has a significant but modest effect on unemployment rates.[15] Allard and Danziger showed that proximity to employment opportunities is associated with a higher probability of working and of leaving welfare.[16]

An analysis conducted by the Brookings Institution found that Houston was one of the 29 large metropolitan areas that experienced both net job gains as well as an increase in the number of jobs within the typical commute distance for the average resident between 2000 and 2012.[17] Despite the fact that both people and jobs continued to suburbanize and spread out in the 2000s, the number of jobs within 12.2 miles, the typical commute distance for residents in the Greater Houston area, increased by 4.5 percent.[18]

Despite Houston's success in its ability to grow "nearby" jobs in both the central city and suburban portion of the metropolitan area, the growth rate in the central city is only half of the suburban areas. Within Harris County, some high-poverty areas have lower levels of opportunity, making it difficult for residents to break the poverty cycle. Side by side, we compare two maps to present the difference in concentration of low- and medium-wage workers versus jobs.

As the maps illustrate, major job centers located in or near the central city, including Downtown, Uptown, Upper Kirby/Greenway, the Medical Center and the Astrodome area, provide 120,000 low- and medium-wage jobs, or 10 percent of all low- to medium-wage jobs in Harris County. Yet less than 5 percent of low- and medium-wage jobs in the five major job centers are filled by low- to medium-wage workers living in those neighborhoods. Most of the low- to medium-wage workers commute from the southwestern sector of the county to those five job centers.
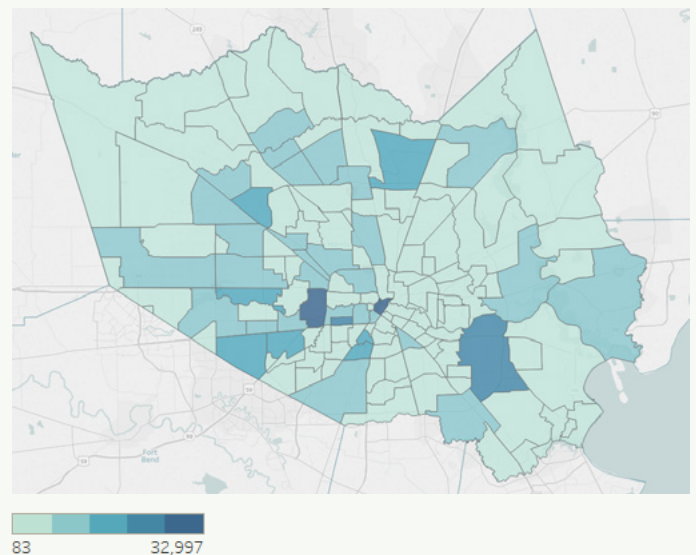
In contrast, **Pasadena**, the dark-shaded neighborhood located in the southeast section of Harris County in the maps below, provided 23,182 low- and medium-wage

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FIGURE 5 ## Concentration of Low- and Medium-Wage Workers and Jobs by Count

Where low- and medium-wage earners live
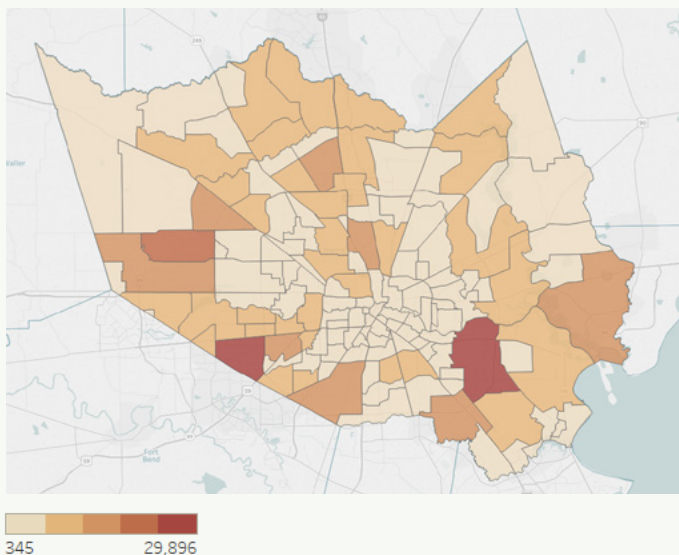
Where low- and medium-wage jobs are located

345   29,896

83   32,997

jobs in 2014, and 29 percent of those jobs were filled by residents in Pasadena. Similarly, **Alief** and **Sharpstown** provided almost 34,000 low- and medium-wage jobs, 25 percent of which were filled by residents in those two neighborhoods.

Access to a personal vehicle, typically more than location within a metropolitan area, greatly expands the number of job sites reachable within a specified travel time window.[19] In 2014, Harris County had 1.9 million residents aged 16 years and over who commuted to work, while the aggregate number of vehicles (car, truck or van) used in commuting was 1.6 million or 0.87 per Harris County commuter. Empirical evidence suggests a commuting tolerance of 30 to 45 minutes for most workers. The average commute to work for Harris County residents is approximately 28 minutes.

For low-wage workers who don't have easy access to an automobile, however, the number of job sites reachable by public transit within a 45-minute ride is quite limited. According to the indicators provided by the Access to Jobs and Workers via Transit Tool,[20] the jobs reachable within a 45-minute transit and walking commute are con-

centrated in the job centers on the west side of Highway 288 inside Loop 610. For low-wage workers, **Downtown, Midtown** and the **Astrodome** area are relatively easier to access by transit.

Affordability of Place

Housing and transportation are huge costs for low-income households. Sometimes it's difficult for residents to fully factor both housing and transportation costs into their decisions about where to live and work. The H+T Affordability Index is a good tool to understand the cost burden of the combined expenses at a given location.[21]

In Harris County, about 47 percent of the household budget is spent on combined housing and transportation costs. Only one percent of all the tracts in Harris County were considered as "location efficient neighborhoods," places close to jobs and services with a variety of transportation choices. When housing and transportation burdens are both considered, Houston is not very affordable compared to other cities.

Figure 6 shows the percentage of income a typical household can expect to pay for combined housing and trans-

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FIGURE 6   **Housing and Transportation Costs as a Percentage of Household Income**

Legend:
- 24% - 39%
- 40% - 48%
- 49% - 61%
- 62% - 81%
- Over 82%
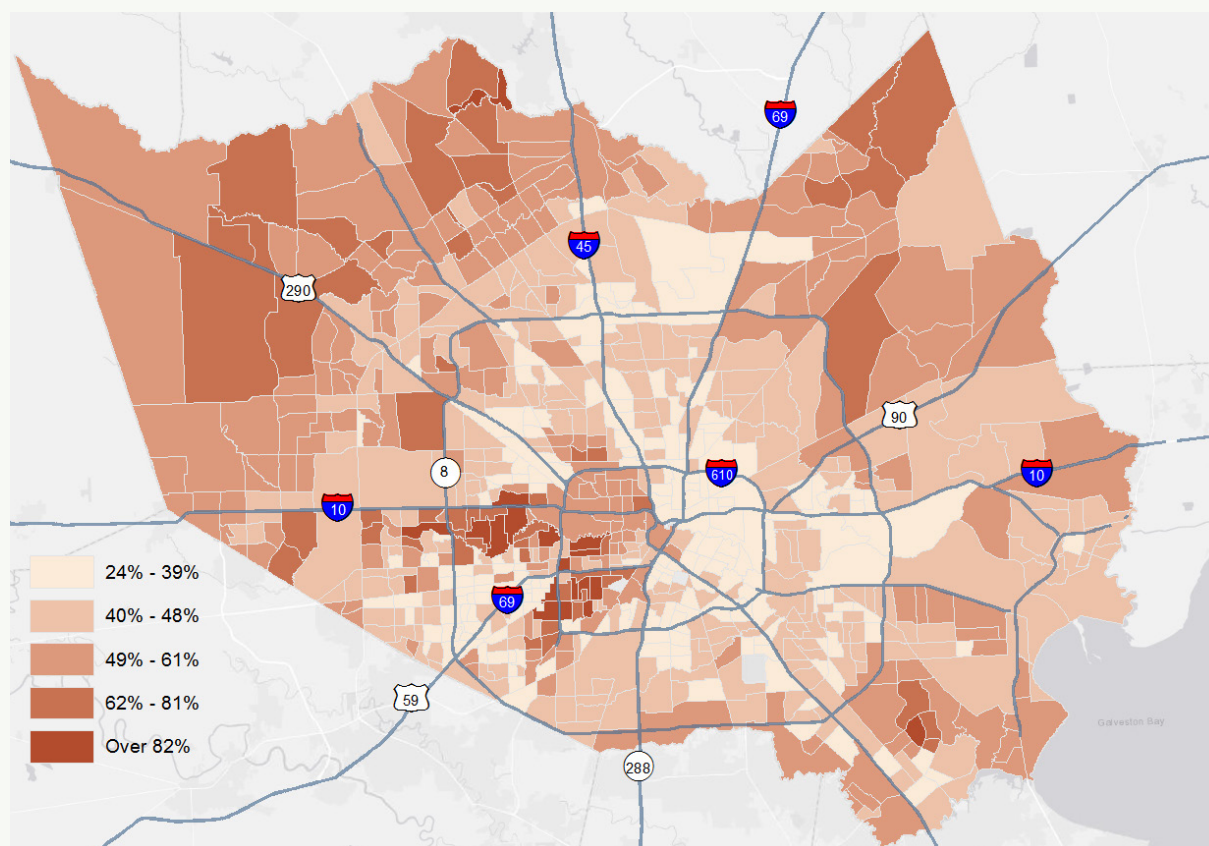
Jim Porter/flickr

portation costs in a given neighborhood within Harris County. The cost burden placed on a typical household by transportation costs ranges from 0 to 30 percent, with a median of 21 percent. The average annual transportation costs amount to $12,529.

Housing costs are the single largest expense for most households. About 27 percent of the average household budget goes into housing expenses. Incomes are a key driver of determining housing affordability, regardless of housing prices. In Figure 6, areas in the darkest shade are those where a typical Houston family would have to pay more than 82 percent of their household income on combined housing and transportation costs. These include some of the wealthiest neighborhoods along I-10, near **River Oaks, West University** and **Bellaire**, as well as several neighborhoods near **Memorial, Briar Forest** and **Energy Corridor**. The high-cost burden is driven largely by housing prices in those areas. Many households pay a large portion of their income to live in neighborhoods near the major job centers.

Costs of housing and transportation combined complicate the affordability issue, especially for low-wage workers. Most low-wage workers are renters. In Harris County, the median household income of renters is approximately $35,000. According to the American Community Survey, 19 percent of renter-occupied housing units are rented to households with an income less than $15,000, and 30 percent to those with household incomes between $15,000 and $34,999. The majority of renters live in multi-family structures with five or more units in Harris County, most of which concentrate heavily in the southwestern part of Harris County.[22] This correlates with a pattern similar to the geographic concentration of low-wage workers.

Renters tend to have shorter commutes than homeowners in many large metropolitan areas.[23] However, that's not the case for low-wage workers in Houston. Few affordable units are found in major job centers, making it difficult for low-wage workers to live close to where they work. The apartment complexes built between 1960 and 1980 play an important role in the Houston area. Since these units' median gross rent is still under $800 per month, the unit is considered 'affordable' though for a low-wage worker and a sole earner, it means more than 60 percent of earnings goes to rent. Those low-cost rental housing units lay outside of the Inner Loop, in the neighborhoods of Gulfton, Sharpstown and Alief. Multi-family housing from this period also clusters in the southeastern sector of the county, such as in Pasadena.[24] As described in the following sections, some of those areas are inconvenient to jobs. Even in these inconvenient locations, older apartment buildings are torn down to make way for new development, thus making low-wage workers' options more limited.

Commuting Patterns of Workers in Three Job Centers

Theoretically, job centers should be connected to the regional transportation network with high-capacity transit service. Housing options should be expanded within these job center boundaries, especially around existing or planned public transit. But is that the case in Houston?

This section looks into the commuting patterns of workers in three major centers in Harris County, namely **Downtown, the Texas Medical Center (TMC)** and **Uptown** (including the **Galleria**). Collectively, the three employment centers provide more than 300,000 jobs, or approximately 15 percent of all jobs in the Harris County. Figure 7 shows the share of low-, medium- and high-wage nonfarm jobs provided by the three job centers, compared to the Harris County average. Approximately, 65 percent of those jobs are filled by Harris County residents.
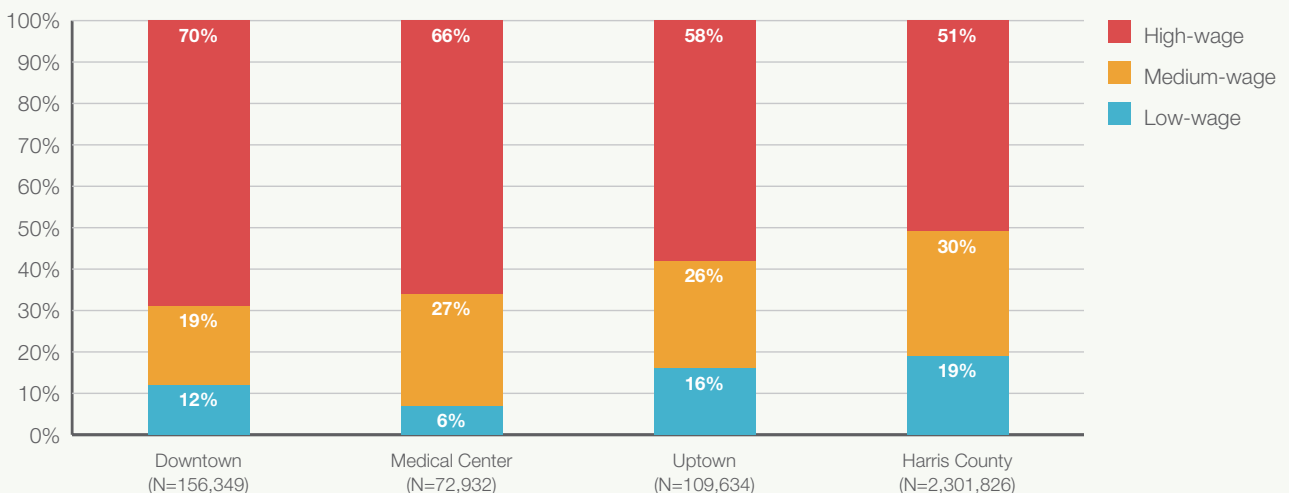
Next, we examine the commuting patterns of workers in each job center, including average commute distance and time. Flow-mapping techniques are applied to visualize

the commuting patterns of the three wage categories, highlighting the interactions between workers' residence and worksites as well as the commute options.

Downtown

Downtown Houston is the largest business district in the region and has been the most important commercial district since the city was founded there in 1836. Today it has a wide industry mix providing more than 150,000 jobs, 70 percent of which are high-wage jobs. More than 60 percent of Downtown employees are between ages 30 and 54. According to the 2014 LEHD data, a total of 101,182 Harris County residents commute to Downtown every day. The

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FIGURE 7 **The Share of Low-, Medium- and High-wage Jobs**

	Downtown (N=156,349)	Medical Center (N=72,932)	Uptown (N=109,634)	Harris County (N=2,301,826)
High-wage	70%	66%	58%	51%
Medium-wage	19%	27%	26%	30%
Low-wage	12%	6%	16%	19%

Average Commute Distance and Time for Harris County commuters to Downtown

Weighted Average Commute Distance

Weighted Average Commute Time (by automobile)

Commuting Flow Pattern in Harris County for Downtown Low-, Medium- and High-wage Workers in 2014

a. Low-wage

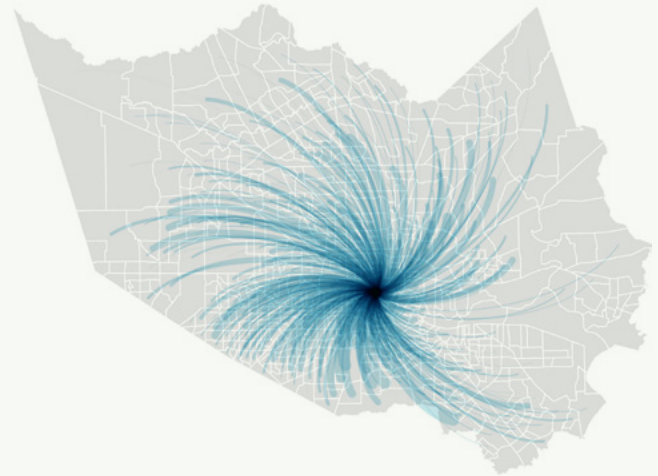**b. Medium-wage**

c. High-wage

rest come from other counties. Only 831 jobs are filled by workers living in Downtown—which is half of one percent of the total downtown jobs—and most are earning more than $40,000 annually.

As a major public transportation hub, Downtown Houston is well-connected and accessible by multiple transportation modes, such as the light rail system, park and ride service, METRO bus system and freeway network.[25] Downtown also provides "green" transportation options such as the BCycle bike share program and the free circulator Greenlink, and has recently added more bicycle lanes. A 2013 commuter survey conducted by Central Houston revealed that approximately 32 percent of Downtown employees use public transit and another 11.2 percent use alternative modes to get to work, compared to only three percent of Harris County employees who use public transit to get to work.[26]
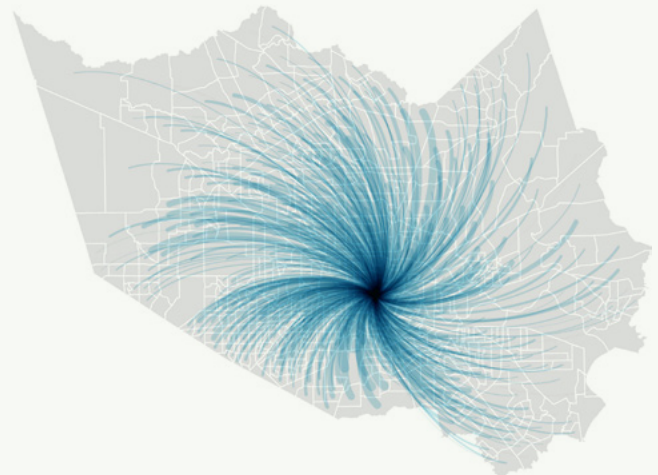
On average, low-wage workers in Harris County travel 12.3 miles to Downtown, compared to 13.0 miles and 14.4 miles for medium- and high-wage workers.[27] The estimated automobile travel time for a typical low-wage worker is about 16 minutes, compared to 16.8 minutes and 18.4 minutes for medium- and high-wage workers. In other words, low-wage workers in Downtown tend to live a bit closer to the job center compared to medium- and high-wage workers.

We created three flow maps to visualize the commuting patterns for different wage groups.[28] For better visuals, we aggregated LODES data from the census block to census tract. The thickness of the line is proportional to the number of commuters from a neighborhood to Downtown. The thicker the flow lines are, the larger the commuter population is.

Additionally, LODES data is aggregated to the Kinder CTA boundaries to better illustrate the dynamics between residence and employment center. A web-based data tool is available at http://www.datahouston.org/story/Commuting.html.

The flow maps enable us to identify a distinct spatial pattern showing where low-, medium- and high-wage workers live and commute to Downtown. In general, most of the low-wage workers live in south and southwest Houston such as Alief and Five Corners; medium-wage workers come from neighborhoods such as Pasadena, Northside and Spring Southwest. High-wage workers live in the central city, including Montrose and Uptown; as well as in north and northwest Houston, including the Heights, Cypress North and Kingwood. Thus, we chose three specific residence areas for further study: **Alief**, **Pasadena** and **Kingwood**.
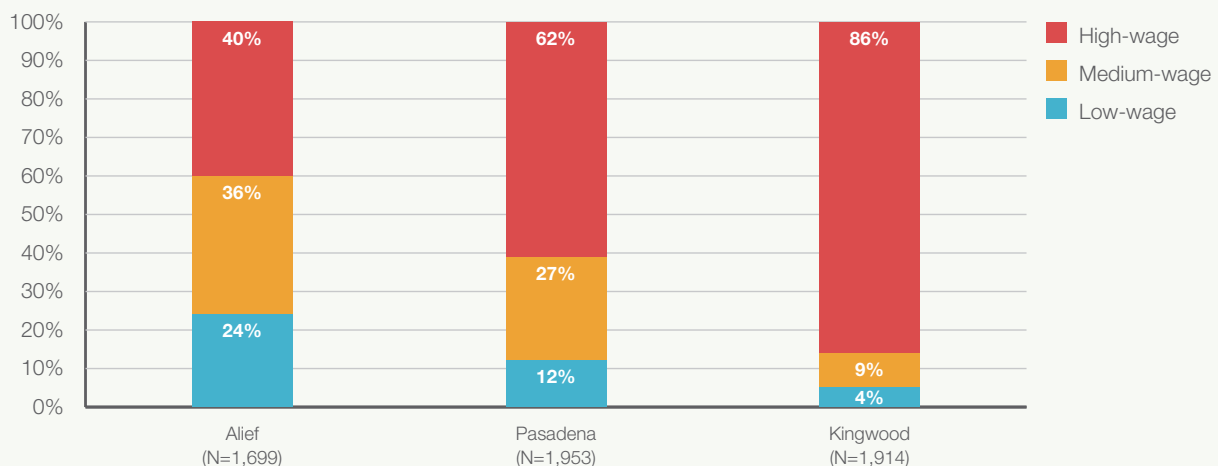

Downtown

Characteristics of Residence Areas: Alief, Pasadena and Kingwood

TABLE 2

	Number of Commuters to Harris County	Number of Commuters to Downtown	% Non-Hispanic Whites among All Residents	% High School or Less among All Residents	% Unemployed among All Residents	% Commute by Public Transit among All Commuters
Alief	41,385	1,699 (4%)	8%	59%	11%	4%
Pasadena	46,562	1,953 (4%)	28%	62%	11%	1%
Kingwood	21,709	1,914 (9%)	81%	19%	5%	4%

Breakdown of residents working in Downtown

Alief (N=1,699): High-wage 40%, Medium-wage 36%, Low-wage 24%
Pasadena (N=1,953): High-wage 62%, Medium-wage 27%, Low-wage 12%
Kingwood (N=1,914): High-wage 86%, Medium-wage 9%, Low-wage 4%

The **Alief** neighborhood area has a high density and racial-ethnically diverse population. Eight percent are non-Hispanic whites, 24 percent non-Hispanic blacks, 45 percent Hispanics and 22 percent Asians. Almost half of the population is foreign-born. The residents of this neighborhood have low educational attainment compared to other neighborhoods. Almost 60 percent of the population aged 25 and older has no post-secondary education. More than half of the households have annual incomes less than $40,000, according to the 2014 American Community Survey 5-year estimates. The majority of all commuters from Alief either drive alone (77 percent) or carpool (15 percent). About four percent use public transit to commute.

Among all 41,385 workers who live in Alief and work in Harris County, only a small proportion commute to Downtown every day, most of whom work in low- to medium-paying jobs. Unfortunately, due to data limitations, the commute mode of those workers is unknown. The distance between Alief and Downtown Houston is about 18 miles. On a typical workday, it takes about 30–50 minutes to travel from Alief to Downtown via automobile, [29] while it takes about 80 minutes to get to work via public transit and at least two transfers.[30]

Pasadena is a mostly working-class suburb located about 13 miles east of Downtown near the Houston Ship Channel. About 67 percent of the residents in this community are Hispanic and 28 percent are non-Hispanic whites. Socioeconomically, this neighborhood area is very similar to Alief. Most of the Pasadena residents work in Pasadena, Deer Park, La Porte, Downtown and the South Belt/Ellington areas. Almost all the commuters drive alone to work or carpool.

Pasadena is served by three freeway systems: I-45, State Highway 225, and the east portion of the Sam Houston Tollway. Typically, it takes about 20–40 minutes to drive to Downtown. Almost 7 percent of the households in Pasadena don't have access to a vehicle. However, Pasadena opted out of service by Metro. The bus service operated by Harris County Transit was also canceled in October 2012, leaving the residents without many commuting options.

The third neighborhood, **Kingwood,** is very different from the other two in racial-ethnic makeup and socioeconomic status. Located at the edge of Harris County about 30 miles north of Downtown Houston, this neighborhood is composed of 81 percent non-Hispanic whites and 11 percent Hispanics. More than 80 percent of the residents 25 years and older have post-secondary education. Almost

90 percent of all the workers residing in the Kingwood area are high-wage earners. However, in terms of commute modes by its residents, it's quite similar to the other two. Eighty-one percent of all the workers from Kingwood drive alone to work, seven percent carpool, and about four percent use public transit. Again, LEHD data doesn't have information on what percent of workers take public transit to Downtown. Typically the drive from Kingwood to Downtown on a workday is about an hour or more. The weekday commuter service to Downtown offered by Kingwood Park & Ride, $4.50 each way, is approximately 55 minutes.

In sum, Alief and Pasadena are both majority-minority communities and economically disadvantaged, with limited public transit options to get to downtown. In contrast, Kingwood, an affluent neighborhood, has a Park and Ride service for commuters that is a good alternative to driving to downtown.

Texas Medical Center (TMC)

TMC is the largest medical complex in the world, with over 60 member institutions concentrated in a triangular area near Brays Bayou. In 2014, TMC provided 72,932 jobs. Unsurprisingly 66 percent were high-wage jobs and 27 percent were medium-wage jobs. About 48,000 jobs were filled by Harris County residents, 12,737 by Fort Bend County residents, 6,387 by Brazoria County residents and 2,696 by Montgomery County residents. Again, only 328, or 0.4 percent of jobs, were filled by workers living within the medical center. Almost 5,000 TMC workers live in the Astrodome and Braeswood area, not far from the medical center.
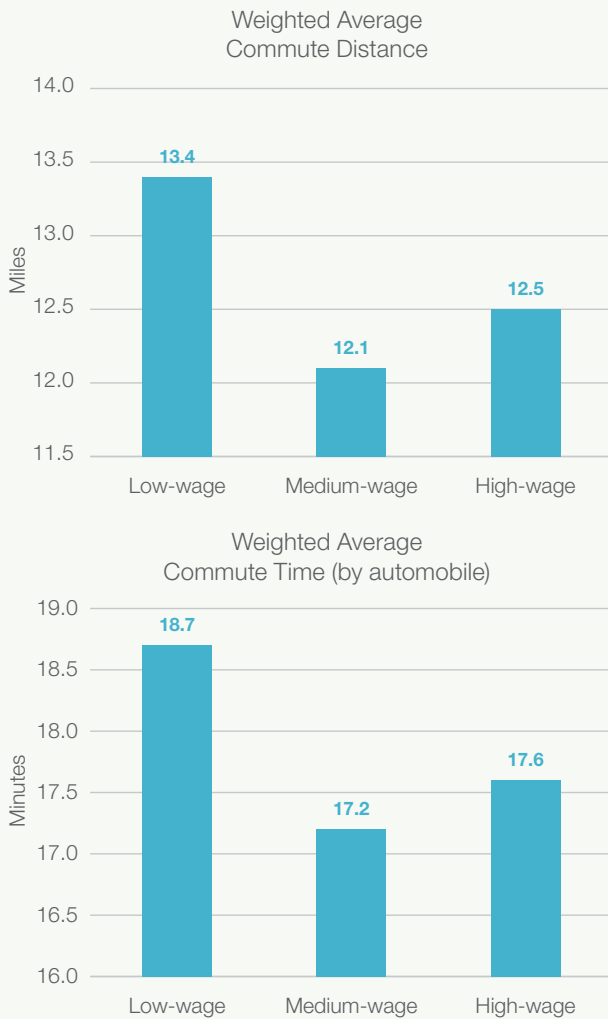
TMC is one of the few job centers in Houston that is not directly serviced by a freeway. Instead, it has developed strong public transit connections, including the MetroRail Red Line connecting the job center to Downtown Houston and the NRG Park, the Fort Bend Express operated by Fort Bend County and the Woodlands Express operated by The Woodlands Township. Most Metro bus routes that directly serve the TMC include a stop at the TMC Transit Center. TMC Transportation provides shuttle service for employees that interconnects TMC parking sites and its main campus institutions. According to a TMC mobility study, the combined transit services deliver nearly 65,000 passenger trips per weekday to or from the area.[31]

On average, low-wage workers in Harris County travel 13.4 miles to TMC, compared to 12.1 miles and 12.5 miles for medium- and high-wage workers. Similarly, low-wage

FIGURE 10

Average Commute Distance and Time for Harris County Commuters to TMC

Weighted Average Commute Distance

Weighted Average Commute Time (by automobile)

FIGURE 11 a-c

Commuting Flow Pattern in Harris County for TMC Low-, Medium- and High-wage Workers in 2014

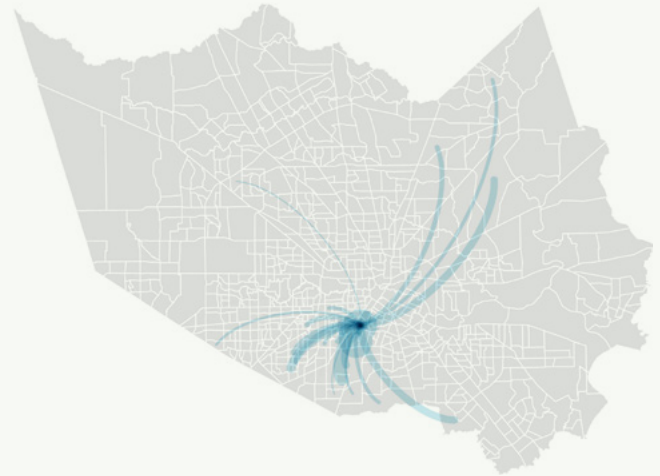### a. Low-wage

b. Medium-wage

c. High-wage

workers in Harris County spend more commuting time. On average, a low-wage worker spends 18.7 minutes to get to work, compared to 17.2 minutes and 17.6 minutes for medium- and high-wage workers. This pattern is very different from the commuters to Downtown. Medium-wage and high-wage workers, mostly medical professionals, tend to live closer to the job center.

As the flow maps indicate, most of the low-wage TMC workers live in pockets southwest of TMC, including Alief and Five Corners. Medium-wage workers mostly live in Five Corners and the Astrodome area. High-wage workers live in neighborhoods not too far from the medical center, such as Braeswood, Astrodome, Bellaire, West University/Southside, University Place, Montrose and Meyerland. We then looked into the characteristics of three residence areas: **Five Corners**, **Astrodome** and **Braeswood**.
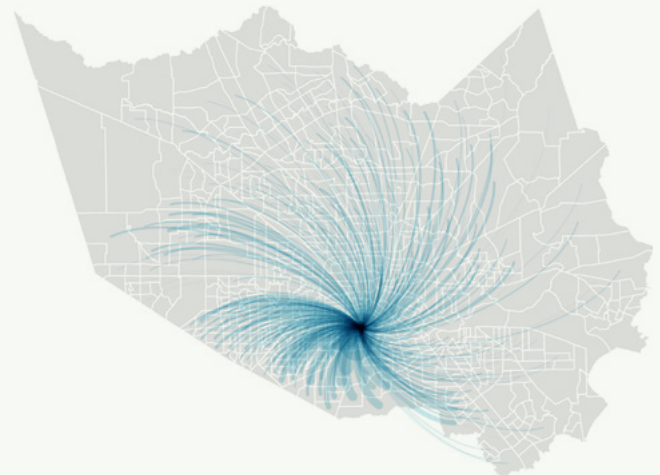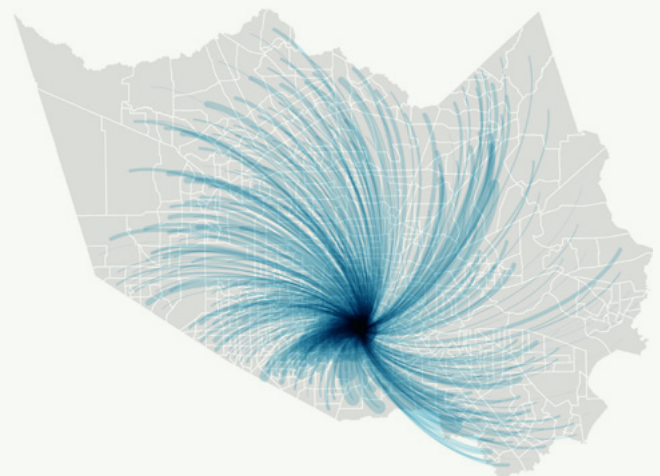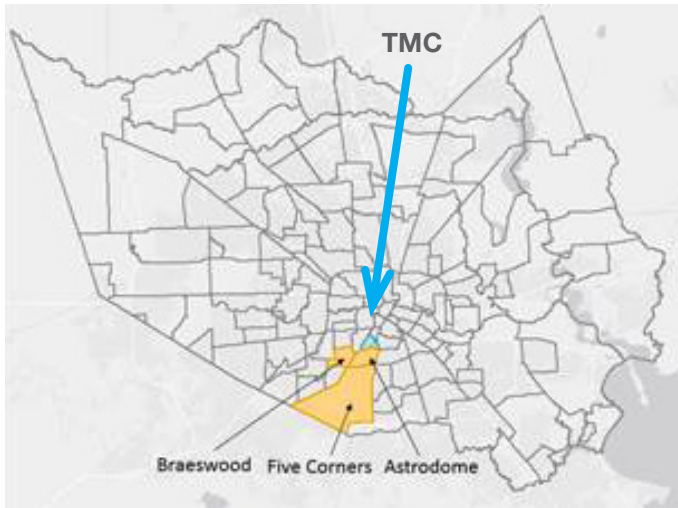
The **Five Corners** neighborhood is located in southwest Houston, bound by Highway 90, Sam Houston Tollway, Southwest Freeway and Loop 610. In 2014, it had 75,388 residents, of which 42 percent were black and 50 percent were Hispanic. One in four residents is foreign born. Approximately 44 percent of the households have incomes less than $40,000. This neighborhood is also characterized by relatively low educational attainment and a high unemployment rate.

More than 93 percent of the residents take a car, truck or van to work. Among all the workers over the age of 15 who do not work at home, 47 percent spend upwards of 30 minutes commuting to work. Only a small percentage of Five Corners residents commute to TMC, but we don't know the most common modes of transportation among those commuters. Traveling by car, getting from Five Corners to the TMC can take between 15 and 20 minutes from the closest edge and up to 40 minutes from the farthest edges. When taking public transit, that range expands to between 30 minutes and 1.5 hours. Residents living close to the border of Harris County and Fort Bend County have the option of using the Missouri City Park & Ride service to the TMC Transit Center with a fare of $2.00 and a 20-minute ride each way.

The **Astrodome** neighborhood, just south of the TMC, is racially diverse; 26 percent of residents are non-Hispanic white, 36 percent are non-Hispanic black, 26 percent are Asian and 9 percent are Hispanic. Almost one-third of residents are foreign born. This diversity can be seen in its income makeup as well. The neighborhood enjoys relatively high educational attainment. Almost 60 percent of the population 25 years and older have a bachelor's degree or more. Despite its racial and income diversity, and relatively high

| TABLE 3 | Characteristics of Residence Areas: Five Corners, Astrodome and Braeswood |

	Number of Commuters to Harris County	Number of Commuters to TMC	% Non-Hispanic Whites among All Residents	% High School or Less among All Residents	% Unemployed among All Residents	% Commute by Public Transit among All Commuters
Five Corners	24,658	1,004 (4%)	5%	57%	13%	4%
Astrodome	9,057	2,399 (26%)	26%	14%	10%	11%
Braeswood	10,263	2,066 (20%)	62%	9%	5%	4%

Breakdown of residents working in TMC
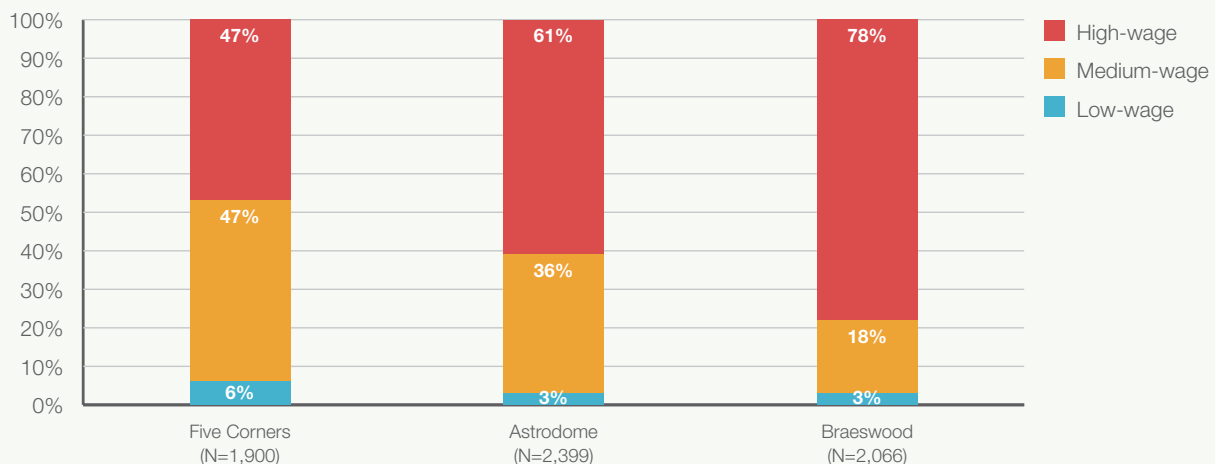
education outlook, the Astrodome area had a 10 percent unemployment rate, almost double the county level in 2014.

Transportation in the Astrodome neighborhood splits across modes. While 69 percent drive alone to work, 10 percent carpool and 11 percent take public transportation. Only 20 percent of its residents spend over 30 minutes commuting to work each day, possibly due to its relative proximity to major job centers. Over a quarter of Astrodome residents work in the TMC. Driving to the TMC from this area can take between 5 and 20 minutes depending on traffic, while taking public transportation can take between 15 and 30 minutes, depending on location and time of day.

Compared to the other neighborhoods discussed in this section, residents in **Braeswood** are relatively wealthy, white and well educated. Three-quarters of households make over $40,000 per year in this area three-quarters have bachelor's degrees or higher. Sixty-two percent of residents are non-Hispanic white, and 16 percent are Asian, only 9 percent are black and 11 percent are Hispanic. In short, this is an economically privileged neighborhood.

Given the Astrodome area's central location, only 24 percent of residents spend more than 30 minutes commuting. About 84 percent either drive alone or carpool to work, while 4 percent take public transportation and 5 percent either bike or walk to work. One in five Braeswood residents work in the medical center and 80 percent of them are high-wage earners. Despite short commute times to the medical center, this neighborhood, in general, is not affordable for everyone.

Both the Astrodome area and Braeswood are located in the central city close to multiple job centers. Residents are more likely to choose public transit, bicycle or walk for a commute. In contrast, residents in Five Corners have longer commute times and fewer alternatives to commute to the TMC.

Uptown

Uptown Houston is an upscale, mixed-use urban development located west of Downtown Houston. One of its major features is the Galleria, the largest shopping mall in Texas. It is the largest employment center outside of a traditional downtown. Compared to the other two job centers, Uptown has a more balanced mix of jobs with respect to the wage categories. About 62 percent of jobs are filled by Harris County residents, slightly fewer than the other two centers probably due to its location. Unlike the other two job centers, almost 7 percent of all Harris County commuters live in the Uptown district and most are high-wage workers.

Average commute distance and time for workers in Uptown

Weighted Average Commute Distance

Weighted Average Commute Time (by automobile)
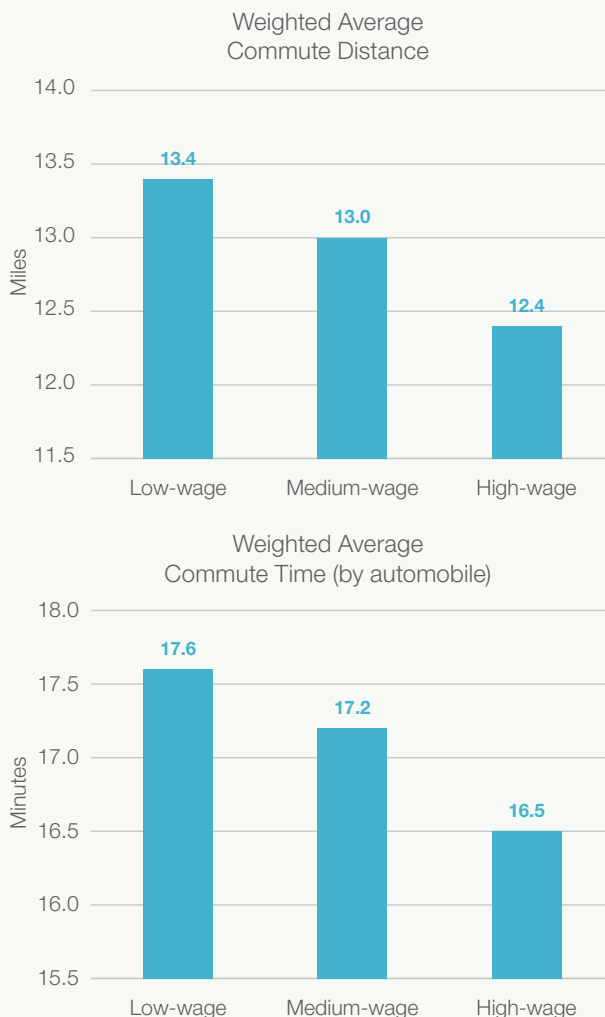
Uptown Houston is a Tax Increment Reinvestment Zone (TIRZ), a self-imposed taxing entity created by property owners in order to fund development and improvements in the area, including mobility improvements. Many residential offerings in Uptown meet the needs of executives and young professionals, rather than low- and medium-wage workers. Many local bus routes and a couple of commuter routes serve the area. Since 2013, construction has been underway to build a Bus Rapid Transit (BRT) line on Post Oak Boulevard to deliver transit service from Westpark to the Northwest Transit Center.

Again, we compare the average commute distance and time among the three wage groups. Low-wage workers in Harris County travel 13.4 miles to the Galleria, compared to 13.0 miles and 12.4 miles for medium- and high-wage workers. On average, low-wage worker spend 17.6 min-
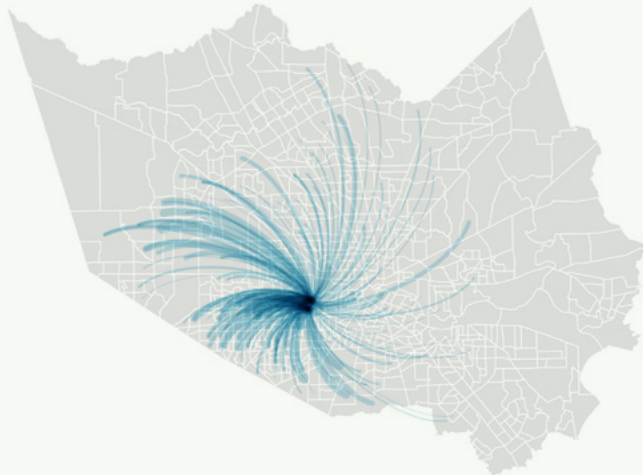
FIGURE 13 a-c

Commuting Flow Pattern in Harris County for Uptown Low-, Medium- and High-wage Workers in 2014
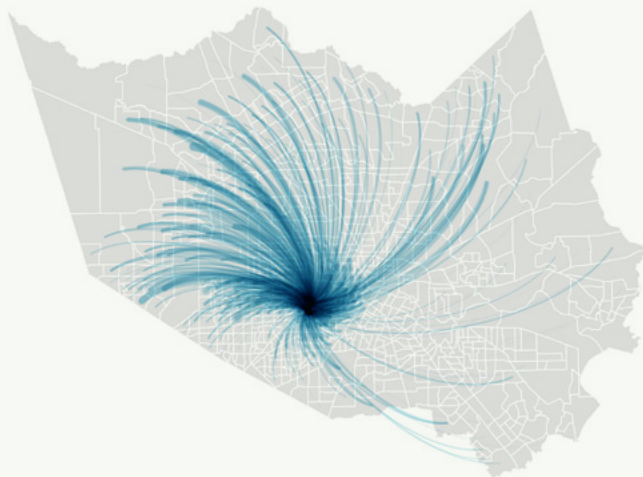
a. Low-wage
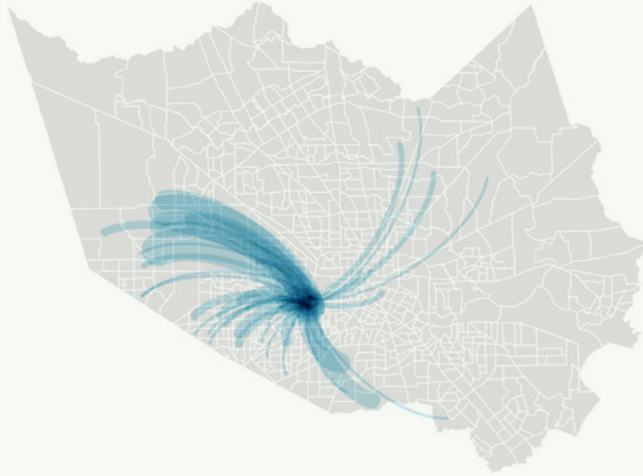
b. Medium-wage

c. High-wage

utes on commuting, compared to 17.2 minutes and 16.5 minutes for medium- and high-wage workers. Generally, high-wage workers tend to live closer to this job center, compared to the other two groups, probably due to the housing and transportation options.

The three flow maps show that many low-wage workers live in the neighborhoods west of Uptown, such as Alief, Sharpstown and Katy North. Medium-wage earners have more housing options. Besides Alief and Sharpstown, they also reside in Gulfton, Eldridge/West Oaks, Bear Creek and Westchase areas. Besides Uptown itself, high-wage workers commute from various neighborhoods located west and north to Uptown, including Memorial, Briar Forest and Katy on the west side, Cypress North and Copperfield on the northwest side and the Heights and Montrose on the east side.
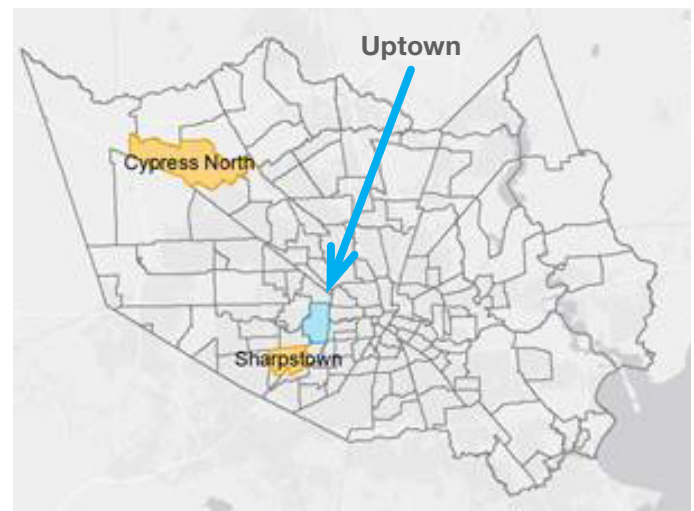
The **Sharpstown** neighborhood in west Houston is bound by Westpark Tollway, Sam Houston Tollway and Southwest Freeway. The neighborhood is majority Hispanic (57 percent), with 12 percent non-Hispanic whites, 14 percent black and 15 percent Asian. More than half of the residents are foreign born. The area is relatively poor with low educational attainment. Sixty-two percent of households make less than $40,000 a year and 63 percent of residents 25 years and over have a high school diploma or less.

Sharpstown has a much higher rate of carpooling than the county average. Twenty-three percent of workers carpool, 7 percent take the bus and 4 percent bike or walk to work. The high rate of carpooling is likely due to the fact that only 0.72 vehicles are available for commuting per person in this neighborhood—significantly lower than the 0.87 at the county level.[32]

Only seven percent of its residents work in nearby Uptown. The shortest route from Sharpstown to the Galleria area takes 15 minutes by car depending on traffic; however, the commute time is longer than 50 minutes by bus, depending on location and time of day. The trip is about 35 minutes by bicycle, but there are currently no designated bicycle lanes. The new citywide bike plan includes a pilot project for the Gulfton-Sharpstown area.[33] In addition, the Metro's Moving Forward Plan mentions the possibility of developing a high capacity rapid transit project extending BRT from the Uptown Transit Center to Gulfton, which also serves part of the Sharpstown area.

The **Cypress North** area in northwest Houston is a suburban neighborhood well outside Beltway 8, roughly bound by Cypress Creek to the south, Highway 290 to the west, and Little Cypress Creek and Grant Road to the North. This neighborhood is highly educated and mostly white. Nearly half of the residents 25 years and older have bachelor's degree or higher. Eight in 10 households have annual incomes over $60,000.

Unsurprisingly, 90 percent of its residents commute by car and 82 percent of workers spend more than 30 minutes commuting. Only a small portion of its residents work in Uptown. A trip to Uptown can take approxi-

mately 40 minutes by car and between 60 and 90 minutes by bus each way. The Cypress Park and Ride service, in conjunction with Route 33, gets workers to Uptown in about an hour.

In sum, relatively few people live in Downtown and the TMC compared to Uptown. Less than one percent of the jobs in Downtown and TMC are filled by people living in the job center; while more than 4 percent of Uptown jobs were filled by Uptown residents. This is probably due to the fact that Downtown and TMC have fewer housing units than Uptown. Appendix B shows that Downtown only has 2,754 housing units, 81 percent of which are renter-occupied. TMC has fewer rental units than Downtown. In contrast, Uptown has more than 30,000 housing units, 58 percent of which are renter-occupied. In addition, half of the renters in TMC spend more than 30 percent of their incomes on housing, facing affordability challenges.
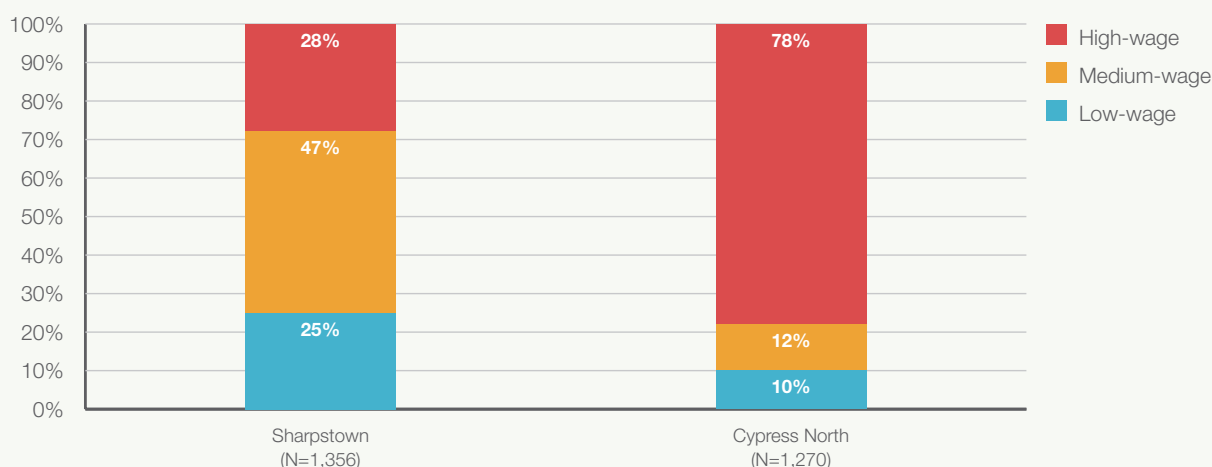
The case studies also suggest that more affluent communities located near job centers have more job opportunities. Middle- to high-income suburban neighborhoods are well connected to major job centers via park and ride service; while workers in economically disadvantaged neighborhoods have limited commuting options other than driving to work.

TABLE 4 — Characteristics of Residence Areas: Sharpstown and Cypress North

	Number of Commuters to Harris County	Number of Commuters to Uptown	% Non-Hispanic Whites among All Residents	% High School or Less among All Residents	% Unemployed among All Residents	% Commute by Public Transit among All Commuters
Sharpstown	19,903	1,356 (7%)	12%	63%	9%	7%
Cypress North	32,169	1,270 (4%)	71%	21%	3%	2%

Breakdown of residents working in Uptown

Sharpstown (N=1,356): Low-wage 25%, Medium-wage 47%, High-wage 28%
Cypress North (N=1,270): Low-wage 10%, Medium-wage 12%, High-wage 78%

Legend: High-wage, Medium-wage, Low-wage

Conclusion and Discussion

This report identifies a geographical mismatch between the location of low- and medium-income jobs and the residential locations of low- and medium-wage workers.

Low- and medium-wage jobs are concentrated in major job centers such as Downtown, the Texas Medical Center, Upper Kirby/Greenway Plaza and Uptown/the Galleria area. But few affordable units are found in major job centers, making it difficult for low-wage workers to live close to where they work. Compared to higher-wage workers, low-wage workers are more likely to live all over Harris County in neighborhoods that are poorly connected to job centers by transit.

Additionally, we find different commuting patterns among Downtown, TMC and Uptown workers of the three earning categories. Low-wage workers who need to commute to Downtown tend to live closer to the job centers, compared to the other two categories. Medium- and high-wage TMC workers, mostly medical professionals, are more likely to live closer to the job center. Similarly, high-wage Uptown workers live closer to the job center given the housing options they have.

These results demonstrate the critical interdependence between jobs, housing and commuter transportation options. Our findings point to the need for more integrated strategies around economic and workforce development, housing and transportation programs to improve upward mobility for all residents.

Although this report is primarily descriptive, some policy implications are clear in light of the spatial mismatch we found. As Keith Ihlanfeldt has pointed out, policy options to address the issue can be grouped into two categories:

1. Policies to reduce distances between the residential locations of low-wage workers and the locations of available jobs; and

2. Policies to improve the job accessibility of low-wage workers without changing jobs or residence.[34]

To pursue the first category policy option, for example, policymakers could expand housing options within or near job centers, especially around existing or planned public transit, in an effort to reduce commute time and alleviate the need for government spending in public assistance programs. An aggressive policy approach can be difficult in a low-regulation environment such as Houston, but it may be possible to target economic development incentives to move toward these goals.

Similarly, policymakers should also consider developing strategies to help low-income communities as well as urban and suburban communities of color to be better connected to major job centers, especially when they are in close proximity to one another. For example, given the characteristics of Sharpstown and its proximity to Uptown, the city could look into the possibility of improving public transit service and connecting the neighborhood to the larger bike lane network.

The geographical mismatch between job centers and affordable residential areas is a very real problem, especially for low- and medium-wage workers who make up approximately half of the workforce. Houston is fortunate to have several strong and important job centers that provide many employment opportunities for lower-wage workers. But the future economic well-being of the city and the region depend a great deal on the ability of policymakers to address the spatial mismatch so that workers can get to their jobs and businesses can count on a reliable workforce.

Appendix A: Data Sources, Methods and Limitations

The analysis of this report is based on a dataset constructed from the 2014 Longitudinal Employer-Household Dynamics program and the 2010–14 American Community Survey five-year estimates.

Geographic Boundary

This report focuses on the Houston MSA and Harris County, Texas. Besides census tract boundaries, this report also uses Kinder Community Tabulation Areas (CTAs) as neighborhood boundaries.

The Kinder CTAs are designed to serve as approximations of neighborhoods, based specifically on census geographic boundaries, to facilitate the aggregation of census data to geographies larger than census tracts, but smaller than counties. By taking social community boundaries, such as super neighborhoods, market areas, and school districts into account, it is hoped that Kinder CTAs will serve as a more suitable approximation of neighborhoods than zip code tabulation areas.

For more information on how we created the Kinder CTA boundaries, please go to https://tinyurl.com/KinderCTA.

Data Sources

Longitudinal Employer-Household Dynamics (LEHD)

Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES) data provides statistics on employment at the census block level, including information on resident workers, jobs and commute flows of resident workers to jobs. We aggregated the block-level statistics to 2010 census tract boundaries as well as Kinder CTA boundaries, and used them to estimate the weighted average of Euclidian commute distance between origin and destination tracts.

Weighted census tract coordinates are calculated as follows:

$$X_t = \frac{(\sum_{i=1}^{n_i} x_i \times p_i)}{(\sum_{i=1}^{n_i} p_i)} \quad \text{and} \quad Y_t = \frac{(\sum_{i=1}^{n_i} y_i \times p_i)}{(\sum_{i=1}^{n_i} p_i)} \, ,$$

Where is a census block in a census tract, is the count of jobs in a block and are the x- and y- coordinates of the geographic centroid of block.[35] Therefore, the estimated commute distance and commute time doesn't consider actual routes and traffic.

We chose LEHD commute data over the Census Transportation Planning Products (CTPP) because the CTPP models tract-to-tract commute based on the American Community Survey five year estimates, and has less origin-destination information. It's also worth noting that typical commutes within a metropolitan area from the CTPP were shorter than those from the LEHD. See Matthew R. Graham, Mark J. Kutzback, and Brian McKenzie, "Design Comparison of LODES and ACS Commuting Data Products," U.S. Census Bureau (2014), and Bruce D. Spear, "NCHRP 08-36, Task 098: Improving Employment Data for Transportation Planning," prepared for AASHTO Standing Committee on Planning (2011).

In addition, we trimmed Residence Area Characteristic (RAC) data to select the geographic area of interest to understand the resident workers characteristics. Similarly, we processed Work Area Characteristics (WAC) data to understand the characteristics of major job centers in Houston.

Paul Sableman/flickr

The 2010–14 American Community Survey

Demographic characteristics on population, race and ethnicity, poverty, unemployment, labor force participation, car ownership come from the 2010–14 American Community Survey five-year estimates. Data are downloaded through American FactFinder. We then aggregated the tract-level statistics to Kinder CTA boundaries.

Job Accessibility Indicators

Job accessibility indicators come from Access to Jobs and Workers Via Transit, a free geospatial data resource and mapping tool created by U.S. EPA's Office of Sustainable Communities. Using transit service data, EPA researchers calculated travel time for each census block group to all other census block groups accessible via transit. Combined with data from the census, they generated several indicators summarizing accessibility to jobs, accessibility by workers, households and population.

Travel time is limited to 45 minutes and is inclusive of wait times, transfers and walking to/from transit stops. For more information, please go to https://www.epa.gov/smartgrowth/smart-location-mapping#Trans45.

Data limitations

LEHD provides only earnings data, but has no information about other sources of household income. In addition, LEHD reports earnings on a job basis, providing incomplete information about households in which there is more than one earner or in which an earner holds multiple jobs.

Earlier studies have pointed out that because the LEHD data is based on employers' administrative records, while the American Community Survey data comes from a household sample survey, it is not accurate to draw direct comparisons between the tract-level wage earners' characteristics using LEHD data with the tract-level working individuals' characteristics using ACS data.[36]

Appendix B: Worker/Resident Composition & Housing Composition in the Three Job Centers

TABLE **B-1** Worker/Resident Composition in the Three Job Centers

Job Centers	Number of Jobs (2014)	Number of Jobs Filled by Harris County Residents	Workers Living in the Center	Number of Jobs filled by Workers Living in the Center	% of All Jobs Filled by Residents in the Center
Downtown	156,349	101,182	2,719	831	0.5%
TMC	72,932	47,822	1,271	328	0.4%
Uptown	109,634	68,204	22,993	4,649	4.2%

TABLE **B-2** Housing Composition and Affordability in the Three Job Centers

Job Centers	Total Pop.	Total Housing Units	% Owner-Occupied Housing Units	% Renter-Occupied Housing Units	% Vacant Housing Units	% of Renters Spending More than 30% of their Income on Housing
Downtown	10,165	2,754	18.8	81.2	24.5	42.2
TMC	3,193	1,952	31.8	68.2	16.4	50.0
Uptown	55,189	33,689	42.0	58.0	13.8	36.1
Harris County	4,356,362	1,660,235	52.0	42.7	9.7	46.6

Endnotes

1   See Appendix regarding the data limitation.

2   In some cases, there might be more than one earner per household. In other cases, a single earner may work more than one job. Also LEHD provides only earnings data, so we have no information about other sources of household income.

3   Note that the definition of the working poor is different from U.S. Department of Labor's definition. If an individual spent at least 27 weeks in the past year in the labor force (that is, working or looking for work), but didn't earn more than the official poverty threshold, the US Department of Labor would classify this person as "working poor."

4   U.S. Census Bureau, 2010–2014 American Community Survey 5-Year Estimates.

5   Note that the definition of the working poor is different from U.S. Department of Labor's definition. If an individual spent at least 27 weeks in the past year in the labor force (that is, working or looking for work), but didn't earn more than the official poverty threshold, the US Department of Labor would classify this person as "working poor."

6   U.S. Bureau of Labor Statistics, "Occupational Employment and Wages in Houston-The Woodlands-Sugar Land, May 2017," Retrieved at https://www.bls.gov/regions/southwest/news-release/pdf/occupationalemploymentandwages_houston.pdf.

7   Torraco, R. 2016. "The Persistence of Working Poor Families in a Changing U.S. Job Market: An Integrative Review of the Literature." Human Resource Development Review, 15(1): 55-76.

8   Kalleberg, A. 2011. Good Jobs, Bad Jobs: The Rise of Polarized and Precarious Employment Systems in the United States, 1970–2000s. New York: Russell Sage Foundation, American Sociological Association Rose Series in Sociology.

9   In the literature, "low skill" refers to individuals with only a high school education and no more than one year of work experience.

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14 Pendal, et.al. 2014."Driving to Opportunity: Understanding the Links among Transportation Access, Residential Outcomes, and Economic Opportunity for Housing Voucher Recipients," Urban Institute, Washington, DC. Retrieved at https://www.urban.org/sites/default/files/publication/22461/413078-Driving-to-Opportunity-Understanding-the-Links-among-Transportation-Access-Residential-Outcomes-and-Economic-Opportunity-for-Housing-Voucher-Recipients.PDF.
    MacDonald et. al.. 2017. "Housing's Economic and Social Impacts," Iowa Finance Authority. Retrieved at http://housingtrustfundproject.org/wp-content/ uploads/2011/10/Iowa-Economic-Impact-Final1.pdf.

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27 Note that we used a similar method to calculate commute distance as the method used in a Brookings Institution's report. The report finds that the median within-metro-area commute distance in Houston-The Woodlands-Sugar Land Metro Area was 12.2 miles in 2011.

28 Note that we didn't include the transit maps on the flow maps because overlay of the transit maps makes the graphs too crowded to identify any pattern.

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