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Recreational justice and
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Environmental justice has been defined by the unfairly exposure of minorities to hazardous materials, in this study we consider another aspect of environmental justice by analysis de exposure of population to beneficial sources for the environment.

Population living around 1 mile from the parks of the cities of Dallas, Plano, Midlothian and McKinney were analyzed base on descriptive statistics, compare of means among and within the city by an analysis of variance, and a distance prediction on demographics characteristic of race/ethnicity, age, economics and education obtained from the U.S. census of 2000.

Plano and Dallas have 98% and 97% population coverage; this resulted in statistical significant differences in all demographics.

McKinney and Midlothian reported less than 78% of coverage with only education as significant predictor of distance. Recreational Justice does not substitute environmental justice; however it should be considered to evaluate this condition.

RECREATIONAL JUSTICE

AND CITY PLANNING

ANA ROMERO, MD.

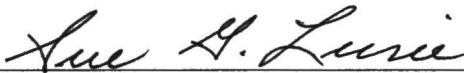
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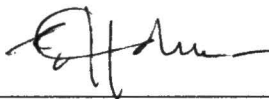
Major Professor



Committee Member



Committee Member



Department Chair



Dean, School of Public Health

**RECREATIONAL JUSTICE
AND CITY PLANNING**

THESIS

Presented to the School of Public Health

University of North Texas

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in Partial Fulfillment of the Requirements

for the Degree of

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By

Ana Romero, MD.

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To my father who taught to me serenity and calmness.

To my husband who after all this time is still there.

To my daughters whose presence makes me happy, and to all my supportive friends.

To my helpful committee and to my supportive advisor.

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CHAPTER I

INTRODUCTION

RATIONALE

As a consequence of the change in the race/ethnicity distribution of the population in this country, Texas was recently declared a majority minority state (Bernstein, 2005). Cultural diversity in the community had generated benefits as well as challenges, and as a result opens windows for improvement.

Health status has been defined as a clear expression, among other things, of demographics and social status (Fiscella, 2002). In similar conclusions Jenny Lunnon (2005) established that ethnographic and social divisions are both created and reinforced by geography. Therefore, geography should also play a role in the outcome of individual and community health.

By 1930 most of modern city geography was landscaped by city planning established by zoning areas. Since then two major federal laws, have dramatically affected city planning, were passed. These were the National Historic Preservation Act of 1966; and the National Environmental Policy Act (NEPA) of 1969 (Thomas, 2005).

Environmental Justice was subsequently defined in the Executive Order 12898 (February 11, 1994) as a mandate to Federal agencies:

“... to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.”

Recreational Justice is described in this investigation as the disproportionate exposure of minorities to beneficial environment conditions such as parks. This is a new concept because “environmental justice activities have centered on hazards, health risks, and undesirable land use. Only recently have social scientists started looking at disparities in the delivery of recreation benefits” (Johnson, 2001).

STATEMENT OF PURPOSE

This study describes and analyzes the demographic characteristics of the population living within “walking distance” (1600 meters or 1 mile) of parks. Parks were the location point used to establish exposure to favorable environmental conditions. The analysis was conducted in four North Texas cities in order to compare different metropolis and determine if recreational justice was met in these communities. These communities were chosen due to their differences in population, income, and the age (See appendix C).

RESEARCH QUESTION

What are the demographic characteristics (age, ethnicity/race, education, income) of the population living within 1,600 meters or 1 mile of the perimeter of the parks in Plano, Dallas, McKinney and Midlothian?

HYPOTHESES

If recreational justice is achieved in the four cities studied then there should be no differences in age, race, education or income of the population residing within 1600 m of a park. In other words demographics of the population will not vary as distance from the parks increases.

Since the study is based on secondary data internal validity limited by the following:

1. Data is from the US Census therefore, the accuracy of the location of the population was based on the measurement level of a geographic unit in this case by census block for age and ethnicity and by census block group for education and economics variables. (Illustration 1). Census block groups were a ratio of one sampling questionnaire per every six households within a block unit.

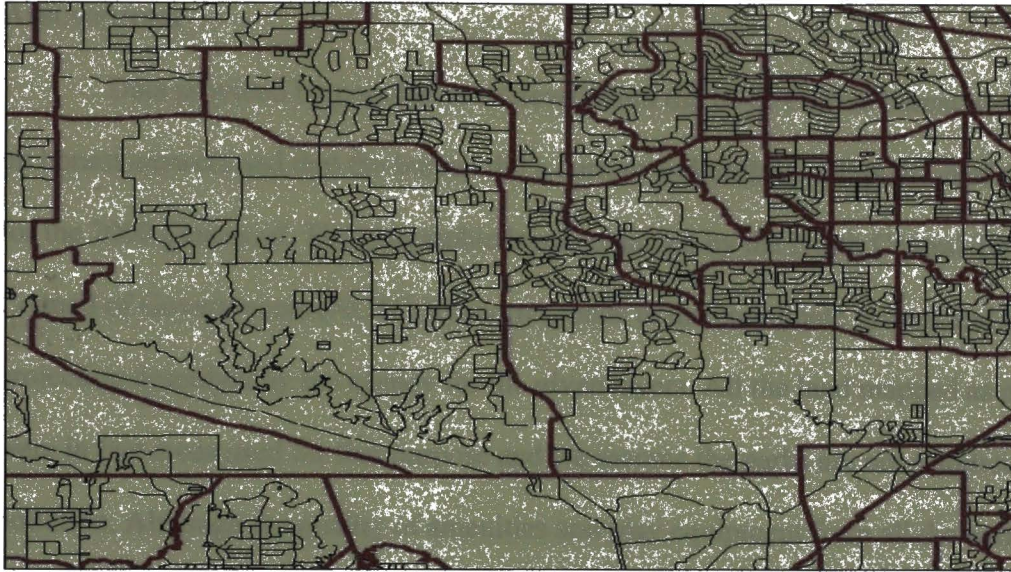


Illustration 1: Block vs. Block Groups (Census 2000 Geographic Terms and Concepts, 2000)

2. Parks were defined by the city and vary by size, type, and equipment/amenities provided, which was not taken in consideration for purposes of this study. This is a selection bias which may have biased the estimates towards the null.

LIMITATIONS

The use of these results by other cities or populations should consider:

1. Population characteristics;
2. Change of ethnicity over time due to immigration or/and emigration;
3. Age of the parks;
4. Park amenities characteristics and general conditions; and
5. Change in neighborhood zoning.

ASSUMPTIONS

Data provided by population retrieved from the U. S. Census bureau was based on honest answers and that the bureau did a current and truthful compilation of the data for the 2000 Census of. The geographic layers obtained by the North Central Texas Council of Governments (NCTCOG) corresponds to the coordinate system and the projection described by the agency for the given layers. All the land mapped as parks were in fact areas used for that purpose and we assume the parks are not a source of pollution. Although the quality of amenities and play equipment from all the parks may not be the same, in this study, all the parks were considered to provide the same benefits to population around them.

DEFINITION OF THE TERMS

Aggregate earnings: “Aggregate earnings are the sum of wage/salary and net self-employment income for a particular universe of people 16 years old and over. Aggregate earnings are subjected to rounding, which means that all cells in a matrix are rounded to the nearest hundred dollars” (Census 2000 Geographic Terms and Concepts, 2000).

Area measurement: “data for the size, in square units (metric and non metric) of geographic entities for which the U.S. Census Bureau tabulates and disseminates data. Area is calculated from the specific boundary recorded for each entity in the U.S. Census Bureau’s geographic database Census 2000 Geographic Terms and Concepts A-7 U.S. Census Bureau, Census 2000 (see TIGER®

database). These area measurements are recorded as whole square meters”
(Census 2000 Geographic Terms and Concepts, 2000).

Census block: “A geographic area bounded by visible and/or invisible feature shown on a map prepared by the U.S. Census Bureau. A block is the smallest geographic entity for which the Census Bureau tabulates decennial census data”.

Census block group: “Census block group (BG) is a statistical subdivision of a census tract (or, prior to Census 2000, a block numbering area). A BG consists of all tabulation blocks whose numbers begin with the same digit in a census tract. For example, for Census 2000, BG 3 within a census tract includes all blocks numbered from 3000 to 3999. (A few BGs consist of a single block.) BGs generally contain between 300 and 3,000 people, with an optimum size of 1,500 people. The BG is the lowest-level geographic entity for which the U.S. Census Bureau tabulates sample data for a decennial census” (Census 2000 Geographic Terms and Concepts, 2000).

Race: “reflects self-identification by people according to the race or races with which they most closely identify” (William, 2005).

Parks: also known as “landscaping,” parks are defined as the arrangement of trees, grass, bushes, shrubs, flowers, gardens, fountains, patios, decks, street furniture, and paving materials in a space for community use. It does not include the placing or installation of artificial plants, shrubs, bushes, grass or flowers.

Per capita income: Per capita income is the mean income computed for every man, woman, and child in a particular group. It is derived by dividing the aggregate income of a particular group by the total population in that group. (The aggregate used to calculate per capita income is rounded. For more information, see “Aggregate”. Per capita income is rounded to the nearest whole dollar (Census 2000 Geographic Terms and Concepts, 2000).

Perimeter: “the boundary of a closed plane figure”.

Poverty Status “The data on poverty status of households were derived from answers to the income questions. The income items were asked on a sample basis. Since poverty is defined at the family level and not the household level, the poverty status of the household is determined by the poverty status of the householder. Households are classified as poor when the total 1999 income of the householder’s family is below the appropriate poverty threshold (For no family householders, their own income is compared with the appropriate threshold.). The income of people living in the household who are unrelated to the householder is not considered when determining the poverty status of a household, nor does their presence affect the family size in determining the appropriate threshold. The poverty thresholds vary depending upon three criteria: size of family, number of children, and, for 1- and 2-person families, age of the householder” (Census 2000 Geographic Terms and Concepts, 2000).

Buffer rings: used to define the near and far limits of concentric rings around the polygons representing parks.

Importance of the Study

The description of the population receiving benefits from the environment has to be considered in order to understand all the dimensions of environmental justice. This could also be useful preliminary data for other factors that could influence health.

CHAPTER II

LITERATURE REVIEW

Since the beginning of human organization, communities were created with certain structures intended to preserve the community *per se* (Escalante-Moscoso, 1996). Eight thousand years ago the production system of gathering and hunting as well as religious beliefs were the guidelines for people to construct and develop their communities (Escalante-Moscoso, 1996). Protection from inclement weather and enemies were also part of the characteristics considered in the location within the habitat. Houses were made from materials available in the area (wood, stone, soil, grass or ice) whose locations were closed to rivers or other sources of water.

As the ability to obtain food and shelter increased so did the population in the communities. Under this situation, space distribution on the settlement changed in the direction of the new era of established agriculture and social status. The urban concept emerged under these circumstances to echo the concentration of power and economic wealth. The concept of “metropolis” was born in the ancient Greece around 2000 B.C. (Escalante-Moscoso, 1996). The abundance of resources obtained by the new systems of trading and military colonization were reflected in the organization of the societies; the new elite no longer have the priority of preserving the community. The ancient cities around the world were designed for the public. Majestic palaces, gardens, entertainment

centers and religious construction were at the center of the cities. In these earliest urban developments a rudimentary public health concept played an important role, reflected through the sewage system planning and market regulations (Escalante-Moscoso, 1996).

Regrettably most of the knowledge developed in this period elapsed due to a series of lamentable events which took western civilization into the era of dark ages. For centuries cities were driven by different interests that created great human epidemics such as yellow fever and bubonic plague (Baum & Singer, 1982). The concept of metropolis reemerged as a solution for many of these health tribulations.

For example, plans for open spaces were developed in European cities like London (Loundon, 1981; Turner, 2004). Some of those plans about landscaping debated between mimicking nature or building something different (Thompson, 2003), yet the real application of city planning was not brought to light until the last century, when urban planning was considered for the reconstruction of the European cities at the end of the First World War (Knibbs, 1901; Bushnell, 1864; Buls, 1899).

In 1943 the Abercrombie plan was developed and became known as “the most brilliant open space plan ever prepared for a capital city” (Taylor, 2004). These were the combination of two major proposals; County of London Plan, and Greater London plan (Taylor, 2004). The philosophy of these plans included standard ratio of 4 acres per 1000

habitants, a system of parks that makes an easy flow of open space from garden to park and accesses to private open spaces (Turner, 2004).

In the United States the history of city planning was shaped by several unfortunate events such the Chicago fire, and other pollution problems that led to the call for city zoning and planning (Coleman-Adams, 1896). Urban parks emerged in the nineteenth century as part of a city design movement called landscape architecture (Tate, 2001). Recently defined as: “*public spaces in densely developed areas that offer the opportunity for passive and active recreation*” (Fairfax County, Virginia, 2006), they were initially designed for Public Recreation. In the wake of this century defining what constitutes a park, is no longer simply grass and trees. Today parks offer a multitude of benefits to their users. The best example of this evolution was the history of Central Park in New York City. The initial proposal is known as the Greensward Plan (Central Park Conservancy, 2006) which took two decades to complete. In 1934 the park was the echo of the new era of open space planning, which responded to the demand of recreational space for crowded cities (Cedar-Miller, 2002).

However, today this concept of parks as elements of the country into the city, or as a relief from overcrowded housing conditions or population congestion is no longer applicable. Urban parks have evolved into recreation centers and sport facilities. As a consequence parks have begun to play an integrated role in urban environments by providing formal and informal gathering spaces to their community. They also have positively influenced property values. The parks of modern societies have given residents

a place to connect to the natural world, an invitation to live, relax, exercise, and to improve ones health.

The concept of justice has certainly evolved from Socrates definition as “telling the truth and returning what one has taken” (Stauffer, 2001) to Walzer’s values of generosity, frankness and solidarity that in his words “inspired the demand for justice” (Walzer, 2002). However, the concept was institutionalized by the 1964 Civil Rights Act that prohibits discrimination on the basis of race, religion, color, national origin, or economical status (Department of Justice, 1966).

In 1970 the National Environmental Policy Act gave another dimension to the concept of justice and rights. Under this legislation, the disparities of exposure to pollution were considered injustice.

Nevertheless the integration of this practice was not achieved until Executive Order 12898 was signed into effect on February 1994. The order states:

“To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States.”

The executive order requires a series of investigations to examine the condition of the exposed population to the pollution (Mays, Ponce, Washington, & Cochran 2003).

Since then, several aspects have been included under environmental justice; among them is the equal access of recreation space (Department of Environmental Health, University of Washington, 1999).

With recent use of Geographic Information System (GIS) analysis, and display of geographic knowledge demographic components of the population can be represented using a series of information sets such as maps and globes, geographic data sets, processing and work flow models, data models, and data attached to a geographic location known as metadata (Orton & Fritzinger, 2003). This combination of data can also apply to public health (Maheswaran & Craglia 2004; Cromley & McLafferty 2002).

In various studies a discrepancy in park access and minorities usage has been described. Geographers have shown that place is often confused with ideas of ethnicity and that the boundaries between ethnicities are part of the cultural representations associated with some places (Agyeman & Spooner, 1997). It would be reasonable to conclude that that one belongs to their neighborhood along with the facilities in the neighborhood.

CHAPTER III

METHODOLOGY

To address the research question, data from the 2000 census was obtained for the cities of Dallas, Plano, McKinney, and Midlothian to answer what are the demographic characteristics (age, ethnicity/race, education, income) of the population living within walking distance from the perimeter of the parks. Specific data for census tract blocks and census block groups within 1600 m (approximately 1 mile) of park was also obtained. To compare the above population groups a data base was created with various distances from the park was used; this data set contained approximately 1.5 million people.

PROTECTION OF HUMAN PARTICIPANTS

There were no identifiable characteristics of the subjects in this study. Data was obtained from the North Central Texas Council of Government web page. Since only secondary data was used, surveys or consents were not necessary.

All databases were reviewed in the Center for Spatial Analysis and Mapping (Csam) inside the Environmental Education Science and Technology (EESAT) Building at University of North Texas Campus in Denton. As previously stated, all reports and

potential publications will be reported as aggregate information with no identifiers. Due to the procedures implemented by the investigators, there was not risk to subjects.

DATA COLLECTION PROCEDURES

Data elements were collected from the 2000 U.S. Census which included the following:

- a. Demographic characteristics of the subjects (ethnicity, race, age, education and economic status)
- b. Census tract blocks was be the smallest unit analyzed.
- c. Selection of parks from the participant cities were obtained by aerial photo image from the North Central Texas Council of Government web page.
- d. Location and Maps of the Census tract/block were obtained from the North Central Texas Council of Government (NCTCOG) web page.

INSTRUMENTATION

To overcome the limitation of sampling accuracy two model analyses were performed. The models were based on different distance patterns that analyzed both geographic units that the census data provided; block and block groups. Blocks contain information about race and age for hundred percent of the population living in that polygon. Block groups are bigger geographic units compared to blocks. And they contain random sampling of income, and education.

Model 1 includes the variables of race and age at block level, and the variables of income and education at block group level. For this model 50 m distances pattern was applied. The pattern consisted in building buffer rings around the parks from distance 0 m

up to 1600 m every 50 m, this resulted in 32 buffer rings with 107,434 polygons for the block level and 19,363 polygons for the block group level.

Model 2 includes same variables used in model 1. For this model double distances pattern was applied. The pattern consisted in building buffer rings around the parks from distance 0 m up to 1600 m every 50, 100, 200, 400, 600 m and so. This resulted in 6 buffer rings with 37,688 polygons for the block level and 5011 polygons for the block group level.

Data Analysis

The geographic layer of “parks”, “city limits”, “blocks”, and “block groups” were obtained from the NCTCOG. Data access tables of survey file 1, survey file 3, and survey file 7 were obtained from the US census of 2000, then the information of race and age was used in a table labeled “block”, and the information of income, and education was placed in the table labeled “block group”. These last tables were imported along with the layers from NCTCOG to a geodatabase for GIS analysis.

The GIS analysis began by linking the tables to the corresponding geographic unit; for instance “blocks” table was linked to “blocks” layer.

Then two new layers were created containing the buffers rings of “50” (model 1) and “double” (model 2). After that, the buffer layers, “50” and “double”, were independently associated with their corresponding blocks and blocks groups layers by intersection method. This resulted in 4 layers; “blocks 50”, “block groups 50” (model 1), “blocks double”, and “block groups double” (model 2).

For each layer and each variable the following was made; a column that calculated the current area for the polygon was multiplied by population given by the census, and then divided by the total area of the original block or block group, depending on the case. This procedure was intended to normalize the population by the area. So, there was a unique value for each polygon, and this value was representative of the population living there. Finally the four resulting layers were associated with the “cities limits” layer that contained the cities name. The information of these layers was exported as files into the Statistical Package for the Social Sciences 14.0 software (SPSS).

In SPSS descriptive statistics of the variables was performed on both models, followed by an analysis of variance (ANOVA) with a Levene’s test, Games-Howell post hoc test, curve estimation, and multiple linear regressions.

The homogeneity test (Levene’s test) showed no homogeneous sample at $\alpha = 0.05$ for all the files, therefore a Games-Howell post hoc test was chosen. The multiple linear regression was separated into 4 models; Race Ethnicity variables (1), Age (2), Economics (3), and Education (4). All models included distance as dependent variable.

After comparison of the 4 files, “blocks 50”, “block groups 50” (model 1), “blocks double”, and “block groups double” (model 2), only the results from model 1 were chosen to be reported in this study.

Summary

To determine if Recreational Justice was achieved among the four cities in the Metroplex, a multiple linear regression analysis of the data from the census was performed. The analysis determined how the distance of residents from a park was

influenced by Ethnicity/Race, Income, Education or Age. The analysis consisted of 1 distance pattern, or ring, every 50 m or every 164.04 feet up to a 0.999 Mile or 1600 m with two levels of sampling “block group” and “block” level (See illustration 2).

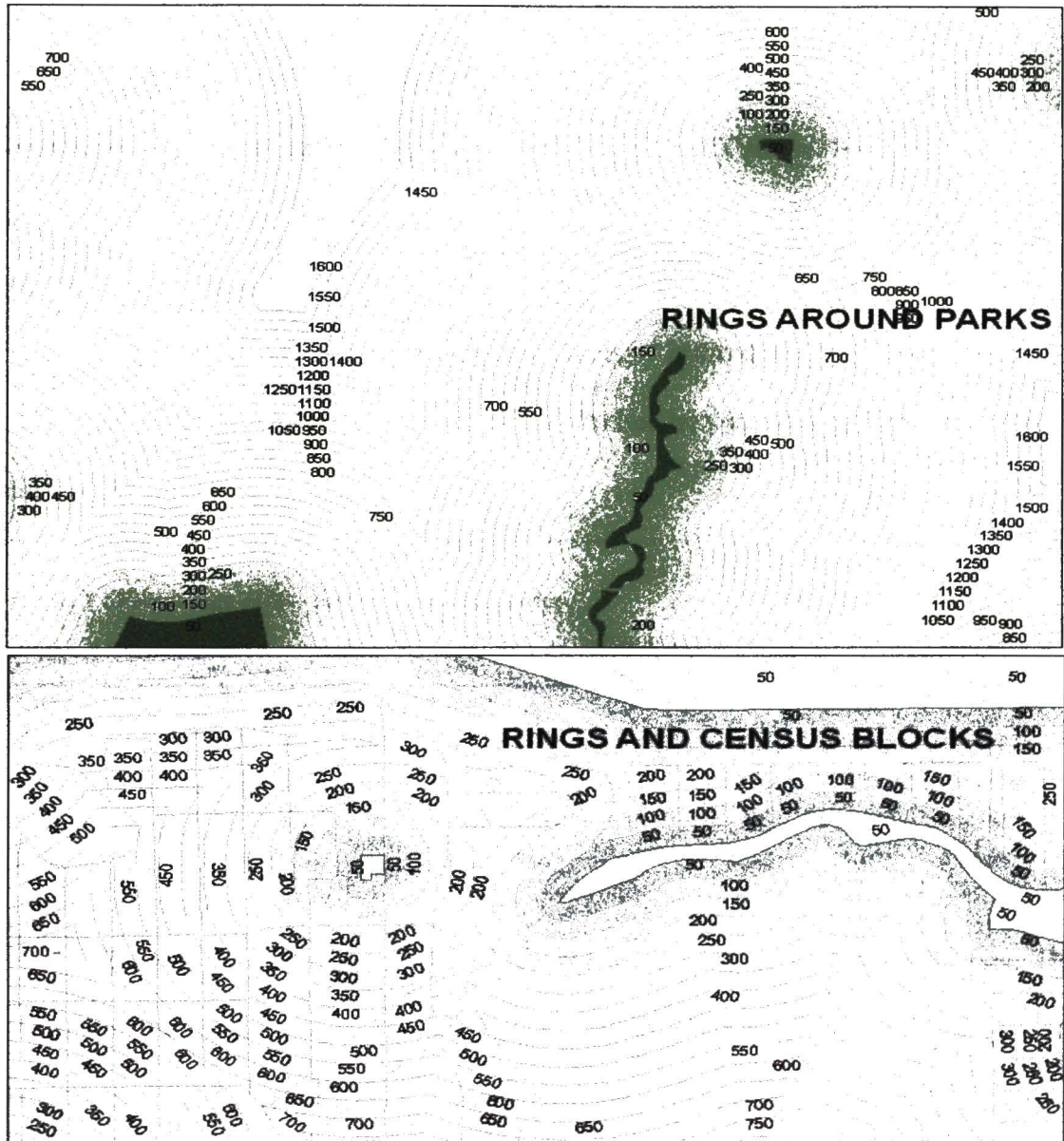


Illustration 2: Rings and Census Block Examples

CHAPTER IV

RESULTS

The results of the analysis of block and blocks groups at 50 m distance increase are reported by overall parks (1), population among cities (2), and within the cities population(3) described by city.

1. OVERALL PARKS

Reported in Table 1 as “parks area percentage” is the sum of the area from all the polygons identified as parks for a given city multiplied by 100, then divided by the total city area.

Table 1 : Percentage of the city land used for parks

	City Area	Population from blocks	Population from blocks group	Parks	Parks Area %
City	<i>M²</i>	<i>Polygons</i>	<i>Polygons</i>	<i>Polygons</i>	%
Dallas	10,751,249,336	1,153,048	15604	285,165	0.62%
Midlothian	1,064,331,298	4,983	219	4,320	0.02%
McKinney	1,651,540,426	41,750	730	285,165	0.09%
Plano	200,950,246	218,984	2810	15,035	5.65%

The percentage on this table reflects the actual land use for parks by city. The visual distribution of the maps among cities is shown in map 1 for Dallas, map 2 for Midlothian, map 3 for McKinney and map 4 for Plano. Included on the maps described above is a detail of the rings and the percentage (See Appendix B).

3. AMONG THE CITIES

- a. General population: The percentage of the population covered by parks within cities was the following: 97% of Dallas residents, 77% of McKinney residents, 67% of Midlothian residents and 99% of Plano residents' population live within the study area. This exposure proved to be statistical significant among the cities ($f = 153.821$, $p < 0.05$, see table 14). This indicates that recreational justice is different among cities. And, in a post hoc Games-Howell test, the highest differences were observed for the cities of Plano ($I-J = 2.98$ Dallas, 5.30 McKinney, and 8.08 Midlothian).

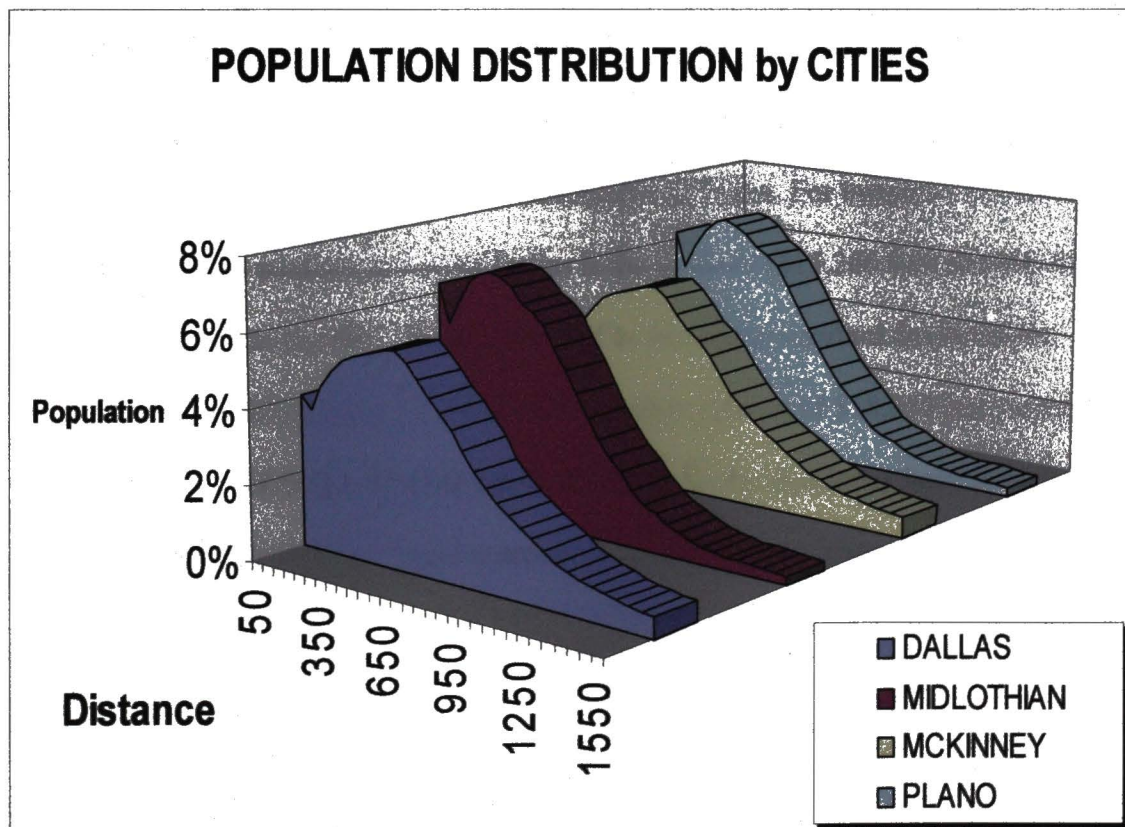


Illustration 3: Population Distribution Among the Rings by Cities

- b. Race/Ethnicity: a comparison of means by an analysis of variance showed significant differences among the cities for Whites ($f = 153.82$, $p < 0.05$), African Americans ($f = 42.646$, $p < 0.05$), Hispanics ($f = 422.64$, $p < 0.05$), Asians ($f = 953.41$, $p < 0.05$), and Others ($f = 13.22$, $p < 0.05$; see table 14).
- c. Age: despite the fact that in most of the cities the majority of the population is concentrated in the age groups of 20 to 54 (refer to tables 2, 5, 8, and 11), there was a statistically significant difference among cities for all 10 age groups (see table 14).
- d. Income: dollar annual income per capita was statistically significant among cities ($f = 3171.61$, $p < 0.05$); Midlothian with \$22,380.00 held the highest median income followed by McKinney with \$19,784.00; however, patterns in income distribution for every city were considerable different. For instance; despite the fact that the median income of Dallas is the smallest (\$15,266.00), this city has the maximum income. This is attributed to the higher standard deviation for Dallas (see illustration 4). Plano with a median income of \$18,855 has a scenario similar to Dallas (see illustration 4). Midlothian and McKinney have a modest uniform distribution of income around \$20,000.00 (see illustration 4).

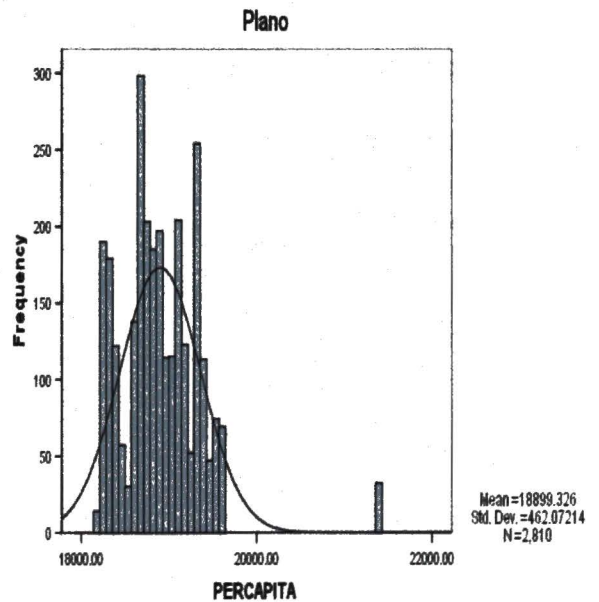
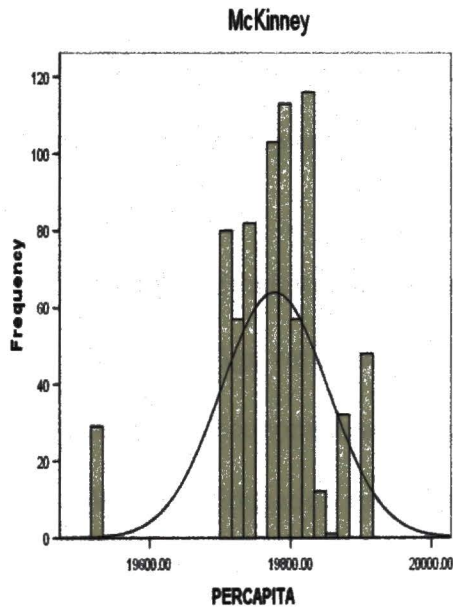
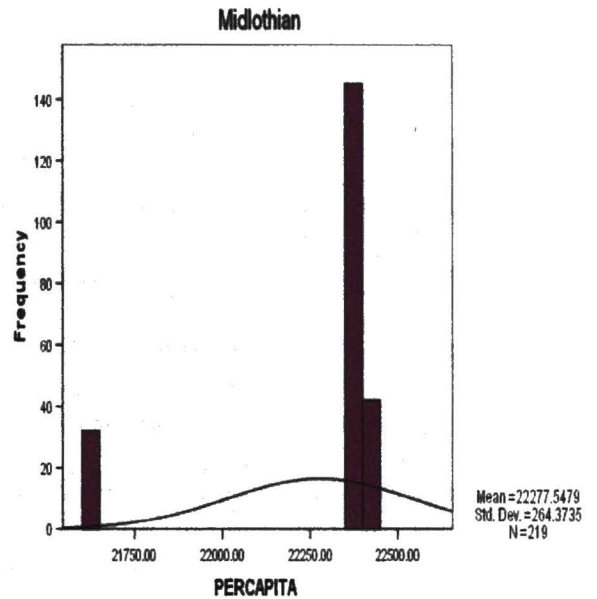
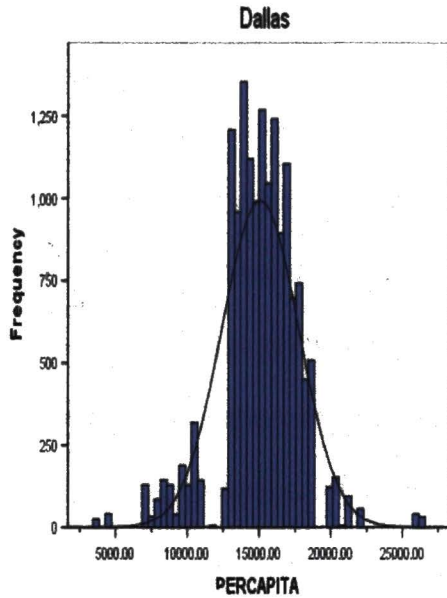


Illustration 4: Distribution of per capita income

- e. Education: Education was statistically significant in all educational levels (see table 14). Although the city of Plano has the highest profession level percentage,

16 percent (see table 11), there were no specific remarks in the post hoc Games-Howell test.

3. WITHIN CITIES

For all the cities individual analysis was performed. First, descriptive statistics were conducted in order to respond to the study question about what are the demographic characteristics (age, ethnicity/race, education, income) of the population living within 1,600 meters or approximately 1 mile of the perimeter of the parks in the given city.

Then, an analysis of variance addressed the mean differences of demographic characteristics among 32 increasing distances from the parks. Finally in order to decide if demographic characteristics can predict the distance between the house of a given person and the closest park, a regression analysis was run in 4 models. All models included distance as dependent variable, and independent variables were assigned among the models as follow:

Model 1: Ethnicity/race variables.

Model 2: Age variables.

Model 3: Economics variables.

Model 4: Education variables.

The results of these analyses are reported below.

DALLAS

- a. Race/Ethnicity: a comparison of means by an analysis of variance showed significant differences among the distance rings for Whites ($f = 3.068$,

- $p<0.05$), African Americans ($f= 4.152$, $p<0.05$), Hispanics ($f= 1.785$, $p<0.05$), Asians ($f= 4.436$, $p<0.05$), and Others ($f= 1.336$, $p<0.05$; see table 3). The regression analysis showed race as a significant predictor of distance; although, with 1 percent explanation of the variance ($r^2=0.015$ $p<0.05$).
- b. Age: the majority of the population in Dallas is concentrated around the age groups of 5 to 14 and 20 to 54 (refer to tables 2), all age groups were statistically significant (see table 3). Multiple linear regression illustrated in table 4 showed age as a significant but weak predictor of distance ($r^2=0.032$ $p<0.05$).
 - c. Income: Median \$ 15,266.00. Means differences, table 3, were statistically significant ($f= 14.076$, $p<0.05$) however, income was not a strong significant predictor of distance ($r^2= -0.023$ $p<0.05$).
 - d. Education: the majority of the population has an education level between elementary and high school (refer to table 2), yet all education levels were statistically significant in the ANOVA analysis (see table 3). For Dallas education alone was the strongest significant predictor of distance ($r^2= -0.096$ $p<0.05$).

MIDLOTHIAN

- a. Race/Ethnicity: a comparison of means by ANOVA showed significant differences among the distance rings for all races except for Whites ($f= 1.106$, $p<0.05$, see table 6). Yet, the regression analysis showed race as a significant

predictor of distance, with 1 percent explanation of the variance ($r^2=0.015$ $p<0.05$).

- b. Age: the majority of the population in Midlothian is concentrated around the age groups of 20 to 54 years old (refer to tables 5), with only 6 age groups being statistically significant (see table 6). However, in multiple linear regression (see table), age was a statistically significant predictor of distance ($r^2=0.303$ $p<0.05$).
- c. Income: with a per capita median of \$ 22,380.00, means differences (see table 3) were not statistically significant ($f= 0.054$, $p<0.05$). Income was not a significant predictor of distance ($r^2= -0.181$ $p<0.05$).
- d. Education: the majority of the population has an education level between elementary and high school (refer to table 5), yet all education levels were statistically significant in the ANOVA analysis (see table 6). For Midlothian education along was the strongest significant predictor of distance ($r^2= -0.398$ $p<0.05$), see table 7.

MCKINNEY

- a. Race/Ethnicity: with a majority White population in an ANOVA analysis only Hispanics ($f= 3.801$, $p<0.05$), and African Americans ($f= 4.934$, $p<0.05$) were statistically significant (see table 8). Nevertheless, the regression analysis showed race as a significant predictor of distance with 8 percent of the variance explained by this model ($r^2=0.084$ $p<0.05$).

- b. Age: the majority of the population in this city is concentrated around the age groups of 0 to 14 and 20 to 54 (refer to tables 8), all age groups were statistically significant (see table 3). Multiple linear regression illustrated in table 4 shown age as a significant no strong predictor of distance ($r^2=0.087$ $p<0.05$).
- c. Income: with a per capita median of \$ 19,784.00, means differences (see table 9) were not statistically significant ($f= 0.065$, $p<0.05$). Income was not a significant predictor of distance ($r^2= -0.043$ $p>0.05$).
- d. Education: the education level population is distributed between elementary school and College level (refer to table 8), yet all education levels were statistically significant in the ANOVA analysis (see table 9). For McKinney education alone was the strongest significant predictor of distance ($r^2= -0.338$, $p<0.05$).

PLANO

- a. Race/Ethnicity: Although most of the population in Plano is White (73%) a comparison of means by an analysis of variance showed significant differences among the distance rings for Whites ($f= 14.249$, $p<0.05$), African Americans ($f= 3.242$, $p<0.05$), Hispanics ($f= 2.198$, $p<0.05$), Asians ($f= 3.768$, $p<0.05$), and Others ($f= 4.682$, $p<0.05$; see table 11). The regression analysis shown race as a significant predictor of distance; although, with 1 percent explanation of the variance ($r^2=0.020$ $p<0.05$).

- b. Age: the majority of the population in Plano is concentrated around the age groups of 20 to 54 years old (refer to tables 11), all age groups were statistically significant (see table 3). Multiple linear regression illustrated in table 13 showed age as a significant no strong predictor of distance ($r^2=0.079$ $p<0.05$).
- c. Income: with a per capita median of \$ 18,855, means differences (see table 12) were not statistically significant ($f= 0.345$, $p>0.05$). Income was not a significant predictor of distance ($r^2= -0.004$ $p>0.05$).
- d. Education: the education level of the population is distributed between elementary school up to professional level (refer to table 8), yet all education levels were statistically significant in the ANOVA analysis (see table 12). For Plano education alone was the strongest significant predictor of distance ($r^2= -0.194$, $p<0.05$).

SUMMARY

Response of the study question of what are the demographic characteristics (age, ethnicity/race, education, income) of the population living within 1,600 meters or 1 mile of the perimeter of the parks in Plano, Dallas, McKinney and Midlothian was achieved by the descriptive statistics of the population living around the parks from all cities.

Variance among the cities was statistically significant in all levels; race/ethnicity, education, income, and age. Results are compiled in tables 3, 6, 9, and 12. Within cities variance was statically significant for all the demographic characteristics for Cities of

Dallas and Plano. For the cities of Midlothian and McKinney the stronger predictor was education. Tables 4, 7, 10, and 13 display the analysis results.

CHAPTER V

CONCLUSIONS

AMONG CITIES

There are statistically significant differences in the demographic characteristics among cities' population. Although, this is mainly explained by the differences of the population for the cities themselves, total population variance reflects that regardless the demographics there is a lack of equity in the distribution of parks, with the city of Plano and Dallas with the highest percentage and McKinney and Midlothian with the smallest.

In conclusion, based on these analyses the null hypothesis for no differences among cities can be rejected. Stating that recreational justice measured in this study is different among these cities.

Within Cities

General conclusions for all the variables in all the cities are as follows:

1. Small "r square" in all the variables can be explained by method used in the geographic sampling. Blocks and blocks groups are geographic census units that assume an equal distribution on the surface of the polygon. Since the analysis included distances smaller (50 m) than the total surface of the blocks or block groups polygons, population calculated based on the area was used, rather than assuming the same population for all the area of blocks and block

groups. This resulted in several sampling units (polygons) with values close to zeros or zeros.

2. Another effect of sampling is the break on decreasing pattern of population around 100 m for all the cities. This again is due to the fineness of the sampling which is higher within the smaller distances from the park. This was also confirmed by the comparison of model analysis which were better when distances increases were smaller (50 m) compare to bigger increases (double increased m)
3. For all cities college population for people 25 and younger was less than 10 percent because except for Dallas of these cities are college towns.
4. For all the cities the stronger predictor was Education.

Specifically, the results can divided into two groups; cities with more than 96 percentage of their population in the study area, and cities below 78 percentage of the study area.

For the first group, Dallas and Plano, the fact that 97% and 98% of the population was analyzed explained the statistically significant values of Betas from the regression analysis, and for the regression analysis. It can be said that both cities included more than 97% percent of the population; however the city of Dallas only has 0.62 % of its land designated to parks, compare 5.65% for Plano.

Second, although the city of Plano is mainly white (76%), there was also beneficial exposure of Hispanic and African American. So for instance; for every African American there is 0.05 meters less distance from a park. Asian with a bigger percentage population

than African American (see table 11) received less beneficial exposure to parks than African American, so for every Asian there is 0.08 meters more from parks.

Finally, Dallas was the only city where income was a significant predictor of distance.

In conclusion, despite the fact that the Null hypothesis for Dallas and Plano can be rejected stating that there are differences in the population demographics living around parks, recreational justice has been met due to the fact that over 97% of the population is within 1 mile of a park.

For the second group, there were no statistically significant differences for most of the demographics except education. Therefore the null hypothesis can be accepted for the rest of the demographic characteristics stating that there are no ethnicity/race, age, or income differences among the population living around parks. Nevertheless, with less than 78 % coverage, recreational justice was not met for the city of Midlothian and McKinney.

In a phone interview with Supernatant for recreation and parks for the city of Midlothian Mr. Jim Berman (see appendix D), acknowledged the lack of land designed for parks and the priority to solve this matter. In the 2006 decennial parks plan for the city of Midlothian a budget of 14 million dollars to acquire more land was designated. Also new ordinances include the donation of 5 acres per every 1000 roofs build in the developer's plans.

RECOMMENDATIONS

More sophisticated sampling techniques are required to search for meaningful differences for the cities of Plano and Dallas. An important component that could change

the results for this study is the analysis with a factor park level base on parks classification. For instance the city of Plano has a five level classification of parks (see appendix D); neighborhood parks (7.5 to 10 acres), linear parks – (for flood mitigation), community parks (25 or more acres) some recreational facilities, open space preserves (preserve ecologically sensitive areas), and special use facilities (dog park, skate park, etc). Further studies should consider parks classification as the one described above.

Although the total land designated for parks is important to archive the desire ratio of 5 acres per 1000 people, planning for parks distribution is also a key factor. For the cities of Midlothian and McKinney this distribution is essential to cover the base majority of their population.

It is also important to mention that the same percentage coverage of the population can be achieved by considerable different percentages of land designated as parks. Adequate coverage may be accomplished by city planning through land use regulations (Dallas Development Code Article IV, 2002 and Plano Development regulation 2005), and in the case of Dallas city also by committed maintenance programs (American City and County Magazine 2003).

However planning would be meaningless without funding. In this study cities with different income were intentionally chosen. As expected the city of Dallas and Plano with the highest maximum income were the only one that achieved recreational justice (See Appendix C). Budget for individual recreational and parks departments was not considered in this study, and is recommended to be taken into consideration for further analysis.

In conclusion, the study does not provide evidence for the use of recreational justice as a single measurement of environmental justice. Environmental assessments should include equal distribution to mitigate pollution measurements such as parks, however this analysis should not be the only criteria in considering environmental justice for a given population, the traditional exposure to hazardous materials, health risks, and undesirable land use should still be considered. Further studies are needed to see if there is a difference when size of the city, the median income of the city, budget designated to parks, and/or parks qualities are taken into account.

APPENDIX A
STATISTICAL ANALYSIS TABLES

CITY OF DALLAS

Table 2: Characteristics of population from the Census 2000 living in the study area for the city of Dallas

Characteristic	No. in sample (n)	Population %
CITY POPULATION	1,188,580	100%
TOTAL POPULATION STUDIED	1,153,078	97%
RACE/ ETHNICITY		
White	390,839	34%
African American	298,350	26%
Hispanic	415,844	36%
Asian	30,009	3%
Others	18,036	2%
AGE*		
5 or Less	96,015	8%
5 to 14	164,857	14%
15 to 19	79,869	7%
20 to 24	102,160	9%
25 to 34	226,527	20%
35 to 44	178,912	16%
45 to 54	128,963	11%
55 to 59	43,043	4%
60 to 64	32,453	3%
65 or More	100,273	9%
INCOME		
Total Families	266,789	
Families with Income Below Poverty Level	18,690	7%
Annual Income Per Capita median**	\$ 15,266.00	
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	56141	5%
Elementary to Middle	190186	16%
High school	80926	7%
College	61588	5%
Graduate School	18022	2%
<i>26 years old or greater</i>		
Analphabet	46132	4%
Some Elementary or Middle	132141	11%
Some High School or High School	450040	39%
Some College or College	39977	3%
Graduate or Profession	81130	7%

* In years

** Dollars

Table 3: Analysis of variance of population from the Census 2000 living in the study area for the city of Dallas

Variables	Levene Test	F-test
RACE/ ETHNICITY		
White	10.348*	3.068*
African American	10.898*	4.152*
Hispanic	3.892*	1.785*
Asian	13.172*	4.436*
Others	4.490*	1.336
AGE*		
5 or Less	5.471*	2.056*
5 to 14	8.670*	4.065*
15 to 19	9.074*	4.379*
20 to 24	6.708*	1.533*
25 to 34	7.877*	1.630*
35 to 44	6.201*	2.418*
45 to 54	14.547*	6.211*
55 to 59	18.585*	7.938*
60 to 64	25.170*	9.749*
65 or More	11.830*	5.554*
INCOME		
Total Families	45.794*	1103.264*
Families with Income Below Poverty Level	30.294*	549.042*
Income Per Capita**	8.954*	14.076*
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	36.254*	792.774*
Elementary to Middle	37.851*	846.577*
High School	44.190*	995.448*
College	14.340*	512.753*
Graduate School	11.768*	310.780*
<i>26 years old or greater</i>		
Analphabet	18.286*	284.864*
Some Elementary or Middle	15.987*	280.681*
Some High School or High School	35.716*	763.416*
Some College or College	29.720*	795.247*
Graduate or Profession	22.870*	453.964*

*p<0.05

Table 4. Multiple linear regression models for the relationship between distance and population demographics. Data obtained from the Census 2000 for the city of Dallas

VARIABLES	R Square	Standardized B	Confidence Intervals for unstandardized B	
MODEL 1 RACE/ ETHNICITY	0.015			
White		-0.059	-0.382	-0.346
African American		0.003	0.003	0.033
Hispanic		-0.036	-0.166	-0.149
Asian		0.131	5.375	5.556
Others		-0.030	-2.794	-2.215
MODEL 2 AGE*	0.032			
5 or Less		0.156	3.489	3.923
5 to 14		0.072	1.268	1.576
15 to 19		-0.449	-15.003	-14.469
20 to 24		0.267	3.551	3.932
25 to 34		0.080	0.487	0.664
35 to 44		-0.101	-1.044	-0.853
45 to 54		-0.062	-2.131	-1.555
55 to 59		0.058	7.047	8.386
60 to 64		-0.052	-10.852	-9.397
65 or More		-0.022	-0.978	-0.798
MODEL 3 INCOME	0.023			
Total Families		-0.007	-1.620	0.262
Families with Income Below Poverty Level		-0.194	-14.454	-13.092
Income Per Capita**		-0.153	-0.024	-0.020
MODEL 4 EDUCATION	0.096			
<i>Under 25 years old</i>				
Below Preschooler		0.083	37.389	50.940
Elementary to Middle		-0.186	-32.151	-26.976
High School		-0.180	-72.475	-63.524
College		0.184	64.189	73.932
Graduate School		0.135	128.051	148.96
<i>26 years old or greater</i>				
Analphabet		-0.186	-81.698	-70.164
Some Elementary or Middle		-0.208	-39.394	-31.564
Some High School or High School		-0.501	-34.142	-29.6145
Some College or College		-0.784	-51.806	-47.132
Graduate or Profession		-0.105	-30.205	-23.623

*p<0.05

CITY OF MIDLOTHIAN

Table 5: Characteristics of population from the Census 2000 living in the study area for the city of Midlothian

Characteristic	No. in sample (n)	Population %
CITY POPULATION	7,480	
TOTAL POPULATION STUDIED	4983	67%
RACE/ ETHNICITY		
White	3889	78%
African American	192	4%
Hispanic	802	16%
Asian	27	1%
Others	70	1%
AGE*		
5 or Less	450	9%
5 to 14	858	8%
15 to 19	403	7%
20 to 24	328	17%
25 to 34	850	15%
35 to 44	769	15%
45 to 54	537	11%
55 to 59	212	4%
60 to 64	152	3%
65 or More	420	8%
INCOME		
Total Families	210	
Families with Income Below Poverty Level	62	30%
Median Income Per Capita**	\$ 22,387.00	
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	140	3%
Elementary to Middle	922	19%
High School	533	11%
College	103	2%
Graduate School	54	1%
<i>26 years old or More</i>		
Analphabet	44	1%
Some Elementary or Middle	311	6%
Some High School or High School	2312	46%
Some College or College	357	7%
Graduate or Profession	208	4%

* In years

** Dollars

Table 6: Analysis of variance of population from the Census 2000 living in the study area for the city of Midlothian

Variables	Levene Test	F-test
RACE/ ETHNICITY		
White	1.106	0.290
African American	2.537*	0.290
Hispanic	1.799*	0.549
Asian	2.764*	0.734
Others	2.158*	0.688
AGE*		
5 or Less	1.388	0.386
5 to 14	1.501*	0.366
15 to 19	1.222	0.299
20 to 24	1.735*	0.486
25 to 34	1.605*	0.379
35 to 44	1.158	0.266
45 to 54	1.158	0.531
55 to 59	2.040*	0.826
60 to 64	3.961*	1.558*
65 or More	3.114*	1.772*
INCOME		
Total Families	1.613*	4.166*
Families with Income Below Poverty Level	2.056*	4.626*
Income Per Capita**	0.178	0.054
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	1.077	2.152*
Elementary to Middle	0.733	3.948*
High School	1.433	3.923*
College	1.336	3.051*
Graduate School	1.911*	3.066*
<i>26 years old or More</i>		
Analphabet		
Some Elementary or Middle	3.735*	4.694*
Some High School or High School	3.464*	4.486*
Some College or College	2.612*	4.872*
Graduate or Profession	0.675	2.278*

*p<0.05

Table 7. Multi-linear regression models for the relationship between distance and population demographics. Data drawn from the Census 2000 for the city of Midlothian

VARIABLES	R Square	Standardized	Confidence Intervals	
		B	unstandardized B	
MODEL 1 RACE/ ETHNICITY	0.015			
White		0.279	4.669	8.580
African American		0.029	0.850	17.931
Hispanic		-0.607	-9.716	-8.267
Asian		0.279	-15.072	52.530
Others		0.029	225.011	0.279
MODEL 2 AGE*	0.303			
5 or Less		-0.256	-37.426	-0.608
5 to 14		1.266	49.031	70.605
15 to 19		1.093	83.115	127.769
20 to 24		-0.885	-88.077	-58.973
25 to 34		1.418	65.448	87.592
35 to 44		-0.978	-75.974	-44.320
45 to 54		-1.052	-135.926	-104.368
55 to 59		-0.294	-97.793	-44.644
60 to 64		-0.204	-119.689	-66.427
65 or More		-0.006	-14.097	11.081
MODEL 3 INCOME	0.181			
Total Families		1.454	674.407	1875.398
Families with Income Below Poverty Level		-0.351	-1683.900	-268.379
Income Per Capita**		0.079	-6987.588	2943.869
MODEL 4 EDUCATION	0.398			
<i>Under 25 years old</i>				
Below Preschooler		5.448	26218.504	60193.167
Elementary to Middle				
High School		-7.313	-45506.211	-9393.665
College		-1.419	-27580.315	-10353.911
Graduate School		-7.637	-212911.098	-66836.399
<i>26 years old or More</i>				
Analphabet		2.955	2858.396	119799.336
Some Elementary or Middle		Excluded		
Some High School or High School		Excluded		
Some College or College		6.128	687.159	13470.549
Graduate or Profession		1.087	-4658.319	28272.175

*p<0.05

CITY OF MCKINNEY

Table 8: Characteristics of population from the Census 2000 living in the study area for the city of McKinney

Characteristic	No. in sample (n=)	Population %
CITY POPULATION	54,369	100%
TOTAL POPULATION STUDIED	41749	77%
RACE/ ETHNICITY		
White	28970.13835	69%
African American	3114.637639	7%
Hispanic	8345.390889	20%
Asian	565.1270438	1%
Others	755	2%
AGE*		
5 or Less	3,978	10%
5 to 14	6,914	17%
15 to 19	3,084	7%
20 to 24	2,925	7%
25 to 34	7,025	17%
35 to 44	7,597	18%
45 to 54	4,570	11%
55 to 59	1,477	4%
60 to 64	1,057	3%
65 or More	3,118	7%
INCOME		
Total Families	909	
Families with Income Below Poverty Level	342	38%
Median Income Per Capita**	\$ 19,784.00	
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	2025	5%
Elementary to Middle	5376	13%
High School	1749	4%
College	1269	3%
Graduate School	450	1%
<i>26 years old or More</i>		
Analphabet	393	1%
Some Elementary or Middle	1634	4%
Some High School or High School	13170	32%
Some College or College	13102	31%
Graduate or Profession	2581	6%

* In years

** Dollars

Table 9: Analysis of variance of population from the Census 2000 living in the study area for the city of McKinney

Variables	Levene Test	F-test
RACE/ ETHNICITY		
White	1.18	0.691
African American	9.311*	3.801*
Hispanic	9.153*	4.934*
Asian	1.166	0.344
Others	2.795*	0.876
AGE*		
5 or Less	1.158	0.722
5 to 14	1.417	0.880
15 to 19	3.436*	1.980*
20 to 24	4.655*	2.207*
25 to 34	1.254	0.852
35 to 44	1.805*	0.830
45 to 54	1.032	0.806
55 to 59	1.969*	1.014
60 to 64	2.125*	1.050
65 or More	4.020*	2.335*
INCOME		
Total Families	0.496	9.894*
Families with Income Below Poverty Level	3.124*	33.570*
Income Per Capita**	0.652	0.059
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	0.604	13.957*
Elementary to Middle	0.459	10.096*
High School	0.610	10.390*
College	0.963	6.326*
Graduate School	1.105	26.272*
<i>26 years old or More</i>		
Analphabet	2.508*	15.353*
Some Elementary or Middle	5.524*	31.972*
Some High School or High School	3.391*	18.462*
Some College or College	1.118	20.583*
Graduate or Profession	1.127	25.174*

*p<0.05

Table 10. Multiple linear regression models for the relationship between distance and population demographics. Data drawn from the Census 2000 for the city of McKinney

VARIABLES	R Square	Standardized B	Confidence Intervals unstandardized B	
MODEL 1 RACE/ ETHNICITY	0.084			
White		0.288	4.751	5.373
African American		-0.131	-7.086	-5.985
Hispanic		-0.083	-2.368	-1.837
Asian		0.000	-6.386	6.722
Others		-0.242	-75.404	-65.423
MODEL 2 AGE*	0.087			
5 or Less		0.034	0.218	7.030
5 to 14		-0.037	-5.514	-0.695
15 to 19		0.016	-0.445	2.304
20 to 24		-0.264	-15.815	-12.106
25 to 34		-0.159	-8.771	-5.630
35 to 44		0.476	32.055	36.903
45 to 54		-0.201	-27.285	-21.504
55 to 59		0.086	29.836	42.612
60 to 64		-0.050	-30.542	-15.132
65 or More		-0.013	-4.233	-0.323
MODEL 3 INCOME	0.002			
Total Families		0.283	50.671	63.006
Families with Income Below Poverty Level		-0.405	-160.561	-138.678
Income Per Capita**		0.043	-12008.838	4128.542
MODEL 4 EDUCATION	0.338			
<i>Under 25 years old</i>				
Below Preschooler		-0.7735	-772.589	-494.035
Elementary to Middle		0.902	250.7244	378.9733
High School		-0.081	-205.956	25.33823
College		-0.497	-847.666	-586.214
Graduate School		0.045	-208.173	520.7708
<i>26 years old or More</i>				
Analphabet		0.418	624.4507	875.9603
Some Elementary or Middle		-0.632	-431.563	-223.915
Some High School or High School		-0.467	-219.537	-80.876
Some College or College		0.873	61.62158	164.0977
Graduate or Profession		-0.654	-456.911	-193.813

*p<0.05

CITY OF PLANO

Table 11: Characteristics of population from the Census 2000 living in the study area
for the city of Plano

Characteristic	No. in sample (n)	Population %
CITY POPULATION	222,030	
TOTAL POPULATION STUDIED	218984	99%
RACE/ ETHNICITY		
White	159096	73%
African American	10813	5%
Hispanic	22166	10%
Asian	22342	10%
Others	4,562	2%
AGE*		
5 or Less	18,184	8%
5 to 14	35,521	6%
15 to 19	14,174	5%
20 to 24	10,405	16%
25 to 34	34,845	16%
35 to 44	44,918	21%
45 to 54	33,717	15%
55 to 59	10,404	5%
60 to 64	5,974	3%
65 or More	10,836	5%
INCOME		
Total Families	60,578	
Families with Income Below Poverty Level	13,347	22%
Median Income Per Capita**	\$ 18,855	
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	14071	6%
Elementary to Middle	40274	18%
High School	17913	8%
College	12999	6%
Graduate School	4633	2%
<i>26 years old or More</i>		
Analphabet	942	0%
Some Elementary or Middle	3729	2%
Some High School or High School	37353	17%
Some College or College	52530	24%
Graduate or Profession	34110	16%

* In years

** Dollars

Table 12: Analysis of variance of population from the Census 2000 living in the study area for the city of Plano

Variables	Levene Test	F-test
RACE/ ETHNICITY		
White	14.707*	14.269*
African American	7.721*	3.242*
Hispanic	3.920*	2.198*
Asian	8.984*	3.768*
Others	11.195*	4.682*
AGE*		
5 or Less	11.161*	8.099*
5 to 14	16.762*	14.237*
15 to 19	15.236*	13.945*
20 to 24	4.604*	2.085*
25 to 34	6.724*	3.062*
35 to 44	14.842*	11.608*
45 to 54	18.009*	18.484*
55 to 59	30.188*	23.818*
60 to 64	31.849*	21.772*
65 or More	7.529*	5.021*
INCOME		
Total Families	45.794*	1103.264*
Families with Income Below Poverty Level	30.294*	549.042*
Income Per Capita**	0.345	0.092
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	13.649*	298.926*
Elementary to Middle	16.553*	315.885*
High School	18.727*	279.288*
College	15.655*	284.080*
Graduate School	8.674*	191.449*
<i>26 years old or More</i>		
Analphabet	4.478*	28.443*
Some Elementary or Middle	3.130*	34.810*
Some High school or High School	22.500*	382.171*
Some College or College	21.039*	407.990*
Graduate or Profession	10.790*	253.535*

*p<0.05

Table 13. Multiple linear regression models for the relationship between distance and population demographics. Data drawn from the Census 2000 for the city of Plano

VARIABLES	R Square	Standardized	Confidence Intervals	
		B	unstandardized	B
MODEL 1 RACE/ ETHNICITY	0.02			
White		-0.1798	-1.456	-1.307
African American		-0.0391	-1.384	-0.834
Hispanic		-0.0515	-0.691	-0.576
Asian		0.0894	3.284	3.894
Others		0.0321	2.174	4.710
MODEL 2 AGE*	0.079			
5 or Less		-0.518	-23.141	-21.530
5 to 14		0.370	10.040	11.197
15 to 19		-0.562	-33.678	-31.438
20 to 24		0.511	16.110	17.807
25 to 34		0.070	0.734	1.550
35 to 44		0.159	3.673	4.772
45 to 54		0.020	0.363	1.545
55 to 59		-0.172	-28.160	-25.417
60 to 64		-0.101	-28.149	-24.349
65 or More		0.027	1.450	2.111
MODEL 3 INCOME	0.004			
Total Families		-0.175	-14.278	-11.275
Families with Income Below Poverty Level		-0.106	-34.136	-25.548
Income Per Capita**		0.004	-0.027	0.033
MODEL 4 EDUCATION	0.194			
<i>Under 25 years old</i>				
Below Preschooler		0.266	89.642	116.764
Elementary to Middle		0.121	9.856	23.383
High School		-0.020	-14.981	3.316
College		0.074	14.704	30.886
Graduate School		0.421	350.713	399.941
<i>26 years old or More</i>				
Analphabet		0.177	424.964	571.856
Some Elementary or Middle		-0.336	-256.596	-208.087
Some High School or High School		-1.035	-180.572	-158.244
Some College or College		-1.719	-89.471	-75.388
Graduate or Profession		-0.497	-96.734	-78.506

*p<0.05

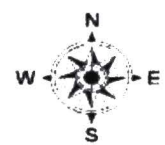
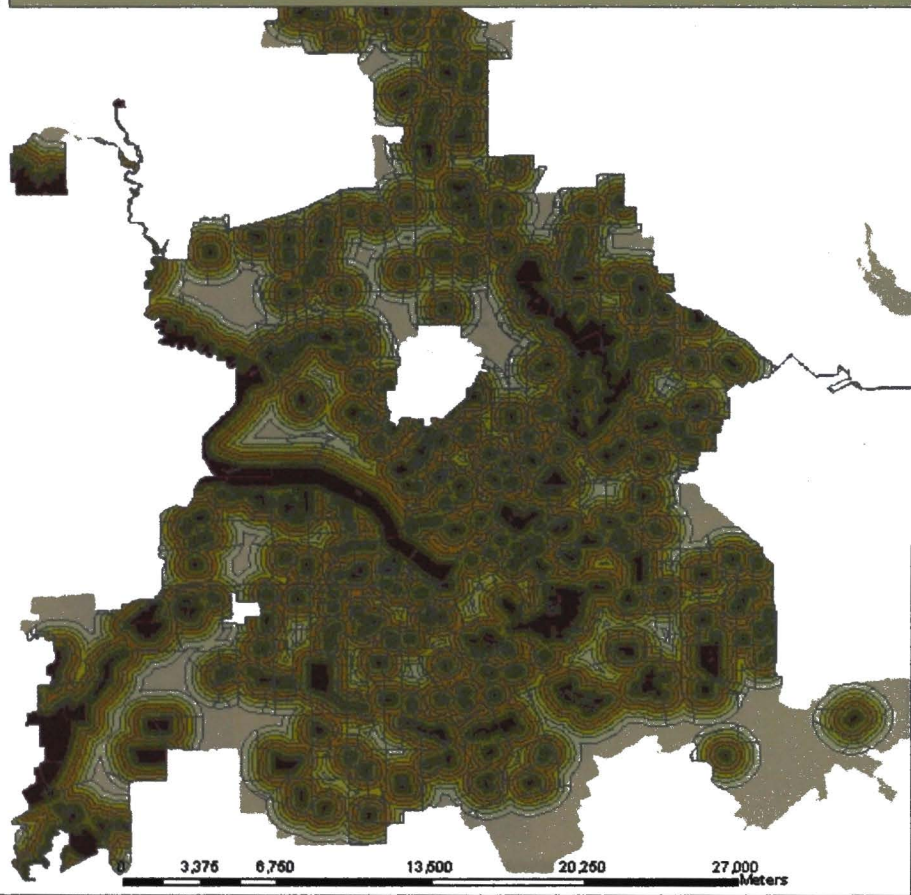
Table 14: Analysis of variance among the cities of the Recreational Justice and City Planning population.

Variables	Levene Test	F-test
TOTAL POPULATION	63.272*	153.821*
RACE/ ETHNICITY		
White	302.556*	740.499*
African American	1075.124*	422.646*
Hispanic	687.762*	285.817*
Asian	1269.826*	953.417*
Others	46.704*	13.222*
AGE*		
5 or Less	123.738*	42.389*
5 to 14	120.222*	72.113*
15 to 19	174.238*	65.751*
20 to 24	271.351*	120.722*
25 to 34	180.067*	70.681*
35 to 44	64.388*	107.074*
45 to 54	245.894*	314.790*
55 to 59	263.147*	235.855*
60 to 64	235.066*	161.387*
65 or More	282.156*	245.351*
INCOME		
Mean Income Per Capita**	1023.149*	3171.612*
EDUCATION		
<i>Under 25 years old</i>		
Below Preschooler	3824.790*	2233.388*
Elementary to Middle	6290.359*	4211.251*
High School	10780.897*	4972.778*
College	5790.482*	2955.707*
Graduate School	2349.688*	1130.442*
<i>26 years old or More</i>		
Analphabet	1699.374*	634.831*
Some Elementary or Middle	2162.099*	1223.669*
Some High school or High School	7544.710*	3777.301*
Some College or College	6042.137*	3307.751*
Graduate or Profession	2920.576*	1677.524*

*p<0.05

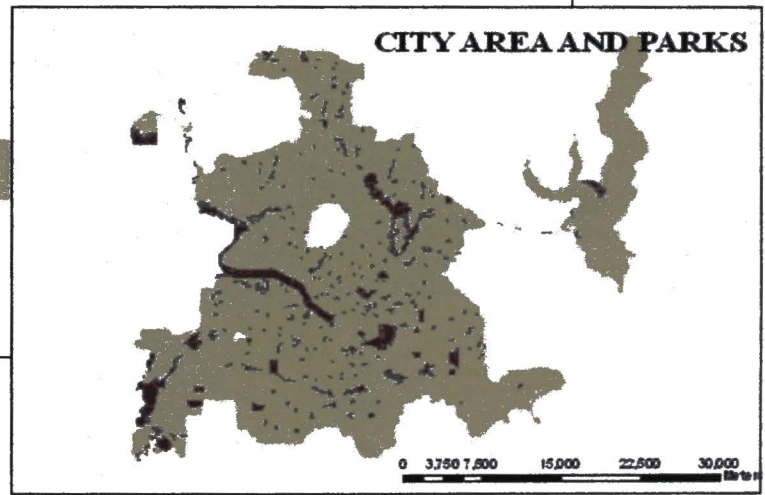
APPENDIX B
CITIES MAPS

DALLAS ENVIRONMENTAL JUSTICE AND CITY PLANNING



PARKS OF DALLAS CITY

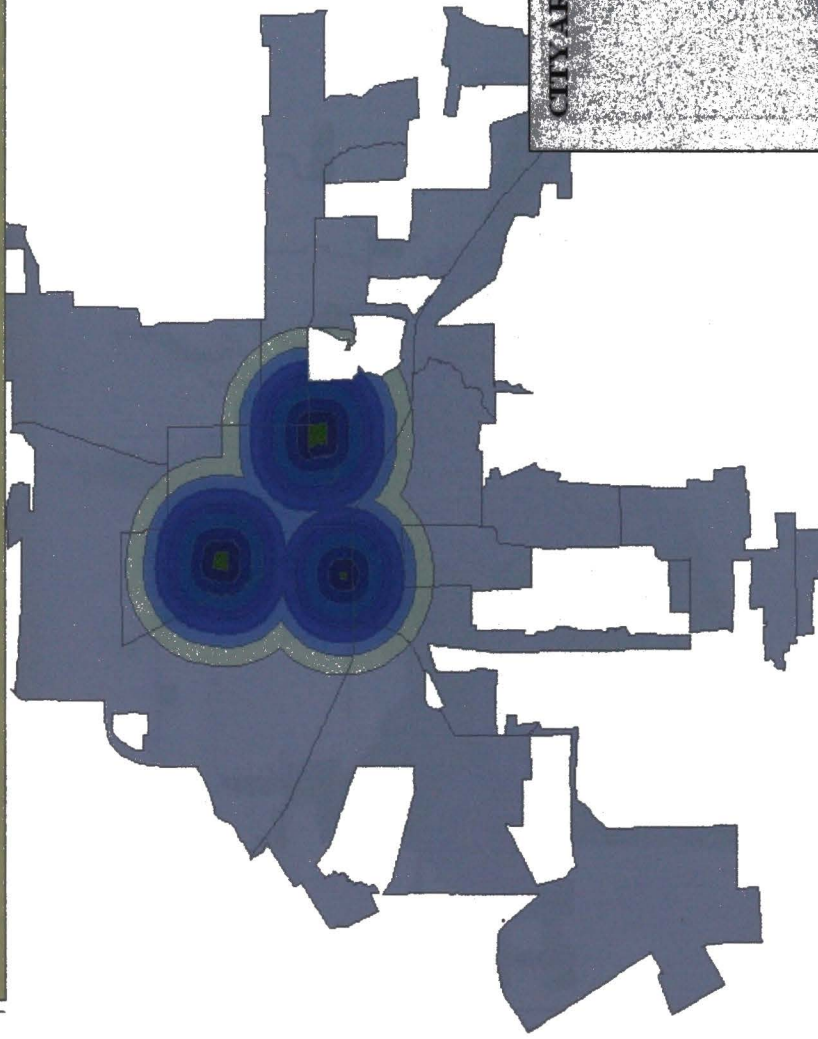
- Parks
- Dallas City



RINGS AND CENSUS BLOCKS GROUPS

CITY AREA AND PARKS

MIDLOTHIAN ENVIRONMENTAL JUSTICE AND CITY PLANNING

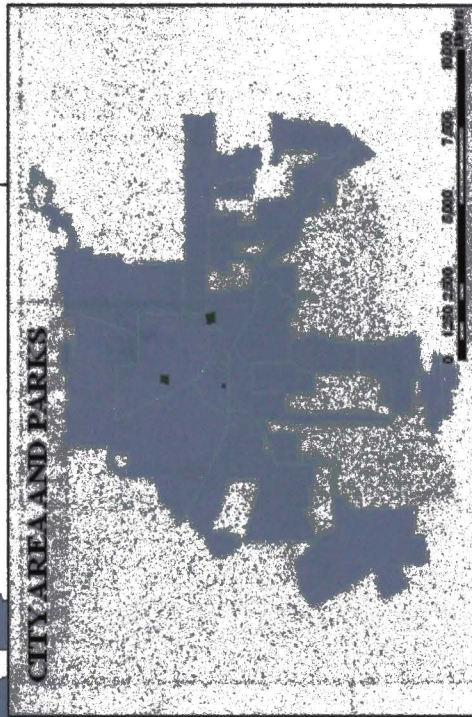


0 1,150 2,300 4,600 6,900 9,200 Meters

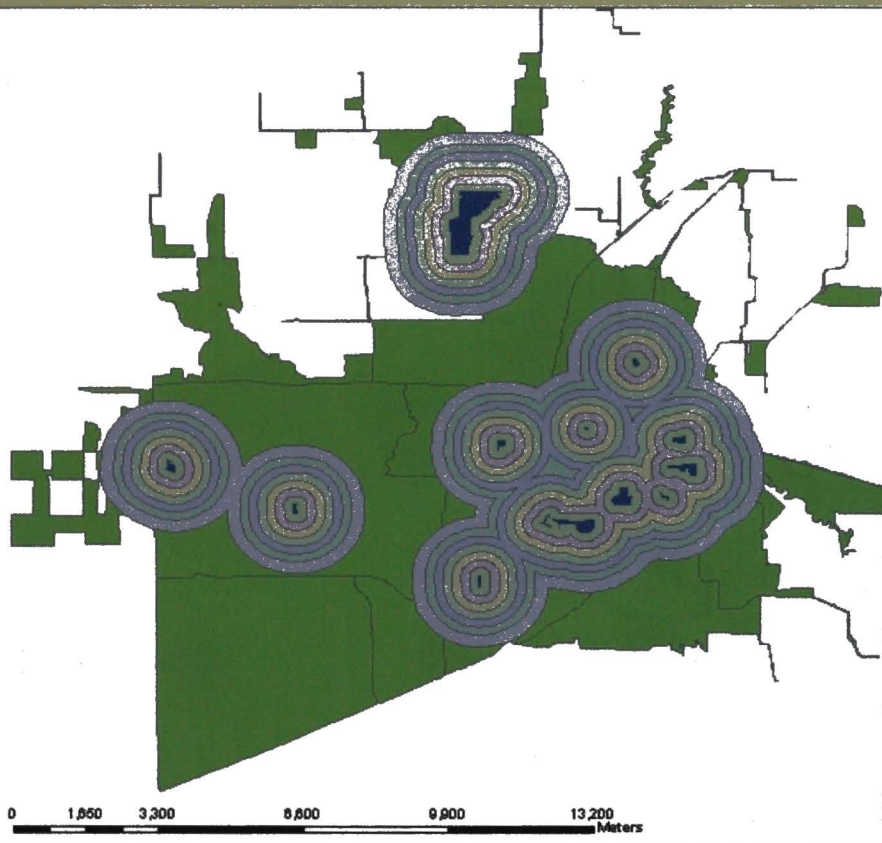
RINGS AND CENSUS BLOCKS GROUPS

PARKS OF MIDLOTHIAN CITY

Parks
Midlothian City



MCKINNEY ENVIRONMENTAL JUSTICE AND CITY PLANNING

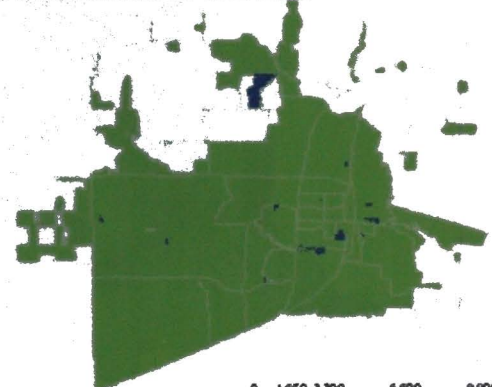


PARKS OF MCKINNEY CITY

McKinney City
Parks

RINGS AND CENSUS BLOCKS

CITY AREA AND PARKS



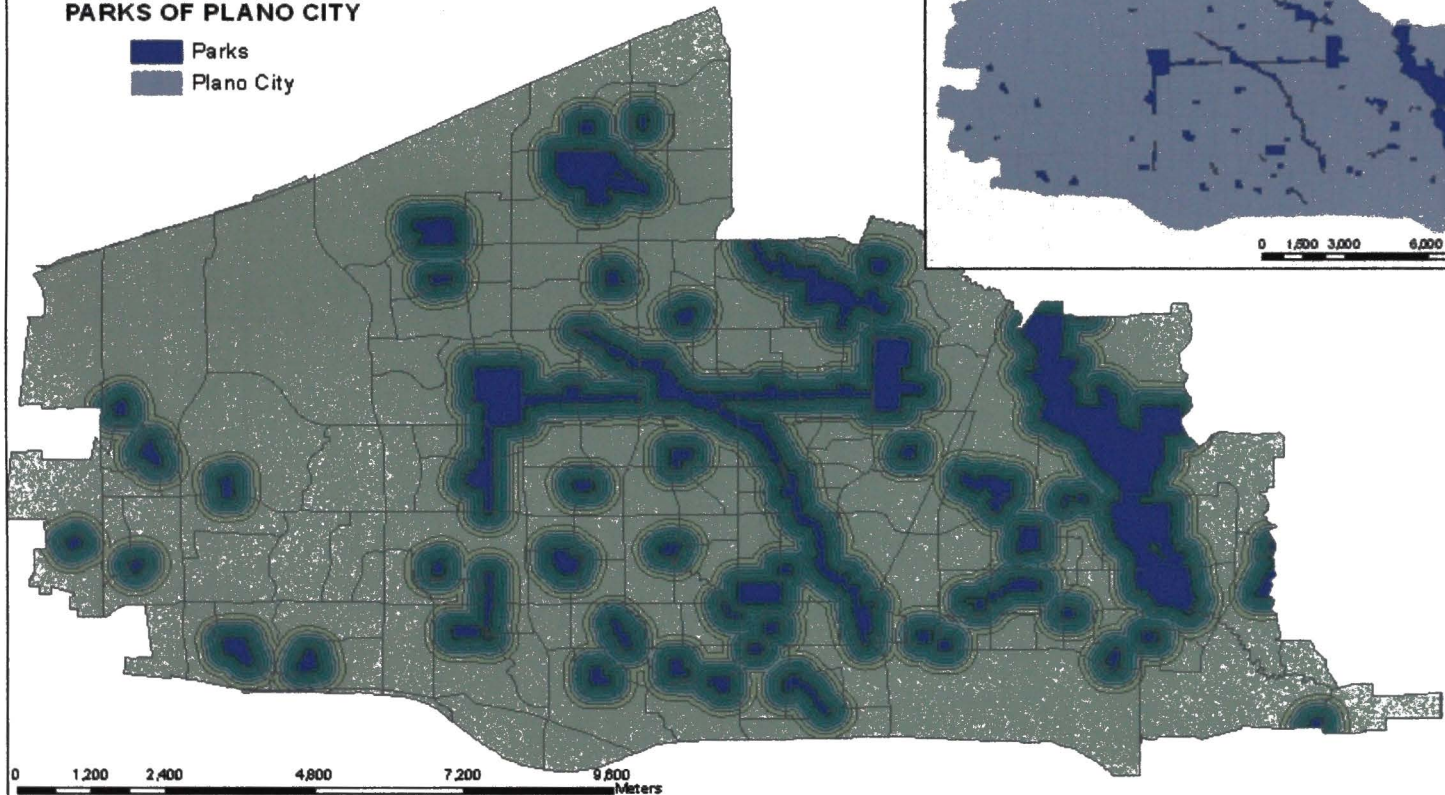
0 1,650 3,300 6,600 9,900 13,200 Meters

PLANO ENVIRONMENTAL JUSTICE AND CITY PLANNING

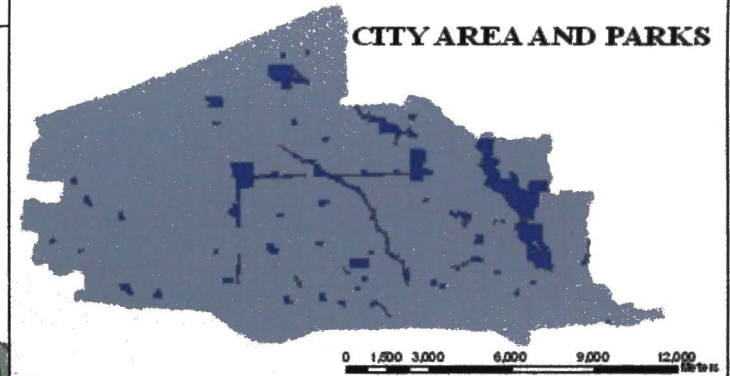
RINGS AND CENSUS BLOCKS GROUPS

PARKS OF PLANO CITY

- Parks
- Plano City



CITY AREA AND PARKS



APPENDIX C
CITY INDIVIDUAL CHARACTERISTICS.

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic Area: Dallas city, Texas

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent	Subject	Number	Percent
Total population.....	1,188,580	100.0	HISPANIC OR LATINO AND RACE		
SEX AND AGE			Total population.....	1,188,580	100.0
Male.....	598,991	50.4	Hispanic or Latino (of any race).....	422,587	35.6
Female.....	589,589	49.6	Mexican.....	350,491	29.5
Under 5 years.....	98,785	8.3	Puerto Rican.....	2,360	0.2
5 to 9 years.....	89,942	7.6	Cuban.....	2,283	0.2
10 to 14 years.....	79,546	6.7	Other Hispanic or Latino.....	67,444	5.7
15 to 19 years.....	81,733	6.9	Not Hispanic or Latino.....	765,993	64.4
20 to 24 years.....	106,190	8.9	White alone.....	410,777	34.6
25 to 34 years.....	235,824	19.8	RELATIONSHIP		
35 to 44 years.....	184,218	15.5	Total population.....	1,188,580	100.0
45 to 54 years.....	132,491	11.1	In households.....	1,167,416	98.2
55 to 59 years.....	44,247	3.7	Householder.....	451,833	38.0
60 to 64 years.....	33,303	2.8	Spouse.....	175,252	14.7
65 to 74 years.....	53,554	4.5	Child.....	337,705	28.4
75 to 84 years.....	35,808	3.0	Own child under 18 years.....	262,818	22.1
85 years and over.....	12,939	1.1	Other relatives.....	119,467	10.1
Median age (years).....	30.5	(X)	Under 18 years.....	44,757	3.8
18 years and over.....	873,004	73.4	Nonrelatives.....	83,150	7.0
Male.....	437,582	36.8	Unmarried partner.....	25,077	2.1
Female.....	435,422	36.6	In group quarters.....	21,164	1.8
21 years and over.....	819,790	69.0	Institutionalized population.....	15,999	1.3
62 years and over.....	121,273	10.2	Noninstitutionalized population.....	5,265	0.4
65 years and over.....	102,301	8.6	HOUSEHOLD BY TYPE		
Male.....	40,010	3.4	Total households.....	451,833	100.0
Female.....	62,291	5.2	Family households (families).....	266,789	59.0
RACE			With own children under 18 years.....	136,926	30.3
One race.....	1,156,229	97.3	Married-couple family.....	175,252	38.8
White.....	604,209	50.8	With own children under 18 years.....	87,783	19.4
Black or African American.....	307,957	25.9	Female householder, no husband present.....	67,435	14.9
American Indian and Alaska Native.....	6,472	0.5	With own children under 18 years.....	39,743	8.8
Asian.....	32,118	2.7	Nonfamily households.....	185,044	41.0
Asian Indian.....	7,675	0.6	Householder living alone.....	149,852	32.9
Chinese.....	5,762	0.5	Householder 65 years and over.....	29,587	6.5
Filipino.....	2,037	0.2	Households with individuals under 18 years.....	157,848	34.9
Japanese.....	835	0.1	Households with individuals 65 years and over.....	74,237	16.4
Korean.....	3,209	0.3	Average household size.....	2.58	(X)
Vietnamese.....	7,584	0.6	Average family size.....	3.37	(X)
Other Asian ¹	5,016	0.4	HOUSING OCCUPANCY		
Native Hawaiian and Other Pacific Islander.....	500	-	Total housing units.....	484,117	100.0
Native Hawaiian.....	123	-	Occupied housing units.....	451,833	93.3
Guamanian or Chamorro.....	156	-	Vacant housing units.....	32,284	6.7
Samoan.....	134	-	For seasonal, recreational, or		
Other Pacific Islander ²	177	-	occasional use.....	1,474	0.3
Some other race.....	204,883	17.2	Homeowner vacancy rate (percent).....	1.4	(X)
Two or more races.....	32,351	2.7	Rental vacancy rate (percent).....	7.0	(X)
Race alone or in combination with one			HOUSING TENURE		
or more other races: ³			Occupied housing units.....	451,833	100.0
White.....	630,419	53.0	Owner-occupied housing units.....	195,335	43.2
Black or African American.....	314,678	26.5	Renter-occupied housing units.....	256,498	56.8
American Indian and Alaska Native.....	11,334	1.0	Average household size of owner-occupied units.....	2.78	(X)
Asian.....	36,665	3.1	Average household size of renter-occupied units.....	2.44	(X)
Native Hawaiian and Other Pacific Islander.....	1,461	0.1			
Some other race.....	227,850	19.2			

- Represents zero or rounds to zero. (X) Not applicable.

¹ Other Asian alone, or two or more Asian categories.

² Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

³ In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic Area: Midlothian city, Texas

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent	Subject	Number	Percent
Total population.....	7,480	100.0	HISPANIC OR LATINO AND RACE		
SEX AND AGE			Total population.....	7,480	100.0
Male.....	3,740	50.0	Hispanic or Latino (of any race).....	981	13.1
Female.....	3,740	50.0	Mexican.....	771	10.3
Under 5 years.....	640	8.7	Puerto Rican.....	3	-
5 to 9 years.....	627	8.4	Cuban.....	8	0.1
10 to 14 years.....	662	8.9	Other Hispanic or Latino.....	199	2.7
15 to 19 years.....	605	8.1	Not Hispanic or Latino.....	6,499	86.9
20 to 24 years.....	451	6.0	White alone.....	6,153	82.3
25 to 34 years.....	1,231	16.5	RELATIONSHIP		
35 to 44 years.....	1,230	16.4	Total population.....	7,480	100.0
45 to 54 years.....	902	12.1	In households.....	7,480	100.0
55 to 59 years.....	319	4.3	Householder.....	2,650	35.4
60 to 64 years.....	222	3.0	Spouse.....	1,588	21.2
65 to 74 years.....	315	4.2	Child.....	2,532	33.9
75 to 84 years.....	200	2.7	Own child under 18 years.....	2,109	28.2
85 years and over.....	67	0.9	Other relatives.....	407	5.4
Median age (years).....	31.2	(X)	Under 18 years.....	167	2.2
18 years and over.....	5,147	68.8	Nonrelatives.....	303	4.1
Male.....	2,544	34.0	Unmarried partner.....	113	1.5
Female.....	2,603	34.8	In group quarters.....	-	-
21 years and over.....	4,857	64.9	Institutionalized population.....	-	-
62 years and over.....	712	9.5	Noninstitutionalized population.....	-	-
65 years and over.....	582	7.8	HOUSEHOLD BY TYPE		
Male.....	211	2.8	Total households.....	2,650	100.0
Female.....	371	5.0	Family households (families).....	2,011	75.9
RACE			With own children under 18 years.....	1,131	42.7
One race.....	7,356	98.3	Married-couple family.....	1,588	59.9
White.....	6,766	90.5	With own children under 18 years.....	987	33.5
Black or African American.....	218	2.9	Female householder, no husband present.....	292	11.0
American Indian and Alaska Native.....	39	0.5	With own children under 18 years.....	180	6.8
Asian.....	37	0.5	Nonfamily households.....	639	24.1
Asian Indian.....	15	0.2	Householder living alone.....	527	19.9
Chinese.....	3	-	Householder 65 years and over.....	196	7.4
Filipino.....	6	0.1	Households with individuals under 18 years.....	1,243	46.9
Japanese.....	-	-	Households with individuals 65 years and over ..	446	16.8
Korean.....	11	0.1	Average household size.....	2.82	(X)
Vietnamese.....	-	-	Average family size.....	3.25	(X)
Other Asian ¹	2	-	HOUSING OCCUPANCY		
Native Hawaiian and Other Pacific Islander.....	1	-	Total housing units.....	2,792	100.0
Native Hawaiian.....	1	-	Occupied housing units.....	2,650	94.9
Guamanian or Chamorro.....	-	-	Vacant housing units.....	142	5.1
Samoa.....	-	-	For seasonal, recreational, or		
Other Pacific Islander ²	-	-	occasional use.....	18	0.6
Some other race.....	295	3.9	Homeowner vacancy rate (percent).....	0.7	(X)
Two or more races.....	124	1.7	Rental vacancy rate (percent).....	5.1	(X)
Race alone or in combination with one			HOUSING TENURE		
or more other races:³			Occupied housing units.....	2,650	100.0
White.....	6,883	92.0	Owner-occupied housing units.....	1,833	69.2
Black or African American.....	231	3.1	Renter-occupied housing units.....	817	30.8
American Indian and Alaska Native.....	72	1.0	Average household size of owner-occupied units.....	2.91	(X)
Asian.....	46	0.6	Average household size of renter-occupied units.....	2.62	(X)
Native Hawaiian and Other Pacific Islander.....	5	0.1			
Some other race.....	367	4.9			

- Represents zero or rounds to zero. (X) Not applicable.

¹ Other Asian alone, or two or more Asian categories.² Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.³ In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic Area: McKinney city, Texas

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent	Subject	Number	Percent
Total population.....	54,369	100.0	HISPANIC OR LATINO AND RACE		
SEX AND AGE			Total population.....	54,369	100.0
Male.....	27,501	50.6	Hispanic or Latino (of any race).....	9,876	18.2
Female.....	26,868	49.4	Mexican.....	7,789	14.3
Under 5 years.....	5,474	10.1	Puerto Rican.....	148	0.3
5 to 9 years.....	5,077	9.3	Cuban.....	65	0.1
10 to 14 years.....	4,041	7.4	Other Hispanic or Latino.....	1,874	3.4
15 to 19 years.....	3,776	6.9	Not Hispanic or Latino.....	44,493	81.8
20 to 24 years.....	3,530	6.5	White alone.....	38,854	71.5
25 to 34 years.....	9,843	18.1	RELATIONSHIP		
35 to 44 years.....	9,958	18.3	Total population.....	54,369	100.0
45 to 54 years.....	5,829	10.7	In households.....	52,542	96.6
55 to 59 years.....	1,860	3.4	Householder.....	18,186	33.4
60 to 64 years.....	1,302	2.4	Spouse.....	11,570	21.3
65 to 74 years.....	1,885	3.5	Child.....	17,683	32.5
75 to 84 years.....	1,259	2.3	Own child under 18 years.....	15,465	28.4
85 years and over.....	535	1.0	Other relatives.....	2,751	5.1
Median age (years).....	30.6	(X)	Under 18 years.....	942	1.7
18 years and over.....	37,542	69.1	Nonrelatives.....	2,352	4.3
Male.....	18,718	34.4	Unmarried partner.....	688	1.3
Female.....	18,824	34.6	In group quarters.....	1,827	3.4
21 years and over.....	35,300	64.9	Institutionalized population.....	1,093	2.0
62 years and over.....	4,407	8.1	Noninstitutionalized population.....	734	1.4
65 years and over.....	3,679	6.8	HOUSEHOLD BY TYPE		
Male.....	1,388	2.6	Total households.....	18,186	100.0
Female.....	2,291	4.2	Family households (families).....	13,974	76.8
RACE			With own children under 18 years.....	8,204	45.1
One race.....	53,242	97.9	Married-couple family.....	11,570	63.6
White.....	42,628	78.4	With own children under 18 years.....	6,698	36.8
Black or African American.....	3,913	7.2	Female householder, no husband present.....	1,731	9.5
American Indian and Alaska Native.....	293	0.5	With own children under 18 years.....	1,184	6.5
Asian.....	811	1.5	Nonfamily households.....	4,212	23.2
Asian Indian.....	232	0.4	Householder living alone.....	3,456	19.0
Chinese.....	151	0.3	Householder 65 years and over.....	959	5.3
Filipino.....	105	0.2	Households with individuals under 18 years.....	8,720	47.9
Japanese.....	48	0.1	Households with individuals 65 years and over.....	2,475	13.6
Korean.....	81	0.1	Average household size.....	2.89	(X)
Vietnamese.....	85	0.2	Average family size.....	3.29	(X)
Other Asian ¹	109	0.2	HOUSING OCCUPANCY		
Native Hawaiian and Other Pacific Islander.....	35	0.1	Total housing units.....	19,462	100.0
Native Hawaiian.....	2	-	Occupied housing units.....	18,186	93.4
Guamanian or Chamorro.....	4	-	Vacant housing units.....	1,276	6.6
Samoan.....	14	-	For seasonal, recreational, or		
Other Pacific Islander ²	15	-	occasional use.....	41	0.2
Some other race.....	5,562	10.2	Homeowner vacancy rate (percent).....	2.7	(X)
Two or more races.....	1,127	2.1	Rental vacancy rate (percent).....	10.4	(X)
Race alone or in combination with one			HOUSING TENURE		
or more other races:³			Occupied housing units.....	18,186	100.0
White.....	43,635	80.3	Owner-occupied housing units.....	12,768	70.2
Black or African American.....	4,160	7.7	Renter-occupied housing units.....	5,418	29.8
American Indian and Alaska Native.....	594	1.1	Average household size of owner-occupied units.....	3.00	(X)
Asian.....	993	1.8	Average household size of renter-occupied units.....	2.62	(X)
Native Hawaiian and Other Pacific Islander.....	73	0.1			
Some other race.....	6,119	11.3			

- Represents zero or rounds to zero. (X) Not applicable.

¹ Other Asian alone, or two or more Asian categories.

² Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

³ In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic Area: Plano city, Texas

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent	Subject	Number	Percent
Total population.....	222,030	100.0	HISPANIC OR LATINO AND RACE		
SEX AND AGE			Total population.....	222,030	100.0
Male.....	110,619	49.8	Hispanic or Latino (of any race).....	22,357	10.1
Female.....	111,411	50.2	Mexican.....	15,541	7.0
Under 5 years.....	18,379	8.3	Puerto Rican.....	751	0.3
5 to 9 years.....	18,519	8.3	Cuban.....	334	0.2
10 to 14 years.....	17,385	7.8	Other Hispanic or Latino.....	5,731	2.6
15 to 19 years.....	14,322	6.5	Not Hispanic or Latino.....	199,673	89.9
20 to 24 years.....	10,639	4.8	White alone.....	161,543	72.8
25 to 34 years.....	35,576	16.0			
35 to 44 years.....	45,543	20.5	RELATIONSHIP		
45 to 54 years.....	34,182	15.4	Total population.....	222,030	100.0
55 to 59 years.....	10,544	4.7	In households.....	220,908	99.5
60 to 64 years.....	6,030	2.7	Householder.....	80,875	36.4
65 to 74 years.....	6,339	2.9	Spouse.....	52,029	23.4
75 to 84 years.....	3,436	1.5	Child.....	71,201	32.1
85 years and over.....	1,136	0.5	Own child under 18 years.....	60,874	27.4
Median age (years).....	34.1	(X)	Other relatives.....	9,823	4.0
18 years and over.....	158,284	71.3	Under 18 years.....	2,242	1.0
Male.....	78,022	35.1	Nonrelatives.....	7,978	3.6
Female.....	80,262	36.1	Unmarried partner.....	2,700	1.2
21 years and over.....	151,434	68.2	In group quarters.....	1,124	0.5
62 years and over.....	14,195	6.4	Institutionalized population.....	531	0.2
65 years and over.....	10,911	4.9	Noninstitutionalized population.....	593	0.3
Male.....	4,464	2.0			
Female.....	6,447	2.9	HOUSEHOLD BY TYPE		
RACE			Total households.....	80,875	100.0
One race.....	216,976	97.7	Family households (families).....	60,578	74.9
White.....	173,761	78.3	With own children under 18 years.....	33,973	42.0
Black or African American.....	11,155	5.0	Married-couple family.....	52,029	64.3
American Indian and Alaska Native.....	803	0.4	With own children under 18 years.....	28,902	35.6
Asian.....	22,594	10.2	Female householder, no husband present.....	6,069	7.5
Asian Indian.....	6,321	2.8	With own children under 18 years.....	3,922	4.8
Chinese.....	9,524	4.3	Nonfamily households.....	20,297	25.1
Filipino.....	994	0.4	Householder living alone.....	16,359	20.2
Japanese.....	586	0.3	Householder 65 years and over.....	2,369	2.9
Korean.....	1,760	0.8	Households with individuals under 18 years.....	35,371	43.7
Vietnamese.....	1,745	0.8	Households with individuals 65 years and over.....	7,807	9.7
Other Asian ¹	1,664	0.7	Average household size.....	2.73	(X)
Native Hawaiian and Other Pacific Islander.....	98	-	Average family size.....	3.18	(X)
Native Hawaiian.....	30	-			
Guamanian or Chamorro.....	22	-	HOUSING OCCUPANCY		
Samoan.....	10	-	Total housing units.....	86,078	100.0
Other Pacific Islander ²	36	-	Occupied housing units.....	80,875	94.0
Some other race.....	8,565	3.9	Vacant housing units.....	5,203	6.0
Two or more races.....	5,054	2.3	For seasonal, recreational, or occasional use.....	238	0.3
Race alone or in combination with one or more other races:³			Homeowner vacancy rate (percent).....	1.4	(X)
White.....	178,070	80.2	Rental vacancy rate (percent).....	12.6	(X)
Black or African American.....	11,985	5.4			
American Indian and Alaska Native.....	1,739	0.8	HOUSING TENURE		
Asian.....	24,430	11.0	Occupied housing units.....	80,875	100.0
Native Hawaiian and Other Pacific Islander.....	229	0.1	Owner-occupied housing units.....	55,625	68.8
Some other race.....	10,878	4.9	Renter-occupied housing units.....	25,250	31.2
			Average household size of owner-occupied units.....	2.97	(X)
			Average household size of renter-occupied units.....	2.21	(X)

- Represents zero or rounds to zero. (X) Not applicable.

¹ Other Asian alone, or two or more Asian categories.

² Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

³ In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

APPENDIX D
INDIVIDUAL INTERVIEWS.

Jim Berman
Recreation and Parks Superintend.
Midlothian Parks and Recreation Dept.

Mr. Berman provided the following responses in a phone interview last June 2006.

1-What is your definition of parks?

Open spaces

2-How do you decide where to build a park?

A master plan is created every 10 years, this year we created the new plan for the next decade. Plans are review every 2 or 3 years to decide if partial goals have been met and if further adjustments are need.

3-What is the general rule you use for the number acres designate to parks?

Acres of parks per every 1000 people.

4-What is your Park area per capita ratio?

Less than 5 acres per 1000, but we are trying to buy more land

5-What is the priority factor when building parks?

Purchase land, lots of 5, 10 and 15 acres in our latest plan 14 millions have been designated to that purpose.

We analyzed population increase and economic developed to decide were to build parks.

Dana Conklin

Marketing and Special Events Manager

Plano Parks and Recreation Dept.

Ms Conklin responded to the followed question by electronically mail.

1-What is your definition of parks?

A park is defined as publicly owned open space provided for the purpose of preserving natural features, providing community gathering space, and contributing tot the quality of life in a community.

2-How do you decide where to build a park?

Our park system is defined by a Park Master Plan, a part of the City's Comprehensive Plan. This plan identifies existing park spaces and recreation facilities as well as future locations for parks and facilities. This plan is adopted on a regular cycle by the City Council.

3-What is the general rule you use for the number acres designate to parks?

We have five classifications of parks in Plano.

- Neighborhood Parks - typically 7.5 to 10 acres, serving one-mile square

- Linear Parks - include flood plain land along creeks and major utility Easements, no set acreage

- Community Parks - typically 25 + acres with active and passive areas of use and may include recreation facilities

- Open Space Preserves - preserve ecologically sensitive areas and provided opportunities for interaction with the natural environment
- Special Use Facilities - examples are dog park, skate park, etc

4-What is your Park area per capita ratio?

We currently provide about 65 acres per 1000 people.

5-What is the priority factor when building parks?

They key of our park system has been location within the one-mile square area for neighborhood parks. This has provided easy access for nearly every resident. Larger park sites are determined on an availability and potential use basis and locations are considered individually at the time they may appear available.

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