To what extent does the quality of a park and its sphere of influence differ in neighbourhoods with varying median incomes?

Word Count: 3974

Subject: IB Geography

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ABSTRACT

This essay targets the effects the median income of a neighbourhood has on the amenities offered to residents. Specifically, this investigation explores the research question: *"To what extent does the quality of a park and its sphere of influence differ in neighbourhoods with varying median incomes?"*

This was achieved through the exploration of two hypotheses:

H_1: Park quality will increase with the increase of median income

H_2: A Park's Sphere of Influence will increase with the increase of median income

In order to investigate these hypotheses, nine parks were chosen, and a Park Quality Assessment and a Park Quality Questionnaire were created and carried out at each park as a means of collecting primary data. The sustainability of each park was assessed using the Egan Wheel as a supplementary theory. This was carried out in the Park Quality Assessment, as the categories *'Amount of Open Green Space', 'Well Maintained', and 'Cleanliness'* were derived using the Egan Wheel. The sphere of influence of each park was calculated using results from the Park Quality Questionnaire. The median income of the zip code in which each park was located was compared to the data collected from the park site visits, allowing a determination to be made in regards to the initial research question. Spearman's Rank Statistical Tests were carried out to explore the correlation specifically between median income and park quality.

Based on the evidence collected throughout this investigation, both hypotheses are accepted, however it must be noted that they are not applicable to every park investigated as anomalies did arise.

Word Count: 258

INTRODUCTION

Research into the correlation between income disparities and availability of green space has shown that there is a positive correlation between a neighbourhood's median income and the amount of green space that can be found within that area. Tim DeChant's research into this led to the conclusion that the amount of forest cover in an area can be an indictor of wealth:

"[F]or every 1 percent increase in per capita income, demand for forest cover increased by 1.76 percent. But when income dropped by the same amount, demand decreased by 1.26 percent. That's a pretty tight correlation. The researchers reason that wealthier cities can afford more trees, both on private and public property. The well-to-do can afford larger lots, which in turn can support more trees."(Riley, 2012)

This investigation is focusing on the effect that a neighbourhood's economic development (measured by income per capita) has on the availability of parks and green space in the Houston area, through an investigation into the question:

"To what extent does the quality of a park and its sphere of influence differ in neighbourhoods with varying median incomes?"

Sustainability is a factor that will be investigated throughout this study. The sustainability of a community can be influenced by multiple different factors, green space being one of them.

"The ability to make development choices which respect the relationship between the three "E's" – economy, ecology, and equity:

- Economy: Economic activity should serve the common good, be self-renewing, and build local assets and self-reliance.

- Ecology: Humans are part of nature, nature has limits, and communities are responsible for protecting and building natural assets.

- Equity: The opportunity for full participation in all activities, benefits, and decision making of a society." ("What is a Sustainable City?," n.d.)

I contend that there is a direct correlation between the abundance of green space in a neighbourhood and the median income of that neighbourhood. It is also my contention that the sustainability of a community is reliant to some extent on the green space available.

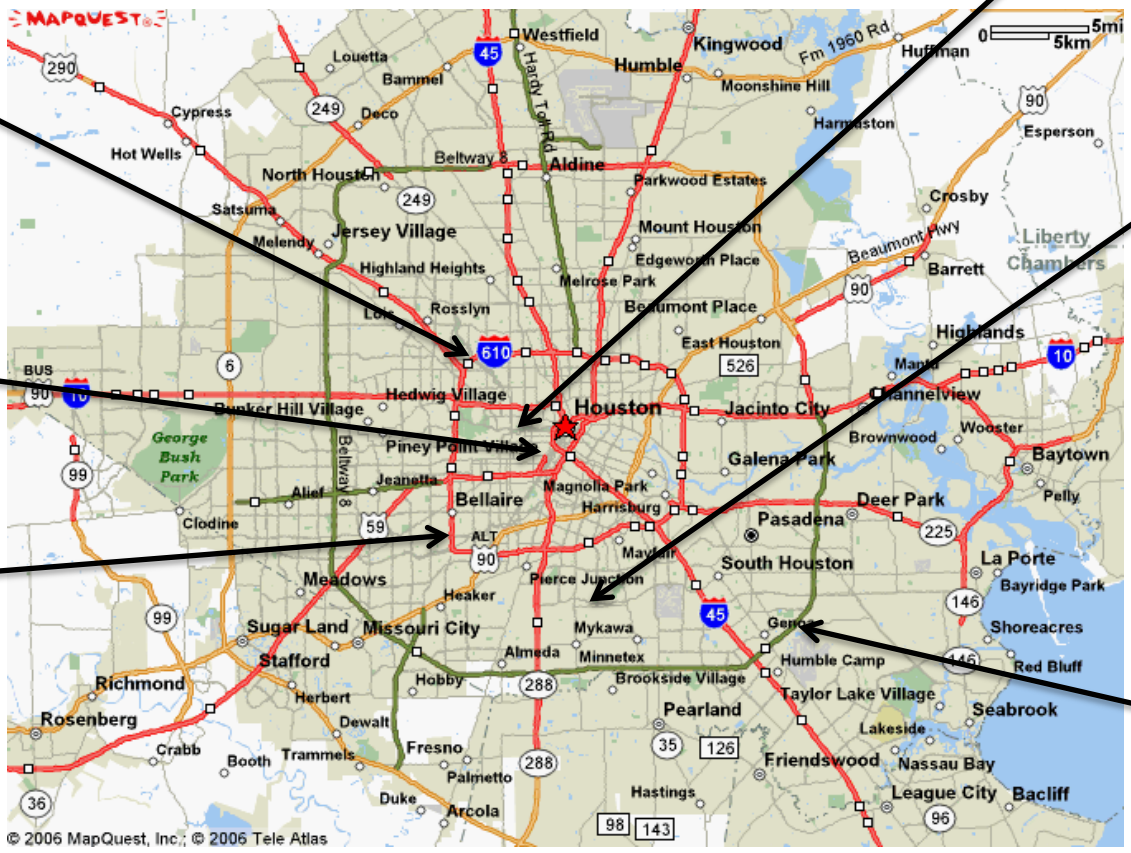
H_1: As the median income of a neighbourhood increases, so does the abundance of green space.

H_2: Park quality will increase with the increase of median income and overall neighbourhood 'quality'

1 - GEOGRAPHICAL CONTEXT

Houston, located in Southeast Texas approximately 50 miles away from the Gulf of Mexico, is the most populous city in Texas itself, and the fourth most populous in the United States, with a 2014 census estimated population of 2.239 million people. Its growing population is resulting in extensive urban sprawl – Houston covers a land area of 627.8 square miles. The increase in population density consequently results in the need for sustainable cities (cities designed to have a minimal environmental impact, using land efficiently, having the smallest possible ecological footprint, and producing the least possible amount of pollution and waste).

Figure 1.1 Map showing Houston in its entirety. ("Google Images," n.d.)



Memorial Park (city park) is located in the North West.

River Oaks is located in the center of town.

Herman Park (city park) is located centrally.

Sunnyside is located in the South East of Houston.

Highway 610 encircles the inner segment of Houston.

The "Outer Loop" is formed by Sam Houston freeway.

The area inside this is called the "Inner Loop"

This ring road forms a larger loop around the city.

This particular investigation is relevant to Houston due to the extreme disparities that can be found within the city. Pockets of extreme wealth are scattered around the city, for example the neighbourhood 'River Oaks' (zip code 77019) is one of the wealthiest in the city, however is located only 24 minutes away from a neighbourhood called 'Sunnyside', which was ranked by the NeighbourhoodScout.com as the sixth most dangerous neighbourhood in America (Stanton, 2014).

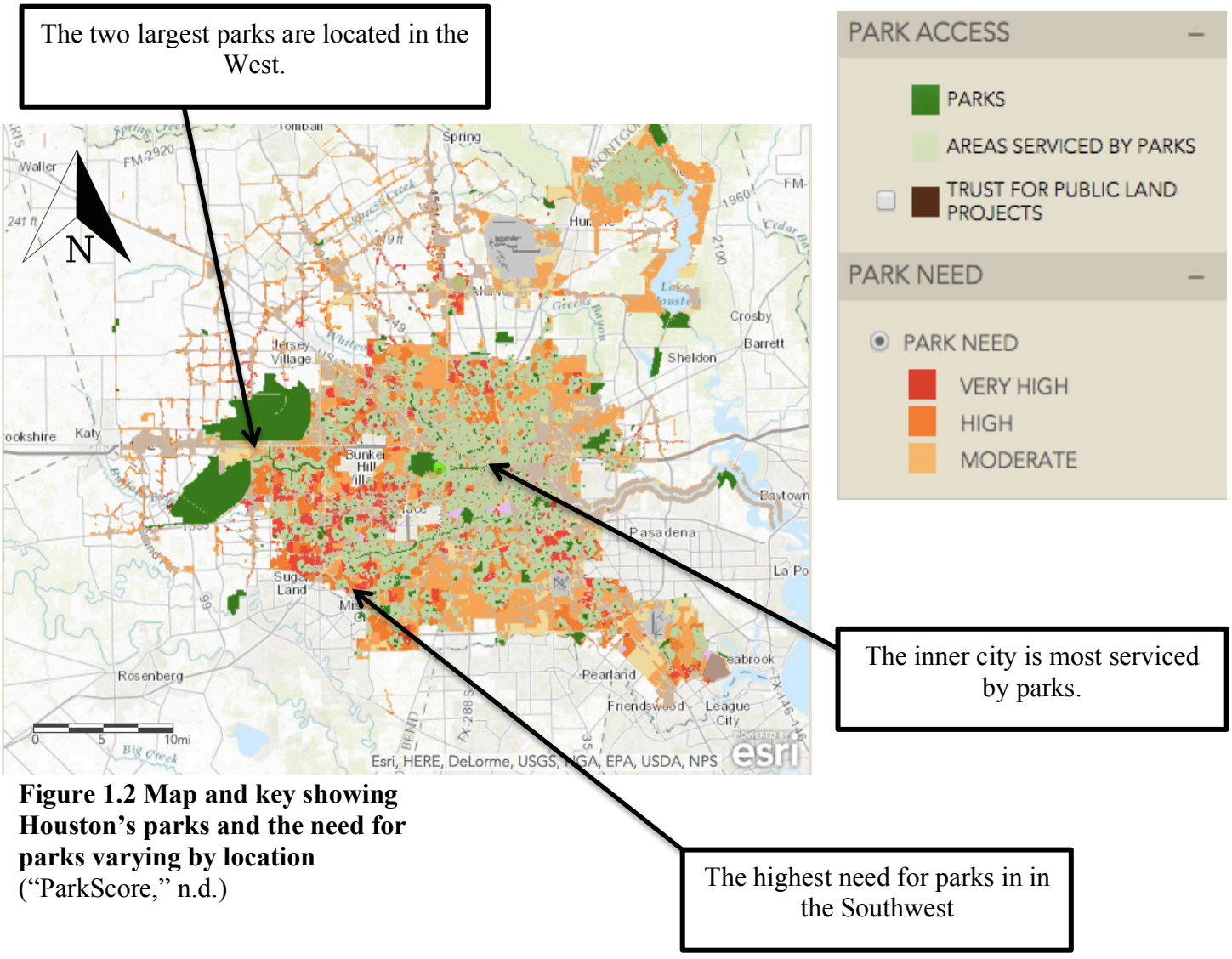
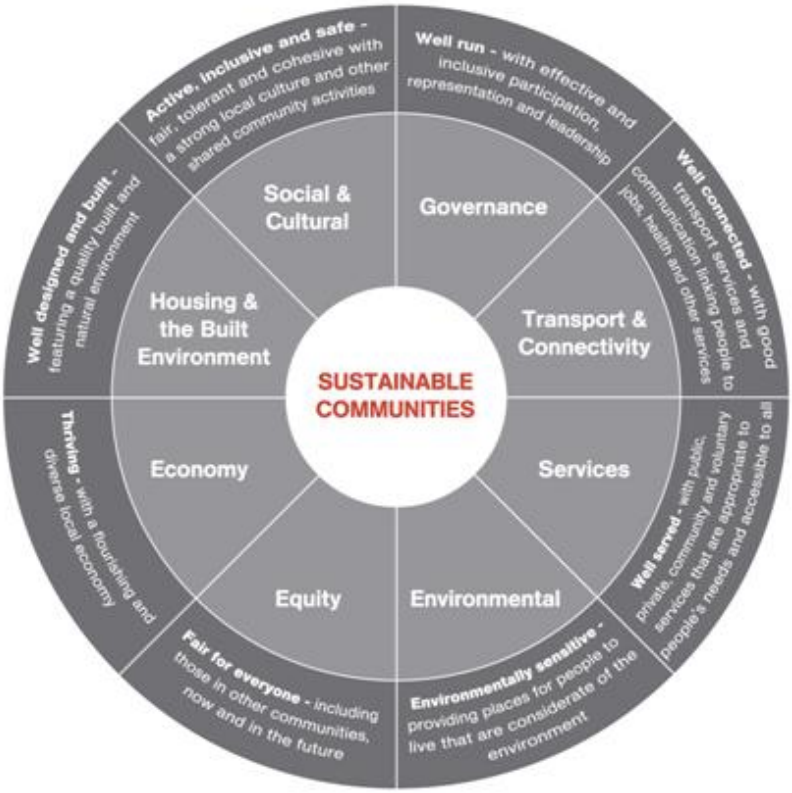


Figure 1.2 Map and key showing Houston's parks and the need for parks varying by location
("ParkScore," n.d.)

One way in which the sustainability of a city can be measured is through the Egan Wheel, a model that will establish the basis of this investigation. The Egan Wheel divides the term 'Sustainable Community' into specific qualities that are deemed influential factors. These factors are Governance, Transport and Connectivity, Services, Environmental, Equity, Economy, Housing and the Built Environment, and Social and Cultural.



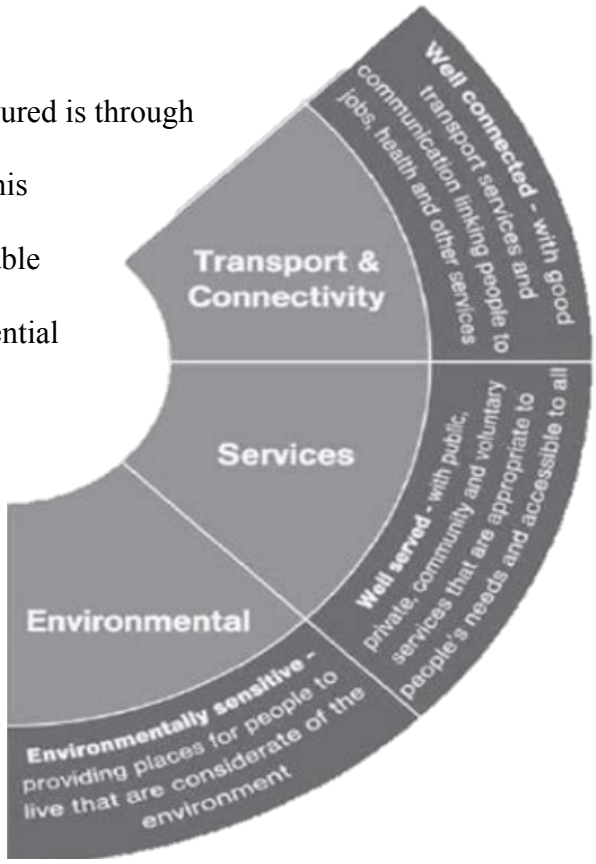


Figure 1.3 The Egan Wheel, specifically highlighting the sections integral to this investigation. (Arayici, 2014)

Components of a Sustainable City	Explanation
Transport & Connectivity	The available transport facilities allow connections between different communities. These facilities can include public transport, or designated paths etc that encourage walking and cycling.
Services	Services of a high standard are available to all community members. These services include, but are not limited to, fresh food, green spaces, and school opportunities.
Environmental	Community is encouraged to recycle waste, and live in sustainable homes in order to reduce carbon footprint. Neighbourhoods are designed to be cleaner, safer, and greener – by introducing public green spaces, reducing litter, and minimizing vandalism.

Figure 1.4 Table showing the Components of a Sustainable City (taken from Egan Wheel)

This study will have an emphasis on *Environmental, Transport and Connectivity, and Services*, as these are the most applicable to the research question posed. Each park and the community surrounding it will be evaluated, and compared to each other. The relevant sections of the Egan Wheel will be used as an aid in these evaluations of park quality that will in turn be compared to neighbourhood median income.

2 - INVESTIGATION

The aims of this investigation are to highlight the connections between varying income per capita in different geographical locations throughout Houston and the abundance of 'dedicated green spaces' in these varying areas. In order to carry out this investigation into Houston's parks, the wide spectrum of parks had to be narrowed down to a measurable number.

Houston is split into 4 precincts (Hernandez, 2011). The parks chosen for this investigation are from a variety of different precincts, to allow the investigation to spread over the entire city of Houston, rather than be limited to one area of Houston – which would conclude in biased results.

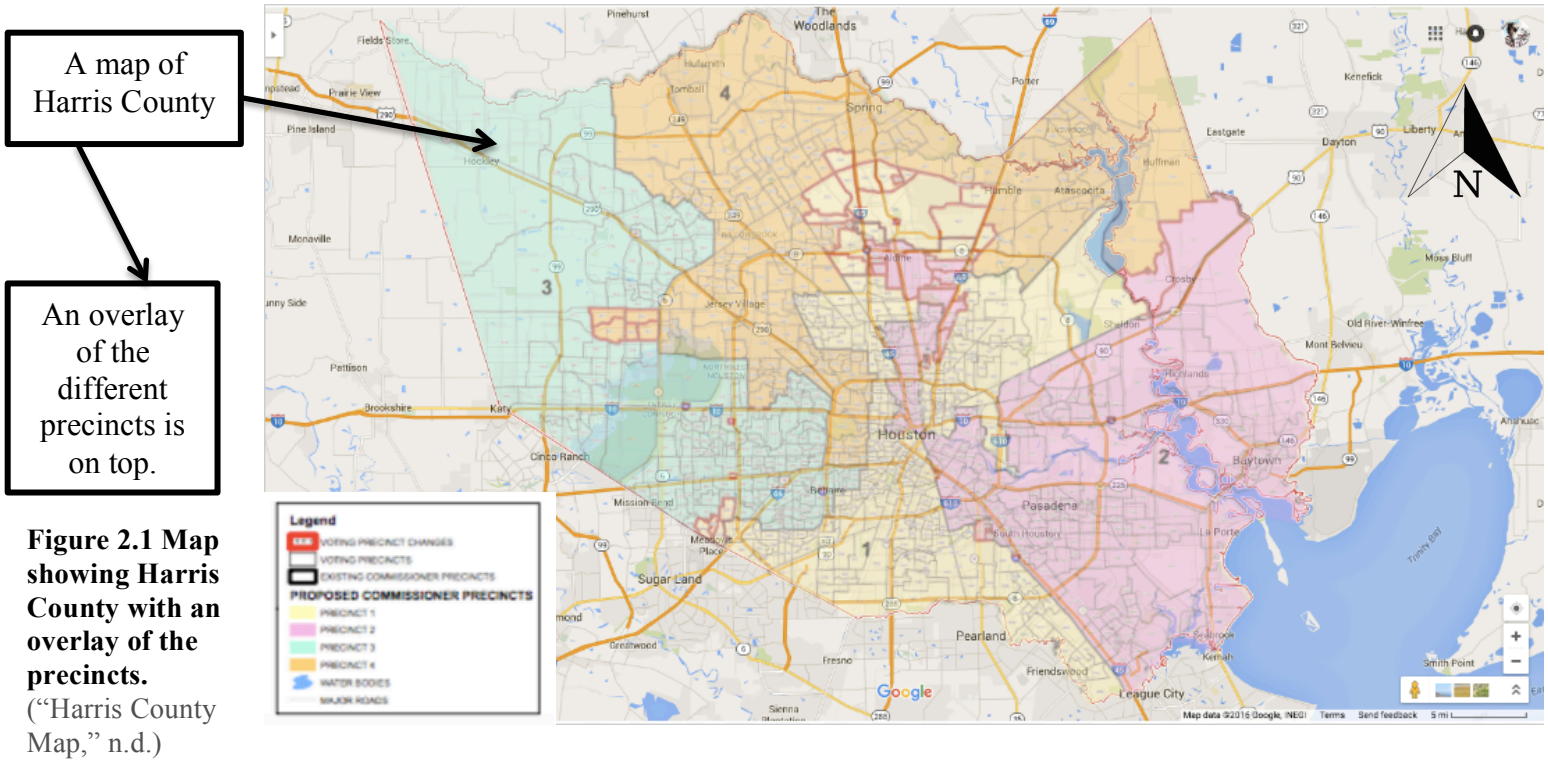


Figure 2.1 Map showing Harris County with an overlay of the precincts. ("Harris County Map," n.d.)

The nine parks were chosen with the four precincts in mind, as a way of ensuring the parks are spread over the entire city of Houston. This was done to guarantee that the sampling and evaluation of parks allows a general overview of Houston's green space to be seen.

The parks chosen for this investigation (and their corresponding zip codes) are:

Fire Truck Park (77005)

Jaycee Park (77008)

Nottingham Park (77079)

River Oaks Park (77027)

Liberty Park (77028)

Peiser Park (77012)

Tony Marron Park (77003)

Binglewood Park (77080)

Whitt Johnson Park (77005)

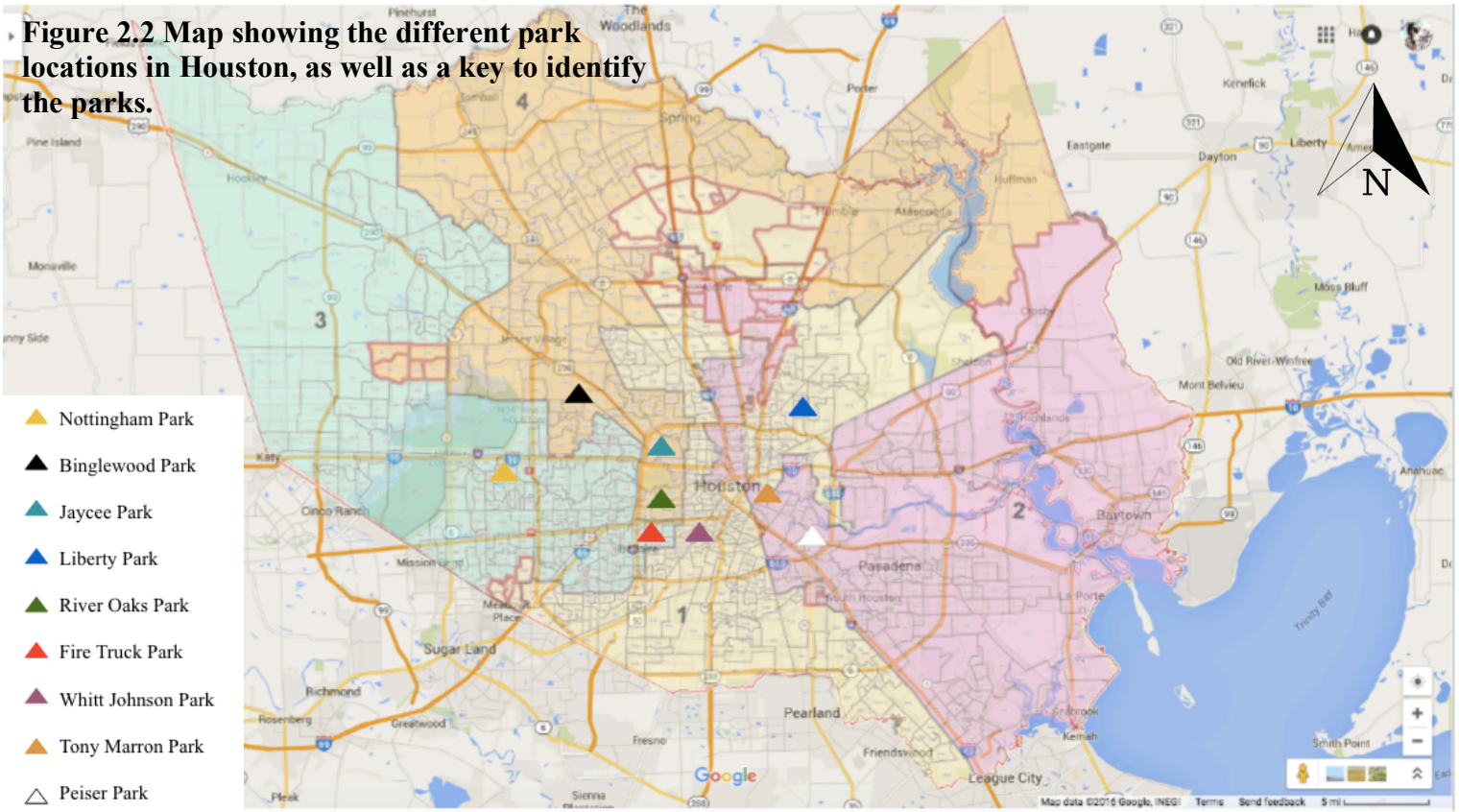


Figure 2.2 Map showing the different park locations in Houston, as well as a key to identify the parks.

Three primary methods of investigating and assessing park quality were used in this investigation – these are outlined below.

Method of Measuring Park Quality	**Description of Method**
Park Quality Assessment	Each Park Quality Assessment featured a ranking system that rated each park from 1 to 5 (1 being the lowest score and consequently the worst, 5 meaning the opposite). This ranking system was applied to six different categories that define the success of a park; '*Cleanliness, Amount of Open Green Space, Variety of Playground Equipment, Well Maintained, Busy, and Amount of Shaded Areas*". A Park Quality Assessment was completed at each of the nine parks, and the data collected was used to create graphs that allow a visual interpretation as well as a comparison between the nine parks across six different categories.
Park Quality Questionnaire	A questionnaire will be conducted at each park in order to determine the park's sphere of influence – a factor that will allow the park's effect on the surrounding area to be determined. In creating the questionnaire, it was important to ask questions that could be translated into statistical data. The question "How long do you travel to get to the park?" allows the sphere of influence of each individual park to be determined. It was also important to analyse the demographic using the park, as this can give insight into the lifestyles of those living in the neighbourhood. A clear point of view can be established of the community that lives surrounding the park through the question "What do you like about this park?" that allows the questionnaire subject to put their thoughts about the park into their own words.
Annotated Images	Photos will be taken at each park location, allowing the amenities mentioned in the Park

	Quality Assessment to be seen. A range of images will be taken at each park to ensure a clear and varied view of the overall park is portrayed, rather than a focus on an individual area in the park. Following this, each image will be annotated to clearly state the amenities observed. The images and their annotations enforce the second hypothesis investigated in this study *(Park quality will increase with the increase of median income and overall neighbourhood 'quality'.),* as the images can be used as evidence to enforce inferences made in regards to the focus subject of this essay and the two hypothesis investigated.

Figure 2.3 Table showing the Methods used to Measure and Assess Park Quality

The Egan Wheel

The six categories chosen to assess each park in the Park Quality Assessment were chosen with influence from the Egan Wheel. It is stated in the Egan Wheel under the category of *'Environmental'*, that "Neighbourhoods are designed to be cleaner, safer, and greener – by introducing public green spaces, reducing litter...". From this statement, the categories '*Amount of Open Green Space', 'Well Maintained'*, and '*Cleanliness*' were created. The linking of these categories to the Egan Wheel allows an assessment of the sustainability of the parks.

The median per capita income of each area surrounding the parks (determined by zip code) was used as an indicator of the neighbourhoods' economic development. This allows median income to be used as a factor that influences the quality of the park, as well as its sphere of influence. This corresponds to the two hypotheses that will be investigated in this study:

H_1: Park quality will increase with the increase of median income

H_2: A Park's Sphere of Influence will increase with the increase of median income

3 – RESULTS

Therefore the sphere of influence could not be mapped.

Only a Park Quality Assessment was carried out.

Binglewood Park provided no data.

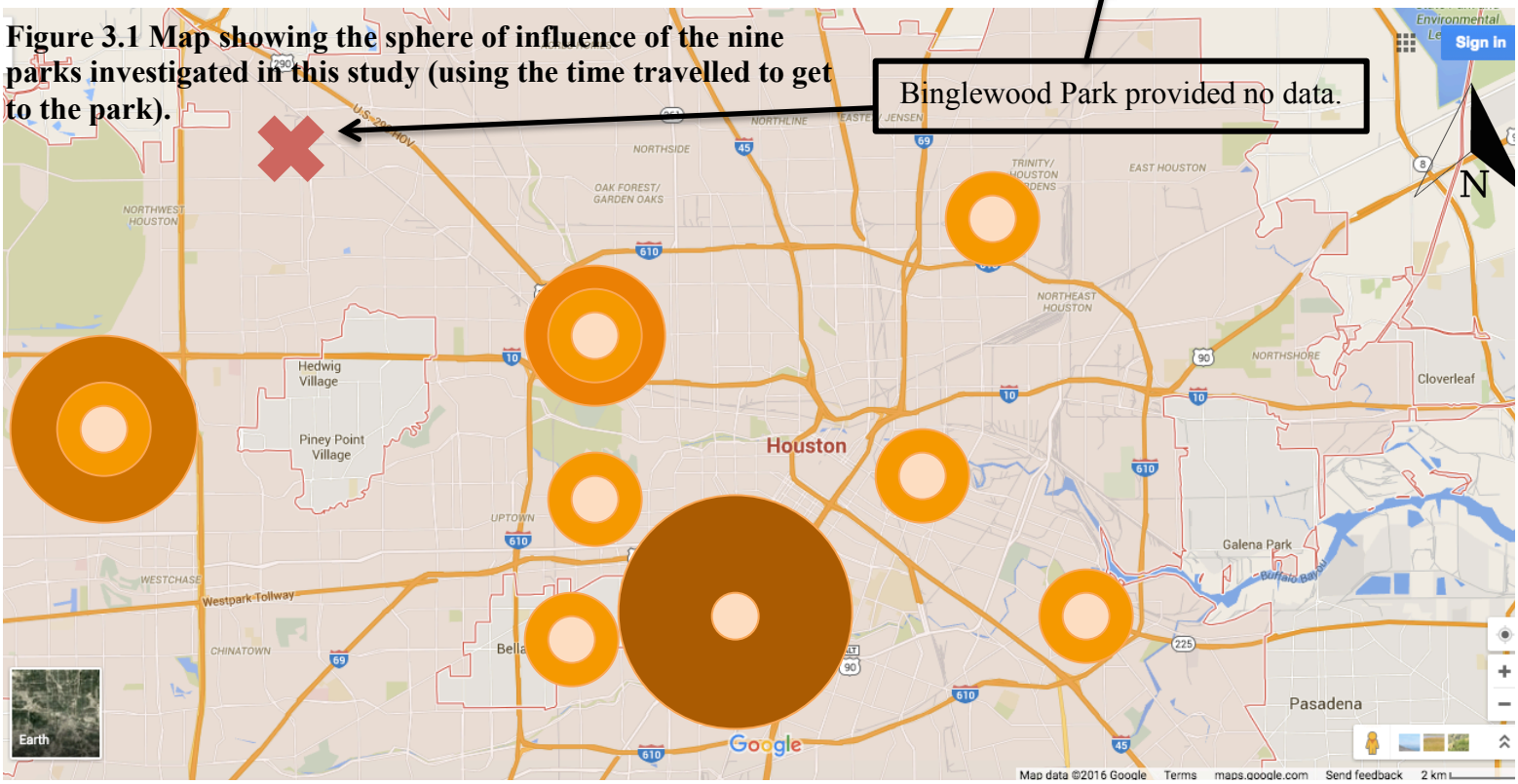
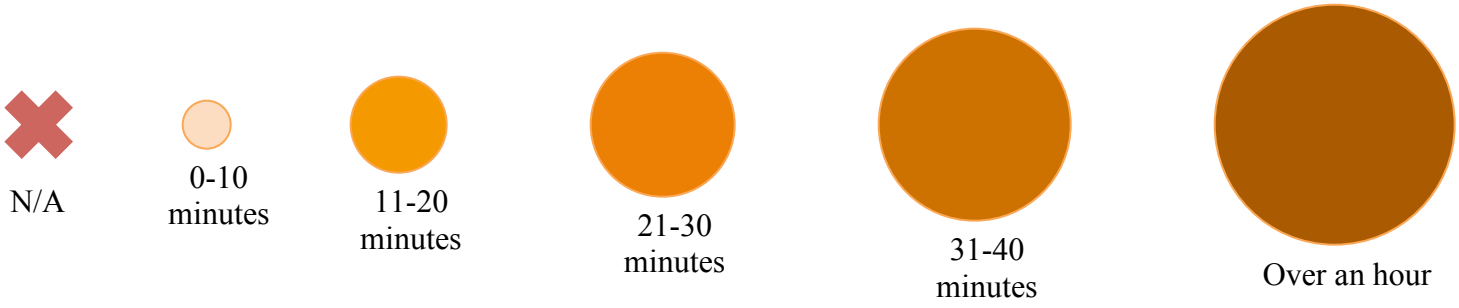


Figure 3.1 Map showing the sphere of influence of the nine parks investigated in this study (using the time travelled to get to the park).



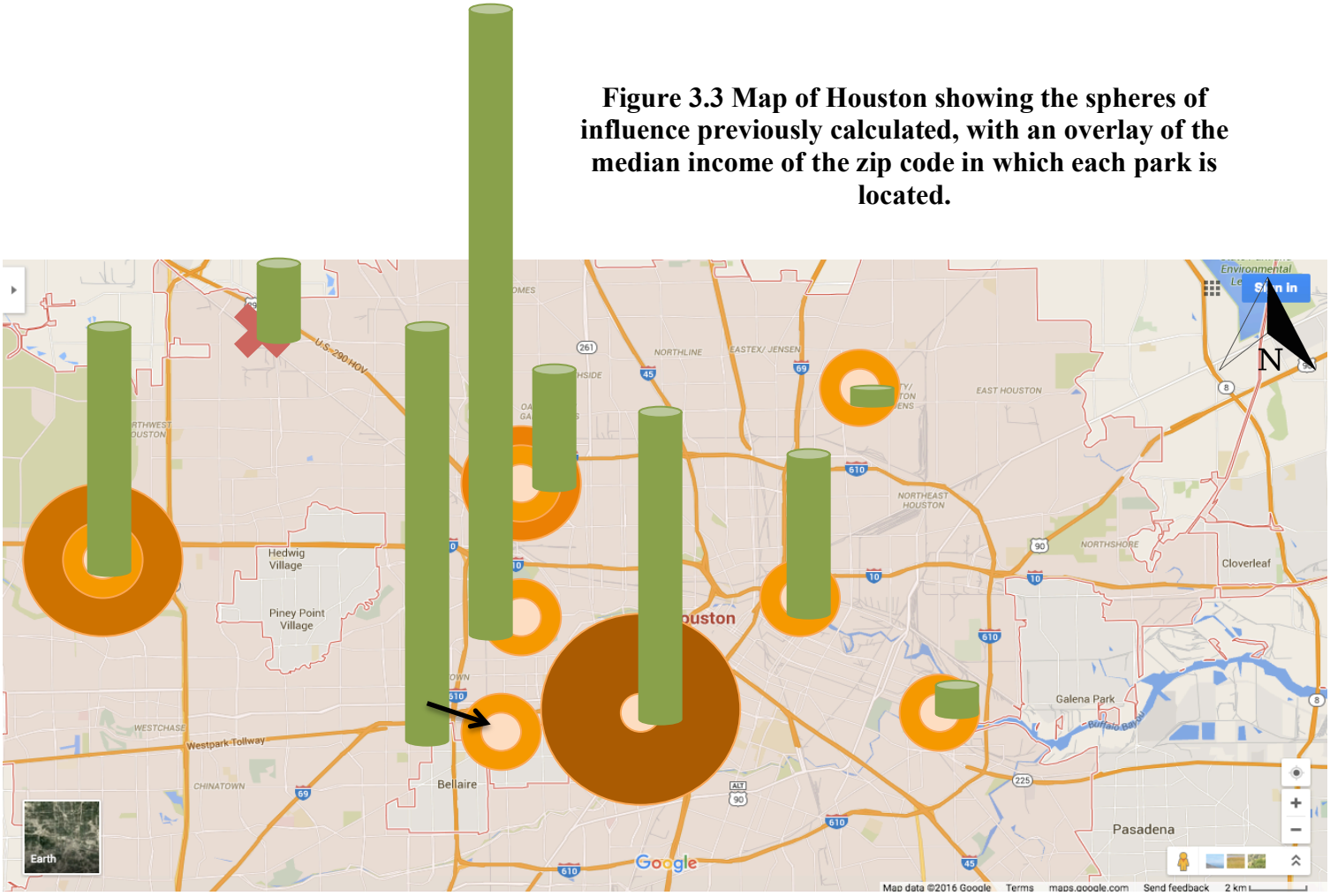
Data obtained from the question "On average, how long do you travel to get to the park?" was used to create a sphere of influence for each park. The sphere of influence shows how far people travel to reach the park, therefore allowing the inference to be made in regards to how impactful each park is to its community.

An anomaly can be seen in Figure 3.1 at Whitt Johnson Park, where the sphere of influence is extremely large in comparison to neighbouring parks (it was answered in one of the questionnaires that someone traveled over an hour to get to the park). It can be seen from Figure 3.1 that the majority of parks have a sphere of influence up to 11-20 minutes. The reason for this small sphere of influence could be that the parks themselves are neighbourhood parks, and don't have the broad scale of facilities that Houston's city parks such as Memorial Park or Hermann Park (see Figure 1.1) have. Whitt Johnson Park ranked highly in the Park Quality Assessment (see appendix; Figure 6.1), scoring 4's in categories such as the variety of playground equipment available and the amount of shaded areas, 5's in cleanliness and maintenance, and a 2 in the amount of open green space (this was due to the parks location inside a dense neighbourhood, causing it to be restricted to a certain size). These high ratings would accommodate a further sphere of influence, as the park is more 'worthy' of a longer journey. Furthermore, the zip code that Whitt Johnson Park is located in has the third highest median income of all 9 parks (see Figure 3.2), contributing to the parks good facilities and constant maintenance. This in turn would cause in increase in the sphere of influence, as the park would be seen to be in an affluent neighbourhood. This was in answer to H_2.

Park Name	Zip Code	Median Per Capita Income ($)
Nottingham Park	77079	72,170
Binglewood Park	77080	26,125
Jaycee Park	77008	36,087
River Oaks Park	77027	220,919
Fire Truck Park	77005	137,552
Whitt Johnson Park	77005	106,480
Tony Marron Park	77003	43,914
Peiser Park	77012	13,657
Liberty Park	77028	11,354[11]

Figure 3.2 Table showing the median income and zip code of each park

Figure 3.3 Map of Houston showing the spheres of influence previously calculated, with an overlay of the median income of the zip code in which each park is located.



The median per capita income ($) of the zip code in which each park is located and the sphere of influence of each park are compared in Figure 3.3 Generally, it can be noted that parks located in an area of increased median income have a larger sphere of influence. This positive correlation could be due to increased amenities in parks situated in a wealthier neighbourhood – due to more money being spent on facilities such

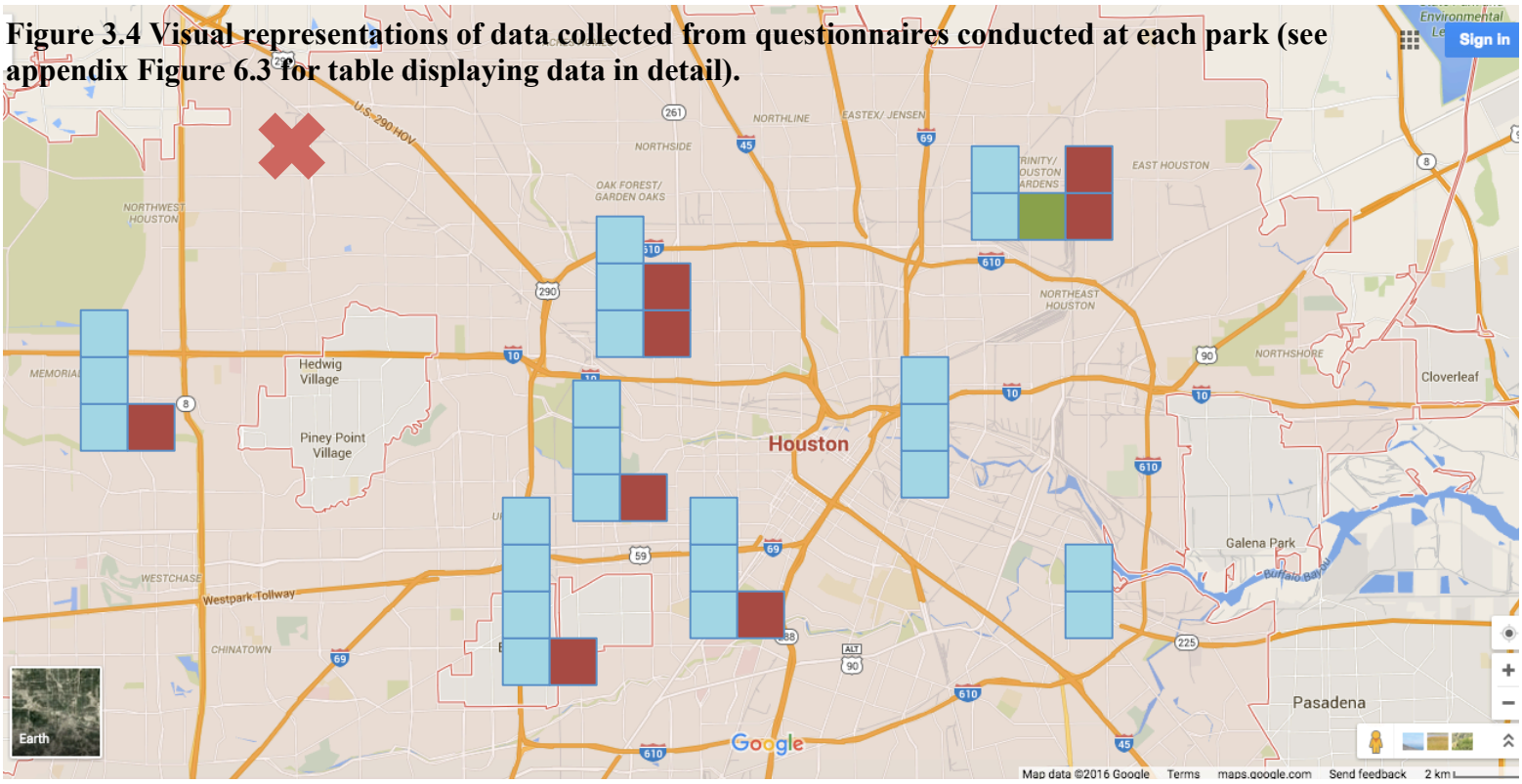
as parks and green space. Whitt Johnson Park can be seen as an example of this. Located in zip code 77005 with a median per capita income of $106,480, the park had one of the largest spheres of influence. The fact that people travelled further to get to the park is a reflection of the quality of the amenities and of the park itself, which can be seen in Figures 3.32, and 3.33. This corresponds to the research question of which this investigation is centered around, as it can be seen that generally as the median income of the neighbourhood the park is located in increases, as does the park's sphere of influence.

Neighbourhoods such as River Oaks (where River Oaks Park is located) are good examples of the 'Services' sector of the Egan Wheel. The 'Services' sector states that a neighbourhood that corresponds has "*Services of a high standard that are available to all community members. These services include...green spaces...*" which is evident in not only the questionnaire responses but in the completed Park Quality Assessment in which the park received 5's in half the categories observed (see Figure 3.10).

The opposite of this can be seen in Liberty Park for example. Liberty Park was situated in zip code 77028, the neighbourhood with the lowest median income at $11,354. This is reflected in the park's results in the Park Quality Assessment, and could be seen purely by the naked eye. The park scored 1's in four out of six categories (see Figure 3.10) and had none of the special amenities that had been noted in previous parks (such as a splash pad or a football pitch). It was clear from visiting the park that the park and surrounding neighbourhood did not correspond to the 'Services' sector of the Egan wheel, as the

amenities were poorly maintained and the green space that was available was neglected and shabby (see Figure 3.11).

Figure 3.4 Visual representations of data collected from questionnaires conducted at each park (see appendix Figure 6.3 for table displaying data in detail).



N/A Car Bus Walked Other

Each square represents one person (results are taken from the questionnaires conducted at each park.

No data was available for Binglewood Park the park was empty when visited. It would be expected that the data collected from the question "*What method of transportation did you use to get to the park?*" would reinforce the individual sphere's of influence calculated for each park, however when compared it becomes clear that this is not the case. The park with the largest sphere of influence was Whitt Johnson Park, however the methods of transport used to reach this park were found to be identical to River Oaks

Park and Nottingham Park (both of which have a considerably smaller sphere of influence). It would be expected that parks with a smaller sphere of influence would have a higher proportion of visitors using walking as their method of transportation. This in mind, Houston's climate could be a factor in the high proportion of park visitors using a car as their primary method of transportation (despite possibly only travelling 0-10 minutes). Firstly, the questionnaires were conducted in July, one of the hottest months of the year with average daily temperatures of 29°C (Networks, 2000). The high temperatures could encourage parents of young children to drive, resulting in a car being the most common method of transport.

Data obtained from the Park Quality Assessments is shown in Figure 3.6, 3.10, and 3.13.

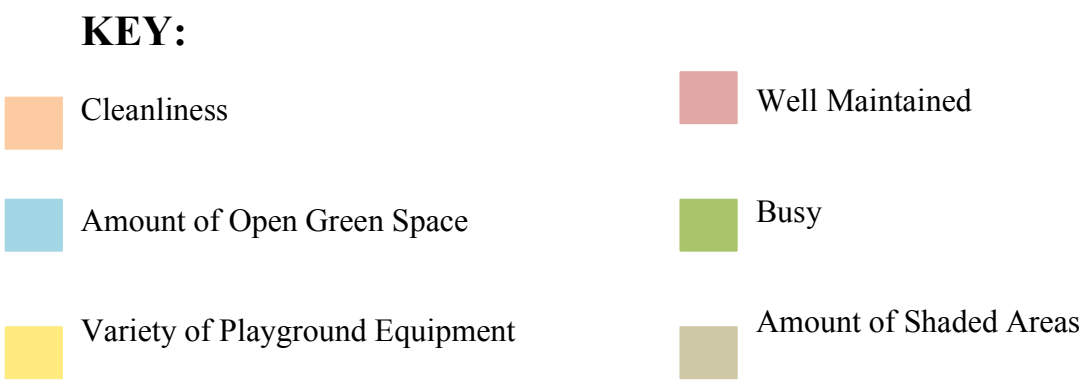


Figure 3.5 Key that applies to the Park Quality Assessment Graphs

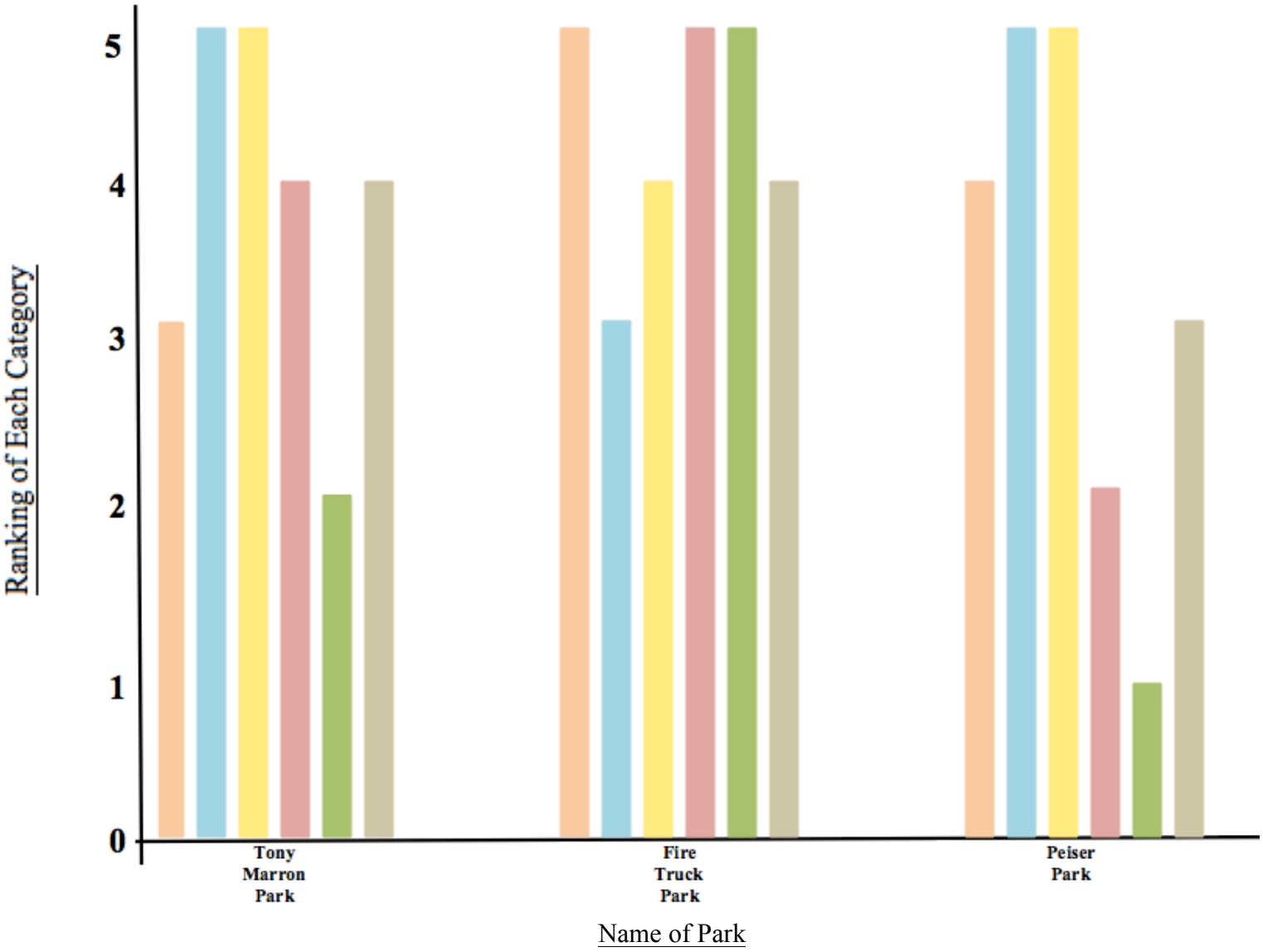


Figure 3.6 Graph showing the Park Quality Assessment results for Tony Marron Park, Fire Truck Park, and Peiser Park.

Peiser Park can be seen to score both high and low scores, scoring 5's in '*Amount of Open Green Space'* and *' Variety of Playground Equipment'*, but a 1 in '*Busy'*. The lack of visitors to the park could have been due to the high temperatures, or due to the park being located in a commercial area rather than a residential. Peiser Park also had a small sphere of influence (seen in Figure 3.1) , which reflects the low score given for '*Busy'*.

Figure 3.7 Image showing equipment at Peiser Park.

Playground equipment was wooden and handmade.

The playground seemed un-modernized because of this.

The park was more 'makeshift'.

Portable toilets were in place of a permanent structure.

Figure 3.8 Image showing toilets at Peiser Park.

Bins were located around park; consequently the park was clean.

Figure 3.9 Image showing green space at Peiser Park.

Park was large, and consequently had lots of green space.

Park had vacant feeling, as it was empty when visited.

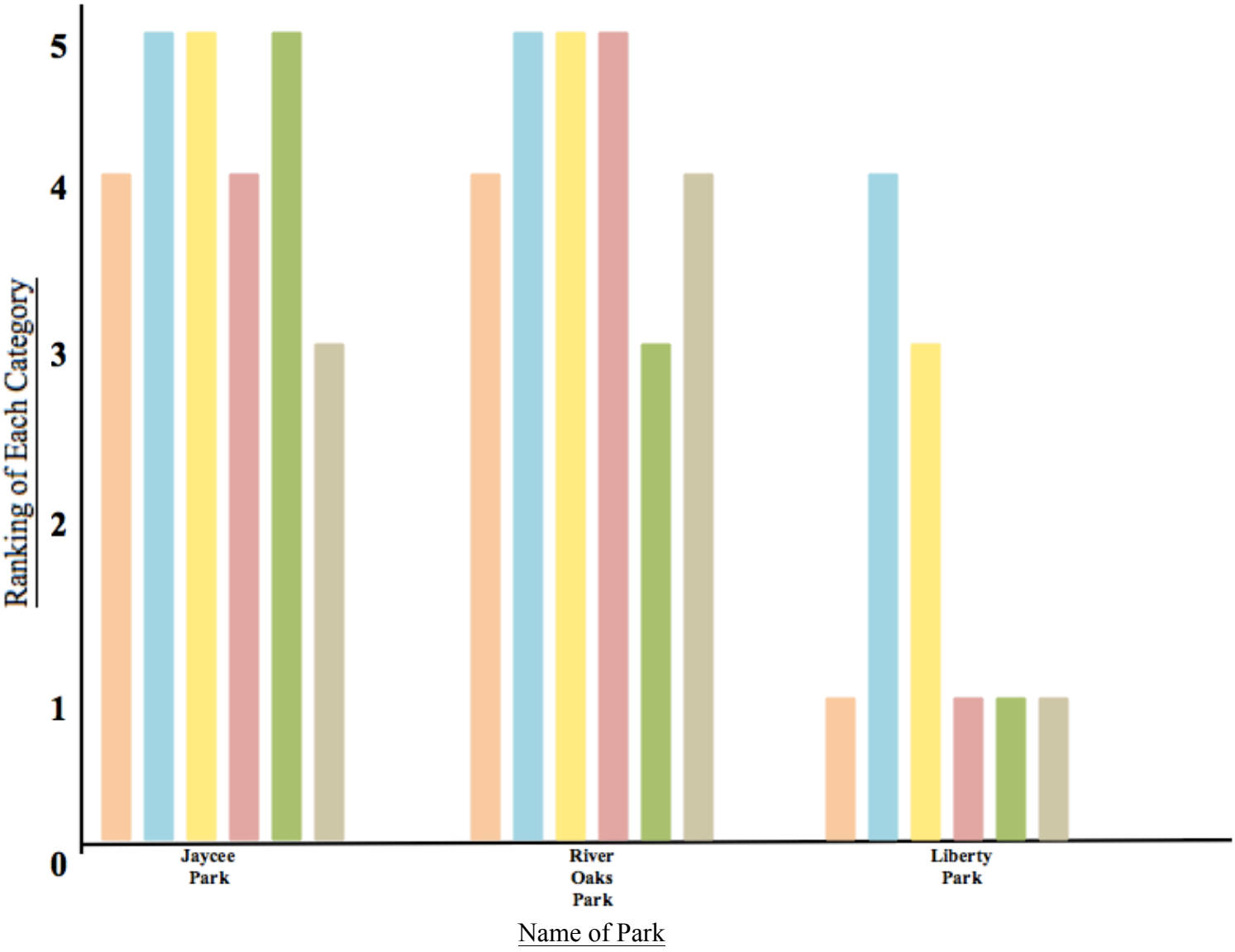


Figure 3.10 Graph showing the Park Quality Assessment results for Jaycee Park, River Oaks Park, and Liberty Park.

Liberty Park scored the lowest of all parks visited. A clear correlation between median income and park quality can be seen here, as Liberty Park is located in zip code 77028, with the lowest median income overall: $11,354. The park scored 1's in four out of the six categories, and was considerably worse maintained than the other parks – there was an abundance of litter and the playground equipment itself (although there was a wide variety, was clearly neglected (see Figure 3.12).

Figure 3.11 Image showing poor maintenance and abundance of litter in Liberty Park.

Figure 3.12 Image showing neglect in Liberty Park.

The extremely low income of the neighbourhood did not change the fact that it's residents valued green space and a playground just as much as residents of River Oaks (a neighbourhood with a median income of $220,919), just that they had lower quality amenities and felt that they had less of a voice in the city of Houston. This shared opinion was seen in the results of the questionnaire distributed at Liberty Park (see Figure 6.2).

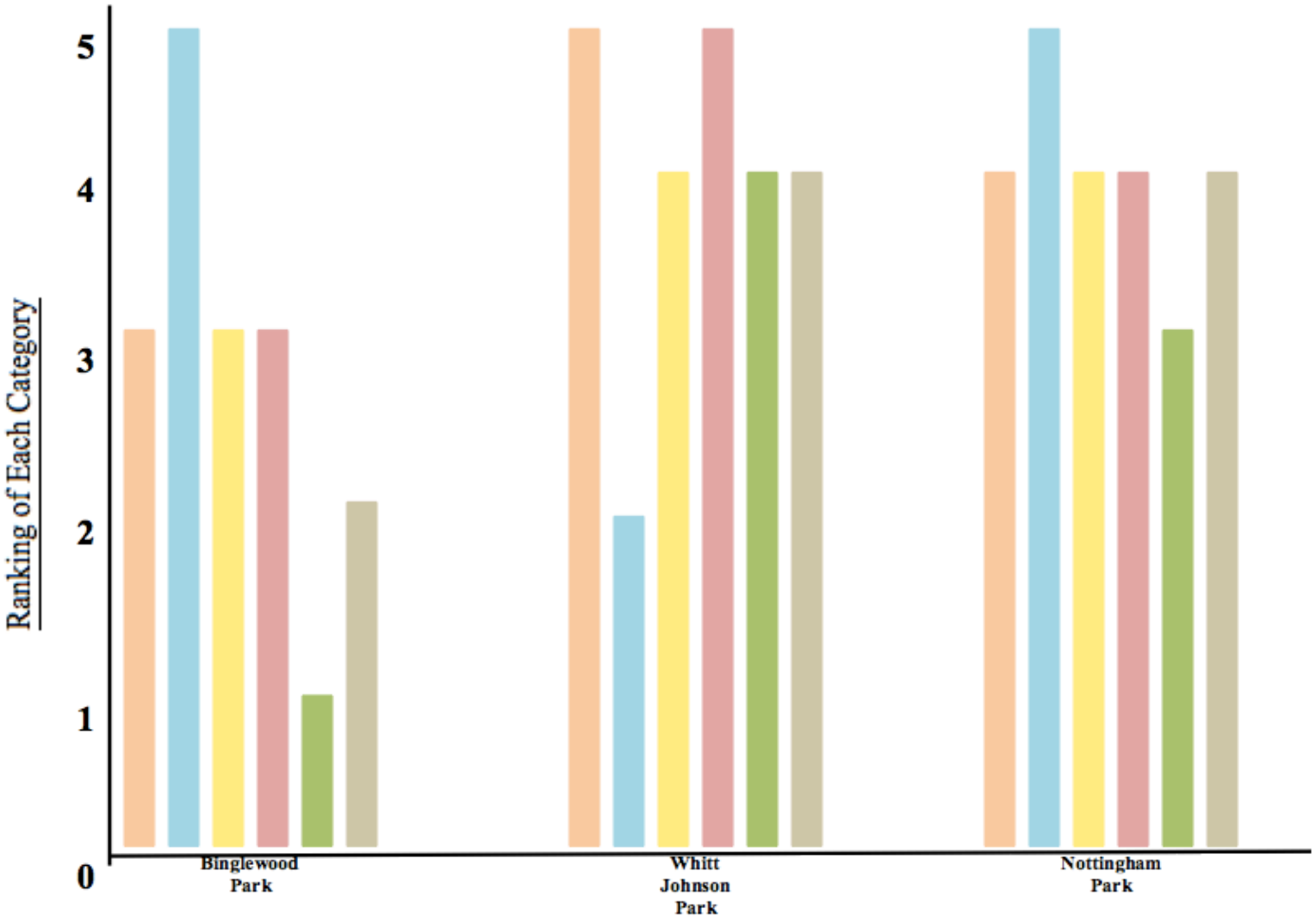
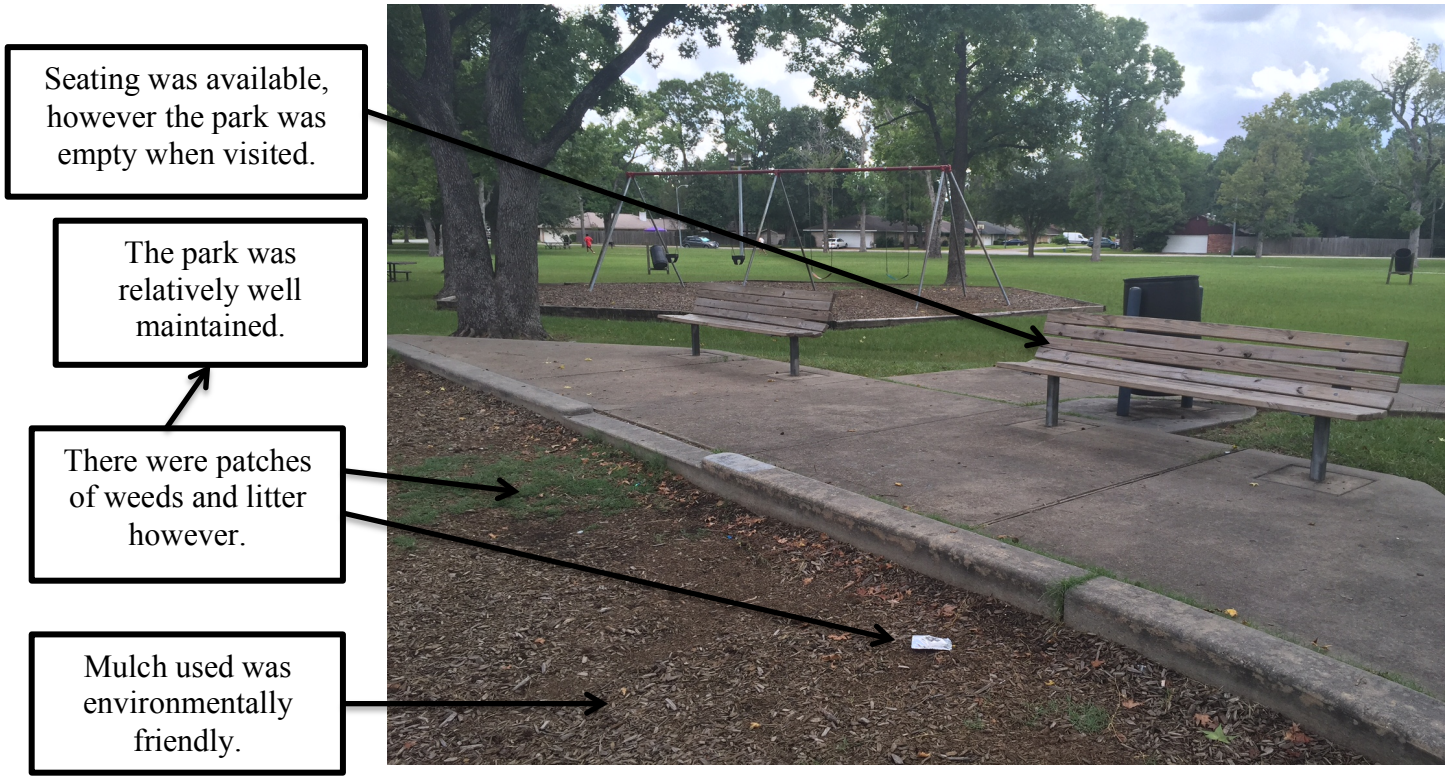


Figure 3.13 Graph showing the Park Quality Assessment results for Binglewood Park, Whitt Johnson Park, and Nottingham Park.

Whitt Johnson Park and Nottingham Park scored similarly in the Assessment, despite being located in completely different areas of town. There was a stark difference in scores in the category '*Amount of Open Green Space'*. This can be justified by the parks different locations however, Whitt Johnson Park was located closer to the CBD (Central Business District) of Houston than Nottingham Park. This increase in proximity means land prices are more expensive, and consequently it is not cost-effective to design an

inner city neighbourhood park with a large amount of open green space. Nottingham Park on the other hand was located further outside the center of town, therefore it was located in an area with lower land prices, which meant that allowing the park an abundance of open green space was nowhere near as expensive as it would be at Whitt Johnson Park. Inner city neighbourhood parks with a small amount of open green space can lead to the larger sphere of influence that parks outside the inner city had. For example, it is seen in Figure 3.1 that Nottingham and Binglewood Park have larger spheres of influence than parks such as River Oaks Park. This could be due to a desire for green space – something that families are willing to travel further outside their own neighbourhoods to get.

Figure 3.14 Image showing seating at Binglewood Park.



A Spearman's Rank Correlation was calculated to statistically analyse certain sets of data. As seen below, there was a strong positive correlation between the Median Per Capita Income ($) of a zip code and its subsequent park, and the score the park received in the *'well maintained'* category of the Park Quality Assessment.

SPEARMAN'S RANK FOR '*WELL MAINTAINED*'

Data One = Median per Capita Income ($)

Data Two = Score achieved by Park in Park Quality Assessment Category: '*Well Maintained*'

Data 1 ($)	Data 2	Rank 1	Rank 2	d	d^2
72,170	4	6	4	2	4
26,125	3	3	3	0	0
36,087	4	4	4	0	0
220,919	5	9	5	4	16
137,552	5	8	5	3	9
106,480	5	7	5	2	4
43,914	4	5	4	1	1
13,657	2	2	2	0	0
11,354	1	1	1	0	0

Figure 3.15 Table showing Spearman's Rank Calculations

$$1 - \left(\frac{6\Sigma d^2}{n(n^2-1)}\right)$$ *Formula used to calculate Spearman's Rank*

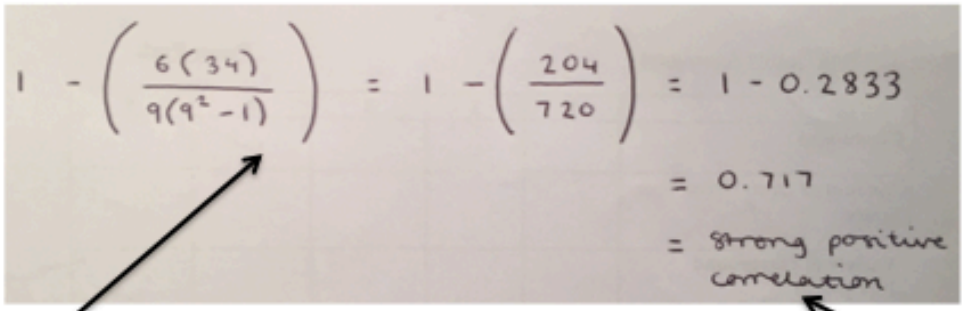


Figure 3.16 Annotated image showing the correlation between the sets of data used

Calculations used to deduce Spearman's Rank.

Monotonic relationship between the two sets of data.

Strong positive correlation between the two sets of data.

As median income increases, so does the *'well maintained'* score.

Parks located in higher income areas are better maintained.

As the Median Income increased, generally the park's score did too. From this it can be inferred that a higher income results in more funding for local neighbourhood parks, and therefore allows the parks to be maintained to a high standard. These results clearly supports the research question this essay is focused around, that the quality of a park is directly affected by the Median Income of the neighbourhood it's located within.

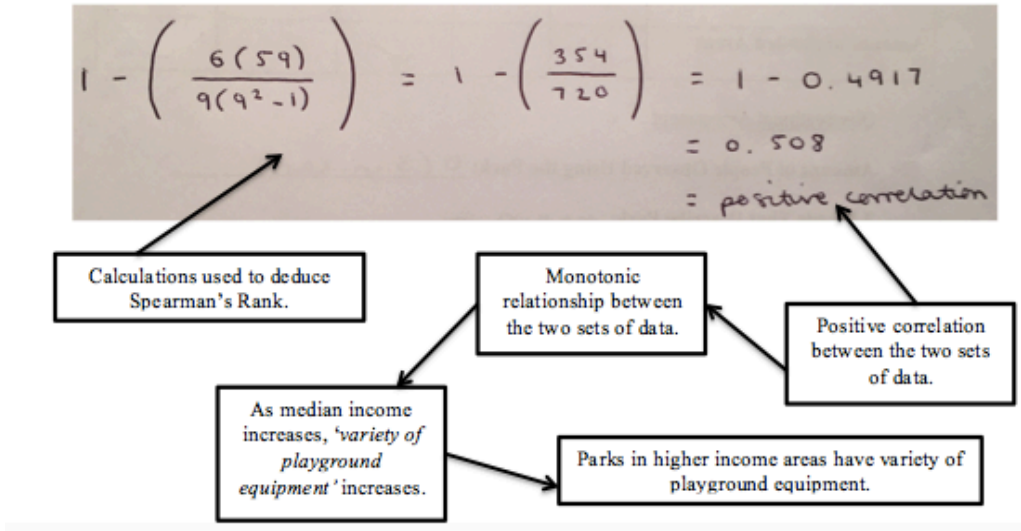
When Spearman's rank correlation was calculated for the Median per Capita Income ($) and the category *'Variety of Playground Equipment'* it could be inferred from the results that a higher median income meant a better variety of playground equipment.

SPEARMAN'S RANK FOR *'VARIETY OF PLAYGROUND EQUIPMENT'*
Data One = Median per Capita Income ($)
Data Two = Score achieved by Park in Park Quality Assessment Category:
'Variety of Playground Equipment'

Data 1 ($)	Data 2	Rank 1	Rank 2	d	d^2
72,170	4	6	4	2	4
26,125	3	3	3	0	0
36,087	5	4	5	1	1
220,919	5	9	5	4	16
137,552	4	8	4	4	16
106,480	4	7	4	3	9
43,914	5	5	5	0	0
13,657	5	2	5	3	9
11,354	3	1	3	2	4

3.17 Table showing Spearman's Rank Calculations

$$1-\left(\frac{6\Sigma d^2}{n(n^2-1)}\right)$$ *Formula used to calculate Spearman's Rank*



3.18 Annotated image showing the correlation between the two sets of data used

H_2 (Park quality will increase with the increase of median income and overall neighbourhood 'quality'.) is supported by the images taken and analysed at each park.

Liberty Park was located in a neighbourhood with a low median income ($11,354), and the effects of this can be seen in Figure 3.19**,** for example a lack of resources such as permanent shade structures, and a large amount of litter. In contrast to this, River Oaks Park was located in a neighbourhood with a high median income ($220,919). The improved amenities and quality of the park can be seen in Figure 3.20**.** The opposite of Liberty Park, River Oaks Park had an abundance of trees providing shade, as well as permanent shade structures. The park also featured a wide variety of equipment and was extremely well maintained.

Figure 3.19 Image showing play equipment and lack of shade at Liberty Park.

Figure 3.20 Image showing the shade structure at River Oaks Park.

Liberty Park was the lowest scoring park on the Park Quality Assessment (see Figure 3.10). Questionnaires that were completed by visitors clearly reflected the neighbourhood's negative opinions of the park. Two questionnaire subjects added a comprehensive list of improvements onto the questionnaire, and it became apparent that they felt their neighbourhood was abandoned by the City of Houston due to its low median income ($11,354). It was written that the *"...pool [had been] leaking for a year..."* that the *"...drainage system [doesn't] work very well..."* and that the *"...Mayor needed to come out and see our park"* in order for changes to be made to the park.

Figure 3.21 Image showing play equipment at River Oaks

River Oaks Park was the park located in the zip code with the highest median income by far, which was clearly reflected in the quality of the park. The park was very green, trees were planted in multiple places to provide shade and also increase the visual appeal of the park. The park scored very highly in all categories of the Park Quality Assessment, and the three words/phrases used to describe the park upon first glance were *"diverse, exciting, and lots of equipment"*. This supports the research question, as in the case of River Oaks Park it is true that a higher median income resulted in an increased park quality.

Figure 3.22 Image showing shade and green space at River Oaks Park.

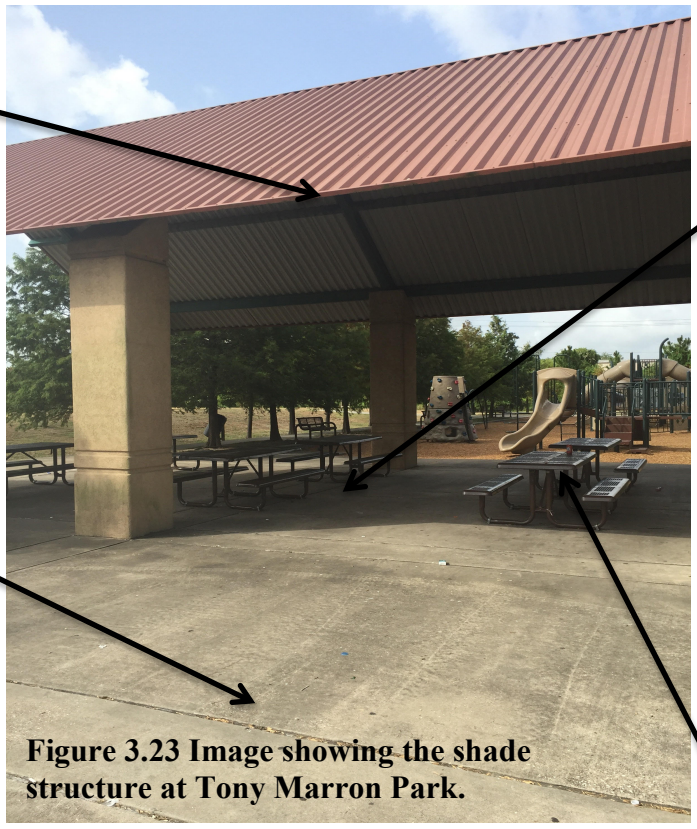


Figure 3.23 Image showing the shade structure at Tony Marron Park.

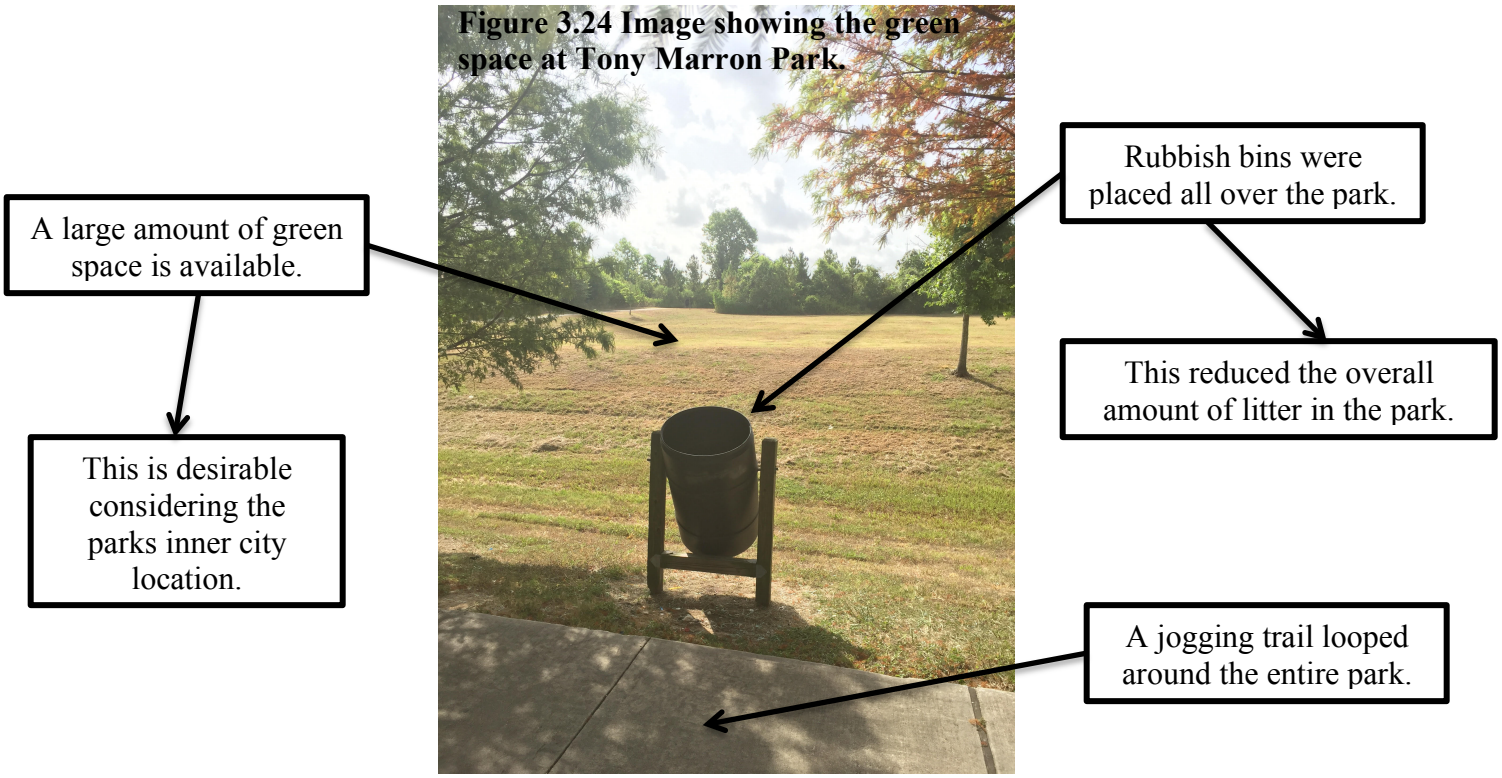


Figure 3.24 Image showing the green space at Tony Marron Park.

The results that Tony Marron Park obtained in the Park Quality Assessment Survey can clearly be seen in Figure 3.6. The park scored high for green space in the Assessment, which is clearly shown in Figure 3.24 as the park had adjacent fields that provided free, open green space.

Tony Marron Park was located in the zip code 77003, with a Median Income of $43,914 placing it in the middle of the parks chosen. The park further had a relatively small sphere of influence, likely due to the moderate conditions.

A splash pad (water area) was another amenity.

This amenity would be desirable in the summer.

Due to Houston's hot temperatures.

This area was handicap accessible due to the flat concrete.

Figure 3.25 Image showing the splash pad amenity at Tony Marron Park.

The playground was located in a shaded area.

Figure 3.26 Image showing equipment at Fire Truck Park.

Fans were located in the permanent shade structure.

This provided extra cooling for families.

Mulch was used as it is child-friendly.

Figure 3.27 Image showing shade structure at Fire Truck Park.

Figure 3.28 Image showing play equipment and open space at Fire Truck Park.

A wide variety of playground equipment was available.

This equipment catered to children of all ages.

Astroturf was used in certain areas in place of grass.

In questionnaire responses, parents believed this was safer for babies.

A designated splash pad area was found at Jaycee Park.

The splash pad was utilised by children of all ages.

The park had a large amount of green space.

Figure 3.29 Image showing splash pad amenity at Jaycee Park.

Figure 3.30 Image showing equipment and shade structures at Jaycee Park.

Figure 3.31 Image showing poor maintenance at Binglewood Park.

Park was located in a safe neighbourhood.

Its central location meant it was well used.

Gated for children's safety due to close proximity to roads.

Figure 3.32 Image showing safety of Whitt Johnson Park.

Figure 3.33 Image showing equipment and shade structure at Whitt Johnson Park.

Various shade sails were installed to protect children from Sun.

Parents mentioned this in questionnaire responses as a desirable amenity.

Variety of equipment that playground was suitable for all ages.

This increased the safety of the playground.

Padded Astroturf was installed on the ground.

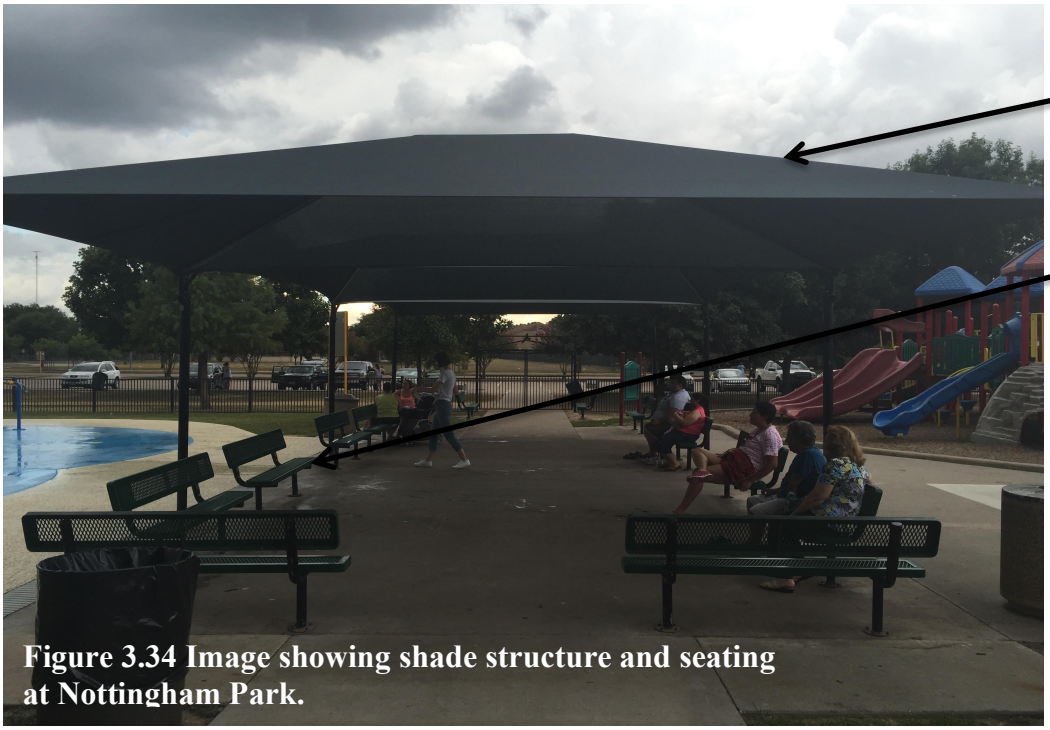


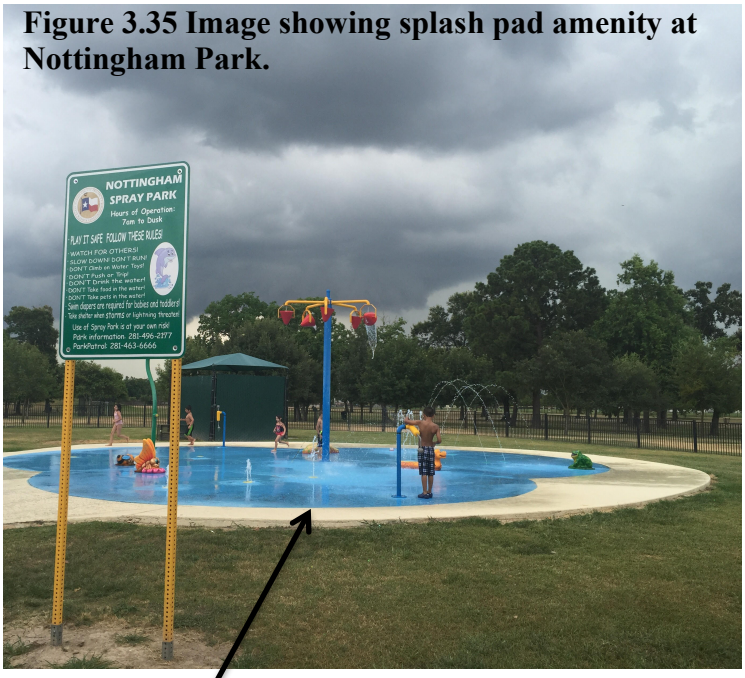
Figure 3.34 Image showing shade structure and seating at Nottingham Park.

A large shade structure provided shelter from the Sun.

Seating was available, in a central location within the park.

The central location ensured that parents could watch their children.

Figure 3.35 Image showing splash pad amenity at Nottingham Park.



A large splash pad was available for children to use.

Different equipment on splash pad made it a desirable amenity.

Figure 3.36 Image showing equipment at Nottingham Park.

The playground featured a wide variety of equipment.

Park was clean, and the equipment was well maintained.

There was no litter around the park at all.

The park was spacious.

4 – CONCLUSION

Houston as a city is extremely diverse and due to this there are subsequently multiple disparities, one of the main being wealth, which was highlighted in this essay. The importance of green space can clearly be seen, and the desire for green space results in many neighbourhood parks having a large sphere of influence as families travel from their own neighbourhoods to reach these parks.

The research question *"To what extent does the quality of a park and its sphere of influence differ in neighbourhoods with varying median incomes?"* was devised to investigate the effect these disparities have on Houston's population and the neighbourhood parks scattered around the city. Evidence presented in this research paper clearly shows there is a correlation between the quality of a park and it's median income. It was discovered that the park located in the neighbourhood with the lowest median income (Liberty Park) was clearly the worst maintained and the most overlooked. Subsequently, the park located in the neighbourhood with the highest median income (River Oaks Park) was extremely cared for and very well maintained.

By calculating a Spearman's Rank statistical test, quantative data was obtained that pointed to there being a positive correlation between the quality of the park and it's median income. Data obtained from the Park Quality Assessments were used to obtain these results, which allows them to be reliable as the data recorded into the Assessments was recorded during the park visits and show a clear representation of the state of the park.

Furthermore, the sphere of influence of each park was calculated with the initial belief being that parks located in higher income neighbourhoods would have a larger sphere of influence due to their improved quality. It can be seen in Figure 3.1 that this is not necessarily the case. In retrospect, this could be due to the afore mentioned fact that land prices are considerably more expensive in inner city locations (commonly where the higher income neighbourhoods investigated in this study were located). Therefore, parks located further outside the city would be able to provide more green space due to lowered and costs, and these could therefore attract inner city residents looking to escape the high-density neighbourhoods found closer to the CBD.

The quality of a park and its sphere of influence greatly differs in neighbourhoods with varying median incomes, but that the income of a neighbourhood does not define its resident's appreciation and desire for green space. It can be concluded that both hypotheses originally stated are to be accepted based on the evidence provided throughout this study – however there are certain cases in which anomalous results led to the hypotheses not being applicable in the case of each park.

5 – EVALUATION

Multiple limiting factors had an effect on this investigation, especially in determining the sphere of influence of each park (relating to H_2) such as the time of day the park is visited – if the park is visited at night, it is likely that there will be no one there to gather questionnaire results from. Another limitation was Houston's climate. In the summer, the average high temperature is 33.3 °C (Data, 2016). As the parks investigated are geared towards families and small children, the high temperatures could deter parents from bringing their children outside for long periods of time. In an attempt to counteract these limiting factors, the parks were all visited between 10AM and 11:30AM, allowing for lower temperatures. This time period was seen as a popular time for families to visit parks, as it's late enough that all children are awake, but early enough that a different activity can be done in the afternoon.

Investigating the sphere of influence of each park determined the need for parks and green space – do people find green space important enough in a city to travel distances to reach it? The sphere of influence of a park aided in the determination of a parks importance. A limitation to this was the quality of the park itself – residents living an area surrounding a lower quality park are more likely to travel to an area with a higher quality park.

There were multiple limiting factors that came into play regarding the Park Quality Assessment and Questionnaire that were carried out at each park location. These limiting factors are listed and explained below:

Time of day the park was visited – and consequently temperature

As mentioned previously, each park was visited within the same time frame (between 10AM and 11.30AM), due to high temperatures. Although this allowed for a relatively fair test, the difference in timing between each park could result in varying results when it comes to people using the park.

Language barriers

Houston is a melting pot of nationalities. "There is no majority group here, not even close" (Hu, 2013) *says Michael Emerson (a sociologist working at Rice University and investigating the constant shift in demographics that is found in Houston). The broad spectrum of cultures that call Houston home made it inevitable that a language barrier could become a problem. This consequently had an effect on the quality of the written response section of the questionnaire ("What do you like about this park?"). In multiple cases, the participant made it clear that they didn't speak English, and therefore their answers were limited or written in broken English. The effect that this had on the overall results was minimal, however it did result in some parks having a very limited response, meaning that it was hard to obtain a successful insight onto the surrounding neighbourhood's view of the park.*

6 – APPENDIX

Park Quality Assessment

	1	2	3	4	5
Cleanliness					
Amount of Open Green Space					
Variety of Playground Equipment					
Well Maintained					
Busy					
Amount of Shaded Areas					

Observational Assessment

Amount of People Observed Using the Park: _____

3 Words That Describe Park: _____
_____
_____

Special Features: _____
_____

Parking Lot:
Yes ☐ No ☐

Handicap Accessible:
Yes ☐ No ☐

Figure 6.1 Park Quality Assessment Completed at all 9 Park Locations

Park Quality Questionnaire

Male ☐ **Female** ☐

Age (Years)

20 or Below ☐ **21-30** ☐ **31-40** ☐

41-50 ☐ **51+** ☐

Figure 6.2 Park Quality Questionnaire Distributed at all 9 Park Locations

Do you have children?

Yes ☐ **No** ☐

If yes, how many do you have? _____

On average, how long do you travel to get to the park?

0-10 minutes ☐ **11-20 minutes** ☐

21-30 minutes ☐ **31-40 minutes** ☐ **Over an hour** ☐

What method of transportation did you use to get to the park?

Car ☐ **Bus** ☐ **Walked** ☐ **Other** ☐

What do you like about this park?

_____

_____

_____

_____

Methods of Transport Used to Reach Park

	Nottingham Park	**Whitt Johnson Park**	**Binglewood Park**	**Liberty Park**	**Peiser Park**	**Fire Truck Park**	**River Oaks Park**	**Tony Marron Park**	**Jaycee Park**
Car	3	3	N/A	2	2	4	3	3	3
Bus	0	0	N/A	1	0	0	0	0	0
Walked	1	1	N/A	2	0	1	1	0	2
Other	0	0	N/A	0	0	0	0	0	0

Figure 6.3 Table Showing Method of Transport data collected from Questionnaire results

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Figure 1.1

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Figure 1.2

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Figure 1.3

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