Sustainable Communities and Public Education

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THE 6TH
HOUSTON SUSTAINBILITY INDICATORS REPORT
SUSTAINABLE COMMUNITIES AND PUBLIC EDUCATION

by

Lester King, PhD, AICP, LEED

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Acknowledgements

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Executive Summary

Location affordability has come to be primarily defined by keeping housing costs plus transportation costs as a percentage of income under 46% (Hulchanski, 1995; Stone, 2006; CNT, 2010; Mattingly & Morrissey, 2014). This report evaluates a missing component of the affordability equation, which is high school performance and its impact on housing price and hence location decision (Machin, 2011; Fack & Grenet, 2010; Gibbons & Machin, 2008).

In the Consumer Expenditures Survey (CES) for the Houston metropolitan region, the average householder spent 33% of income on housing costs, 21% on transportation costs and 1.6% of income on education[1]. However, in the City of Houston, 20% of the k-12 students are enrolled in Private Schools[2]. Moreover, the average cost of private school in the City of Houston is $13,144[3]. The problem here, why the CES cost of education appears to be so low (1.6%)[4], is that there is a major difference between public school appreciation for residents living within the City of Houston and those who live outside of Houston, in the 10 county metropolitan region for which the CES is calculated. Outside of Houston, in the more suburban areas, there is a higher enrollment of k-12 students in public school and hence much lower costs of education. Whereas in the City of Houston, there may be less trust with the public education system and hence people spend a much higher percentage of their income on private schools.

This report will add to the affordability question in Houston by evaluating the importance of school performance on housing price. The literature established to date suggests that most households balance housing and transportation cost considerations in determining where to live. Those who choose higher housing costs will opt for lower transportation costs and vice versa (Lipman, 2006). This dichotomy ignores proximity to quality schools and the premise that urban public schools carry the stigma of poor performance. Many people who choose to live in urban areas may also choose to send their kids to private school (Holme, 2002; Dougherty, et al., 2009).

The following research questions will be evaluated in this report:

- **What is the relative importance of school performance in predicting housing value in Houston?**
- **How can comprehensive sustainability indicators be used to predict the variance in housing value?**

We hope you find this report useful to better understand affordability in Houston.
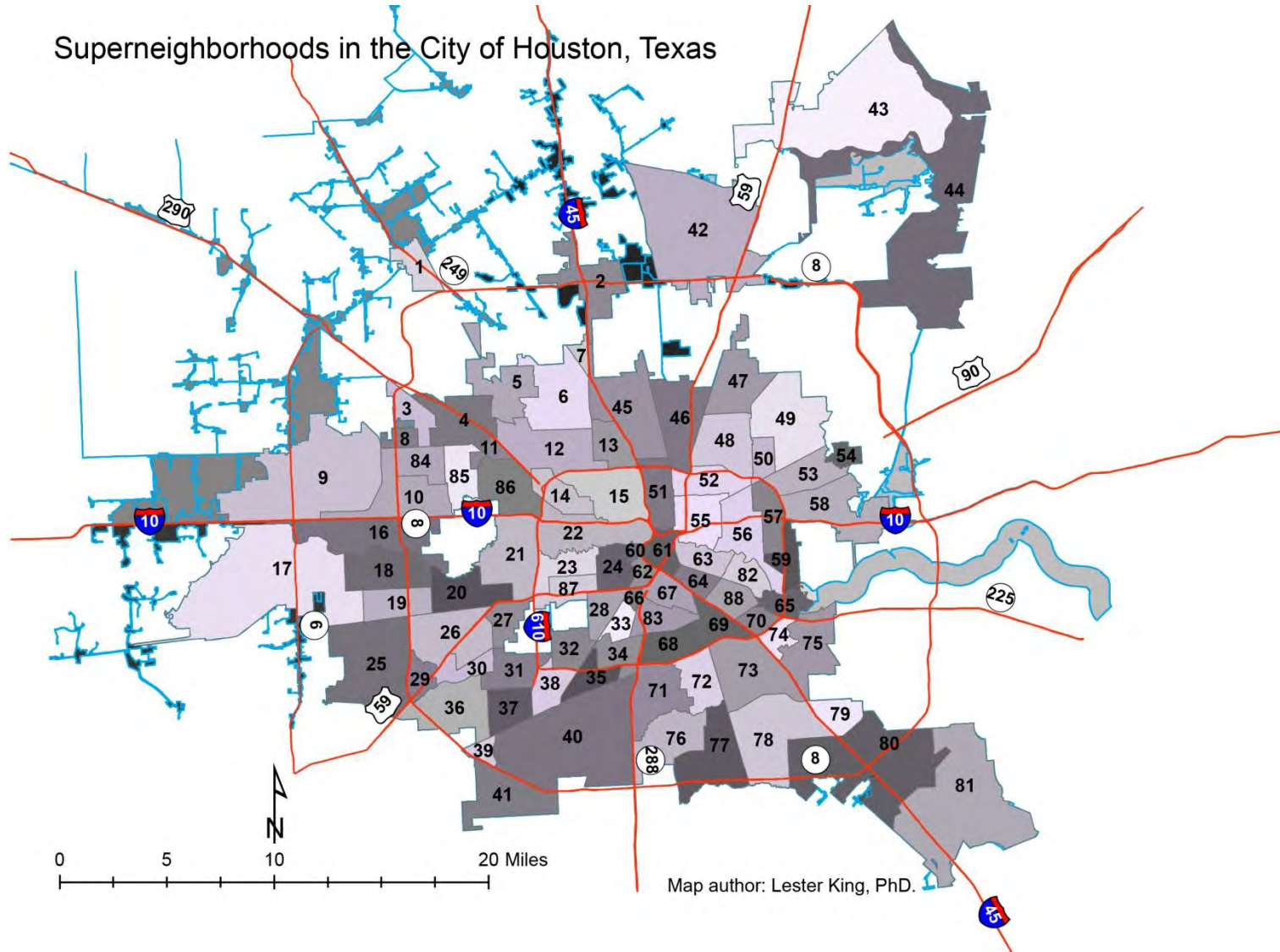
Sincerely,

Lester O. King, PhD

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[1] (Bureau of Labor Statistics, 2013)
[2] (Private School Review, 2014); (HISD 2013)
[3] (Private School Review, 2014)
[4] According to the CES the average education costs was $954

Superneighborhoods in the City of Houston, Texas

The map above shows the outline of the City of Houston and boundaries of each Super Neighborhood. In the Northwest and West of the city, the tendrils represent streets and the land immediately adjacent to the streets (commercial property), that was recently annexed into the City.

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HIGH SCHOOL PERFORMANCE

The Houston Independent School District (HISD) serves 215,000 students in 287 schools[5]. HISD is the largest school district in the state of Texas and the seventh (7th) largest in the nation. The total revenue for HISD was $1.8 Billion in 2016[6]. HISD is a majority-minority urban school district with dual-language instruction offered in 62 schools[7]. The racial/ ethnic population of the district is 62% Hispanic, 24% African-American, 8% White and 6% Other[8]. With the exception of the White student cohort and the Hispanic student cohort, these numbers reflect the racial/ethnic compositions in the City of Houston, which are 44% Hispanic, 23% African-American, 25% White and 8% Other[9]. One reason for the difference in demographics is the under-representation of the White cohort within HISD, which may account for the Hispanic population constituting a larger share of the HISD population.

This report does not directly address the reasons for the White population being under-represented in HISD (relative to its share of the overall population in Houston). Rather, we are concerned with the impact of **public school performance** on **housing prices**. Specifically if and how does public school performance affect the housing prices across communities in Houston. Since there are many factors that may influence the housing prices across the city, we rely on the comprehensive sustainability indicators from the Houston Sustainability Indicators project (HSI), to make a robust attempt at characterizing the relative impact of school performance as a predictor of housing prices, when compared to many other factors.

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[5] HISD At-A-Glance (2016)
[6] HISD 2015-2016 Facts and Figures
[7] HISD At-A-Glace (2016)

[8] HISD 2015-2016 Facts and Figures
[9] ACS 5Yr (2014)

The performance of public High Schools in Houston are routinely used to rate the desirability of neighborhoods and communities (Hardy, Balke, & Rufca, 2015). Since students are zoned to high schools based on place of residence within school Feeder Boundaries[10], then these boundaries can be used to classify neighborhoods and communities, according to the school performance in each respective zone.[11] Figure 1, for example, shows High School graduation rates, averaged by Houston communities. **Graduation rates across Houston communities range from a high of 86% students graduating in Museum Park to 56% students graduating in Settegast.**

HISD currently has a policy of relieving overcrowding in schools by adjusting the zoned attendance boundaries, thereby redistributing students to different schools. This policy does not properly empower existing communities in Houston, since the attendance boundaries do not correspond with existing community boundaries. Community leadership and neighborhood involvement operates at the level of our geographic communities and neighborhood boundaries, not at the level of the feeder pattern around our children's schools. Therefore residents are not incentivized to invest time and resources, since there is a 'disconnect' between school feeder patterns and community boundaries.

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[10] HISD offers over 40 high school magnet programs. This means a student can choose to go to a school outside of their zoned school. However not all students who apply can get into their desired school due to lack of available seats.

[11] For this analysis we calculated the average graduation rate for each Super Neighborhood community using the graduation rate of zoned high schools within HISD and the graduation rate for all high schools within the districts outside of HISD, that intersect with the City of Houston. For Super Neighborhoods within school districts outside of HISD, we first assigned a single graduation rate for each school district based on the average of all the high schools within each respective school district. Next we calculated the graduation rate for each Super neighborhood based on the percentage of the Super Neighborhood that fell within the school feeder zone boundary or school district outside HISD. The output graduation rate was based on the percentage in which the school feeder zone area was divided. For example, if a Super Neighborhood (A) was divided by area 1/3 and 2/3 between two feeder zones (B) and (C), with 50% and 80% graduation rates respectively, the resulting graduation rate of (A) would be 1/3 x (50) + 2/3 x (80) = 69.3.

Graduation Rate

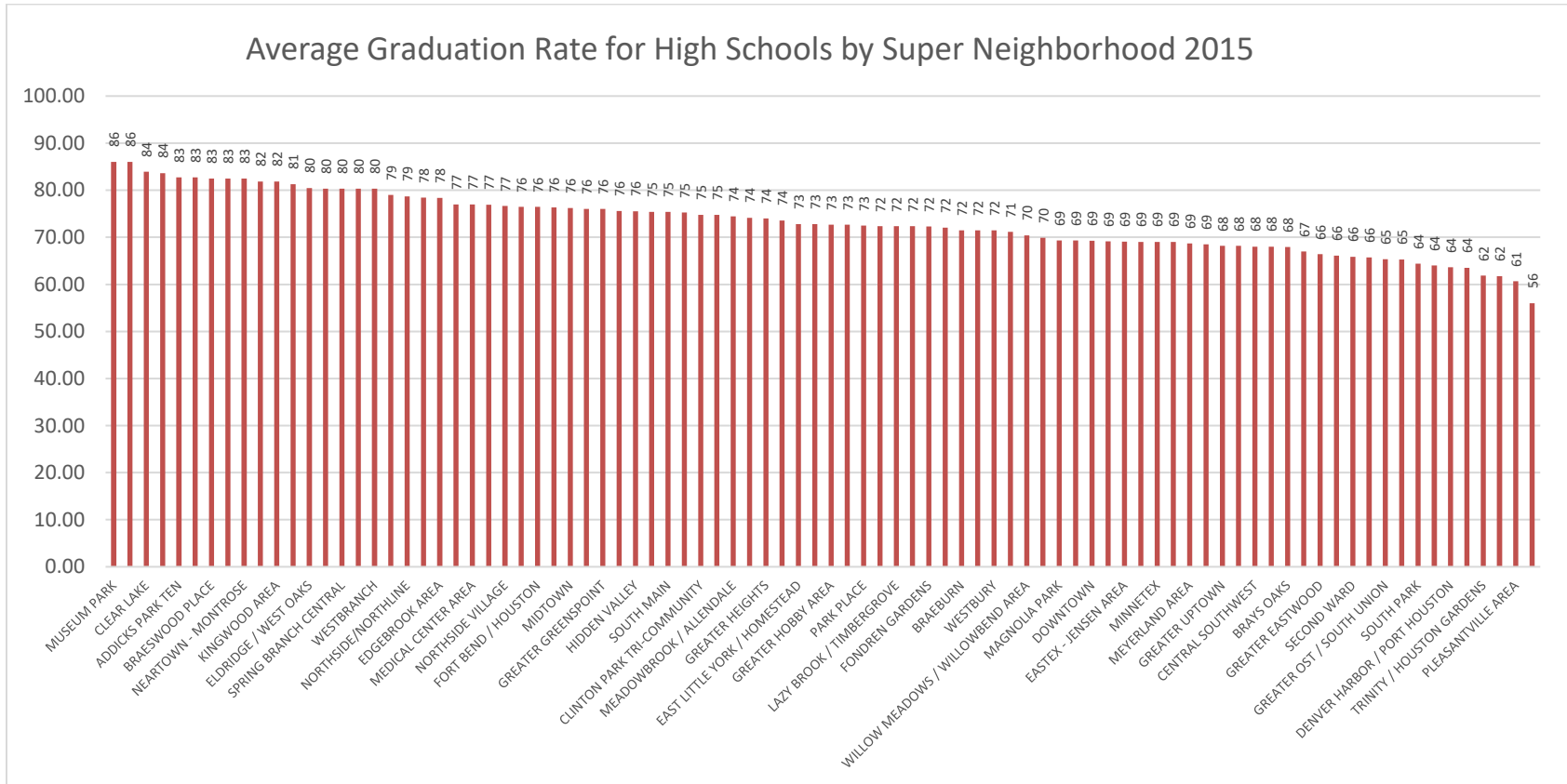Average Graduation Rate for High Schools by Super Neighborhood 2015

Chart 1: Average graduation rate for High Schools by Super Neighborhood; Source: Children-At-Risk 2014 Greater Houston High School Rankings; Calculation by author; Data for Sam Houston High School was retrieved from the 2014-2015 AEIS report produced by the Texas Education Agency (TEA).

HOUSING VALUE

The median housing value for all owner occupied housing units in the City of Houston is reported at $125,400[12]. Of these units, the largest number, almost 30% range in value from $50,000 - $99,999. This is followed by 24% of units ranging from $150,000 - $299,999. Homes ranging from $100,000 to $149,000 make up the third largest category of 21% of owner occupied housing units.
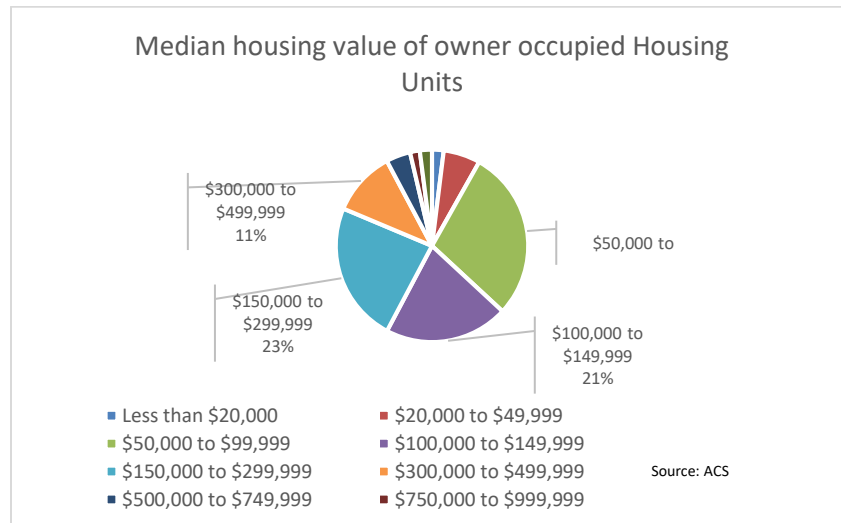
The median housing value for owner occupied housing units in Houston ranges from $58,763 in Settegast to $570,347 in Greenway/ Upper Kirby Super Neighborhood.
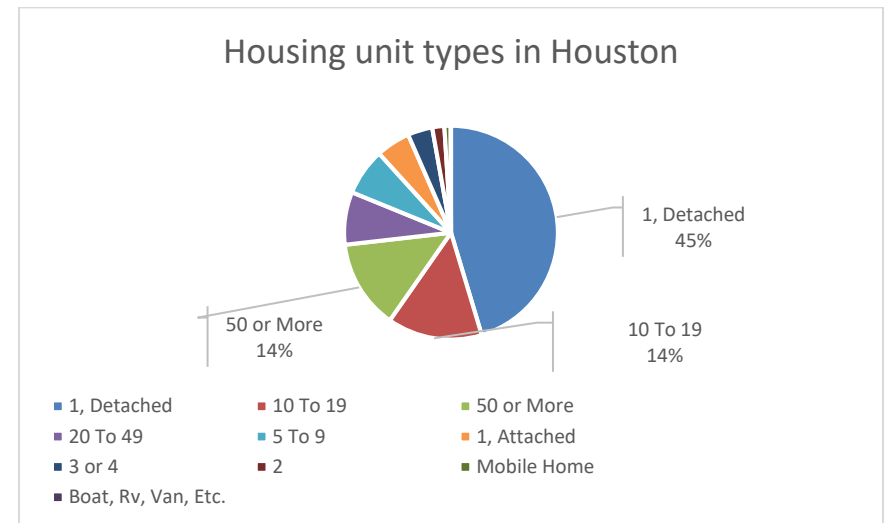
Single family detached homes make up the largest portion of the housing stock in Houston with 45%. This is followed by mid-size apartments with 10 to 19 units at 14%. Large apartments with 50 or more units make up 13% of the housing units[12].

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[12] ACS 5YR (2014)

Housing Value
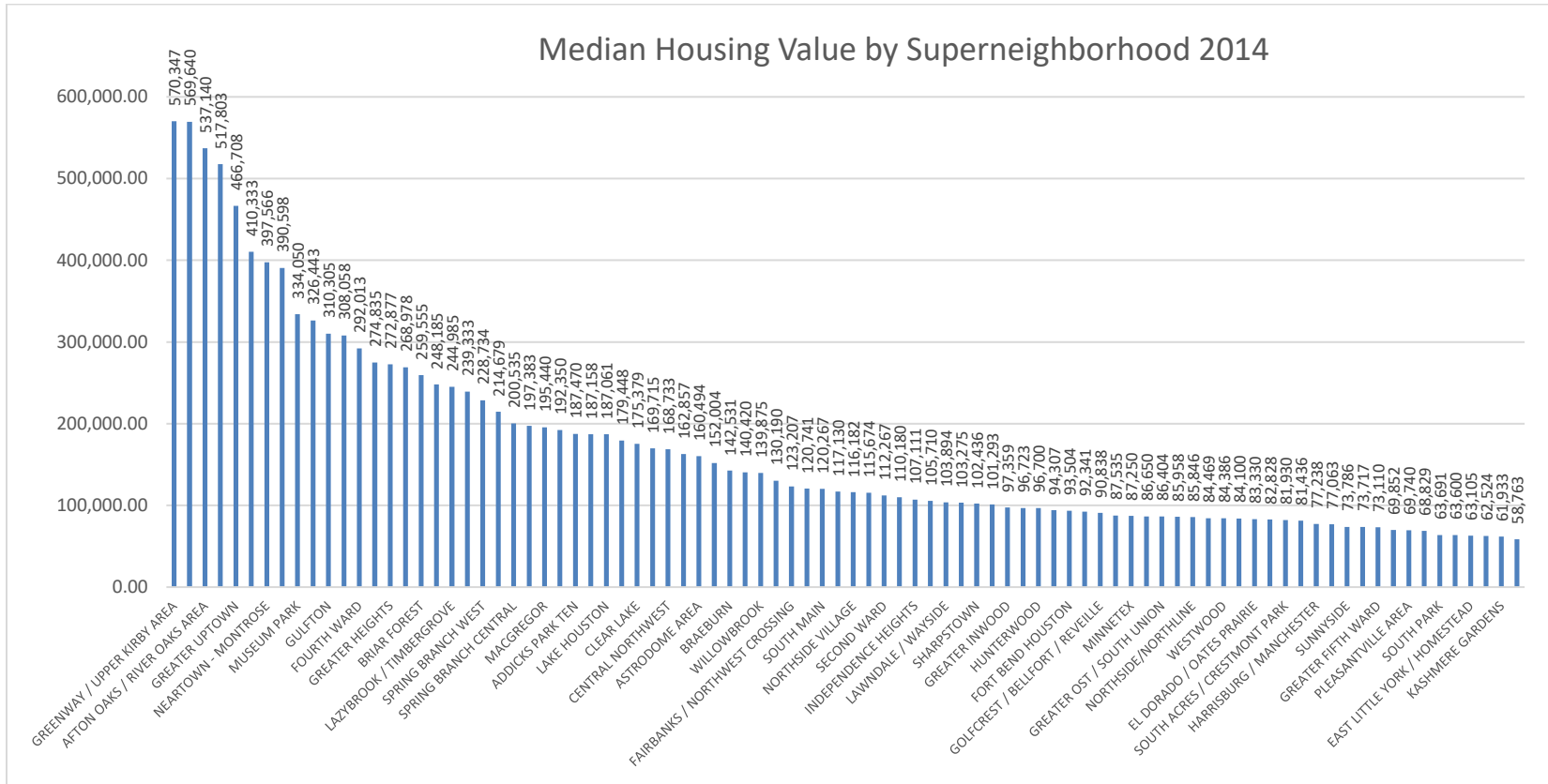

Median Housing Value by Superneighborhood 2014

Chart 2: Median housing value by Super Neighborhood; Source: ACS 5Yr-2014
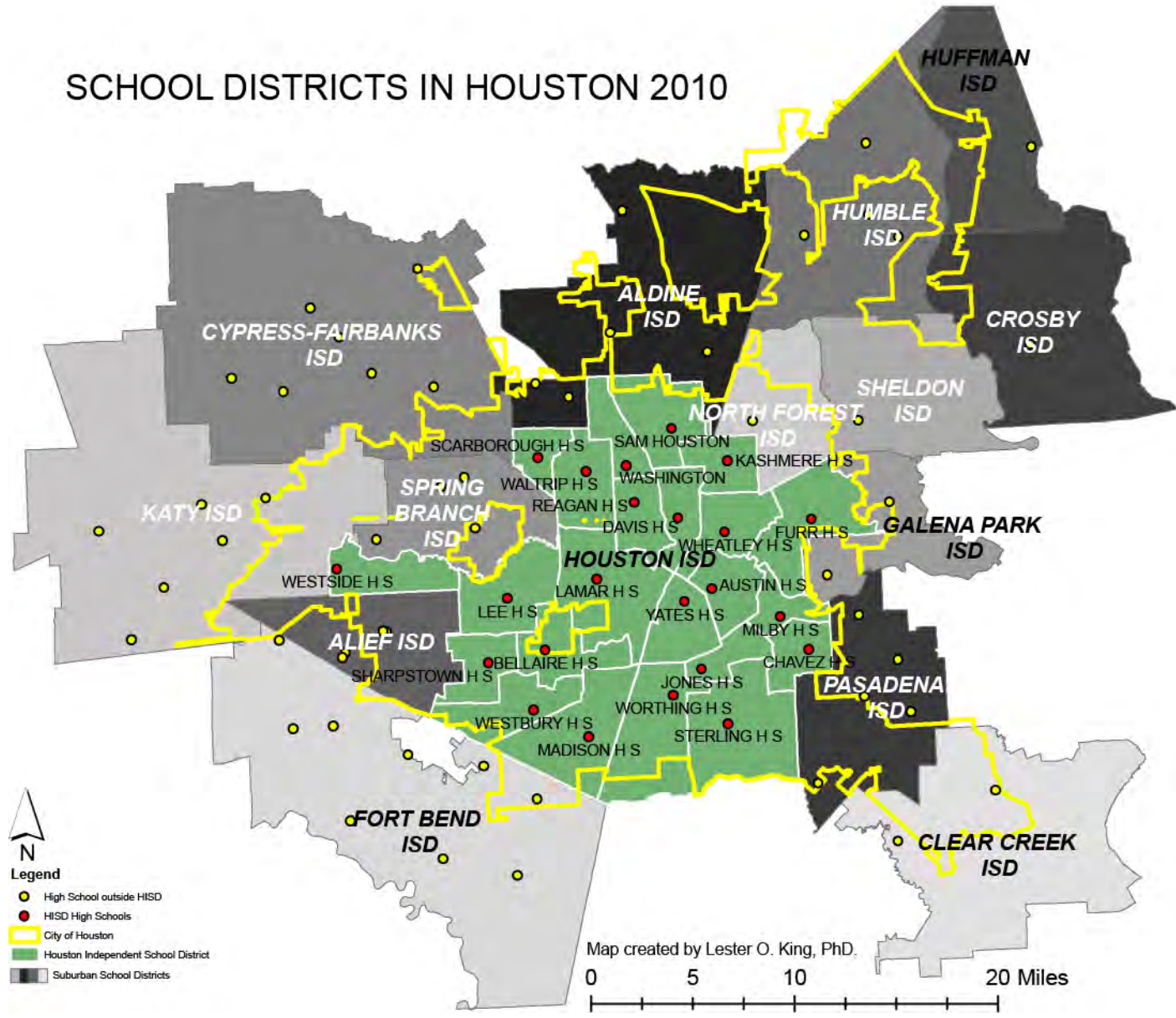
Geography and Performance

Although, HISD is the largest school district in Texas and the seventh (7th) largest in the nation, its boundaries do not cover all of the City of Houston (See Figure 3). Houston is approximately 667 square miles and significantly contains portions of approximately 15 school districts including HISD - Cypress-Fairbanks ISD, Katy ISD, Spring Branch ISD, Alief ISD, Fort Bend ISD, Aldine ISD, Humble ISD, Huffman ISD, Crosby ISD, Sheldon ISD, North Forest ISD[13], Galena Park ISD, Pasadena ISD, and Clear Creek ISD. The greater Houston transportation region has approximately 60 school districts in an 8 county area. In 2014 the non-profit group Children At Risk ranked school districts across the Greater Houston metropolitan region[14]. This group found that in terms of performance on state exams, student improvements and low-income student performance, that HISD ranks 11 when compared to large school districts. Clear Creek ISD in Galveston county ranks number 1 in that study.

DISTRICT	2014 LARGE DISTRICTS PERFORMANCE RANK	LETTER GRADE
Clear Creek	1	B
Conroe	2	B
Katy	3	B
Fort Bend	4	B
Alief	5	B
Cypress-Fairbanks	6	B
Humble	7	C
Klein	8	C
Spring Branch	9	C
Pasadena	10	C
Houston	11	C
Aldine	12	C
Spring	13	D
Source: 2014 Children At Risk District Rankings		

[13] The Texas Education Commissioner ordered Houston ISD to annex North Forest ISD effective July 1, 2013. Approximately 7,000 NFISD students became HISD students on the annexation date.

[14] Children at Risk – School Rankings (2014)

SCHOOL DISTRICTS IN HOUSTON 2010

HUFFMAN ISD

HUMBLE ISD

CROSBY ISD

ALDINE ISD

CYPRESS-FAIRBANKS ISD

SHELDON ISD

NORTH FOREST ISD

SCARBOROUGH H S
SAM HOUSTON
KASHMERE H S
WASHINGTON

SPRING BRANCH ISD
WALTRIP H S
REAGAN H S
DAVIS H S
FURR H S

KATY ISD
GALENA PARK ISD

WHEATLEY H S

HOUSTON ISD

WESTSIDE H S
LAMAR H S
AUSTIN H S

LEE H S
YATES H S

ALIEF ISD
MILBY H S

SHARPSTOWN H S
BELLAIRE H S
CHAVEZ H S

PASADENA ISD

JONES H S

WESTBURY H S
WORTHING H S

MADISON H S
STERLING H S

FORT BEND ISD

CLEAR CREEK ISD

N

Legend
○ High School outside HISD
● HISD High Schools
▢ City of Houston
▨ Houston Independent School District
▨ Suburban School Districts

Map created by Lester O. King, PhD.

0   5   10   20 Miles

Sustainability Indicators

The measures used in this study were taken from the 2016 update of the Houston Sustainability Indicators (HSI). This update utilizes 2014 data, primarily because of the update schedule of the American Community Survey's 5-Year Block-Group data update. All data was aggregated to the geographic level of Super Neighborhoods in Houston.

HSI consists of a procedure and methodology for a robust program to monitor sustainable development in the Houston, Texas area. HSI data is reported publicly through a web-based platform called the **Houston Sustainability Indicators Quality of Life Atlas**. This visualization portal is capable of monitoring key urban performance indicators for Houston, and analyzing trends and correlations between indicators. This tool is also capable of supporting the development of short term and long range policy implications. The HSI database serves as a resource for various local government departments, elected officials, and local neighborhood organizations for urban sustainability projects.

Following a model of integrative science for building a comprehensive indicators dataset, the HSI data integrates a robust collection of different datasets including: raster data from the National Land Cover Database (NLCD) developed by the U.S.

Geological Survey; Greenhouse Gas emissions inventory from the Vulcan Project based at Arizona State University; Continuous cover of National Ambient Air Quality Standards (NAAQS) from the Environmental Protection Agency; Business agglomeration analysis and monitoring growth in primary businesses from InfoUSA; Local and State administrative data on voting performance, waste management, parks development, and capital improvement projects; Decennial Census and American Community Survey socio-economic data is also included.

The HSI Project is now in its fifth 5th year and has published 5 previous annual reports. HSI has contributed to conference proceedings throughout the US and internationally in Ireland, Barbados, Brazil, Canada and Portugal. The research provides hands on learning opportunities for students in various academic units at Rice University, including the Department of Statistics, the Professional Science Masters Program, and the Jones School of Business.

| Sustainability Pillar	SNBR Theme	SNBR SubTheme	SNBR Indicator	SNBR Metrics
Social Development (13 Metrics)	Social Demography	Demographics	Race/ Ethnicity	Race and ethinicity (%White)
				Race and ethinicity (%Black)
				Race and ethinicity (%Other)
		Education	Education Attainment	Population with High School Degree or less
			High School Performance	Zoned High School Graduation Rate
			High School Demographics	High School Race and ethinicity (%White)
				High School Race and ethinicity (%Other)
				High School Race and ethinicity (%Black)
	Poverty/ Wealth	Wealth	Income	Median Household Income
		Poverty Level	Population living below poverty	Percent below poverty
	Livability	Cost of Living	Affordability	Housing + transportation costs as percentage of income
		Quality of Life	Accessibility of Public Parks	%Pop within 1/4 mile to parks
		Health & Nutrition	Population in Food Deserts	Percent of population in food desert
Economic Development (4 Metrics)	Economic Development	Employment	Employment Status	Unemployment rate
		Economic Performance	Primary Jobs	Primary jobs as a percentage of total jobs
	Transportation	Access	Access to Transit	% Population ¼ mile to transit stops
		Mode	Travel Choice	% Population using Transit to work
Environmental Development (4 Metrics)	Land	Flooding	Floodplain Expansion	% Population within 100 Yr Floodplain
		Sprawl	City Size	Distance to CBD
		Density	Population Density	Population Density
		Land Use	Land Use Mix	Land Use Mix index (HHI)
Table showing the Sustainability Indicators and Metrics from the HSI dataset used in this study				

Study Results

What is the relative importance of school performance in predicting housing value in Houston?

- We computed an analysis and found that school performance, measured by the Graduation Rate, significantly impacts the Housing Value in each Super Neighborhood in Houston .

- The data suggest that for every one percentage point increase in the Graduation Rate, the Housing Value is predicted to increase by $7,945[15].

- However, the Graduation Rate only explains 17%[16] of the variance in Housing Value across all of the Super Neighborhoods in Houston.

- Many factors affect Housing Values, such as features of the house, neighborhood and community amenities, and the socio-economics of the communities. In the next section we will add the comprehensive indicators from the **Houston Sustainability Indicators** project to

determine how much of the Housing Value variance in Houston can be explained by the many measures in this dataset.

Graduation Rate plotted against Median Housing Value for Super Neighborhoods in Houston

$y = 2E\text{-}05x + 69.606$
$R^2 = 0.17$

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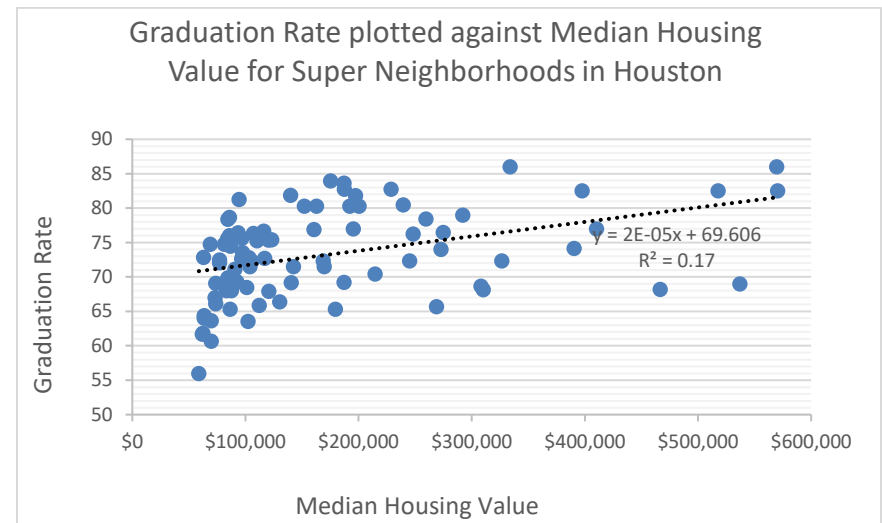
[15] Unstandardized coefficient

[16] R^2

How can comprehensive sustainability indicators be used to predict the variance in housing value?

- **Step 1: First** we computed an analysis[17] to reduce the large number of indicators to a more manageable set. This was also important because many of the variables were correlated and complementary. Our analysis was able to identify five (5) new indexes that together can explain 73% of the variance in Housing Values. The Indexes were primarily composed of the variables below.

Index 1: Wealth	Index 2: Ex-Urban Communities	Index 3: African American	Index 4: Bedroom Communities	Index 5: Industrial Communities
Median Income (.93) White Pop (.92) Below Poverty (-.87) High School Degree or Less(-.80) White Students in Public High School (.70) Other Race (.68) Unemployed (-.66) Graduation Rate (.51)	Distance to CBD (.91) Population ¼ Mile to Park (-.79) Population ¼ Mile to Transit stop (-.65) High School Race (Other) (.63)	High School Race (Black) (.90) Black Pop (.86) Transit Use (.63)	Pop Density (.76) Food Desert (-.75) Land Cover Mix (-39) Population in Flood Zone (.36)	Primary Jobs (.79) Housing + Transport Costs (-.645)

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[17] Principal components analysis with varimax orthogonal rotation. Used a cutoff of eigenvalues >1. KMO was 0.758

- **Step2: Second** we conducted another analysis to predict the Housing Value using the values that each Super Neighborhood scored on each of the five (5) indices above.
- We found that school performance, measured by four (4) of the five (5) indices, significantly impacts the Housing Value in each Super Neighborhood in Houston[18].
  - **Index 1: Wealthy Communities.** For every one percentage point increase in the cumulative score of all of the indicators in Index 1, the Housing Value is predicted to increase by $103,813[19].
  - **Index 2: Ex-Urban Communities.** For every one percentage point increase in the cumulative score of all of the indicators in Index 2, the Housing Value is predicted to decrease by -$22,277.
  - **Index 3: African-American Communities.** For every one percentage point increase in the cumulative score of all of the indicators in Index 3, the Housing Value is predicted to decrease by -$19,925.
  - **Index 4: Bedroom Communities.** For every one percentage point increase in the cumulative score of all of the indicators in Index 4, the Housing Value is predicted to increase by $23,552.

- The indices explain 80%[20] of the variance in Housing Value across all of the Super Neighborhoods in Houston.

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[18] We utilized an Multivariate Regression analysis.
[19] Unstandardized coefficient
[20] R^2

Wealthy Communities – Graduate Rate – Housing Values

- Super Neighborhoods which rank high on the Wealthy Community Index are mainly composed of high Median Income; high percentage of White persons; low percentage of persons in poverty; low percentage of persons with only a high school degree; high percentage of white high school kids, high percentage of Asian students; low percentage of unemployed persons and high graduation rate.

Index 1: Wealthy Communities
Median Income (.93)
White Pop (.92)
Below Poverty (-.87)
High School Degree or Less(-.80)
White Students in Public High School (.70)
Other Race (.68)
Unemployed (-.66)
Graduation Rate (.51)

Wealthy Communities – Graduate Rate – Housing Values

- The table shows the top ten most Wealthy Super Neighborhoods and the bottom ten most Distressed Super Neighborhoods in Houston.

- The importance of this study is that policy makers in the City of Houston can use this procedure to objectively prioritize communities in terms of targets for public services for improvements.

- The procedure utilized can be considered non-political and systematically objective.

- Super Neighborhoods in this study are not ranked by just single indicators of performance such as Poverty or Income, but they were ranked simultaneously by a large group of indicators. This study can then be considered more robust since it reflects the complexity of the urban environment and the communities we live in.

Rank	Community
1	UNIVERSITY PLACE
2	AFTON OAKS / RIVER OAKS AREA
3	GREENWAY / UPPER KIRBY AREA
4	BRAESWOOD PLACE
5	MUSEUM PARK
6	MEMORIAL
7	MEDICAL CENTER AREA
8	NEARTOWN - MONTROSE
9	GREATER UPTOWN
10	WASHINGTON AVENUE COALITION / MEMORIAL
79	GREATER FIFTH WARD
80	MAGNOLIA PARK
81	PECAN PARK
82	CLINTON PARK TRI-COMMUNITY
83	NORTHSIDE/NORTHLINE
84	GULFGATE RIVERVIEW / PINE VALLEY
85	HARRISBURG / MANCHESTER
86	GREATER GREENSPOINT
87	KASHMERE GARDENS
88	WESTWOOD

CONCLUSION

This report supports the current Mayor of Houston's plan to develop **Complete Communities** in Houston.

1. Super Neighborhoods in Houston range in population from approximately 2,000 to 107,000 persons, the median population count is approximately 19,000 persons. This suggests that our Super Neighborhoods may be the most ideal existing geographic boundaries for communities in Houston, since 19,000 persons is the ideal manageable size of a community from a governance perspective.

2. Superneighborhood boundaries should be updated along with the decennial census count. The process needs to include citizen stakeholders to ensure that interested persons can participate in defining their own communities.

3. School Performance within the Houston Independent School District's (HISD) high school feeder patterns matter to housing value and neighborhood attractiveness in Houston . This research does not evaluate the impact of high school feeder paterns within suburban school districts outside of HISD. For those surrounding school districts (within the city of Houston boundary) we report the average performance level of all high schools.

4. There is no discernable reason why high school feeder patterns should not follow community/ Super Neighborhood boundaries. Aligning Feeder patterns with Super Neighborhood boundaries makes it much easier for Houston's communities to properly identify with their community schools and participate in their development.

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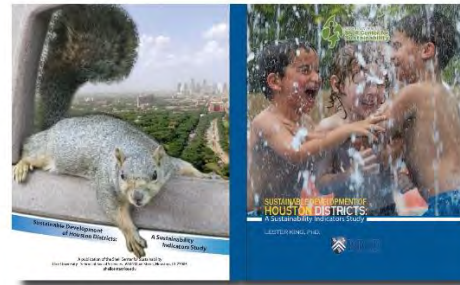
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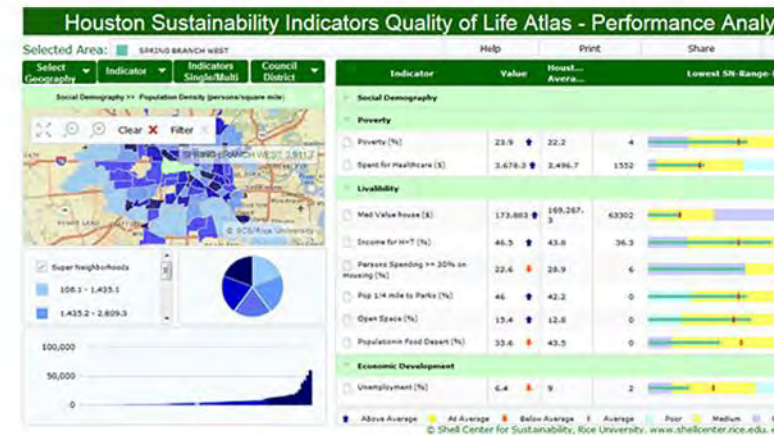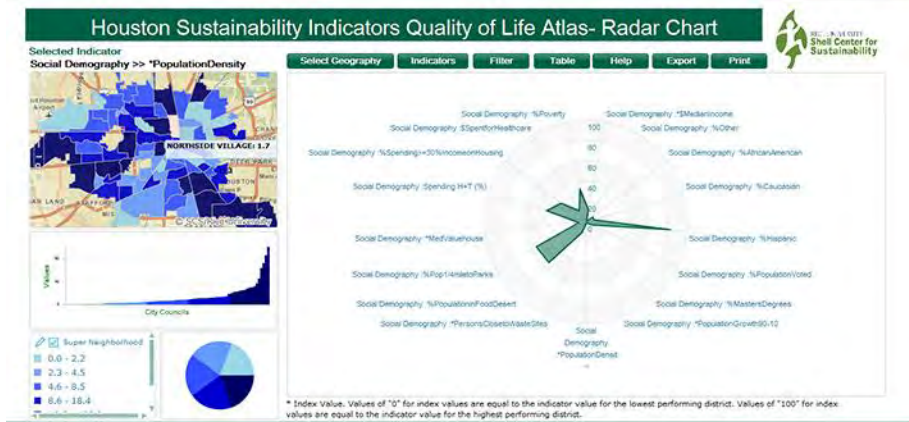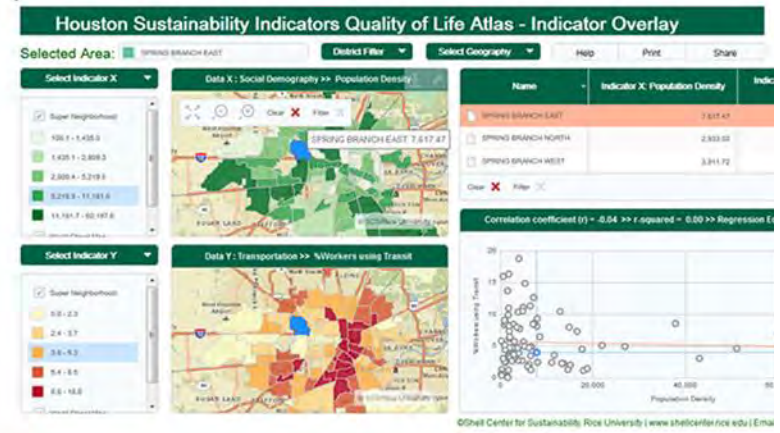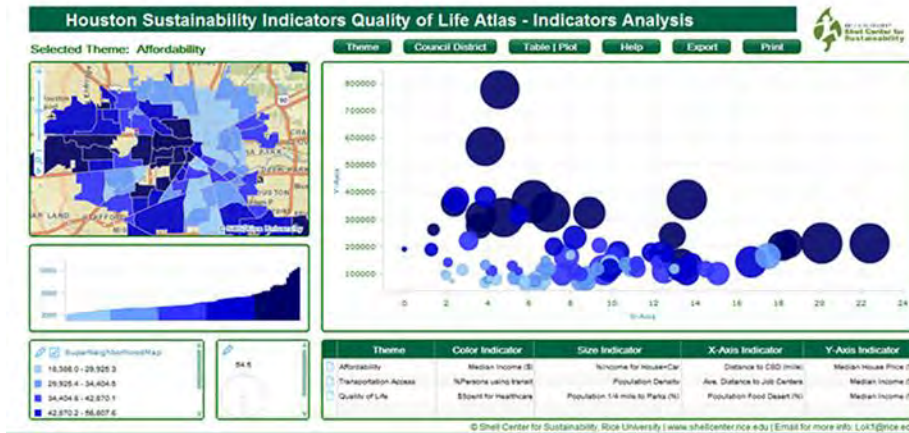
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